NORTHWESTERN UNIVERSITY

Online Tools for Evidence-Based Behavioral Practice: A Mixed-Methods Evaluation Among Graduate Students and Clinicians

A DISSERTATION

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Evidence-Based Behavioral Practice (EBBP) is a transdisciplinary systematic approach that emphasizes the use of best evidence in combination with clinical expertise, as well as patient preferences and values, to make clinically-informed decisions about care and treatment (Spring, 2007). Despite numerous benefits and strong policy support of EBBP, findings indicate that clinicians generally fail to implement EBBP in standard clinical practice due to a lack of knowledge, negative attitudes, and low self-efficacy associated with an absence of resources.

To address the need for EBBP resources and tools, Bonnie Spring, PhD and colleagues developed a theory-driven website for graduate students and clinicians. The website is primarily comprised of two components: nine interactive training modules and a novel assessment portal that utilizes patient-reported computer adaptive tests (CATs). To date, the training modules and assessment portal have not been evaluated, and there is currently a critical need to incorporate mixed methods evaluations into EBBP implementation science. The goal of this dissertation is to contribute to the ongoing evaluation and optimization of the EBBP Project by conducting summative and implementation-focused formative evaluations of its training modules and assessment portal.

**Aim 1** evaluated changes in user knowledge, attitudes, and self-efficacy for each EBBP module and determined whether these outcomes varied by user characteristics, including degree, professional discipline, and number of completed modules. Together, findings suggested heightened interest and use of asynchronous, web-based training modules about EBBP in social
work and psychology, and that these modules can produce short-term improvements in knowledge, attitudes, and self-efficacy about EBBP. Overall, however, attrition continues to be a challenge.

To better understand the attrition rates of the EBBP training modules and web-based modules, in general, **Aim 2** conducted implementation-focused formative evaluations to assess individual-level and intervention-level characteristics related to module engagement. Overall, findings from quantitative and qualitative analyses (i.e., mixed method analyses) revealed that specific instructional guidance and interactive features, coupled with user technical knowledge, are particularly important characteristics that may improve engagement in asynchronous web-based training modules.

Given the novelty of the EBBP assessment portal, **Aim 3** conducted implementation-focused formative evaluations to assess individual-level and intervention-level characteristics associated with its engagement and implementation. Results from mixed method analyses suggested that user knowledge, attitudes, and self-efficacy, coupled with programmatic functions to ensure privacy and confidentiality of patient information, may be important characteristics to improving engagement with a CATs-based assessment portal.

In conclusion, the present study provides valuable information on the short-term effectiveness of asynchronous web-based modules, and factors that may contribute to engagement and implementation of online training and clinical tools for EBBP.
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I. Evidence-Based Behavioral Practice: What is it and Why is it Beneficial?

A. The Purpose of EBBP

A small number of behavioral risk factors now account for a third of the global chronic disease burden, and half of all deaths are related to chronic disease (Ezzati & Lopez, 2004). Research indicates that mental and physical illnesses often co-occur and that their co-morbidity increases healthcare burden and costs (Scott et al., 2007). There is growing evidence that behavioral interventions, delivered alone or in conjunction with medical treatments, are effective for preventing and treating a wide range of health problems (DeRubeis et al., 2005).

Behavioral interventions, including psychosocial, rehabilitation, and psychological treatments, are a major focus of evidence-based behavioral practice (EBBP), which has been conceptualized as a way of supporting clinicians in lifelong learning and transdisciplinary collaboration in research and practice (Spring, 2007). Specifically, EBBP is a systematic approach that transcends health disciplines to emphasize the use of best evidence in combination with clinical expertise, as well as patient preferences and values, to make clinically-informed decisions about care and treatment (Spring, 2007; Marteau et al., 2006).

From this model, five discrete steps for delivering EBBP were established (Spring, 2007; Satterfield et al., 2009). Each step in the process is described in terms of expected behaviors and specific individual knowledge, skills, and abilities.

The first step is Ask, which refers to translating information needs into well-formulated background and foreground questions. The second step is Acquire, or efficiently and effectively searching for the best available evidence to answer practical questions. Appraise is the third step, whereby practitioners critically evaluate the evidence for quality, strength, and applicability to the
population and circumstances at hand. The next step in the process is Apply, which refers to selecting and implementing evidence-based action plans by integrating appraisal of the relevant literature, available expertise, other resources, as well as the intended care recipient’s characteristics, values, preferences, and context. The final step is Analyze and Adjust in which practitioners assess change, often in the form of patient-reported outcomes (PROs), and adjust practice accordingly to continuously improve care for individuals or populations.

B. Benefits of EBBP

There are a growing number of studies that suggests EBBP implementation in clinical practice is associated with numerous benefits for patients, clinicians, and health care systems. EBBP is related to higher quality of care and improved patient outcomes (Lambert et al., 2003; Prior et al., 2010). Studies show that patient outcomes for hypertension, pain, hyperlipidemia, mental health, and other psychosocial outcomes are nearly 30% better when clinical practice employs an EBBP approach (e.g., Melnyk et al., 2012).

EBBP has been shown to increase clinicians’ confidence, adaptability, and critical thinking and decision-making skills (Hanberg & Brown, 2006). Clinicians who use EBBP tend to experience higher job satisfaction and improved group cohesion, leading to higher job retention, which, itself, leads to improved patient outcomes (Saba & McCormick, 2011).

Furthermore, clinical practices that incorporate EBBP demonstrate reduced health care costs in comparison to practices that use outdated policies and courses of intervention (Fueurstein et al., 2006). Some even argue that EBBP is synonymous with ethical and responsible clinical practice (Woody et al., 2005). Tracking patient progress using PROs, a specific step of EBBP, independently enhances patient outcomes by providing feedback to clinicians about non-
responsive patients for whom treatment plans need to be adjusted (Lambert et al., 2003).

C. Policy Support for EBBP

The well-documented benefits of EBBP have contributed to a recent surge in policy support. In 2011, The Patient Protection and Affordable Care Act mandated the Secretary of Health and Human Services to establish the Patient Centered Medical Home (PCMH) in an effort to decrease burden on the US healthcare system. The principles of PCMH, which include a patient-centered orientation and comprehensive, coordinated, team-based care, can be realized through EBBP. Indeed, the US Department of Health and Human Services (2014) has included EBBP as a central tenet of health care delivery.

Calls to action are increasing for clinicians in the behavioral health disciplines to include EBBP in their work (APA Presidential Task Force on Evidence-Based Practice, 2006; Institute of Medicine, 2001, 2003). The mission of Healthy People 2020, the 10-year US national health agenda, is “to strengthen and improve practices that are driven by the best available evidence and knowledge” (CDC, 2011). Funding agencies, particularly federal organizations, are requiring clinical practices to be evidence-based and to use PROs. The American Recovery and Reimbursement Act of 2009 allocated $650 million to “carry out evidence-based clinical prevention and wellness strategies that deliver specific, measurable health outcomes” (Steinbrook, 2009).

II. EBBP Implementation: Ongoing Barriers

A. Low Rates of Implementation

In spite of the numerous benefits of EBBP and strong policy support for its implementation
in standard clinical practice, findings indicate that clinicians, in general, still fail to implement EBBP (Grol, 2001; McGlynn et al., 2003), leading to poor quality patient care (Wagner et al., 2001) and unnecessary medical spending (Grol, 2000). Prior to 2000, a survey commissioned by the Practice Directorate of the American Psychological Association found that only 29% of licensed clinicians use EBBP in their practice (Phelps et al., 1998). More recent studies suggest that implementation rates of EBBP have not drastically improved (e.g., Asch et al., 2006). It has been estimated that up to 40% of patients that visit their clinician fail to receive behavioral treatments shown to be effective, and more than 20% of patients received behavioral treatments that are not needed or potentially harmful (Grol, 2001). Similarly, a study of 12 US metropolitan areas found that the average adult received only 55% of recommended behavioral health services during visits with their clinician (McGlynn et al., 2003).

Barriers to implementation may arise at multiple levels of delivery of EBBP: the patient level, the clinician level, the organization level, or the market/policy level (Ferlie et al., 2001). A growing literature on the barriers to EBBP implementation has identified three consistently-reported clinician-level barriers (Harrison et al., 2010; Rainbird et al., 2006; Pagoto et al., 2007), including 1) lack of knowledge of EBBP and lack of access to EBBP training, 2) negative attitudes and beliefs regarding EBBP, and 3) low self-efficacy related to the EBBP process, particularly the administration and interpretation of PROs, an integral step of EBBP (Spring, 2007).

**B. Lack of Knowledge and Access**

First, while a majority of behavioral health clinicians acknowledge the importance of EBBP education and skills, more than 76% report not having access to educational opportunities, resources, and tools needed to learn and use EBBP (Melnyk et al., 2012; O’Donnell, 2004).
Supervision and consistency with which clinicians and trainees can expect to receive training in EBBP has been declining for over 10 years (Weissman et al., 2006). Most clinical training programs do not emphasize EBBP or do not accurately teach the EBBP process (Beidas & Kendall, 2010). Current training programs are teaching a greater number of empirically-supported treatments (ESTs), which is one component of the EBBP model (Woody et al., 2005), but most training programs continue to neglect clinical expertise and patient characteristics, the other two critical components of the EBBP model (Gray et al., 2012; Collins-Camargo, 2007).

Furthermore, these training programs tend to be passively-delivered, face-to-face didactic lectures that have limited reach and minimal effects on learning (El-Tannir, 2002; Gray et al., 2012). While efforts have been made to develop web-based EBBP learning programs to increase reach, these online programs generally lack a theoretical basis and fail to comprehensively target and evaluate empirically-supported mediators of implementation (Beidas & Kendall, 2010; Bennett & Glasgow, 2009).

Moreover, attrition of the few extant web-based learning programs for EBBP continue to be significant problems that are not fully understood (Berge & Huang, 2004; Diaz, 2002; Sitzmann et al., 2010), warranting richer, more in-depth evaluations to optimize engagement. These knowledge and access barriers suggest a need for the development of web-based EBBP resources that are theory-based, interactive, widely accessible, and comprehensive and systematic in their evaluation (Dreisinger et al., 2008).

C. Negative Attitudes and Beliefs

Second, many clinicians in the behavioral health disciplines hold misperceptions about the EBBP approach (Gray et al., 2012). Findings suggest that, of all the barriers reported by clinicians,
32% are related to negative attitudes (Pagoto et al., 2007). Some clinicians believe that EBBP is a rigid practice that dehumanizes the patient; others believe that ESTs are not valid or relevant to clinical practice; still others maintain that research evidence holds little relevance to clinical practice (McKenna et al., 2004).

Overall, negative attitudes seem to reflect a belief that EBBP forces the clinician to make practice decisions exclusively based upon research evidence with little regard for clinical judgment and patient values (Pagoto et al., 2007). However, only approximately 24% of both face-to-face and web-based EBBP training programs evaluate participant attitudes and beliefs (Dreisinger et al., 2008), even though attitudes and beliefs have been shown to predict implementation (Beidas & Kendall, 2010). These findings further support the need for the development and systematic evaluation of EBBP resources and tools that comprehensively address individual-level mediators of implementation, including attitudes and beliefs (Dreisinger et al., 2008).

D. Low Self-Efficacy

A final commonly-reported barrier to EBBP implementation in clinical practice is low self-efficacy related to the final step of EBBP: the routine administration and interpretation of PRO instruments that guide treatment (Spring, 2007). One of the chief reported obstacles to the routine collection of PROs is the difficulty and perceived time burden of integrating both the administration and analysis of PRO instruments (Wu et al., 2013; Jones et al., 2007). Clinicians often complain that it is difficult for them to understand the meaning of the PRO scores, particularly in the span of a brief health visit. In a recent review that examined barriers to EBBP implementation, specifically with administering and interpreting PRO assessments, “perceived lack of time” was the most frequently identified barrier, appearing in 91% of included studies.
Clinicians also report concerns about the challenges of identifying low-cost (Pagoto et al., 2007) and valid PRO instruments among the many available ones (there are over 1,100 PRO instruments) (Bielli et al., 2004; Lambert & Hawkins, 2004; O’Donnell, 2004).

In response to these demands, the National Institutes of Health (NIH) have generated a subset of particularly efficient web-based PROs called computer adaptive tests (CATs; Cella et al., 2010). However, it remains unclear how to best integrate CATs into clinical practice (Wu et al., 2013). Efforts to integrate CATs into the electronic health record (EHR) have generated mixed findings and revealed a need to explore alternative platforms of delivery (DesRoches et al., 2008).

The growing use of the Internet to improve the availability, reach, and usability of healthcare resources and tools makes web-based platforms a promising tool for fulfilling this need in EBBP (Bennett & Glasgow, 2009). Recent research indicates, for example, that including improved web-based displays of PRO data, such that PRO data can be charted against other clinical data, can increase clinician understanding of patients’ progress over time and clinician self-efficacy related to the EBBP process (Wu et al., 2013). However, research is still needed to design and test different approaches to enhancing engagement and implementation of CATs in clinical practice (Sener & Hawkins, 2007; Sitzmann et al., 2010; US Department of Education, 2010; Gravel et al, 2006; Grol, 2001; Mendel et al., 2008).

E. Improving Implementation of EBBP: A Theoretical Framework

Many implementation theories to promote effective engagement and implementation have been described in the literature but have differing terminologies and definitions (Damschroder et al., 2009). The Consolidated Framework for Implementation Research (CFIR) is a comprehensive framework that consolidates constructs found in the broad array of published theories
Comprising five major domains, the CFIR is “meta-theoretical” in that it includes constructs and domains from a synthesis of existing theories without depicting interrelationships, specific ecological levels, or specific hypotheses.

The first major domain of the CFIR is related to characteristics of the intervention being implemented (i.e., the characteristics of our EBBP training modules and assessment portal). The next two domains in the CFIR are inner and outer settings. Generally, the inner setting includes features of structural and cultural contexts through which the implementation process will proceed, while the outer setting includes the economic, political, and social context within which an organization resides (Pettigrew et al., 2001). Changes in the outer setting can influence changes in the inner setting (Institute of Medicine, 2001). The fourth major domain of the CFIR is the individuals involved with the intervention and/or implementation process (e.g., clinicians or graduate students). The fifth major domain is the implementation process, itself, which usually requires an active change process aimed to achieve individual- and organizational-level uses of the intervention as designed.

The CFIR offers an overarching typology from which researchers can select constructs that are most relevant for their particular study and use it to guide evaluations of implementation context, development, and progress (Damschroder et al., 2009, 2013).
The reported barriers to implementing EBBP are most consistent with two domains of the CFIR: intervention-level and individual-level domains (Figure 1, p. 14). The intervention-level domain comprises aspects of the intervention, itself, including usability, complexity, and design. The constructs of the individual-level domain include knowledge, attitudes, and self-efficacy of the user in relation to the intervention or process. Knowledge and attitudes refer to individuals’ value placed on the intervention, as well as familiarity with facts and principles related to the intervention (Rogers et al., 2003; Ajzen, 1991). Self-efficacy relates to individuals’ belief in their own capabilities to execute courses of action to achieve implementation goals (Bandura, 1977).

III. The EBBP Project: A Potential Solution

A. The Purpose of the EBBP Project

To address the need for EBBP resources and tools to reduce the research/practice gap, Bonnie Spring, PhD and colleagues developed a theory-driven, innovative website for graduate students and clinicians. The website is primarily comprised of two components: nine interactive training modules and a novel assessment portal that utilizes patient-reported computer adaptive tests (CATs). These resources and tools seek to improve implementation of EBBP in clinical practice by considering the intervention- and individual-level mediators that have been demonstrated to influence behavior change among training and practicing clinicians (Damschroder et al., 2009; Grol & Wensing, 2004). The training modules and assessment portal each aim to address specific constructs of the intervention- or individual-level domain of the CFIR.

B. The Training Modules

The Council for Training in EBBP was tasked with developing the training modules of the
EBBP website, which were launched between 2011 and 2012. Council members were experts across various health fields and professional organizations, including the American Psychological Association, American Association of College of Nursing, Association of Schools of Public Health, and the Council on Social Work Education. They had expertise in the design, testing, and implementation of behavioral interventions, translational research, and different areas of didactic course coverage. Council members met in person for two days to decide upon the competencies of EBBP that would be the focus of the training modules.

Council members agreed upon nine competencies that represent EBBP, including The EBBP Process, Search for Evidence, Systematic Review, Critical Appraisal, Randomized Controlled Trials, Shared Decision Making with Individual Patients, Collaborative Decision Making with Communities, Stakeholder Dialogue about Evidence-Based Practice, and Implementation of Evidence-Based Practice (Table 1, p. 17). Council members also assigned additional Content Expert Consultants the task of creating training materials to be included in the training modules.

Development of the training modules was guided by Bloom’s taxonomy of learning (Bloom, 1956), which consists of knowledge, attitudes, and self-efficacy constructs. These constructs have been used to guide the development of traditional and web-based training resources across various disciplines, including engineering (Felder, 2004) and medicine (Bloom, 2005). Since access to EBBP training resources and supervisors is a significant problem for graduate students and clinicians (Melnyk et al., 2012; O’Donnell, 2004; Weissman et al., 2006), the training modules were developed in a web-based format that has been shown to maximize reach and accessibility.
The modules were also developed in an asynchronous learning format such that instruction and learning do not occur in the same place or at the same time (Hrastinski, 2008). That is, asynchronous learning, most commonly applied to various forms of digital or web-based learning, is not delivered in person or in real time. This enhances the flexibility of the learning process, enabling large numbers of clinicians, even in remote practice settings and different time zones, to access the modules at any time (Dreisinger et al., 2008). However, given that passive dissemination and implementation efforts for even the best teaching tools may be insufficient to promote learner engagement and change (Grol & Grimshaw, 1999), the modules were developed in an interactive method to ensure effective learning and application of knowledge.
manner with videos, exercises, and quizzes that actively engage the learner, which has been shown to improve learning (Cairncross et al., 2001).

Learners also received continuing education (CE) credits for completing the modules. The modules were reviewed and approved by the APA Office of Continuing Education in Psychology, the Accreditation Council for Continuing Medical Education (ACCME), the American Nurses Credentialing Center (ANCC), and the National Association of Social Workers to offer CE credit to psychologists, physicians, nurses, nurse practitioners, and social workers.

C. The Assessment Portal

The second major component of the EBBP website is the assessment portal. The portal, a collaborative project between EBBP and the Association for Behavioral and Cognitive Therapies (ABCT), was embedded in the EBBP website in February 2014 but has not yet been systematically disseminated to graduate students and practicing clinicians.

The portal was developed by researchers and technologists in the Department of Preventive Medicine and Center for Behavioral Intervention Technologies at Northwestern University in Chicago. It is a novel tool whose development was guided by the intervention- and individual-level constructs of the CFIR (Damschroder et al., 2009, 2013), including usability, complexity, design, and self-efficacy. Specifically, it aims to address clinician-reported low self-efficacy related to the routine administration and interpretation of PROs in clinical practice (Jones et al., 2007; Pagoto et al., 2007). The portal, to our knowledge the first of its kind, aims to enable clinicians to easily access, quickly administer, and readily interpret instruments from the Patient Reported Outcomes Measurement Information Systems (PROMIS) developed by the National Institutes of Health.
PROMIS is a system of highly reliable, precise measures of patient-reported health status for physical, mental, and social well-being (Bielli et al., 2004; Cella et al., 2010). Clinicians of ABCT and the EBBP Council selected three patient health domains for the assessment portal that have high prevalence and morbidity, including depression, anxiety, and quality of life (Pignone et al., 2002; Velikova et al., 2004; Antony & Rowa, 2005). The three instruments of the portal are from an innovative sub-set of instruments provided by PROMIS called computer adaptive tests (CATs), which are particularly suitable for clinical practice because they are brief, flexible, highly precise, and free of cost (Cella et al., 2010). They work by choosing the questions in each area (i.e., depression, anxiety, or quality of life) that are best for the patient based on the patient’s responses to earlier questions. CATs contain 3-7 items with precise and individualized content, and show patients how their health compares to that of the general public as well as age- and gender-matched individuals.

IV. The EBBP Project: Is it Working?

A. Formative and Summative Evaluations

To date, the training modules and assessment portal of the EBBP website have not been evaluated. Evaluation is a systematic process to understand what an intervention does and how well it does it (CDC, 2005; Spiel, 2001). Evaluation results can be used to maintain or improve program quality and to ensure that future planning can be more evidence-based. Evaluation constitutes part of a critical ongoing cycle of program planning, implementation, and improvement (Patton, 1987).

Evaluation falls into one of two broad categories: formative and summative (CDC, 2005; Figure 2, p. 20). Formative evaluations are conducted during both intervention development and
implementation, and generally employ more qualitative methods (e.g., interviews) that yield a “narrative, descriptive account of a setting or practice” (Parkinson & Drislane, 2011). They are useful to gain direction on how to best achieve goals or improve an intervention. Summative evaluations are typically completed once the intervention is well established and will provide information on the extent to which the intervention is achieving its goals. These evaluations tend to be more quantitative.

B. Mixed-Methods Evaluations

Mixed methods approaches (i.e., quantitative and qualitative scientific inquiry) are becoming more common in evaluation science (Curry et al., 2009), and federal encouragement of mixed methods research is regularly reflected in NIH funding program announcements (NIH, 2007). Mixed methods can provide unique and critical contributions to evaluation research by capturing essential aspects of a phenomenon from the perspective of study participants (Malterud, 2001) and uncovering beliefs, values, and motivations that underlie individual decision-making and behavior change (Inui, 1996).

There is currently a critical need to incorporate mixed methods evaluations into EBBP
implementation science given the current questions regarding the effectiveness and engagement of web-based components that aim to bridge the gap between behavioral research evidence and clinical practice (Beidas and Kendall, 2010; CDC, 2010).

V. The Present Studies and Specific Aims

The overarching goal of the present studies is to contribute to the ongoing evaluation and optimization of the EBBP Project by conducting summative and implementation-focused formative evaluations of its training modules and assessment portal. Summative and implementation-focused formative evaluations are guided by individual-level and intervention-level domains of the CFIR (Damschroder et al., 2009, 2013). This dissertation comprises three comprehensive studies (Study 1, Study 2, and Study 3) that together propose three specific aims (Aim 1, Aim 2, and Aim 3).

Study 1.

Aim 1. To conduct summative evaluations of the training modules of the EBBP Project by measuring change in user knowledge, attitudes, and self-efficacy for each EBBP module and determine whether these outcomes vary by user degree, professional discipline, and number of completed modules. It is hypothesized that users who complete the training modules will improve scores from pre to post on knowledge, attitudes, and self-efficacy for each competency (i.e., module) of EBBP. Research has demonstrated that different degrees and health disciplines have adopted EBBP at different points in time using disparate training regimens (Spring et al., 2005). Therefore, it is also hypothesized that change in module scores from pre to post on knowledge, attitudes, and self-efficacy will vary significantly by user characteristics (i.e., degree, professional
discipline, and number of modules completed).

Study 2.

*Aim 2.* Given the significant attrition rates across all training modules of the EBBP Project (Table 12, p. 49), Study 2 aims to conduct implementation-focused formative evaluations of the training modules to assess individual-level and intervention-level characteristics related to module engagement. It is hypothesized that participants will identify individual-level and intervention-level characteristics, two major domains with evidence of influencing the likelihood of engagement in an intervention or program (Damschroder et al., 2009), as barriers and facilitators to module engagement.

Study 3.

*Aim 3.* Given the novelty of the assessment portal of the EBBP Project, Study 3 aims to conduct implementation-focused formative evaluations of the assessment portal to assess individual-level and intervention-level characteristics associated with its engagement and implementation. It is hypothesized that participants will identify both individual-level and intervention-level characteristics (Damschroder et al., 2009) as barriers and facilitators to engagement in the assessment portal.
—STUDY 1—

Did the Training Modules Change
Users’ Knowledge, Attitudes, and Self-Efficacy?

ABSTRACT

Although EBBP holds the potential to improve public health, a significant gap persists between behavioral research evidence and clinical practice. To bridge this gap, nine asynchronous and interactive web-based modules were developed to provide training on EBBP. This study examined demographic and outcome data of users who completed quantitative pre- and post-evaluations between January 2011 and October 2015. The purpose of this study was to determine who completed the modules and whether the modules influenced knowledge, attitudes, and self-efficacy. Of 1490 users who completed both pre- and post-evaluations, most were in social work (50.6%) and psychology (21.6%), and the majority held master’s degrees (55.2%). Social workers, compared to other professional disciplines, were most likely to complete a module, while those in medicine were least likely. Among all professional disciplines, the EBBP Process module was completed most frequently, while the Stakeholder Dialogue about EBBP module was completed least frequently. All disciplines demonstrated improved knowledge scores after taking all modules except Collaborative Decision Making and Stakeholder Dialogue and improved self-efficacy across all modules. The Searching for Evidence, Critical Appraisal, and Implementation of EBBP modules improved attitudes, while the remaining modules produced no significant change in attitudes. Together, results suggest heightened interest and use of asynchronous, web-based training modules about EBBP in social work and psychology, and that these modules can produce short-term improvements in knowledge, attitudes, and self-efficacy about EBBP.
INTRODUCTION

Current research indicates that behavioral interventions are effective for preventing and treating a wide range of co-occurring physical and mental health problems (Schroeder, 2007; Fisher et al., 2011; DeRubeis et al., 2005; Lancaster & Stead, 2005). Interdisciplinary clinical care using evidence-based behavioral interventions holds the potential to substantially improve public health (Simon et al., 2007). However, findings suggest there is a significant gap between behavioral research evidence and clinical practice that leads to poor quality patient care (McGlynn et al., 2003; Wagner et al., 2001) and unnecessary medical spending (Grol, 2000).

As a result, policy-makers (CDC, 2011; USDHHS, 2011) and health care leaders (APA, 2006) have endorsed EBBP as a transdisciplinary approach to delivering patient-centered, evidence-based care. Unfortunately, integrating EBBP into standard clinical practice has been largely unsuccessful (Kazdin, 2008), with clinicians reporting substantial barriers to implementation, including a lack of available and comprehensive EBBP training resources, negative attitudes regarding EBBP, and low self-efficacy for implementing EBBP (Pagoto et al., 2007; Woody et al., 2005; Jones et al., 2007). Previous EBBP resources and tools, both in-person and web-based, have attempted to address these barriers but continue to be limited by unsystematic approaches to development and evaluation as well as low reach and engagement (Gray et al., 2012; Collins-Camargo, 2007).

To overcome these barriers, the Council for Training in EBBP was tasked with developing nine theory-driven, interactive training modules for the EBBP website (www.ebbp.org). The Council comprised experts across various health fields and professional organizations, including the American Psychological Association, American Association of College of Nursing, Association of Schools of Public Health, and the Council on Social Work Education. All members
had expertise in the design, testing, and implementation of behavioral interventions, translational research, and different areas of didactic course coverage. Council members met in person for two days to decide upon the competencies of EBBP that would be the focus of the training modules. Council members agreed upon nine competencies that represent EBBP, including The EBBP Process, Searching for Evidence, Systematic Reviews, Critical Appraisal, Randomized Controlled Trials, Shared Decision-Making with Individual Patients, Collaborative Decision-Making with Communities, Stakeholder Dialogue about Evidence-Based Practice, and Implementation of Evidence-Based Practice (Table 1, p. 17). Council members also assigned additional Content Expert Consultants the task of creating training materials to be included in the training modules.

Since limited access to EBBP training resources and supervisors is a significant problem for graduate students and clinicians (Melnyk et al., 2012; O’Donnell, 2004; Weissman et al., 2006), the training modules were developed in a web-based format that has been shown to maximize reach and accessibility of resources (Phipps & Merisotis, 1999). Development of the training modules was guided by Bloom’s taxonomy of learning (Bloom, 1956), which characterizes learning in terms of the constructs of Knowledge, Attitudes, and Self-Efficacy. These constructs have been used to guide the development and evaluation of traditional and web-based training resources across various disciplines, including engineering (Felder, 2004) and medicine (Bloom, 2005). The modules were also developed in an asynchronous learning format such that instruction and learning do not occur in the same place or at the same time (Hrastinski, 2008). That is, asynchronous learning, most commonly applied to various forms of digital or web-based learning, is not delivered in person or in real time. This enhances the flexibility of the learning process, enabling large numbers of clinicians, even in remote practice settings and different time zones, to access the modules at any time (Dreisinger et al., 2008). Still, since passive dissemination and
implementation efforts for even the best teaching tools may be insufficient to promote learner engagement (Grol & Grimshaw, 1999), the modules were developed in an interactive manner with videos, exercises, and quizzes that actively engage the learner, which has been shown to improve learning (Cairncross et al., 2001).

Since web-based EBBP resources and tools for graduate students and clinicians are relatively novel (Bennett & Glasgow, 2009), a need remains for ongoing systematic summative (i.e., outcome) evaluations of web-based resources and tools to guide continuing program refinement and optimization (CDC, 2005, 2010; Beidas and Kendall, 2010). The www.ebbp.org training modules have not previously been systematically evaluated as needed for an ongoing cycle of program planning, implementation, and improvement (Patton, 1987). Thus, the purpose of Study 1 is to answer the question: Did the training modules change users' knowledge, attitudes, and self-efficacy regarding EBBP?

METHODS

Participants and Procedure

A pre-post single group design was used for the present evaluation study (Study 1). To complete the training modules, users registered online at www.ebbp.org/training, which gave them access to the training modules. Users were given the option to complete online self-
report evaluations before and after completing each module. They were reminded that participation in the evaluations was voluntary and unpaid, and that participating in the evaluations was not required to allow completion of the modules. Users included in analyses for this study were graduate students and clinicians who completed both pre- and post-module evaluations between January 2011 (when the first set of modules was launched) and October 2015 (the cut-off point for analyses). Users were from a diverse array of professional disciplines, including psychology, medicine, nursing, social work, and public health.

Assessment

The pre-module evaluation was an online questionnaire with a demographics section and three other sections derived from Bloom’s taxonomy of learning (Bloom, 1956): knowledge, attitudes about EBBP, and self-efficacy (see Appendix, p. 131). The demographics section was composed of open-ended or multiple-choice questions that asked participants about age, academic degree, and professional discipline. The attitudes section contained eight 5-point Likert scale items that were identical for all modules. Items in this section included statements similar to “Engaging in EBBP hinders the use of practitioner judgment” and “EBBP is nothing more than a way to cut treatment costs”. The self-efficacy and knowledge sections assessed content specific to each module. The self-efficacy sections contained seven 5-point Likert scale items that assessed self-efficacy related to implementing skills learned during the module. For example, the EBBP Process module assessed appraisal of the research evidence, and evaluation and adjustment of outcomes of practice decisions. The knowledge sections contained 10 multiple choice items. The post-module evaluation was an online questionnaire with three sections: knowledge, attitudes about EBBP, and self-efficacy. These sections were identical to corresponding sections of the pre-module
evaluation, which allowed within-participant changes in knowledge, attitudes, and self-efficacy to be measured. Post-module evaluations were “locked” until the participant completed the pre-module evaluation and module content.

| Table 2. Disciplinary characteristics of module registrants and completers in www.ebbp.org |
|---------------------------------|---------------------------------|---------------------------------|
| **Field (n,%)**                 | **Registered (n=10,083)**       | **Completed (n=1,490)**         |
| Medicine                        | 794 (7.9)                       | 31 (2.1)                        |
| Nursing                         | 1632 (16.2)                     | 148 (9.9)                       |
| Psychology                      | 2463 (24.4)                     | 326 (21.9)                      |
| Social Work                     | 4021 (39.9)                     | 754 (50.6)                      |
| Public Health                   | 675 (7.0)                       | 67 (4.5)                        |
| Other                           | 498 (4.9)                       | 164 (11.0)                      |
| **Degree (n,%)**                | **Registered (n=10,083)**       | **Completed (n=1,490)**         |
| BA/BS                           | 1635 (16.2)                     | 230 (15.4)                      |
| MA/MS                           | 2294 (22.8)                     | 267 (17.9)                      |
| MSW/LCSW                        | 3272 (32.5)                     | 600 (40.2)                      |
| MPH                             | 193 (1.9)                       | 12 (0.8)                        |
| PhD                             | 1062 (10.5)                     | 103 (6.9)                       |
| PsyD                            | 394 (3.9)                       | 48 (3.2)                        |
| DPN/RN                          | 499 (4.9)                       | 48 (3.2)                        |
| MD                              | 95 (0.9)                        | 2 (0.1)                         |
| EdD                             | 26 (0.2)                        | 3 (0.2)                         |
| Other                           | 611 (9.9)                       | 177 (11.9)                      |

*Note. Users in the “Registered” group registered for the training modules but did not complete any modules. Users in the “Completed” group registered and completed both pre- and post-evaluations of at least one module.*
Analytic Approach

Descriptive statistics were used to describe user demographics. Pearson Chi-squared tests and binomial logistic regression were used to describe module completion across professional disciplines. To compare the change in user scores in knowledge, attitudes, and self-efficacy from before to after each completed training module, two-way analyses of variance (ANOVA) were

Table 3. Number of module completions as a function of user’s professional discipline

<table>
<thead>
<tr>
<th>Module Title</th>
<th>Medicine</th>
<th>Nursing</th>
<th>Psychology</th>
<th>Social Work</th>
<th>Public Health</th>
<th>Other</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>EBBP Process</td>
<td>31</td>
<td>148</td>
<td>326</td>
<td>754</td>
<td>67</td>
<td>164</td>
<td>1490</td>
</tr>
<tr>
<td>Searching for Evidence</td>
<td>5</td>
<td>59</td>
<td>132</td>
<td>267</td>
<td>26</td>
<td>66</td>
<td>555</td>
</tr>
<tr>
<td>Introduction to Systematic Reviews</td>
<td>16</td>
<td>33</td>
<td>156</td>
<td>199</td>
<td>37</td>
<td>57</td>
<td>498</td>
</tr>
<tr>
<td>Critical Appraisal</td>
<td>11</td>
<td>48</td>
<td>71</td>
<td>248</td>
<td>21</td>
<td>43</td>
<td>442</td>
</tr>
<tr>
<td>Randomized Controlled Trials</td>
<td>0</td>
<td>27</td>
<td>48</td>
<td>102</td>
<td>13</td>
<td>20</td>
<td>210</td>
</tr>
<tr>
<td>Shared Decision-Making with Individual Clients</td>
<td>13</td>
<td>47</td>
<td>31</td>
<td>201</td>
<td>6</td>
<td>11</td>
<td>309</td>
</tr>
<tr>
<td>Collaborative Decision-Making with Communities</td>
<td>2</td>
<td>11</td>
<td>18</td>
<td>113</td>
<td>6</td>
<td>8</td>
<td>158</td>
</tr>
<tr>
<td>Stakeholder Dialogue About EBBP</td>
<td>3</td>
<td>12</td>
<td>23</td>
<td>71</td>
<td>7</td>
<td>4</td>
<td>120</td>
</tr>
<tr>
<td>Implementation of EBBP</td>
<td>3</td>
<td>6</td>
<td>51</td>
<td>94</td>
<td>7</td>
<td>2</td>
<td>163</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>84</strong></td>
<td><strong>391</strong></td>
<td><strong>856</strong></td>
<td><strong>2049</strong></td>
<td><strong>190</strong></td>
<td><strong>375</strong></td>
<td></td>
</tr>
</tbody>
</table>

Note. “Other” refers to professional disciplines not represented by Medicine, Nursing, Psychology, Social Work, or Public Health. The Stakeholder Dialogue About EBBP and Implementation of EBBP were launched in January 2012, approximately 12 months following the addition of the other seven modules.
used with time (pre- vs. post-evaluation scores) as the within-subjects factor and professional discipline as the between-subjects factor. Tukey post-hoc tests were conducted to compare how change in outcome scores of knowledge, attitudes, and self-efficacy differed between professional disciplines. Analyses were conducted with users who completed both pre- and post-evaluations (n=1,490). Analyses for these evaluations were conducted using IBM SPSS Statistics Version 23 for Mac.

RESULTS

Module Completion

A total of 10,083 users registered for the training modules between January 2011 and October 2015, and 1,490 completed both pre- and post-evaluations. (Table 2, p. 28). Of those users who registered only, most were in social work (39.9%), psychology (24.4%), and nursing (16.2%). A majority held master’s degrees (55.2%), though a substantial portion held bachelor degrees (16.2%) or PhDs (10.5%). Among users who completed both pre- and post-evaluations, approximately 51% were social workers and nearly 22% were psychologists. These users were mostly Master’s level clinicians (58.9%), though a substantial minority held Bachelor’s level degrees (15.4%).

The number of users that completed training modules is presented in Table 3 (p. 29) as a function of their professional discipline. A significant association was found between professional discipline and module completion ($X^2[5]=187.9$, $p<.001$), as well as between module title and module completion ($X^2[8]=745.7$, $p<.001$). However, user degree was not significantly associated with module completion ($X^2[8]=13.7$, $p>.05$).
Findings of the logistic regression model are presented in Table 4, in which discipline, module title, and discipline*module title are entered as categorical predictors of module completion. Compared to social work, which completed the greatest number of modules (n=754; Table 2, p. 28), medicine was at least four times less likely to complete a module (OR=.24, p<.001), while nursing was nearly 1.5 times less likely (OR=.67, p=.027). Psychology (OR=.98,

<table>
<thead>
<tr>
<th>Table 4. Results of the binary logistic regression model for module completion</th>
<th>B</th>
<th>SE</th>
<th>Wald</th>
<th>Df</th>
<th>Sig.</th>
<th>Exp(B)</th>
</tr>
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<tr>
<td>Variables</td>
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<td></td>
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<td><strong>Discipline</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Work</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
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<tr>
<td>Medicine</td>
<td>-1.41</td>
<td>.37</td>
<td>14.79</td>
<td>1</td>
<td>&lt;.001</td>
<td>.24</td>
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<tr>
<td>Nursing</td>
<td>-.39</td>
<td>.18</td>
<td>4.91</td>
<td>1</td>
<td>.027</td>
<td>.67</td>
</tr>
<tr>
<td>Psychology</td>
<td>-.02</td>
<td>.14</td>
<td>.02</td>
<td>1</td>
<td>.902</td>
<td>.98</td>
</tr>
<tr>
<td>Public Health</td>
<td>-.13</td>
<td>.24</td>
<td>.29</td>
<td>1</td>
<td>.589</td>
<td>.88</td>
</tr>
<tr>
<td>Other</td>
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<td>.25</td>
<td>.00</td>
<td>1</td>
<td>.991</td>
<td>.99</td>
</tr>
<tr>
<td><strong>Module Title</strong></td>
<td></td>
<td></td>
<td>308.13</td>
<td>8</td>
<td>&lt;.001</td>
<td></td>
</tr>
<tr>
<td>EBBP Process</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Searching for Evidence</td>
<td>-.83</td>
<td>.14</td>
<td>36.42</td>
<td>1</td>
<td>&lt;.001</td>
<td>.44</td>
</tr>
<tr>
<td>Intro to Systematic Reviews</td>
<td>-.84</td>
<td>.14</td>
<td>37.45</td>
<td>1</td>
<td>&lt;.001</td>
<td>.43</td>
</tr>
<tr>
<td>Critical Appraisal</td>
<td>-.94</td>
<td>.14</td>
<td>43.30</td>
<td>1</td>
<td>&lt;.001</td>
<td>.39</td>
</tr>
<tr>
<td>Randomized Controlled Trials</td>
<td>-1.78</td>
<td>.18</td>
<td>95.24</td>
<td>1</td>
<td>&lt;.001</td>
<td>.17</td>
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<tr>
<td>Shared Decision-Making with Individual Clients</td>
<td>-1.33</td>
<td>.16</td>
<td>72.68</td>
<td>1</td>
<td>&lt;.001</td>
<td>.27</td>
</tr>
<tr>
<td>Collaborative Decision-Making with Communities</td>
<td>-1.99</td>
<td>.19</td>
<td>108.77</td>
<td>1</td>
<td>&lt;.001</td>
<td>.14</td>
</tr>
<tr>
<td>Stakeholder Dialogue about EBBP</td>
<td>-2.76</td>
<td>.28</td>
<td>100.81</td>
<td>1</td>
<td>&lt;.001</td>
<td>.06</td>
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<tr>
<td>Implementation of EBBP</td>
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<td>.25</td>
<td>104.46</td>
<td>1</td>
<td>&lt;.001</td>
<td>.08</td>
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<td><strong>Discipline*Module Title</strong></td>
<td></td>
<td></td>
<td>38.90</td>
<td>40</td>
<td>.520</td>
<td></td>
</tr>
</tbody>
</table>

Note. “Social Work” and “EBBP Process” are referent categories for Discipline and Module Title variables, respectively.
B=regression coefficient; SE=standard error; Wald=Wald Chi-Square test; Df=degrees of freedom; Sig.=statistical significance; Exp(B)=odds ratio.
Table 5. Mean (and standard deviation) knowledge scores of users who completed both pre- and post-evaluations: effects of time and interaction with discipline

<table>
<thead>
<tr>
<th>Module</th>
<th>Knowledge Scores</th>
<th>Two-Way ANOVA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>Pre %M(SD)</td>
</tr>
<tr>
<td>EBBP Process</td>
<td>1490</td>
<td>60.3 (18.4)</td>
</tr>
<tr>
<td>Searching for Evidence</td>
<td>555</td>
<td>59.1 (21.3)</td>
</tr>
<tr>
<td>Introduction to Systematic Reviews</td>
<td>498</td>
<td>43.3 (17.9)</td>
</tr>
<tr>
<td>Critical Appraisal</td>
<td>442</td>
<td>50.7 (19.5)</td>
</tr>
<tr>
<td>Randomized Controlled Trials</td>
<td>210</td>
<td>42.2 (19.1)</td>
</tr>
<tr>
<td>Shared Decision-Making with Individual Clients</td>
<td>309</td>
<td>65.5 (22.0)</td>
</tr>
<tr>
<td>Collaborative Decision-Making with Communities</td>
<td>158</td>
<td>71.6 (26.1)</td>
</tr>
<tr>
<td>Stakeholder Dialogue About EBBP</td>
<td>120</td>
<td>65.3 (25.4)</td>
</tr>
<tr>
<td>Implementation of EBBP</td>
<td>163</td>
<td>45.3 (19.9)</td>
</tr>
</tbody>
</table>

Note. Average Knowledge scores for each module are presented for participants who completed both pre- and post-evaluations. Knowledge scores are measured on a 100-point percentage scale. M=mean, SD=standard deviation, Change=Post-Pre. *p<.05, **p<.01. T=main effect of time and T*D=interaction effect of time and discipline.

p>.05) and public health (OR=.88, p>.05) appeared equally-likely to complete any module relative to social work.

Table 4 also presents results regarding module completion as a function of module title. The EBBP Process module was significantly more likely to be completed than every other module, while the Stakeholder Dialogue about EBBP (OR=.06, p<.001) and Implementation of EBBP (OR=.08, p<.001) modules were the least likely to be completed. Compared to EBBP Process,
Searching for Evidence (OR=.44, p<.001), Introduction to Systematic Reviews (OR=.43, p<.001), and Critical Appraisal (OR=.39, p<.001) were approximately 2.5 times less likely to be completed; Shared Decision-Making with Individual Clients was 3.7 times less likely to be completed; and Randomized Controlled Trials (OR=.17, p<.001) and Collaborative Decision-Making with Communities (OR=.14, p<.001) were about 6 and 7 times less likely to be completed compared to EBBP Process.

The logistic regression model also included a term for the interaction between professional discipline and module title to ascertain whether certain disciplines were more likely to complete specific modules. The overall Wald test for the discipline*module title interaction was non-significant (Wald=38.90, df=40, p=.52), suggesting that discipline and module title are independent of one another. Therefore, individual regression coefficients of the interaction term were not further examined nor included in the model.

**Did the Training Modules Improve Knowledge of EBBP?**

Change in mean knowledge scores from pre- to post-evaluation are presented in Table 5 (p. 32). Significant increases in knowledge scores from pre- to post-evaluation (i.e., main effects of time) were observed for the majority of modules, including EBBP Process (F[1,1351]=534.93, p<.001), Searching for Evidence (F[1,498]=103.22, p<.001), Introduction to Systematic Reviews (F[1,442]=233.09, p<.001), Critical Appraisal (F[1,414]=113.60, p<.001), Randomized Controlled Trials (F[1,182]=26.16, p<.001), Shared Decision-Making with Individual Clients (F[1,289]=51.45, p<.001), and Implementation of EBBP (F[1,107]=7.64, p=.007).

There were statistically significant differences in knowledge change scores over time (i.e., post-minus pre-evaluation scores) between professional disciplines for the EBBP Process module (F[1,1351]=2.41, p=.035) and the Critical Appraisal module (F[1,414]=3.52, p=.004). For the
EBBP Process module, tests of simple main effects of discipline (Table 6) revealed significant differences in mean knowledge scores for the pre-evaluation scores (F[5,1351]=8.0, p<.001), post-evaluation scores (F[5,1351]=4.6, p<.001), and change scores (F[5,1351]=2.4, p=.035). For the pre-evaluation knowledge scores, simple contrasts (Table 7, p. 35) revealed that nursing had the highest score compared to social work (M_change=8.3, SE=1.6, p<.001) and other disciplines (M_change=13.7, SE=2.6, p<.001). For the post-evaluation knowledge scores, nursing (M_change=8.1, SE=2.5, p=.019) and psychology (M_change=7.3, SE=2.3, p=.022) showed significantly higher scores than other disciplines. For knowledge change scores from pre- to post-evaluation, there were no significant differences between disciplines for EBBP Process. Within each discipline, significant improvements in knowledge scores over time were observed for medicine (F[1,1351]=33.1, p<.001), nursing (F[1,1351]=123.1, p<.001), psychology (F[1,1351]=420.9, p<.001), social work (F[1,1351]=980.2, p<.001), public health (F[1,1351]=44.8, p<.001), and other disciplines (F[1,1351]=101.4, p<.001).
Table 7. Simple contrasts between disciplines on knowledge for EBBP Process and Critical Appraisal

<table>
<thead>
<tr>
<th>Module</th>
<th>Discipline</th>
<th>Knowledge Scores</th>
<th>Simple Main Effects of Time</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>N</td>
<td>Pre %M(SD)</td>
</tr>
<tr>
<td><strong>EBBP Process</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medicine</td>
<td>30</td>
<td>61.0</td>
<td>(16.3)</td>
</tr>
<tr>
<td>Nursing</td>
<td>148</td>
<td>67.0</td>
<td>(17.5)</td>
</tr>
<tr>
<td>Psychology</td>
<td>326</td>
<td>62.1</td>
<td>(17.7)</td>
</tr>
<tr>
<td>Social Work</td>
<td>754</td>
<td>58.7</td>
<td>(17.6)</td>
</tr>
<tr>
<td>Public Health</td>
<td>67</td>
<td>61.6</td>
<td>(19.8)</td>
</tr>
<tr>
<td>Other</td>
<td>164</td>
<td>53.3</td>
<td>(18.2)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Critical Appraisal</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medicine</td>
<td>11</td>
<td>46.2</td>
<td>(21.0)</td>
</tr>
<tr>
<td>Nursing</td>
<td>48</td>
<td>51.8</td>
<td>(17.6)</td>
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<td>248</td>
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<td>(17.6)</td>
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<tr>
<td>Public Health</td>
<td>21</td>
<td>53.2</td>
<td>(16.2)</td>
</tr>
<tr>
<td>Other</td>
<td>43</td>
<td>48.8</td>
<td>(22.0)</td>
</tr>
</tbody>
</table>

Note. Average knowledge scores for each module are presented for users who completed both pre- and post-evaluations. Knowledge scores are measured on a 100-point percentage scale. M=mean, SD=standard deviation, Change=Post-Pre. Simple Main Effects=simple main effects of time within each discipline. Superscript initials indicate significant differences; M=medicine, N=nursing, P=psychology, S=social work, PH=public health, O=other. *p<.05, **p<.01.
For the Critical Appraisal module, tests of simple main effects of discipline (Table 6, p. 34) revealed significant differences in mean knowledge scores for the pre-evaluation scores (F[5,414]=10.6, p<.001), post-evaluation scores (F[5,414]=4.6, p<.001), and change scores (F[5,414]=3.5, p=.004). For the pre-evaluation knowledge scores, simple contrasts revealed that psychology scored significantly higher than most disciplines, including medicine (M_{change}=18.0, SE=5.4, p=.015), nursing (M_{change}=12.4, SE=3.2, p=.002), social work (M_{change}=17.5, SE=2.5,
Table 9. Mean (and standard deviation) self-efficacy scores of participants who completed pre- and post-evaluations: effects of time and interaction with discipline

<table>
<thead>
<tr>
<th>Module</th>
<th>N</th>
<th>Pre</th>
<th>Post</th>
<th>Change</th>
<th>T</th>
<th>T*D</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>M(SD)</td>
<td>M(SD)</td>
<td>M(SD)</td>
<td>(F)</td>
<td>(F)</td>
</tr>
<tr>
<td>EBBP Process</td>
<td>1490</td>
<td>2.97(.91)</td>
<td>3.75(.69)</td>
<td>+.98(.79)</td>
<td>67.77*</td>
<td>1.8</td>
</tr>
<tr>
<td>Searching for Evidence</td>
<td>555</td>
<td>3.03(.91)</td>
<td>3.58(.72)</td>
<td>+.70(.80)</td>
<td>25.89*</td>
<td>.36</td>
</tr>
<tr>
<td>Introduction to Systematic Reviews</td>
<td>498</td>
<td>2.45(1.07)</td>
<td>3.51(.77)</td>
<td>+1.22(1.07)</td>
<td>133.09*</td>
<td>1.4</td>
</tr>
<tr>
<td>Critical Appraisal</td>
<td>442</td>
<td>2.77(.95)</td>
<td>3.46(.76)</td>
<td>+.83(.75)</td>
<td>44.08*</td>
<td>.98</td>
</tr>
<tr>
<td>Randomized Controlled Trials</td>
<td>210</td>
<td>2.69(1.00)</td>
<td>3.45(.75)</td>
<td>+.81(.84)</td>
<td>27.94*</td>
<td>.59</td>
</tr>
<tr>
<td>Shared Decision-Making with</td>
<td>309</td>
<td>2.04(.90)</td>
<td>2.99(.69)</td>
<td>+1.14(.91)</td>
<td>8.10</td>
<td>1.4</td>
</tr>
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<td>Individual Clients</td>
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<td></td>
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<td></td>
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</tr>
<tr>
<td>Collaborative Decision-Making with</td>
<td>158</td>
<td>1.99(.98)</td>
<td>2.88(.72)</td>
<td>+1.04(.99)</td>
<td>13.24*</td>
<td>.20</td>
</tr>
<tr>
<td>Communities</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stakeholder Dialogue About EBBP</td>
<td>120</td>
<td>2.86(1.01)</td>
<td>3.27(.82)</td>
<td>+.41(1.20)</td>
<td>5.15*</td>
<td>2.7*</td>
</tr>
<tr>
<td>Implementation of EBBP</td>
<td>163</td>
<td>2.13(.91)</td>
<td>3.19(1.70)</td>
<td>+1.00(1.75)</td>
<td>7.03</td>
<td>2.3</td>
</tr>
</tbody>
</table>

Note. Average Self-Efficacy scores for each module are presented for participants who completed both pre- and post-evaluations. Self-Efficacy scores are measured on a 5-point Likert scale (0=least confident, 5=most confident). M=mean, SD=standard deviation. *p<.05, **p<.01. T=main effect of time, T*D=interaction effect of time and discipline.

p<.001), and other disciplines (M_change=15.4, SE=4.9, p=.025). For the post-evaluation knowledge scores, psychology scored significantly higher than social work (M_change=10.3, SE=2.9, p=.007) and public health (M_change=17.7, SE=5.2, p=.011). For knowledge change scores, nursing showed significantly greater improvement compared to public health (M_change=18.1, SE=5.5, p=.016). Within each discipline, significant change in knowledge scores over time were observed for medicine (F[1,414]=15.5, p<.001), nursing (F[1,414]=70.3, p<.001), psychology (F[1,414]=24.6, p<.001), social work (F[1,414]=209.7, p<.001), and other disciplines (F[1,414]=15.1, p<.001).
Did the Training Modules Improve Attitudes Toward EBBP?

Change in mean attitude scores from pre- to post-evaluation are presented in Table 8 (p. 36). Attitude scores improved significantly (i.e., became more positive) for Searching for Evidence (F[1,542]=28.68, p<.001), Critical Appraisal (F[1,431]=4.10, p=.043), and Implementation of EBBP (F[1, 163]=14.63, p<.001). While the mean post-evaluation attitude scores for Searching for Evidence (M_post=2.81, SD=.62) and Implementation (M_post=2.74, SD=.75) were in the neutral range of the 5-point Likert scale, that of the Critical Appraisal module was in the positive range (M_post=3.41, SD=.47).

Although change in attitude scores from pre- to post-evaluation was not statistically significant for the other six modules, it is notable that those scores generally trended in the positive direction. However, post-evaluation scores remained in the neutral to slightly negative range of the 5-point Likert scale. There were no statistically significant differences in attitude change scores between professional disciplines over time.

Did the Training Modules Improve Self-Efficacy for EBBP?

Change in mean self-efficacy scores from pre- to post-evaluation are presented in Table 9 (p. 37). Significant improvements in perceived self-efficacy were observed for all nine modules: EBBP Process (F[1,797]=67.77, p<.001), Searching for Evidence (F[1,299]=25.89, p<.001), Introduction to Systematic Reviews (F[1,276]=133.09, p<.001), Critical Appraisal (F[1,242]=44.09, p<.001), Randomized Controlled Trials (F[1,111]=27.94, p<.001), Shared Decision-Making with Individual Clients (F[1,177]=8.09, p=.005), Collaborative Decision-Making with Communities (F[1,101]=13.23, p<.001), Stakeholder Dialogue about EBBP (F[1,114]=5.15, p=.025) and Implementation of EBBP (F[1,53]=7.03, p=.011). A time*discipline
interaction was significant for Stakeholder Dialogue about EBBP (F[1,114]=2.70, p=.024) and Implementation of EBBP module (F[1,53]=2.32, p=.050).

For the Stakeholder Dialogue about EBBP module, tests of simple main effects of discipline (Table 10) revealed significant differences between disciplines in mean self-efficacy scores for pre-evaluation scores (F[5,114]=3.61, p=.005) and change scores (i.e., post- minus pre-evaluation scores; F[5,114]=2.70, p =.024), but not for post-evaluation scores. For the Implementation of EBBP module, tests of simple main effects of discipline revealed significant differences between disciplines in mean self-efficacy scores for post-evaluation scores (F[5,53]=4.5, p=.004) and change scores (i.e., post- minus pre-evaluation scores; F[5,53]=5.4, p=.008), but not for pre-evaluation scores.

For pre-evaluation scores on self-efficacy for the Stakeholder Dialogue about EBBP module (Table 11, p. 40), public health reported greater self-efficacy scores than all other

<table>
<thead>
<tr>
<th>Module</th>
<th>Measurement</th>
<th>Simple Main Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>df</td>
</tr>
<tr>
<td>Stakeholder Dialogue about EBBP</td>
<td>Pre</td>
<td>120</td>
</tr>
<tr>
<td></td>
<td>Post</td>
<td>120</td>
</tr>
<tr>
<td></td>
<td>Change</td>
<td>120</td>
</tr>
<tr>
<td>Implementation of EBBP</td>
<td>Pre</td>
<td>163</td>
</tr>
<tr>
<td></td>
<td>Post</td>
<td>163</td>
</tr>
<tr>
<td></td>
<td>Change</td>
<td>163</td>
</tr>
</tbody>
</table>

Note. Pre=pre-evaluation, Post=post-evaluation, Change=Post-Pre. *p<.05, **p<.01.
Table 11. Simple contrasts between discipline on self-efficacy for Stakeholder Dialogue about EBBP and Implementation of EBBP

<table>
<thead>
<tr>
<th>Module</th>
<th>Discipline</th>
<th>Self-Efficacy Scores</th>
<th>Simple Main Effects of Time</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Pre M(SD)</td>
<td>Post M(SD)</td>
</tr>
<tr>
<td>Stakeholder Dialogue about EBBP</td>
<td>Medicine</td>
<td>3</td>
<td>1.67^p.s,PH (.96)</td>
</tr>
<tr>
<td></td>
<td>Nursing</td>
<td>12</td>
<td>2.72^PH (.93)</td>
</tr>
<tr>
<td></td>
<td>Psychology</td>
<td>23</td>
<td>2.94^M,PH (.96)</td>
</tr>
<tr>
<td></td>
<td>Social Work</td>
<td>71</td>
<td>2.88^M,PH (.93)</td>
</tr>
<tr>
<td></td>
<td>Public Health</td>
<td>7</td>
<td>4.2^M,N,P,S,O (.95)</td>
</tr>
<tr>
<td></td>
<td>Other</td>
<td>4</td>
<td>2.75^PH (.96)</td>
</tr>
<tr>
<td>Implementation of EBBP</td>
<td>Medicine</td>
<td>3</td>
<td>2.0 (.91)</td>
</tr>
<tr>
<td></td>
<td>Nursing</td>
<td>6</td>
<td>1.3 (1.03)</td>
</tr>
<tr>
<td></td>
<td>Psychology</td>
<td>51</td>
<td>1.9 (.84)</td>
</tr>
<tr>
<td></td>
<td>Social Work</td>
<td>94</td>
<td>2.1 (.95)</td>
</tr>
<tr>
<td></td>
<td>Public Health</td>
<td>7</td>
<td>2.9 (1.00)</td>
</tr>
<tr>
<td></td>
<td>Other</td>
<td>2</td>
<td>1.5 (.45)</td>
</tr>
</tbody>
</table>

Note. Average Self-Efficacy scores for each module are presented for users who completed both pre- and post-evaluations. Self-Efficacy scores are measured on a 5-point Likert scale (0=least confident, 5=most confident). M=mean, SD=standard deviation. Simple Main Effects=simple main effects of time within each discipline. Superscript initials indicate significant simple contrasts; M=medicine, N=nursing, P=psychology, S=social work, PH=public health, O=other. *p<.05, **p<.01.
disciplines. Post-evaluation scores did not significantly differ between disciplines. However, public health reported significantly less increase in self-efficacy over time in comparison to medicine (M\text{change}=-2.1, SE=.8, p=.009), nursing (M\text{change}=-1.7, SE=.6, p=.003), psychology (M\text{change}=-1.5, SE=.5, p=.003), and social work (M\text{change}=-1.6, SE=.5, p=.001).

For post-evaluation scores on self-efficacy for the *Implementation of EBBP* module (Table 11, p. 40), psychology reported greater self-efficacy scores than public health (M\text{change}=3.7, SE=1.2, p=.005) and other (M\text{change}=3.2, SE=.9, p=.003). Social work also demonstrated greater self-efficacy than public health (M\text{change}=2.8, SE=1.1, p=.013) and other (M\text{change}=2.3, SE=.8, p=.006) for post-evaluation scores. Public health also reported significantly less increase in self-efficacy over time in comparison to medicine (M\text{change}=-1.43, SE=1.4, p=.020), psychology (M\text{change}=-2.9, SE=.9, p=.004), social work (M\text{change}=-2.3, SE=.9, p=.011), and other (M\text{change}=-1.03, SE=1.2, p=.037).

**DISCUSSION**

The current study was a pre-post single group summative (i.e., outcome) evaluation to determine whether asynchronous training modules on the EBBP website improved users’ knowledge, attitudes, and self-efficacy regarding EBBP. It was hypothesized that users who completed the training modules demonstrate improved scores from pre to post on knowledge, attitudes, and self-efficacy. Research has demonstrated that different degrees and professional disciplines have adopted EBBP at different times, using disparate training regimens (Spring et al., 2005). Therefore, it was also hypothesized that changes in scores from pre to post on knowledge, attitudes, and self-efficacy varied significantly by module title and user characteristics (i.e., degree, discipline, and engagement).
Findings from this study revealed that users of all professional disciplines improved their knowledge over time for all modules except *Collaborative Decision Making with Communities* and *Stakeholder Dialogue about EBBP*. For the *EBBP Process* and *Critical Appraisal* modules, professional disciplines showed significantly different knowledge scores over time. For *EBBP Process*, nursing had the highest scores on both the pre- and post-evaluations, though the amount of improvement in knowledge scores over time was the same across disciplines. For *Critical Appraisal*, psychology had the highest scores on the pre- and post-evaluations, while nursing had the greatest improvement in knowledge over time.

Users, in general, reported improved self-efficacy over time for all modules. When users were stratified by professional disciplines, self-efficacy scores were significantly different between disciplinary groups for the *Stakeholder Dialogue about EBBP* and *Implementation of EBBP* modules. For *Stakeholder Dialogue about EBBP*, public health reported greater self-efficacy scores compared to all other disciplines on the prior to completing the module. However, all other disciplines, in comparison to public health, showed greater improvement in self-efficacy after completing *Stakeholder Dialogue about EBBP*. For *Implementation of EBBP*, psychology and social work, in comparison to public health, reported significantly greater post-evaluation scores for self-efficacy. Pre-evaluation self-efficacy scores were equal across all professional disciplines for the *Implementation of EBBP* module, suggesting psychology and social work, in comparison to public health, reported a significant improvement in self-efficacy for implementing transdisciplinary EBBP.

The lack of improvement in self-efficacy observed for public health might be related to the nature of the problems with which public health professionals are faced, which tend to be defined by intractable, highly-complex, population-based issues, such as global obesity or diabetes.
(Bassett & Perl, 2004). In comparison, clinicians in psychology and social work generally encounter individual-based problems that, while complex, may feel more manageable and receptive to intervention (Kazdin, 2008), leading to a greater sense of self-efficacy in using EBBP in everyday practice.

Regarding attitudes about EBBP, the training modules produced positive changes for some of the modules. Among all users and professional disciplines, the *Searching for Evidence, Critical Appraisal*, and *Implementation of EBBP* modules improved attitudes. The remaining modules produced no significant change in attitudes. Prior research has shown that attitudes and self-efficacy tend to be positively correlated, such that improvement in one tends to be accompanied by improvement in the other (Savolainen et al., 2012).

However, the otherwise consistent pattern of increased self-efficacy for all modules unaccompanied by significant positive attitude change for some of the modules is unexpected. Individual-level correlational analyses between attitude change and self-efficacy change within modules revealed significant positive correlations for *Searching for Evidence, Critical Appraisal, Shared Decision-Making with Individual Clients*, and *Collaborative Decision-Making with Communities*, while a significant negative correlation was found for *Randomized Controlled Trials*. These findings suggest the possibility of deficiency in statistical power for ascertaining significant changes in attitudes across time.

Still, recent research examining practicing clinicians’ reported attitudinal barriers to adopting EBBP reveals the widespread nature of such resistance. Lilienfeld and colleagues (2013) explained that “negative attitudes to therapeutic change are natural, because change in deeply entrenched behaviors is often painful.” They go on to argue that the mechanism for such attitudinal resistance may be rooted in cognitive dissonance theory, in which clinicians have the tendency to
conclude that empirical findings are flawed when they contradict clinical intuition.

Results of the present study also demonstrated differential completion rates across module topics and professional disciplines. The EBBP Process module, which provides an overview of the theoretical and practical applications of EBBP, was by far the most likely module to be completed by any discipline. Searching for Evidence, Introduction to Systematic Reviews, and Critical Appraisal, which outline steps of EBBP related to the research literature (i.e., Acquire and Appraise), were the next most popular modules among participants of all professional disciplines. Stakeholder Dialogue about EBBP was the least likely to be completed by any. Social workers tended to have the highest completion rates across all modules, while those in medicine and nursing tended to have the lowest completion rates, irrespective of module topic.

These findings appear in line with prior studies demonstrating that social workers have reported few attitudinal barriers to the EBBP process and positive engagement with EBBP resources (Gray et al., 2014). On the other hand, other professional disciplines, primarily nursing (Melnyk et al., 2012), medicine (van Dijk et al., 2010), and psychology (Lilienfeld et al., 2013), report ongoing obstacles to engaging with EBBP resources and tools, particularly persistent negative attitudes and misperceptions regarding the EBBP process.

Furthermore, the novelty of the transdisciplinary EBBP model and its emphasis on the research literature might explain why some modules were completed more frequently than other modules. The transdisciplinary EBBP model was originally proposed in 2009 by Satterfield, Spring, and colleagues. This new model, unlike previous EBP models, placed a greater emphasis on integrating the clinical research literature with clinician expertise and patient preferences (Satterfield, 2009; Steglitz et al., 2015). This may explain why the most popular training modules among all professional disciplines were those that explain the foundation of the transdisciplinary
EBBP model (i.e., *EBBP Process*) and how to identify and integrate the research literature into the EBBP process (i.e., *Searching for Evidence, Introduction to Systematic Reviews, and Critical Appraisal*).

The above findings are unique in that they provide outcome data for asynchronous web-based learning modules about gold standard transdisciplinary evidence based behavioral practice for a large sample of individuals across different professional disciplines. While previous empirical investigations regarding the effectiveness of asynchronous web-based training modules also have shown improvements in knowledge, attitudes, or self-efficacy, those studies have been limited to providing training in specific treatment modalities, such as individual Cognitive Behavioral Therapy (e.g., Khanna & Kendall, 2015), and have examined only small samples of individuals drawn from a single discipline (e.g., Curran & Fleet, 2005; Heck et al., 2015; Miglus & Froman, 2016).

There are four main limitations that warrant consideration regarding the current research. First, the study design involved a pre-test post-test design without a control group that underwent testing and retesting without exposure to the modules. Lacking such a control group, it cannot be stated which confounding factors may have contributed to the observed results. Second, the sample of users included in analyses was disproportionately represented by social workers and psychologists, reducing the generalizability of the findings to other professional disciplines that were under-represented in the sample, such as medicine. (Nonetheless, the distribution of professional disciplines, itself, is useful to inform tailored outreach efforts to increase engagement of under-represented disciplines.) Third, the current study did not control for the order in which the modules were listed on the EBBP website. It is possible users were more likely to complete the first module listed in comparison to the last module listed, however this variable was not
measured. Finally, the online evaluations of knowledge, attitudes, and self-efficacy were conducted at two time-points (before and after completing a training module), which aimed to measure short-term self-reported outcome changes of clinicians. Consequently, based on the current findings, it is not possible to ascertain long-term changes in knowledge, attitudes, and self-efficacy of users who completed the training modules, nor is it possible to deduce if changes in user-reported outcomes led to changes in patient health outcomes.

Future summative evaluations of asynchronous web-based training resources of EBBP would benefit from study designs that include a control group to enhance external and internal validities. Evaluating both short- and long-term changes in user knowledge, attitudes, and self-efficacy would also improve generalizability of the findings. Although knowledge, attitudes, and self-efficacy are generally well-established factors related to user engagement with web-based tools and resources (Damschroder et al., 2009), future studies of EBBP resources would be more thorough by incorporating measures that evaluate clinician behavior-change as well as patient health outcomes to evaluate the practical implications of web-based health resources. Clinician behavior-change outcomes could include the nine EBBP competencies delineated by the EBBP Council (Table 1, p. 17) in addition to the five steps of EBBP implementation (Spring, 2007).
Factors Associated with Engagement in the EBBP Training Modules

ABSTRACT

Educational tools offered in a web-based, asynchronous format have been shown to maximize reach and accessibility of resources. However, engagement in web-based learning is a challenging and poorly understood problem. Preliminary evaluations of the present web-based EBBP training modules showed an average attrition rate of 73%. The purpose of the present study was to understand user engagement by evaluating how Low, Moderate, and High engagement users perceived various factors of engagement. This study used a two-phase sequential mixed-methods evaluation comprised of a quantitative questionnaire (Phase 1) followed by a phone interview (Phase 2). Results from the Phase 1 questionnaires (n=89) revealed that user perceptions of intervention-level characteristics did not significantly differ between levels of engagement. However, for individual-level characteristics, Low engagement users, compared to High engagement users, reported a greater perceived need for technical knowledge in order to navigate the modules. From semi-structured telephone interviews for Phase 2 (n=10), thematic analyses revealed that user engagement decreased during sections of the training modules that lacked clear instructions for navigating the web-pages of the modules. However, users described their engagement was strengthened by interactive features that used multiple modalities of learning, which may explain the relatively low attrition rate for EBBP Process. Overall, results from Phases 1 and 2 suggest that instructional guidance and interactive features, coupled with user technical knowledge, are particularly important characteristics that may improve engagement in asynchronous web-based training modules.
INTRODUCTION

The Council for Training in EBBP developed nine theory-driven, asynchronous, interactive training modules for the EBBP website (www.ebbp.org). Since access to EBBP training resources and supervisors has been reported as a significant problem for graduate students and clinicians (Melnyk et al., 2012; O’Donnell, 2004; Weissman et al., 2006), the training modules were developed in a web-based format that has been shown to maximize reach and accessibility of resources (Phipps & Merisotis, 1999). The modules were also developed in an asynchronous learning format such that instruction and learning do not need to occur in the same place or at the same time (Hrastinski, 2008). That is, asynchronous learning, most commonly applied to various forms of digital or web-based learning, is not delivered in person or in real time. This enhances the flexibility of the learning process, enabling large numbers of clinicians, even in remote practice settings and different time zones, to access the modules at any time (Dreisinger et al., 2008). However, since passive dissemination and implementation efforts for even the best teaching tools may be insufficient to promote learner engagement (Grol & Grimshaw, 1999), the modules were developed in an interactive manner with videos, exercises, and quizzes that actively engage the learner, which has been shown to improve learning (Cairncross et al., 2001).

Despite these advantages, user retention and engagement in web-based learning continues to be both unsatisfactory and a poorly understood problem (Tyler-Smith, 2006; Berge & Huang, 2004). Some findings have demonstrated that attrition from web-based learning programs can reach as high as 80% (Flood, 2002; Dagger & Wade, 2004), and Carr (2000) estimates web-based attrition could be as much as 20% higher than that of traditional classroom-based learning. Indeed, preliminary evaluations of the present training modules estimate average attrition across all nine modules at 73% (Table 12, p. 49), which is similar to other web-based learning modules (Flood,
Attrition rates also significantly differed between modules ($X^2[8]=142.7, p<.001$). While the *EBBP Process* and *Introduction to Systematic Reviews* had the lowest attrition rates, the *Stakeholder Dialogue about EBBP* module had the greatest attrition rate (OR=1.61, p<.001). A growing body of research has sought to address the problem of attrition from web-based learning tools (e.g., Parker, 1999; Diaz, 2002; Wang et al., 2003; and Simpson, 2004), but these studies have focused largely on quantitative investigations of synchronous distance learning among college students, offering limited generalizability.

**Table 12. Rates and odds ratios of attrition as functions of module**

<table>
<thead>
<tr>
<th>Module</th>
<th>Started (n)</th>
<th>Completed (n)</th>
<th>Attrition Rate (%)</th>
<th>Wald</th>
<th>Df</th>
<th>Exp(B)</th>
</tr>
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<tbody>
<tr>
<td>EBBP Process</td>
<td>4310</td>
<td>1490</td>
<td>65.4</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Searching for Evidence</td>
<td>1910</td>
<td>555</td>
<td>70.9</td>
<td>18.1</td>
<td>1</td>
<td>1.22**</td>
</tr>
<tr>
<td>Introduction to Systematic Reviews</td>
<td>1532</td>
<td>498</td>
<td>67.5</td>
<td>2.1</td>
<td>1</td>
<td>1.09</td>
</tr>
<tr>
<td>Critical Appraisal</td>
<td>1764</td>
<td>442</td>
<td>74.9</td>
<td>51.8</td>
<td>1</td>
<td>1.37**</td>
</tr>
<tr>
<td>Randomized Controlled Trials</td>
<td>873</td>
<td>210</td>
<td>75.9</td>
<td>35.9</td>
<td>1</td>
<td>1.40**</td>
</tr>
<tr>
<td>Shared Decision-Making with Individual Clients</td>
<td>1166</td>
<td>309</td>
<td>73.5</td>
<td>26.9</td>
<td>1</td>
<td>1.32**</td>
</tr>
<tr>
<td>Collaborative Decision-Making with Communities</td>
<td>528</td>
<td>158</td>
<td>70.1</td>
<td>4.5</td>
<td>1</td>
<td>1.19*</td>
</tr>
<tr>
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<td>698</td>
<td>120</td>
<td>82.8</td>
<td>56.8</td>
<td>1</td>
<td>1.61**</td>
</tr>
<tr>
<td>Implementation of EBBP</td>
<td>694</td>
<td>163</td>
<td>76.5</td>
<td>24.6</td>
<td>1</td>
<td>1.42**</td>
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</tbody>
</table>

*Note*. The *Stakeholder Dialogue About EBBP* and *Implementation of EBBP* were launched in January 2012, approximately 12 months following the addition of the other seven modules. Started=initiated or completed pre-evaluation but did not complete post-evaluation; Completed=completed both pre- and post-evaluations. *EBBP Process* is the reference group, Exp(B)=odds ratio of attrition (i.e., odds of not completing the module), *p<.05, **p<.01.
Intervention-level characteristics (i.e., usability, complexity, and design of a program or intervention) and individual-level characteristics (i.e., knowledge, attitudes, and self-efficacy of users) are two domains of the Consolidated Framework for Implementation Research (CFIR) that have been shown to increase the likelihood of engagement in a program or intervention. These domains serve as the framework for evaluations of the EBBP training modules of Study 2.

Thus, there continues to be a gap in our understanding of which factors contribute to user engagement with web-based asynchronous learning programs outside of the traditional college population (CDC, 2005, 2010; Beidas and Kendall, 2010; Damschroder et al., 2013). To date, the present web-based training modules have not been systematically evaluated, even though evaluation constitutes part of a critical ongoing cycle of program planning, implementation, and improvement (Patton, 1987).

The Consolidated Framework for Implementation Research (CFIR) is a comprehensive
framework that integrates constructs found in the broad array of published theories regarding user engagement with interventions or programs (Damschroder et al., 2009, 2013). Comprising five major domains, the CFIR offers an overarching typology from which researchers can select domains and sub-domains that are most relevant for their particular study and use it to guide evaluations (Damschroder et al., 2009). The reported barriers to engagement with EBBP resources and tools are consistent with two domains of the CFIR: intervention-level and individual-level characteristics (Figure 4, p. 50). Intervention-level characteristics include the usability, complexity, and design of the intervention or program, as well as specific intervention or program functionalities. Individual-level characteristics comprise knowledge, attitudes, and self-efficacy of its users. The purpose of Study 2 is to conduct a systematic mixed methods evaluation guided by the aforementioned domains to answer the question: Which intervention-level characteristics and individual-level characteristics influence user engagement with asynchronous web-based training modules?

**METHODS**

*Participants and Procedure*

A mixed-methods sequential design (Creswell, 2003; Giddings & Grant, 2006) was used for the implementation-focused formative evaluations of the training modules. Formative evaluations typically employ both quantitative and qualitative methods to assess interventions or programs during their development or implementation to provide information about how to revise and modify for improvement (Parkinson & Drislane, 2011). The present design included a quantitative online self-report questionnaire (Phase 1) and a follow-up qualitative telephone interview (Phase 2). This type of mixed methods design is widely used by evaluation researchers
and involves collecting and analyzing first quantitative and then qualitative data in two consecutive phases within a single study (Tashakkori & Teddlie, 1998; Creswell, 2003, 2005).

Recruitment for formative evaluation research is generally purposive, which is a type of non-probability sampling whose goals is to select participants who have particular characteristics that are of interest to the researchers. Unlike probability sampling that aims to randomly select units from a population to create a representative, externally-valid sample, purposive sampling focuses on specific types of participants who are suited to answer the research question at hand (Creswell, 2005).

For this study, the aim of purposive recruitment was to provide a broad perspective on the training module experience, and to assess intervention-level and individual-level characteristics from a variety of viewpoints that may influence training module engagement. User recruitment aimed to represent different levels of professional training (i.e., degree) and various professional disciplines (e.g., social work). Given the present study’s aim to understand engagement with the training modules, purposive recruitment also focused on sampling

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**Figure 5. Consort diagram for Study 2 recruitment.** Module Registry for Study 2 included users who partially or fully completed at least one training module; Low = users who completed 1 module, Mod = users who completed 2-3 modules, High = users who completed >3 modules.
users of varying levels of engagement as measured by the number of modules users completed. Levels of engagement were defined as Low (completed 1 module), Moderate (completed 2-3 modules), and High (completed >3 modules), which have been previously used in formative empirical protocols of web-based tools (e.g., Gagnon et al., 2007).

For Phase 1 (n=89), emails were sent to users who partially or fully completed at least one training module (Figure 5, p. 52). Recruitment emails for Phase 1 contained a brief introduction of the study and a link to the Phase 1 questionnaire. The questionnaire contained a cover page with additional details about the study’s purpose, design, and consent. Names and email addresses of all individuals who registered for and/or completed the training modules were obtained from the training module registry. Recruitment continued until adequate sample size was reached based on previous mixed methods formative evaluation research of web-based training resources (Creswell, 2003; Giddings & Grant, 2006). To the best of our ability, recruitment was purposive such that it aimed for equal representation across participant degree, professional discipline, and number of modules completed. To ascertain adequate size and representation of the sample, sample size and demographic information of users who completed the Phase 1 questionnaire were tabulated daily.

For Phase 2 (n=10), emails were sent to users from Phase 1 to request their voluntary participation in a brief follow-up phone interview regarding their experiences with the training modules. Recruitment for Phase 2 (Figure 5, p. 52) was purposive in that it aimed to achieve representativeness among professional disciplines and number of modules completed (i.e., engagement). Recruitment continued until, to the best of our ability, two goals were achieved: 1) representativeness for discipline and engagement, and 2) theme saturation for the interviews was reached (i.e., until the information collected during interviews was no longer deemed novel [Magee et al., 2012]). Progress toward saturation was assessed by brief notes written by the
interviewer to summarize new information that emerged during the interview. Notes were shared with the research team and reviewed against prior notes to determine when interviews were no longer revealing novel information about the topics under study.

A purposive sample of 89 users completed Phase 1 ($n_{\text{Low}}=46$, $n_{\text{Moderate}}=26$, and $n_{\text{High}}=17$). Ten users completed Phase 2 ($n_{\text{Low}}=2$, $n_{\text{Moderate}}=4$, and $n_{\text{High}}=4$) until theme saturation was reached. All users gave informed consent prior to Phase 1 and Phase 2, and study procedures were approved by the Northwestern University Institutional Review Board.

Assessment

Phase 1. The quantitative evaluations were conducted using an online self-report questionnaire administered via the Northwestern University Biomedical Informatics Center (NUBIC) secure online assessment platform (RedCap). Given the dearth of implementation instruments (Martinez et al., 2014), the questionnaire (see Appendix, p. 131) was adapted specifically for this study. The questionnaire aims to assess factors that have been demonstrated to influence engagement in web-based programs (Damschroder et al., 2009, 2013), including aspects of usability, characteristics of the training modules, and characteristics of users (i.e., knowledge, attitudes, and self-efficacy). Those domains constitute major areas of the CFIR (Damschroder et al., 2009).

The questionnaire asked users to rate each item on a five-point Likert scale (1=strongly disagree, 5=strongly agree). The first 10 items were adapted from the System Usability Scale (SUS), a reliable, brief, and widely-used measure (Brooke, 1996) to assess usability. A sub-section of five 5-point Likert scale items was included to assess additional intervention-level characteristics of the modules (i.e., complexity and aesthetics), and a sub-section of seven 5-point
Likert scale items was included to assess individual-level characteristics (i.e., knowledge, attitudes, and self-efficacy). Both intervention-level and individual-level characteristics have been shown to influence implementation of web-based resources and tools (Damschroder et al., 2009; Sitzmann et al., 2010).

Items were adapted from validated self-report questionnaires that have been previously used to measure individual-level characteristics, including knowledge, attitudes, and self-efficacy, related to engagement with web-based resources and tools (Kittler et al., 2004; Jette et al., 2003; Damschroder et al., 2013). Face and content validity of the adapted questionnaire were assessed through external review by two associate professors and one advanced graduate student from Northwestern University who have expertise in web-based resources and tools. These subject-matter experts assessed the extent to which the items of the questionnaire were relevant and representative of intervention-level and individual-level characteristics related to engagement. The questionnaire was accompanied by a consent form that included information about the purpose of the study, confidentiality, and voluntary participation in a brief telephone follow-up interview.

Phase 2. One interviewer conducted the qualitative interviews, which lasted approximately 10 to 20 minutes. Interviews were conducted on the telephone, audio recorded with users’ consent, and then transcribed verbatim. Transcripts were checked for accuracy and then de-identified to maintain confidentiality. De-identification was performed by removing names of people mentioned, study titles, project names, organization names, and other information with the potential to identify the participant.

The interviewer followed a semi-structured interview script (see Appendix, p. 131) beginning with background information and proceeding to questions about (a) intervention-level characteristics about the training modules and (b) individual-level characteristics about the
knowledge, attitudes, and self-efficacy of users. The interview script, which was flexible and interactive to generate users’ accounts of their own perspectives, perceptions, and interpretations (Lewis-Beck et al., 2004), was informed by the intervention-level and individual-level components of the CFIR (Damschroder et al., 2009).

The first draft of the interview script was exposed to internal testing by three Northwestern University staff, including one advanced graduate student and two associate professors familiar with evaluation science. Internal testing is a preliminary assessment in which ambiguities, leading questions, and general criticisms are discussed and corrected (Mann, 1985). Due to time constraints of users, who were practicing clinicians and graduate students (Doerr et al., 2014; Hove & Anda, 2005), the interview was designed to be completed within 20 minutes. Recruitment for interviews continued until “theme saturation” (Magee et al., 2012), which was assessed by brief notes written by the interviewer to summarize new information that emerged during the interview. Notes were shared with the research team and reviewed against prior notes to determine when interviews were no longer revealing novel information about the topics under study.

**Analytic Approach**

**Phase 1.** Descriptive statistics were conducted to describe user demographics, levels of engagement in the training modules (i.e., users who completed 1 training module vs. 2-3 modules vs. 4-8 modules), and overall user responses to the questionnaires. One-way analyses of variance (ANOVA) were conducted across the three levels of module engagement to determine differences in user-level characteristics (i.e., knowledge, attitudes, and self-efficacy) and training module-level characteristics (e.g., usability and content). Tukey post-hoc tests were conducted for group comparisons. Analyses for Phase 1 were conducted using IBM SPSS Statistics Version 23 for Mac.
**Phase 2.** Audio recordings of interviews were transcribed verbatim and, along with demographic information, imported into Dedoose for coding and qualitative analysis. Qualitative analysis was conducted using the Framework Method, a type of deductive thematic analysis that is guided by a pre-existing research question or theoretical framework (Gale et al., 2013). In the present study, the research question, derived from the Consolidated Framework for Implementation Research (Damschroder et al., 2009), was centered around intervention-level characteristics and individual-level characteristics that might influence engagement with the training modules.

Codes were generated based on the first two transcripts, reexamined, and refined using the constant comparison method (Taylor & Bodgan, 1998). In this method, coding was a dynamic process in which each transcript informed coding of further transcripts. A codebook (see Appendix, p. 131) was created with code names, brief descriptions, full descriptions, and instructions to inform when and when not to use codes. This process resulted in a final set of 73 codes that was generated both deductively from our analytic structure (i.e., intervention-level and individual-level characteristics) and inductively from the transcripts. That is, intervention-level and individual-level characteristics provided an initial framework to create codes prior to the actual coding process, and the transcripts, themselves, subsequently offered additional information from which to generate novel, more specific codes.

Each coder completed two training sessions to practice applying the final set of codes to a subset of excerpts. After discussion among the interviewers to finalize coding guidelines and settle any remaining disagreements, the interviewer then completed two further coding sessions with a new subset of excerpts. For this new subset of excerpts, the interviewer used the Dedoose software to calculate a kappa value that assessed initial inter-coder reliability. The initial kappa was .84,
above the kappa value of .70 that was set as the criteria for adequate agreement between coders (Hruschka et al., 2004). After this demonstration of reliability, coders applied codes to half of the remaining excerpts before a mid-point assessment for inter-coder reliability was conducted using excerpts from the most recently coded transcript. The mid-point kappa was .91. Coders then applied codes to all remaining excerpts. Excerpts from the final two transcripts were then tested for reliability of coding to assure quality of coding throughout the second half of the coding process. The final kappa was .80.

Once coding was complete, a subset of excerpts (i.e., coded text) was extracted using the Dedoose software. Extracted excerpts were analyzed qualitatively to inductively generate sub-themes characterizing the data. Coders used an iterative process to highlight evidence contradictory to our conclusions and the modal response (Ryan & Bernard, 2003). Coders first read the same subset of excerpts independently, then discussed the preliminary sub-themes they perceived. Sub-themes on which coders agreed were retained for analysis of the next subset of excerpts.

During the subsequent reading of the next subset of excerpts, coders identified evidence supporting or contradicting proposed sub-themes, while also attending to novel themes. This process was repeated until all excerpts had been analyzed. To finalize the analysis, coders organized the list into a hierarchy of themes (generated deductively via the CFIR analytic structure) and sub-themes (generated inductively via analysis of excerpts). This list was assessed to determine whether overlapping sub-themes could be merged. The final list contained three primary themes and 11 sub-themes (Table 17, p. 68).

Finally, excerpts were charted into a framework matrix using the Dedoose software. The framework matrix, unique to Framework Method analysis, contained rows and columns
represented by participants and codes, respectively. The framework matrix contained both frequency counts and representative quotations of each code for all participants, which allowed for comparison of code frequencies and characteristic text representation for themes and sub-themes (Neuendorf, 2001; Gale et al., 2013).

RESULTS

Phase 1: Quantitative Analysis

A total of 89 users completed the Phase 1 questionnaire (Table 13, p. 61). The average age among all users was 31 years (SD=10.3), and the majority (89.9%) were female. Users reported completing an average of 2.5 modules (SD=2.3, median=1, range=1-8), with the majority (51.7%) completing one module. They were primarily represented by social work (65.2%), with minority representation in nursing (16.9%) and psychology (12.4%). (All users in the field of medicine who completed both evaluations [n=31; Table 3, p. 29] were emailed a maximum of two times to inquire about participation in Phase 1. These participants either declined to participate or did not respond following email inquiries). The majority of users held advanced degrees, including MSW/LCSW (51.7%), MA/MS (14.6%), PhD (7.9%), and DPN (4.5%). Most users reported using computers either 1-5 hours/day (43.8%) or 5-10 hours/day (44.9%), though 11.2% reported using computers more than 10 hours/day.

Given the present study’s aim to understand how intervention-level characteristics (i.e., usability and module functions) and individual-level characteristics (i.e., knowledge, attitudes, and self-efficacy) vary across different levels of engagement, Table 13 also presents demographic information across three levels of engagement with the training modules: Low (those who completed 1 module; n=46), Moderate (2-3 modules; n=26), and High (>3 modules; n=17). There
were no significant differences between groups of users on demographic variables of age, professional discipline, degree, or computer use.

Usability of the Training Modules

Among all users, usability ratings were generally positive (Table 14, p. 62). Of 11 items that comprised the Usability section of the questionnaire, users responded most strongly (i.e., 1 or 5 on a 5-point Likert scale) to two items that, respectively, inquired about perceived need for technical assistance and the learning curve associated with high engagement in the training modules. For the statement “I think that I would need the support of a technical person to be able to use the training modules”, users strongly disagreed (mean=1.61, SD=.73; 1=strongly disagree, 5=strongly agree). Similarly, users were, on average, in strong agreement with the suggestion that “most people would learn to use these training modules very quickly” (mean=3.77, SD=.88; 1=strongly disagree, 5=strongly agree). One-way ANOVAs revealed no significant differences on usability items between the three groups of training module participants.

Intervention-Level Characteristics

Users, in general, rated the characteristics of the training modules favorably (Table 15, p. 63). Of five characteristics listed, registering for and logging out of the training modules were reported as the most favorable. Users, on average, agreed with the following statements, “Registering a user account and logging in was easy” (mean=4.28, SD=.65) and “Logging out of my session was very manageable” (mean=4.20, SD=.63). Users slightly agreed that the duration of the modules may have impeded their engagement (mean=2.71, SD=1.08). One-way
### Table 13. Descriptive characteristics of users across three levels of engagement

<table>
<thead>
<tr>
<th></th>
<th>All participants (n=89)</th>
<th>Low Engagement (n=46)</th>
<th>Moderate Engagement (n=26)</th>
<th>High Engagement (n=17)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age, mean(sd)</strong></td>
<td>31.3 (10.3)</td>
<td>32.0 (10.3)</td>
<td>28.2 (9.5)</td>
<td>33.9 (11.0)</td>
</tr>
<tr>
<td><strong>Sex, n(%)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>80 (89.9)</td>
<td>41 (99.1)</td>
<td>25 (96.2)</td>
<td>14 (82.4)</td>
</tr>
<tr>
<td>Male</td>
<td>9 (10.1)</td>
<td>5 (5.6)</td>
<td>1 (3.8)</td>
<td>3 (17.6)</td>
</tr>
<tr>
<td><strong>Discipline, n(%)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medicine*</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Nursing</td>
<td>15 (16.9)</td>
<td>10 (21.7)</td>
<td>3 (11.5)</td>
<td>2 (11.8)</td>
</tr>
<tr>
<td>Psychology</td>
<td>11 (12.4)</td>
<td>5 (10.9)</td>
<td>2 (7.7)</td>
<td>4 (23.5)</td>
</tr>
<tr>
<td>Social Work</td>
<td>58 (65.2)</td>
<td>29 (63.0)</td>
<td>19 (73.1)</td>
<td>10 (58.8)</td>
</tr>
<tr>
<td>Public Health</td>
<td>1 (1.1)</td>
<td>1 (2.2)</td>
<td>0 (0)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Other</td>
<td>4 (4.5)</td>
<td>1 (2.2)</td>
<td>2 (7.7)</td>
<td>1 (5.9)</td>
</tr>
<tr>
<td><strong>Degree, n(%)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BA/BS</td>
<td>9 (10.1)</td>
<td>5 (10.9)</td>
<td>1 (3.8)</td>
<td>3 (17.6)</td>
</tr>
<tr>
<td>MA/MS</td>
<td>14 (15.7)</td>
<td>7 (15.2)</td>
<td>6 (23.1)</td>
<td>1 (5.9)</td>
</tr>
<tr>
<td>MSW/LCSW</td>
<td>46 (51.7)</td>
<td>24 (52.2)</td>
<td>16 (61.5)</td>
<td>6 (35.3)</td>
</tr>
<tr>
<td>PhD</td>
<td>8 (9.0)</td>
<td>3 (6.5)</td>
<td>2 (7.7)</td>
<td>3 (17.6)</td>
</tr>
<tr>
<td>DPN/RN</td>
<td>5 (5.6)</td>
<td>2 (4.3)</td>
<td>1 (3.8)</td>
<td>2 (11.8)</td>
</tr>
<tr>
<td>EdD</td>
<td>1 (1.1)</td>
<td>1 (2.2)</td>
<td>0 (0)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Other</td>
<td>6 (6.7)</td>
<td>4 (8.7)</td>
<td>1 (3.8)</td>
<td>1 (5.9)</td>
</tr>
<tr>
<td><strong>Computer Use, n(%)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;1 hr/day</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>1-5 hrs/day</td>
<td>39 (43.8)</td>
<td>22 (47.8)</td>
<td>11 (42.3)</td>
<td>6 (35.3)</td>
</tr>
<tr>
<td>5-10 hrs/day</td>
<td>40 (44.9)</td>
<td>19 (41.3)</td>
<td>12 (46.2)</td>
<td>9 (52.9)</td>
</tr>
<tr>
<td>&gt;10 hrs/day</td>
<td>10 (11.2)</td>
<td>5 (10.9)</td>
<td>3 (11.5)</td>
<td>2 (11.8)</td>
</tr>
</tbody>
</table>

*Note: Low Use = participants who completed 1 module; Moderate Use = participants who completed 2-3 modules; High Use = participants who completed >3 modules. *All users in Medicine who partially or fully completed at least one training module (n=107) were emailed at least twice to participate in the present study. These individuals either did not respond to email contact or did not consent to participate.*
Table 14. Usability items of Phase 1 questionnaire with post-hoc comparisons between Low, Moderate, and High engagement groups

<table>
<thead>
<tr>
<th>Item</th>
<th>All (n=89) M(SD)</th>
<th>L (n=46) M(SD)</th>
<th>M (n=26) M(SD)</th>
<th>H (n=17) M(SD)</th>
<th>Post-hoc comparisons</th>
</tr>
</thead>
<tbody>
<tr>
<td>I think that I would like to use these modules frequently</td>
<td>3.27 (.96)</td>
<td>3.34 (.93)</td>
<td>3.19 (.98)</td>
<td>3.19 (.04)</td>
<td>ns ns ns</td>
</tr>
<tr>
<td>I found the modules unnecessarily complex</td>
<td>2.48 (1.06)</td>
<td>2.37 (1.06)</td>
<td>2.58 (1.02)</td>
<td>2.63 (1.14)</td>
<td>ns ns ns</td>
</tr>
<tr>
<td>I thought the modules were easy to use</td>
<td>3.72 (.92)</td>
<td>3.76 (.88)</td>
<td>3.54 (1.06)</td>
<td>3.94 (.77)</td>
<td>ns ns ns</td>
</tr>
<tr>
<td>I think that I would need the support of a technical person to be able to use the modules</td>
<td>1.61 (.73)</td>
<td>1.68 (.73)</td>
<td>1.62 (1.06)</td>
<td>1.44 (.62)</td>
<td>ns ns ns</td>
</tr>
<tr>
<td>I found that the various functions of the modules were well integrated</td>
<td>3.66 (.78)</td>
<td>3.70 (.75)</td>
<td>3.50 (.81)</td>
<td>3.81 (.83)</td>
<td>ns ns ns</td>
</tr>
<tr>
<td>I thought there was too much inconsistency in the modules</td>
<td>2.10 (.79)</td>
<td>2.08 (.76)</td>
<td>2.08 (.79)</td>
<td>2.19 (.91)</td>
<td>ns ns ns</td>
</tr>
<tr>
<td>I would imagine that most people would learn to use the modules very quickly</td>
<td>3.77 (.87)</td>
<td>3.73 (.81)</td>
<td>3.62 (1.06)</td>
<td>4.13 (.61)</td>
<td>ns ns ns</td>
</tr>
<tr>
<td>I found the modules very cumbersome to use</td>
<td>2.51 (.97)</td>
<td>2.53 (.93)</td>
<td>2.77 (.99)</td>
<td>2.06 (.92)</td>
<td>ns ns ns</td>
</tr>
<tr>
<td>I felt very confident using the modules</td>
<td>3.71 (.86)</td>
<td>3.70 (.82)</td>
<td>3.62 (.94)</td>
<td>3.88 (.88)</td>
<td>ns ns ns</td>
</tr>
<tr>
<td>I needed to learn a lot of things before I could get going with the modules</td>
<td>2.10 (.85)</td>
<td>2.10 (.92)</td>
<td>2.31 (.83)</td>
<td>1.75 (.57)</td>
<td>ns ns ns</td>
</tr>
</tbody>
</table>

Note. Scores based on 5-point Likert scale (0=strongly disagree, 5=strongly agree). Scores are represented in mean (M) and standard deviation (SD). Ns=ANOVA not significant; *p<.05; **p<.01; ***p<.001. L=low users (completed one module); M=moderate users (completed 2-3 modules); H=high users (completed >3 modules).
ANOVAs revealed no significant differences on items for training module characteristics between the three categories of user engagement.

**Individual-Level Characteristics**

Users, in general, agreed that they had the “technical knowledge to use the training modules” (mean=4.29, SD=.57; Table 16, p. 64). For this item, there was a significant difference between engagement groups as determined by one-way ANOVA (F[2,79]=4.19, p=.02). A Tukey post-hoc test revealed that users who completed 1 module, in comparison to those who completed >3 modules, reported a greater perceived need for technical knowledge in order to engage in the training modules (p=.01). In general, users felt relatively confident that, if technical problems arose with the training modules, they could solve them independently, without the

<table>
<thead>
<tr>
<th>Item</th>
<th>All (n=89) M(SD)</th>
<th>L (n=46) M(SD)</th>
<th>M (n=26) M(SD)</th>
<th>H (n=17) M(SD)</th>
<th>Post-hoc comparisons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Registering a user account and logging in was easy</td>
<td>4.28 (.65)</td>
<td>4.35 (.58)</td>
<td>4.23 (.65)</td>
<td>4.19 (.83)</td>
<td>ns ns ns</td>
</tr>
<tr>
<td>Launching a new module was overly complex</td>
<td>2.01 (.89)</td>
<td>2.03 (.89)</td>
<td>2.04 (.99)</td>
<td>1.94 (.77)</td>
<td>ns ns ns</td>
</tr>
<tr>
<td>Navigating the content and pages of the module was straightforward.</td>
<td>3.54 (.89)</td>
<td>3.63 (.86)</td>
<td>3.23 (.99)</td>
<td>3.81 (.65)</td>
<td>ns ns ns</td>
</tr>
<tr>
<td>The duration of the module (60-90 minutes) prevented me from</td>
<td>2.73 (1.08)</td>
<td>2.88 (1.09)</td>
<td>2.46 (1.02)</td>
<td>2.81 (1.16)</td>
<td>ns ns ns</td>
</tr>
<tr>
<td>Logging out of my session was very manageable</td>
<td>4.20 (.63)</td>
<td>4.30 (.56)</td>
<td>4.08 (.79)</td>
<td>4.13 (.50)</td>
<td>ns ns ns</td>
</tr>
</tbody>
</table>

*Note. Scores based on 5-point Likert scale (0=strongly disagree, 5=strongly agree). Scores are represented in mean (M) and standard deviation (SD). Ns=ANOVA not significant; *p<.05; **p<.01; ***p<.001. L=low users (completed one module); M=moderate users (completed 2-3 modules); H=high users (completed >3 modules).*
assistance of EBBP staff (mean=3.73, SD=.83). Users, overall, were neutral toward the statement “I would be more likely to complete these training modules if they were available on mobile devices (e.g., smartphone, tablet)” (mean=2.96, SD=1.0).

**Phase 2: Qualitative Analysis**

Of the 89 users who completed Phase 1, 10 completed telephone interviews for Phase 2 to reach theme saturation. Eight of the users were female, and half (n=5) were in social work, while the remaining were in psychology (n=3) and nursing (n=2). In terms of academic degrees, there
was a broad range: 2 BA/BS, 2 MA/MS, 4 MSW/LCSW, 1 RN, and 1 LPN. Two users were in the Low engagement category (i.e., completed 1 module), while there were four users in each of the Moderate (i.e., completed 2-3 modules) and High engagement (i.e., completed >3 modules) categories.

*Which Themes Are Related to Engagement in the Training Modules?*

In qualitative analyses, a total of 753 codes were applied, and theme saturation was reached after interviewing 10 users. Initial coding structure was guided by a pre-existing framework comprised of intervention-level (e.g., usability and design) and individual-level characteristics (i.e., knowledge, attitudes, and self-efficacy of users). The coding structure was composed of dominant codes (or primary themes), which represented broad categories informed by intervention-level and individual-level characteristics, and sub-axial codes (or sub-themes), which represented detailed categories within dominant codes (e.g., interactive components of the training modules). Sub-axial codes were generated inductively, based on the content of the transcripts. That is, sub-axial codes were formulated during the coding process, while dominant codes were formulated prior to coding to provide an initial framework with which to code transcripts.

In Framework Method and thematic analyses, three primary themes and 11 sub-themes emerged from the coded excerpts. Primary themes were (1) Usability, (2) Training Module Characteristics, and (3) User Characteristics (i.e., knowledge, attitudes, and self-efficacy). The 11 sub-themes were (1) Positive usability experiences, (2) Negative usability experiences, (3) Usability of web-based platforms, (4) Usability of mobile-based platforms, (5) Interactive components of the training modules, (6) Organization of the content, (7) Quality of the content,
(8) Duration of the training modules, (9) Learning style of users, (10) Motivation of users, and
(11) Age of users.

Table 17 (p. 68) summarizes the number of users and the number of excerpts associated with each theme and sub-theme. It should be noted that the total number of users or excerpts for a theme does not necessarily equal the sum of the corresponding sub-theme, as one excerpt could be coded with multiple themes and sub-themes. To illustrate themes and sub-themes, representative quotes are provided from users. To increase readability, repeated words have been deleted from users’ quotes. Ellipses were used to indicate places where portions of a quote have been skipped. Otherwise, quotes are presented verbatim.

*Which Usability Factors Are Associated with Engagement in the Training Modules?*

First, we examined users’ perceptions of the usability of the training modules they completed. All users (n=10) described both positive and negative usability experiences with the training modules. These findings are in line with usability results for Phase 1 of the present study, in which ratings for usability ranged from 2 to 5 (1=most negative, 5=most positive). In Phase 2, excerpts coded with “Positive experiences” contained descriptors such as “effective” and “enjoyable”. The following descriptions exemplified users’ common application of the sub-theme Positive Experiences:

It was good. It was convenient. I didn’t have any problems with that at all. I was even able to create my log-in and password very easily. It didn’t give me a problem.
(User 2, Male, Social Work, MA/MS, Low)

No, I think I like everything else. It shows like where you’re at, which ones you’ve completed, the log-in process, my registration and all that was pretty simple.
(User 6, Female, Psychology, BA/BS, Moderate)
Negative usability experiences that participants described centered around reported problems navigating specific portions of the modules, particularly simulated sections. For example, the *EBBP Process* module contained a virtual desk with various contents (e.g., a virtual computer, telephone, folder, and papers) that, when clicked with the cursor, would produce
**Table 17.** Themes and sub-themes of training module interviews

<table>
<thead>
<tr>
<th>Theme and sub-theme</th>
<th>Excerpts, n</th>
<th>Users, n</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Usability</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positive experiences</td>
<td>40 (4.00)</td>
<td>10</td>
</tr>
<tr>
<td>Negative experiences</td>
<td>38 (3.80)</td>
<td>10</td>
</tr>
<tr>
<td>Web-based platform</td>
<td>51 (5.67)</td>
<td>9</td>
</tr>
<tr>
<td>Mobile-based platform</td>
<td>27 (3.37)</td>
<td>8</td>
</tr>
<tr>
<td><strong>Training module characteristics</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interactive components</td>
<td>40 (4.00)</td>
<td>10</td>
</tr>
<tr>
<td>Organization</td>
<td>24 (4.00)</td>
<td>6</td>
</tr>
<tr>
<td>Quality of content</td>
<td>46 (4.60)</td>
<td>10</td>
</tr>
<tr>
<td>Duration</td>
<td>21 (2.63)</td>
<td>8</td>
</tr>
<tr>
<td><strong>User characteristics</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Learning style</td>
<td>31 (3.44)</td>
<td>9</td>
</tr>
<tr>
<td>Motivation</td>
<td>20 (2.22)</td>
<td>9</td>
</tr>
<tr>
<td>Age</td>
<td>11 (2.20)</td>
<td>5</td>
</tr>
</tbody>
</table>

*Note.* For the number of excerpts, the number in parentheses is the average number of excerpts provided per participant. “Positive experiences” = User describes their experience as user-friendly, easy, enjoyable, and/or other favorable descriptors. “Negative experiences” = User describes their experience as frustrating, confusing, difficult to navigate, lacking instruction, time-consuming, and/or other critical descriptors. “Access/flexibility” = User identifies accessing or flexibility of the training module(s). “Novelty” = User identifies novelty of web-based format. “Interpersonal” = User identifies relational elements of module(s). “Screen” = User identifies smartphone screen. “Interactive components” = User identifies simulated part(s) of the training module(s). “Hyperlinks” = User identifies hyperlinks, research links, and/or external webpages. “Organization of page” = User reports organization of content. “Quality of content” = User reports quality of the content. “Duration” = User identifies duration of modules. “Learning style” = User describes their learning style (e.g., visual, discussion) as a perceived factor in their learning and/or using the content and/or skills of module(s). “Motivation” = User reports reason(s) for completing module(s). “Age” = User describes age as a perceived modifier of overall experience with the module(s).
additional didactic information regarding processes of EBBP (Figure 6, p. 69). Nine users (90%) cited difficulties understanding the order in which to proceed through simulated parts of the modules. For example, User 4 (Female, Social Work, BA/BS, Moderate) mentioned that in “some of [the modules] you had to click through in a certain order — it was a little tedious”. Users described a need for additional guidance or instruction on how to navigate simulated sections of the modules. The following description exemplified users’ common application of the sub-theme Negative Experiences:

It got a little confusing and circular. Just certain times where I wasn’t clicking on the right thing. I definitely took […] 10 to 15 minutes trying to figure out what I was supposed to do next. So I definitely — and I’m not the most technologically-advanced,
so that definitely could just be me — but I definitely had a lot of problems figuring out what the next thing to do was to move on. It was like in the module — like at certain points. I’d keep clicking on something and it says, “Well, you need to do this to move on”, and I’m like “Well, I can’t find that, so I don’t know what to do”. And I’d just keep clicking until I got it. (User 5, Female, Psychology, MA/MS, Moderate)

Descriptions of general usability centered around platforms for delivering the training modules. Eight users (80%) reported that the existing web-based format of the training modules seemed to improve access to and flexibility of training. Users commented on the “convenience” of web-based training, specifically the option to complete the modules “independently” given users’ busy and, at times, unpredictable schedules. The following description exemplified users’ common application of the sub-theme Web-Based Platform:

A lot of times with face-to-face trainings they obviously want to get as many people to the trainings as possible so it’s only offered at one time. They don’t do one-on-one appointments, but with this module, […] I’m able to do it on my time. If something comes up in the middle of it, I can stop and then come back. If my professor had required us to go to a face-to-face training for this, I don’t know if I would have completed it because it’s inconvenient. (User 2, Male, Social Work, MA/MS, Low)

Most users (n=8) also expressed perceived usability advantages of a mobile-based platform for the training modules. These reported advantages centered primarily around perceptions of access and flexibility. However, many expressed usability concerns around compatibility and screen-size. These findings appear in line with those of Phase 1 of this study (Table 11, p. 40), in which participants reported feeling neutral (mean=2.96, SD=1.07) in response to the item “I would be more likely to complete these training modules if they were available on mobile devices (e.g., smart phone, tablet)”. For example, User 4 of Phase 2 (Female, Social Work, BA/BS, Moderate) reported usability concerns for mobile platforms, “[…] I prefer to use my computer just because the screen is bigger, and I have the keyboard, the trackpad, and
more space.” Nonetheless, most users (n=8) reported potential advantages regarding mobile compatibility for the training modules. The following descriptions exemplified users’ common application of the sub-theme Mobile-Based Platform:

That would be awesome. I think anything that makes it easier for folks. I don’t have a tablet and I — a phone is kind of too small for me to work from, but I know that people really like that, especially people that are on-the-go, or I can see myself doing it while I’m traveling on the bus or something like that. I think it would be great.
(User 3, Female, Social Work, LCSW/LSW, Moderate)

I mean besides young people thinking it’s kind of cool to be able to have it smartphone-capable — it just seems like sometimes when I’m on a website or something, and I’m like, “Oh they don’t have an app,” and I’m like “It would be so much cooler if I didn’t have to pull this up on Safari. I could just pull it up through an app”.
(User 2, Male, Social Work, MA/MS, Low)

Which Intervention-Level Characteristics Improve Engagement?

When users were interviewed about characteristics of the training modules they believed influenced their engagement, sub-themes that emerged from coded excerpts (n=131 total) included “Quality of the content” (n=46 excerpts) and “Interactive components of the training modules” (n=40 excerpts), including the “Simulated desk” (n=21 excerpts) and “Hyperlinks” (n=8). Sub-themes of “Duration of the training modules” (n=21 excerpts) and “Organization of the training module content” (n=24 excerpts) were also identified, though users, in general, described those sub-themes as less influential than “Quality” and “Interactive components”.

All users (n=10) commented on the quality of the training module content as a factor in their engagement in the modules. Excerpts for this sub-theme generally described the objective, balanced portrayal of topics such that advantages and disadvantages of a topic were presented for the user. For example, User 1 (Female, Psychology, Other, Low) commented, “So it wasn’t just like everybody is praising evidence based practice. You guys talked about the weaknesses of it
too, and the difficulties of it. I really appreciated that because I don’t know any kind of practice that is 100 percent perfect.”

However, four users also commented on negative aspects of training module content. These negative descriptions centered around reports of “repetitiveness”, “redundancy”, and “relevance” to participants’ fields of study or practice. User 2 (Male, Social Work, MA/MS, Low), for example, commented, “The beginning parts felt, at times, a little bit repetitive in terms of going through the process.” Several users (n=2) suggested options to tailor the modules to users’ particular fields of study or practice. The following descriptions exemplified users’ common negative applications of the sub-theme Quality of Content:

I feel like there was […] introductory stuff that seemed almost too redundant to what we had already read. So, I don’t think it’s a fault of the modules, but just my professor not assigning it in like the most productive sequence. So, I recall I was doing a module or something that I had literally just read something about, and it didn’t expand on it in any meaningful way. (User 3, Female, Social Work, LCSW/LSW, Moderate)

It took more to get invested in them since they weren’t really in relation to what I’m studying. Like I don’t know how feasible that would be if I had multiple options or different career choices. (User 8, Female, Social Work, LCSW/LSW, High)

All users (n=10) described the interactive sections of the modules as strongly contributing to their engagement in the modules. Users generally described how the interactive sections, particularly the simulated desk and research hyperlinks, felt practical and realistic, which helped remind them of the applicability of the content in their actual practice or training. The following descriptions exemplified users’ common application of the sub-theme Interactive Components:

[O]ne thing that I thought was really good was when you click the links it actually took you to the actual research, and I thought that was really cool and interesting […] It was as if I had done a search in a database. This is an article I would find. And it actually felt like […] this isn’t just a hypothetical situation; this is something that I’m actually
going to have to do when I’m practicing. (User 3, Female, Social Work, LCSW/LSW, Moderate)

I was impressed with how advanced it was as far as technology goes. I liked the hands-on approach of the portions where you were at your ‘desk’, you know? I definitely appreciated how applicable it was to reality, like something that you would be doing in your office. So, I definitely appreciated that. (User 5, Female, Psychology, MA/MS, Moderate)

Organization and duration of the module content were also described as influential factors in engagement with the modules. Six users (60%) provided excerpts regarding the overall organization of the module content, rather than organization of a specific web-page of a module. For example, users commented on the sequencing of web-pages that comprise a module. Those web-pages contained content for learning and content for quizzes (these quizzes are separate from pre- and post-evaluation questionnaires users consented to complete for Study 1). In general, users perceived the sequencing of module web-pages as an obstacle to engagement in the material and long-term learning of the content. Users reported that the embedded quizzes were too simple and interrupted the learning process. These findings might explicate neutral ratings in Phase 1 of this study for the item “Navigating the content and pages of the module was straightforward”. The following descriptions exemplified users’ common application of the sub-theme Organization of Content:

I think I would have liked it if it had challenged me a little more. Like maybe let me go through all the steps first, and then at the end if I’m wrong, tell me. So I have to go back and figure out what I did wrong. Because that’s how I learn best. (User 1, Female, Psychology, Other, Low)

I wasn’t really challenged because it said, “Oh, here are the five steps for the EBBP process,” and then the next thing you did was put them in order. So I felt like, “Oh, I can do this, but I don’t know if I necessarily understand it because I’m just kind of regurgitating what they just told me.” So possibly going through the module and having to do that at the end. (User 2, Male, Social Work, MA/MS, Low)
Two users reported that the duration of the modules did not impact their user experience. User 1 (Female, Psychology, Other, Low) commented, “I didn’t have a problem with that. I thought the duration was fine.” Similarly, User 2 (Male, Social Work, MA/MS, Low) mentioned that he was able to manage the amount of time he devoted to specific sections of the modules depending on his prior knowledge of the subject matter, “With face-to-face trainings, you can’t decide how fast the instructor is going, but here I could be like, ‘Oh, I already know this part and I don’t necessarily need to take as much time on it.’” This appears to align with Phase 1 findings in which users, in general, slightly disagreed with the item “The duration of the module (60-90 minutes) prevented me from completing the module.”

However, most users in Phase 2 (n=6) perceived the duration of the training modules as an obstacle to being engaged in the material. These users indicated the modules felt “laborious”, “lengthy”, or “time-consuming”. For example, User 6 commented, “It was at least an hour — each one. I think that was one of the main reasons that I was deterred at the beginning; I didn’t even want to sit through it.” Moreover, users described unrealistic expectations they had about the duration of the modules, reporting they felt the approximated durations provided on the EBBP website were inaccurate. However, one user (User 4, Female, Social Work, BA/BS, Moderate) noted a possible solution by embedding a progress bar in the module to “track how far you’ve come or how much you have left”. The following descriptions exemplified users’ common application of the sub-theme Duration:

The first two were just a little bit lengthy, which, in the last minute, everything seems a bit too long. […] I mean obviously there’s a lot of information in there but it’s a little intimidating when you see, “Oh my goodness I have to do two of these and one of them is an hour and a half and the other one is an hour.” (User 8, Female, Social Work, LCSW/LSW, High)
What I found was navigating through the site — it was really time-consuming to do the research component because a lot of the activities involved actually doing research, pulling up various pieces of research evidence, reading through them, becoming familiar with them so that I had access to that information in order to be able to answer questions. [...] I didn’t feel that aspect of it was considered in the overall amount of time that we were told the modules would actually be involving. (User 10, Female, Nursing, Other, High)

**Which Individual-Level Characteristics Improve Engagement?**

Nearly all users (n=9) reported that their personal learning styles strongly influenced their engagement in the training modules. Users reported positive attitudes toward the interactive nature of the training modules and the variety of learning modalities used (e.g., written, audio, video), which they described as engaging and “enjoyable”. Users also reported that the interactive features and variety of learning modalities improved their knowledge by assisting them with encoding and processing the content. The following descriptions exemplified users’ common application of the sub-theme Learning Style:

I think the way that they employ multiple learning styles at once is helpful. So, whether you’re visual, auditory or someone that learns by doing, I think that they accomplished catering to those learners really well. (User 3, Female, Social Work, LCSW/LSW, Moderate)

I’ve always been better face-to-face, like in class. I’ve never really taken online courses before just because, to an extent, I feel like I learn better in the classroom. I like being there. But that’s because I like the interactivity of it, being face-to-face. Online courses — when they are just like you have to read the PowerPoint and then maybe take a quiz or something — I can’t do that. I forget it immediately — not something that I actually remember and pay attention to. And all of this was different than that. [...] What I liked about the online module is that if you turn the volume up, it is talking to you, and it gets you through the stuff — it reads things off. I found it very helpful [...] to be actively involved with something. It definitely was beneficial for me. (User 6, Female, Psychology, BA/BS, Moderate)
Of users who believed learning style was an important factor in their engagement in the training modules, about one-third (n=3) reported positive attitudes about “discussion” as a means of increasing their content knowledge. These users agreed that augmenting the modules’ interactive capabilities by including discussion opportunities would improve user engagement and learning. For example, User 4 (Female, Social Work, BA/BS, Low) described the potential benefits of a discussion section in terms of knowledge and self-efficacy “to use EBBP” for those who are not necessarily embedded in an academic culture where discussion opportunities might be frequent, “[...] some sort of back-and-forth conversation with other people, like a discussion about the topic. I think that might be more helpful for people that aren’t taking it for a class — they’re trying to learn something and use it in their practice.” Another user commented on the unique benefits of online discussion opportunities in comparison to face-to-face discussions:

In some ways they [online discussion forums] allow people to express themselves in ways that maybe some people don’t feel free to express themselves in person because maybe a particular person may feel — perhaps an introverted person, someone who is shy, may feel somewhat socially limited. [...] They might feel more able to express themselves in an online format. I’ve seen it. I have seen the results of that in some of these online classes, where people are just extremely expressive and discuss things — high level discussions. (User 10, Female, Nursing, Other, High)

Nine users (90%) commented on their motivations or reasons for which they registered and completed training modules. Of these users, all of them reported being initially introduced to the modules through an academic course or training program. Six reported being assigned a module or set of modules to complete for graduate course credit. Three participants reported receiving the modules as a “resource [they] could use” (User 5, Female, Psychology, MA/MS, Moderate), and described completing optional modules “out of curiosity” (User 3, Female, Social Work,
LCSW/LSW, Moderate) or to “inform [their] practice” (User 2, Male, Social Work, MA/MS, Low).

Age of users was another reportedly influential factor in training module engagement. Excerpts about user age often centered around attitudes and beliefs regarding generational differences in self-efficacy and engagement in web-based trainings, in general. For example, User 4 (Female, Social Work, BA/BS, Low) commented, “I prefer to do things on my computer versus a tablet. But that’s more of my old-school self wanting to use computer technology.” The following description exemplified users’ common application of the sub-theme Age:

I’m older. I’m less likely to probably try to engage in things on tablet or mobile devices. I do fewer things that way. I like to read books on paper. Usually, I don’t use an e-reader, and I don’t use tablets very much. It’s a habit and routine.  
(User 1, Female, Psychology, Other, Low)

DISCUSSION

Engagement in web-based learning is a challenging and poorly understood problem. Preliminary evaluations of the present web-based EBBP training modules showed an average attrition rate of 73%; EBBP Process had the lowest attrition rate (62%), while Stakeholder Dialogue had the highest attrition rate (83%). The current study was a mixed-methods sequential design that employed both quantitative measures (Phase 1) and qualitative interviews (Phase 2) to improve our understanding of user engagement with asynchronous, web-based didactic resources. It aimed to determine how intervention-level and individual-level characteristics are differentially perceived by users of varying levels of engagement (i.e., Low, Moderate, High engagement). Intervention-level characteristics included the usability, complexity, and design of the training modules (e.g., content, duration), as well as specific functions of the modules (e.g., registration,
logging out). Individual-level characteristics comprised user-reported knowledge, attitudes, and self-efficacy. It was hypothesized that, depending on level of engagement, participants would differentially perceive individual-level and intervention-level characteristics, two major domains that have been shown to influence the likelihood of engagement in an intervention or program (Damschroder et al., 2009).

Phase 1 questionnaires revealed that usability ratings across all levels of engagement (i.e., Low, Moderate, and High engagement) were generally favorable, and did not significantly differ between engagement levels. All users from Phase 1 most strongly agreed that new users of the training modules would not need technical assistance and would learn navigational tools quickly. Phase 2 interviews corroborated those findings, in which users described the modules as generally “effective” and “enjoyable”. The most favorable Phase 1 ratings were for the registration and log-out processes of the modules, and Phase 2 users described those functions as “very easy” and “simple”.

Users from both Phases 1 and 2 said they would prefer mobile (e.g., smartphone) compatibility for the training modules to improve access and flexibility, which aligns with previous research on user preferences for mobile compatibility of web-based learning tools (Davies et al., 2012). However, Phase 2 users also reported some concerns regarding anticipated usability problems and smaller screen size if the modules were offered on smartphones. Phase 2 users went on to report being moderately confident that smartphone compatibility would actually increase the likelihood they would complete the modules.

Usability concerns associated with screen size appear to be an unusual finding. Recent research on mobile technology in health education has shown that medical students and physicians have indeed reported usability concerns, but they largely revolve around poor implementation of
technology and slow data transmission. In-depth interviews revealed that students and physicians are largely concerned about the efficiency and accessibility of learning materials and Internet access difficulties (Vafa & Chico, 2013; Scott et al., 2015; Zayem & Ozel, 2015). Thus, while mobile compatibility may improve access to and flexibility of web-based learning programs, obstacles to engagement may include small screen size, in addition to previously-identified barriers, such as efficiency and Internet access.

Users of Phases 1 and 2, across all engagement levels, described both positive and negative experiences with simulated sections of the modules. Many users reported difficulties understanding the order in which to proceed through simulated sections, which led to the perception that it was “tedious,” subsequently reducing reported engagement. Users said that additional guidance and instructions for navigating more complex webpages of the modules, namely the simulated sections, would be beneficial in reducing frustration and time spent navigating.

These findings might explain why users in Phase 1 generally reported that “navigating the content and pages of the module was not straightforward” (Table 12, p. 49). At the same time, most users in Phase 2 reported that the simulated and interactive sections of the modules were instrumental in their engagement because those sections felt “practical and realistic.” Users described these sections as helpful in bridging the didactic components of the modules to real-world applications. These mixed findings regarding interactive portions of the training modules are in line with previous research that has shown interactive features to be an effective learning method, though their effectiveness depends on the context, topic, and modality (Cant & Cooper, 2012).

Users of Phases 1 and 2, across all engagement levels, reported their engagement as both
positively and negatively influenced by the content and duration of the modules. Many users in Phase 2 reported appreciation for the “objective and balanced” presentation of material because it allowed them to learn advantages and disadvantages of a topic that helped them shape their own opinion. However, slightly less than half of users in the interviews found the content to be “repetitive” and at times “irrelevant” to their field of study, which reportedly led to decreased engagement. Similarly, the quizzes that were embedded in the training modules were perceived by most users as “too simple” and an interruption to the learning process.

The majority of users also reported that the duration of the modules (60-90 minutes) was an obstacle to maintaining engagement because it felt “laborious”, “lengthy”, or “time-consuming.” These findings align with previous research on barriers to e-learning programs for evidence-based medicine, which showed that perceived “lack of time” was the most-reported obstacle to engagement (Gagnon et al., 2007). Perceived lack of time can be related to contextual factors (such as the length of the modules), but also to personal factors (i.e., individual-level characteristics) since it might refer to users’ perceptions of the personal investment needed.

Results for user knowledge (an individual-level characteristic) showed differential ratings across engagement levels. Specifically, Low users in Phase 1, compared to High users, reported a greater perceived need for technical knowledge in order to engage in the modules, suggesting the importance of technological proficiency as an influential factor in engagement. Previous research strongly supports the influence of perceived computer knowledge and skills on user engagement with web-based programs (Johnston et al., 2011; Moehr & Grant, 2000).

Phase 2 interviews suggested that age might play a moderating role in attitudes toward asynchronous web-based didactic resources. Findings revealed that age was perceived as an important individual-level factor in engagement, such that older users described being less open
to using technology-based modalities of learning compared to younger users. These users described comfort in using non-technology-based learning modalities and acknowledged the challenges of changing well-established habits and attitudes. While some studies provide evidence in support of the moderating role of age (Dutton et al., 2009; Selwyn, 2006), others have demonstrated that relationships among perceived ease of use, perceived usefulness, and intention to participate in online communities and didactic resources do not change with age (Chung et al., 2010). It should be noted, however, that this literature has focused largely on synchronous web-based learning experiences, rather than asynchronous ones, such as the EBBP modules.

Phase 2 users also reported that their personal learning styles (e.g., preference for auditory versus visual presentation of content) strongly influenced their engagement in the training modules. The interactive features and variety of learning modalities (e.g., audio, visual) reportedly improved their knowledge by assisting them with encoding and processing the content. Several users suggested that augmenting the modules’ interactive capabilities by including discussion opportunities would improve user engagement, learning, and troubleshooting technical problems.

These findings build on extant empirical investigations on the relationship between learning style and web-based learning, which have generally focused on active, learner-centered styles (e.g., asynchronous learning) versus passive, teacher-centered styles (synchronous learning). Active, learner-centered styles, which include the present web-based modules, have been shown to be associated with positive attitudes toward and high engagement with computer-based tasks and learning (Gibson, 2001; Jordanov, 2001).

The present study is unique in that it examined both quantitatively and qualitatively how intervention-level and individual-level characteristics, two major domains of the CFIR (Damschroder et al., 2009), influence engagement of a multi-professional sample of users who
completed asynchronous web-based transdisciplinary EBBP training modules. While a growing body of research has attempted to address the problem of attrition and lack of engagement in web-based learning tools (e.g., Parker, 1999; Diaz, 2002; Wang et al., 2003; and Simpson, 2004), these studies have focused largely on quantitative investigations of synchronous distance learning among college and/or medical students, offering limited generalizability. Furthermore, though many empirical investigations have used the CFIR as an evaluative framework, a recent systematic review revealed that most have used it to guide only data analysis in face-to-face programs, and few studies investigated any outcomes at all (Kirk et al., 2016). Findings of the current study extend the application of the CFIR from the study design phase through data analysis, and apply it to a web-based program. They also contribute to the e-learning literature by evaluating engagement of a diverse sample of health professionals in the context of asynchronous transdisciplinary web-based didactic tools.

However, there are four main limitations that warrant consideration regarding the current research. First, the findings must be interpreted within the limitations of mixed-methods research. Although the information provided by Phase 2 interviews was judged to be saturated using the current sample size, the number of users was insufficient to make strong inferences about group differences. Second, there was a potential for selection bias during the recruitment processes of Phases 1 and 2. It is possible more motivated individuals self-selected to participate in the study, potentially reducing the generalizability of the current findings. Third, self-report findings are inherently limited by reporting biases, such as impaired memory or social desirability. Finally, the analysis, itself, may have been biased or limited by the CFIR theoretical perspective that informed the initial coding framework. However, investigators of the current study attempted to control for this by using a flexible, iterative coding process to allow for the emergence of novel codes.
Future mixed-methods evaluations of asynchronous web-based EBBP training resources would benefit from study designs that, like the current study, incorporate domains of the CFIR throughout the research process, including study design, data collection, and data analysis. However, including additional domains of the CFIR in the evaluative framework, including outer setting, inner setting, and process (Damschroder et al., 2009), might add depth and thoroughness to the research protocol, and provide additional perspectives on user engagement. Evaluating outcomes using larger, more diverse samples would also improve generalizability of the findings. Moreover, future studies of web-based EBBP resources would be more thorough by incorporating longitudinal study designs to assess causal relationships between individual-level characteristics and other engagement domains. Given the mixed findings regarding user age and interactive features of the modules, future studies would benefit from additional research in these areas. Finally, supplementing self-report outcomes with more objective behavioral outcomes would allow for stronger conclusions to be made regarding the relationship between individual-level characteristics and other engagement domains.
Factors Associated with Engagement in the EBBP Assessment Portal

ABSTRACT

Clinicians report substantial barriers to integrating web-based patient assessments into standard clinical practice, a major step in EBBP associated with improve patient outcomes. This study conducted a two-phase mixed-methods evaluation comprised of a quantitative questionnaire (Phase 1) and follow-up telephone interview (Phase 2) to assess user experiences with a novel web-based assessment portal that utilizes brief computer adaptive tests (CATs). The purpose of this study was to determine how intervention-level characteristics and individual-level characteristics influence user engagement with CATs. Phase 1 (n=41) comprised users of three different levels of engagement, including Low (n=8), Moderate (n=23), and High (n=10). There were significant differences between Low, Moderate, and High users on self-reported ratings of navigating the portal and the amount of learning needed to operate the portal. These groups also differed on their perceptions of portal functions, such as adding patients to an online tracking portfolio, administering CATs, and using the outcome graphs (i.e., intervention-level characteristic). Individual-level characteristics, especially attitudes and self-efficacy, also differed between groups. From Phase 2 semi-structured interviews (n=9), thematic analyses revealed that users had positive attitudes toward a CATs-based assessment portal but with concerns about self-efficacy in using it in daily practice. Overall, results from Phases 1 and 2 suggest that user attitudes and self-efficacy, particularly as the portal relates to EHR-integration and patient privacy, may be important characteristics that could improve engagement in CATs-based portals for ongoing patient assessment.
INTRODUCTION

A small number of behavioral risk factors now account for a third of the global chronic disease burden, and half of all deaths from chronic disease (Lopez et al., 2004). Interdisciplinary clinical care using evidence-based behavioral practice (EBBP) holds the potential to substantially improve public health (Simon et al., 2007). However, findings suggest there is a significant gap between behavioral research evidence and clinical practice that leads to poor quality patient care (McGlynn et al., 2003; Wagner et al., 2001) and unnecessary medical spending (Grol, 2000).

Part of EBBP is ongoing patient assessment to gather information that informs shared clinical decision-making and treatment planning (Spring, 2007). In fact, administering patient assessment instruments to track patient progress has been shown to independently enhance patient outcomes by providing feedback to clinicians about non-responsive patients for whom treatment plans need to be adjusted (Lambert et al., 2003).

Unfortunately, integrating regular patient assessment into standard clinical practice has been an ongoing struggle (Kazdin, 2008), with clinicians reporting substantial barriers to implementation. A commonly-reported barrier is low self-efficacy related to the routine administration and interpretation of patient assessment instruments (Pagoto et al., 2007; Woody et al., 2005). A chief obstacle to ongoing patient assessment is the reported difficulty and perceived time burden of integrating both the administration and analysis of assessments instruments (Wu et al., 2013; Jones et al., 2007). Clinicians often complain that it is difficult for them to comprehend and act upon the meaning of the assessment scores, particularly in the span of a brief health visit. In a recent review that examined barriers to EBBP implementation, specifically with administering and interpreting assessments, “perceived lack of time” was the most frequently identified barrier, appearing in 91% of included studies (Gray et al., 2012). Clinicians also report concerns about the
challenges of identifying low-cost (Pagoto et al., 2007) and valid assessment instruments among the nearly 1,100 available ones (Bielli et al., 2004; Lambert & Hawkins, 2004; O’Donnell, 2004).

The recent adoption of web-based portals by health care providers and institutions has sought to rectify the low rates of ongoing patient outcome assessment. The vast majority of these portals tend to be geared toward patients (i.e., patient portals) and are generalist, in nature. That is, most existing patient portals are “secure websites for patients […] that offer access to a variety of functions” (Otte-Trojel et al., 2014). These functions can range from secure messaging and accessing lab results to appointment scheduling and sharing personal health records. In this way, patient portals are not specific to patient outcome assessment. Still, some patient portals have been developed to address specific patient outcomes, though these tend to be chronic, physical health conditions, such as cardiac disease (Jones et al., 2015) or diabetes (Lau et al., 2014). Moreover, the assessment instruments embedded in patient portals are generally lengthier and not adapted for brief health visits (Wu et al., 2013).

To address some of these needs, the National Institutes of Health (NIH) created the PatientReported Outcomes Measurement Information Systems (PROMIS). PROMIS is a system of highly reliable, validated measures of patient-reported health status for physical, mental, and social well-being (Bielli et al., 2004; Cella et al., 2010). Within PROMIS, NIH generated a subset of particularly-efficient patient assessment instruments called computer adaptive tests (CATs), which are especially suitable for clinical practice because they are brief, flexible, highly precise, and free of cost (Cella et al., 2010). CATs are based on item response theory (IRT), which is a psychometric method commonly used in educational testing, but more recently adopted by the field of health outcomes. Models based on IRT produce scores (i.e., calibrations) associated with responses to questions. These calibrations provide computer software with the information needed to select the
most informative follow-up question to an initial question. The questions that are asked adapt to the patient based on her responses to the previous question. CATs contain 3-7 items with precise and individualized content, and show patients how their health compares to that of the general public as well as age- and gender-matched individuals.

However, it remains unclear how to best integrate CATs into clinical practice (Wu et al., 2013). Efforts to integrate CATs into the electronic health record (EHR) have generated mixed findings and revealed a need to explore alternative platforms of delivery (DesRoches et al., 2008). The growing use of the Internet to improve the availability, reach, and usability of healthcare tools makes web-based platforms a promising solution for providing clinicians with CATs for patient assessment (Bennett & Glasgow, 2009). However, it remains unclear how to enhance clinician engagement with a web-based assessment tool that utilizes CATs (Sener & Hawkins, 2007; Sitzmann et al., 2010; US Department of Education, 2010; Gravel et al, 2006; Grol, 2001; Mendel et al., 2008). In fact, as part of the Patient Centered Outcomes Research Institute National Workshop to advance the use of patient-reported outcome measures, Wu and colleagues (2013) stated in a comprehensive review that “there are considerable knowledge gaps regarding many scientific and practical aspects of implementing [patient-reported outcome] measures”, particularly CATs.

To address this gap, a web-based assessment portal that utilizes CATs was developed by researchers and technologists in the Centers for Behavior and Health and Behavioral Intervention Technologies at Northwestern University. Its development was guided by previous implementation frameworks, which propose intervention-level characteristics and individual-level characteristics are associated with engagement and use of an intervention or program (Damschroder et al., 2009). Clinicians of the Association of Behavioral and Cognitive Therapies
Figure 7. Patient management page of the EBBP Assessment Portal. Clinicians can add de-identified patients to their online patient management page, where they can also administer CATs in-person or remotely via email.
and the EBBP Council selected three patient health domains for the assessment portal that have high prevalence and morbidity, including depression, anxiety, and quality of life (Pignone et al., 2002; Velikova et al., 2004; Antony & Rowa, 2005).

To access the portal, clinicians create user accounts on the portal’s homepage. Once a user account has been created, clinicians can carry out three basic functions. First, they can add new de-identified patients to their online patient management page (Figure 7, p. 88). Second, clinicians
can administer a single CAT or a combination of CATs in-person or remotely. Depending on the needs of the patient and clinician, CATs can be completed during the health office visit or they can be emailed to the patient to complete outside of the health visit. Third, outcome data is automatically stored in clinicians’ protected accounts and can be graphically visualized over time (Figure 8, p. 89). Individual data lines on the graph for depression, anxiety, or quality of life can be displayed or hidden depending on the needs and preferences of the clinician and patient. Hovering over the data lines with the computer cursor provides explanatory text to assist clinicians with interpreting outcome scores, a frequently-reported barrier to using assessment instruments in clinical practice (Jones et al., 2007).

The present assessment portal, to our knowledge the first of its kind, aims to enable clinicians to easily access, quickly administer, and readily interpret CATs for ongoing patient assessment. Given the novelty of the assessment portal and the importance of patient outcome assessment, there is a critical need to gain a more nuanced understanding of the factors that influence user engagement in web-based clinician portals (Sener & Hawkins, 2007; Sitzmann et al., 2010). Thus, the purpose of this study is to conduct a systematic mixed-methods evaluation (Figure 9, p. 91) to answer the question: Which intervention-level characteristics and individual-level characteristics (i.e., knowledge, attitudes, and self-efficacy) improve user engagement in a web-based assessment portal that utilizes CATs?

METHODS

Participants and Procedure

A mixed-methods sequential design (Creswell, 2003; Giddings & Grant, 2006) was used for the implementation-focused formative evaluations of the assessment portal. Like that of Study 2, the design of the present study included a quantitative online self-report questionnaire (Phase 1)
Figure 9. Theoretical framework for engagement in the EBBP Assessment Portal.

Intervention-level characteristics (i.e., usability, complexity, and design of an intervention) and individual-level characteristics (i.e., knowledge, attitudes, and self-efficacy of users) are two major domains of the Consolidated Framework for Implementation Research (CFIR) that have been shown to increase the likelihood of engagement in a program or intervention. These domains serve as the framework for evaluations of the EBBP assessment portal of Study 3.

and a follow-up qualitative telephone interview (Phase 2). (Please refer to the Methods section of Study 2 on pages 51 for details of the present study design.) Purposive samples of 41 users completed Phase 1, and 9 users were recruited for Phase 2 until theme saturation was reached (Figure 10, p. 92). For both Phases 1 and 2, users were deliberatively sampled across level of training (i.e., degree), professional discipline (e.g., psychology), and exposure to the portal (i.e., Low, Moderate, or High users) to provide a broad perspective on engagement with the portal. Low users engaged with one function of the portal; Moderate users engaged with 2-3 functions of the
portal; and High users engaged with more than 3 functions of the portal. Participants were classified into categories of Low, Moderate, and High engagement, which have been previously used in formative empirical protocols of web-based clinical assessment tools (e.g., Gagnon et al., 2007).

For Phase 1, all users who registered for the portal (n=192) were emailed to request their voluntary participation in an online self-report questionnaire that assessed their experience with the portal. Users who did not respond to the initial email were sent a maximum of two additional emails over a period of one week. The email recruitment letter contained a brief introduction about the study and a link to the questionnaire. The online questionnaire contained a cover page with additional details regarding the study’s purpose, design, and consent. Demographic information of users who completed the questionnaire was tabulated daily to ascertain that the sample was representative across degree, discipline, and level of engagement with the portal. Users from the portal registry who consented to participate in Phase 1 (n=31) were either Low (n=8) or Moderate (n=23) users. High users from the portal registry did not consent to participate in Phase 1. Thus, an additional cohort of clinicians and graduate students (n=10) was recruited by email
from mental health clinics and universities in metropolitan areas in the US. These users were purposefully sampled across degree and professional discipline to provide a diverse perspective on engagement with the portal. Because these users had not used the portal prior to this study, they were requested to use >3 functions of the portal for a duration of at least one week, after which point they were requested to complete the online questionnaire for Phase 1.

For Phase 2 (n=10), emails were sent to all users from Phase 1 to request their voluntary participation in a brief follow-up interview about their experience using the portal. Purposive recruitment for Phase 2 (Figure 10, p. 92) aimed to achieve representativeness among professional disciplines and level of engagement with the portal (i.e., Low, Moderate, and High users). Recruitment continued until, to the extent possible, representativeness of the aforementioned variables was achieved and theme saturation for the interviews was reached (i.e., until the information collected during interviews was no longer deemed novel). Progress toward saturation was assessed by brief notes written by the interviewer to summarize new information that emerged during the interview. Notes were shared with the research team and reviewed against prior notes to determine when interviews were no longer revealing novel information about the topics under study. All users gave informed consent prior to Phase 1 and Phase 2, and study procedures were approved by the Northwestern University Institutional Review Board.

Assessment

**Phase 1.** The quantitative questionnaire was administered online via the Northwestern University Biomedical Informatics Center (NUBIC) secure online assessment platform (RedCap). Given the dearth of questionnaires that comprehensively assess the major domains of engagement and implementation (Martinez et al., 2014), the questionnaire included adapted items from
previous implementation-focused formative evaluation research (Doerr et al., 2014), using the SUS (Brooke, 1996) and domains of the CFIR (Damschroder et al., 2009) as guides.

In addition to demographic items, the questionnaire contained sections on overall usability, intervention-level characteristics (i.e., complexity and design of the assessment portal) and individual-level characteristics (i.e., knowledge, attitudes, and self-efficacy). Face and content validity of the questionnaire was assessed through external review by two associate professors and one advanced graduate student from Northwestern University who have expertise in web-based resources and tools. Users who completed the online questionnaire were included in a random lottery that included 10 gift cards of $10 each.

**Phase 2.** One interviewer conducted the qualitative interviews, which lasted approximately 10 to 20 minutes. Interviews were conducted on the telephone, audio recorded with users’ consents, and then transcribed verbatim. Transcripts were checked for accuracy and then de-identified to maintain confidentiality. De-identification was performed by removing names of people mentioned, study titles, project names, organization names, and other information with the potential to identify the participant.

The interviewer followed a semi-structured interview script (see Appendix, p. 131) beginning with background information and proceeding to questions about (a) characteristics of the assessment portal and (b) user characteristics (i.e., knowledge, attitudes, and self-efficacy). The interview script, which was flexible and interactive to generate users’ accounts of their own perspectives, perceptions, and interpretations (Lewis-Beck et al., 2004), was informed by the CFIR (Damschroder et al., 2009). The first draft of the interview script was exposed to internal testing (Mann, 1985), a preliminary assessment by colleagues in which ambiguities, leading questions, and general criticisms are discussed and corrected.
Due to the time constraints of practicing clinicians and graduate students (Doerr et al., 2014; Hove & Anda, 2005), the interview was designed to be completed within 20 minutes. Recruitment for interviews continued until “theme saturation” (Magee et al., 2012), which was assessed by brief notes written by the interviewer to summarize new information that emerged during the interview. Notes were shared with the research team and reviewed against prior notes to determine when interviews were no longer revealing novel information about the topics under study.

**Analytic Approach**

**Phase 1.** Descriptive statistics were used to describe user demographics and responses to the online self-report questionnaires among all users. One-way analyses of variance (ANOVA) were conducted to evaluate mean differences of average user ratings between items on the questionnaires. Tukey post-hoc tests were conducted to analyze group comparisons. Groups were based on level of portal engagement. Portal engagement was defined according to use of portal functions (e.g., registering for the portal, administering a CAT, or viewing an outcome graph). Low Users were those who used 1 function of the portal; Moderate Users used 2-3 functions of the portal; and High Users used more than 3 functions of the portal. These categories of engagement have been used in previous formative empirical protocols of web-based clinical assessment tools (e.g., Gagnon et al., 2007). Analyses for Phase 1 were conducted using IBM SPSS Statistics Version 23 for Mac.

**Phase 2.** Audio recordings of interviews were transcribed verbatim and, along with demographic information, imported into Dedoose for coding and qualitative analysis. Qualitative analysis was conducted using the Framework Method, an inductive, explanatory analytic approach
that is guided by a pre-existing research question or theoretical framework (Gale et al., 2013). In the present study, the research question, derived from two domains of the CFIR (Damschroder et al., 2009), was centered around intervention-level characteristics and individual-level characteristics that have been shown to increase the likelihood of user engagement in a program or intervention.

Codes were generated based on the first two transcripts, reexamined, and refined using the constant comparison method (Taylor & Bodgan, 1998). In this method, coding was a dynamic process, with each transcript informing coding of further transcripts. A codebook (see Appendix, p. 131) was created with code names, brief descriptions, full descriptions, and instructions to inform when and when not to use codes. This process resulted in a final set of 110 codes that was generated both deductively from our analytic structure (i.e., intervention-level and individual-level characteristics from the CFIR) and inductively from the transcripts, themselves.

Each coder completed two training sessions to practice applying the final set of codes to a subset of excerpts. After discussion to finalize coding guidelines and settle any remaining disagreements, the coders then completed two further coding sessions with a new subset of excerpts. For this new subset of excerpts, coders used the Dedoose software to calculate a kappa value that assessed initial inter-coder reliability. The initial kappa was .84, above the kappa value of .70 that was set as the criteria for adequate agreement between coders (Hruschka et al., 2004). After this demonstration of reliability, coders applied codes to half of the remaining excerpts before a mid-point assessment for inter-coder reliability was conducted using excerpts from the most recently coded transcript. The mid-point kappa was .88. Coders then applied codes to all remaining excerpts. Excerpts from the final two transcripts were then tested for reliability of
coding to assure quality of coding throughout the second half of the coding process. The final kappa was .84.

Once coding was complete, a subset of excerpts (i.e., coded text) was extracted using the Dedoose software. Extracted excerpts were analyzed qualitatively to generate sub-themes characterizing the data. Coders used an iterative process to highlight evidence contradictory to our conclusions and the modal response (Ryan & Bernard, 2003). Coders first read the same subset of excerpts independently, then discussed the preliminary sub-themes they perceived. Sub-themes on which coders agreed were retained for analysis of the next subset of excerpts.

During the subsequent reading of the next subset of excerpts, coders identified evidence supporting or contradicting proposed sub-themes, while also attending to novel themes. This process was repeated until all excerpts had been analyzed. To finalize the analysis, coders organized the list into a hierarchy of themes and sub-themes. This list was assessed to determine whether overlapping sub-themes could be merged. The final list contained three primary themes and 10 sub-themes (Table 16, p. 64).

Finally, excerpts were charted into a framework matrix using the Dedoose software. The framework matrix contained rows and columns represented by participants and codes, respectively. The framework matrix contained both frequency counts and representative quotations of each code for all users, which allowed for comparison of code frequencies and characteristic text representation of themes and sub-themes (Neuendorf, 2001; Gale et al., 2013).
RESULTS

Phase 1: Quantitative Analysis

A total of 41 users (n\textsubscript{Low}=8, n\textsubscript{Mod}=23, n\textsubscript{High}=10) completed the Phase 1 questionnaire that assessed overall usability, intervention-level characteristics, and individual-level characteristics (Table 18, p. 99). Users were mostly female (n=31) and primarily represented by psychology (n=17) and social work (n=17). The majority of users held advanced degrees, including MA/MS (n=10), MSW/LCSW (n=12), and PhD (n=8). Almost half of users (n=19) reported using computers 5-10 hrs/day. Of the High users, who were recruited from the community and used >3 functions of the portal, 80% reported not using the portal following their initial usage for the purpose of this study. The Phase 1 questionnaire asked participants to rate each item on a five-point Likert scale (1=strongly disagree to 5=strongly agree).

Aspects of Usability

Among all users, usability ratings were generally positive (Table 19, p. 100). Of 10 items, users, in general, most strongly disagreed with the following two items: “I found the assessment portal very cumbersome to use” (M=2.06, SD=.87) and “I think that I would need the support of a technical person to be able to use this portal” (M=2.09, SD=1.23). Ratings across different levels of user engagement (i.e., Low, Moderate, and High) were analyzed. One-way ANOVAs revealed significant between-group differences for perceived integration of the portal’s functions (F[2,29]=5.55, p=.009), cumbersomeness when using the portal (F[2,29]=2.69, p=.024), and amount of learning needed to operate the portal (F[2,29]=5.03, p=.013). High users of the portal, compared to Moderate users, reported greater agreement with the item “I found that the various functions of the assessment portal were well-integrated” (p=.003). Further, High users
Table 18. Descriptive characteristics of portal users across levels of engagement

<table>
<thead>
<tr>
<th></th>
<th>All Users (n=41)</th>
<th>Low Engagement (n=8)</th>
<th>Moderate Engagement (n=23)</th>
<th>High Engagement (n=10)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sex, n(%)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>31 (76.2)</td>
<td>6 (75.0)</td>
<td>18 (78.3)</td>
<td>8 (80.0)</td>
</tr>
<tr>
<td>Male</td>
<td>10 (21.4)</td>
<td>2 (25.0)</td>
<td>5 (21.7)</td>
<td>2 (20.0)</td>
</tr>
<tr>
<td><strong>Field, n(%)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medicine</td>
<td>1 (2.4)</td>
<td>1 (12.5)</td>
<td>0 (0)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Nursing</td>
<td>3 (7.1)</td>
<td>2 (25.0)</td>
<td>1 (4.3)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Psychology</td>
<td>17 (40.5)</td>
<td>1 (12.5)</td>
<td>8 (34.8)</td>
<td>8 (80.0)</td>
</tr>
<tr>
<td>Social Work</td>
<td>17 (40.5)</td>
<td>3 (37.5)</td>
<td>12 (52.2)</td>
<td>2 (20.0)</td>
</tr>
<tr>
<td>Other</td>
<td>3 (7.1)</td>
<td>1 (12.5)</td>
<td>2 (8.7)</td>
<td>0 (0)</td>
</tr>
<tr>
<td><strong>Degree, n(%)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BA/BS</td>
<td>9 (21.4)</td>
<td>4 (50.0)</td>
<td>3 (13.0)</td>
<td>2 (20.0)</td>
</tr>
<tr>
<td>MA/MS</td>
<td>10 (23.8)</td>
<td>2 (25.0)</td>
<td>4 (17.4)</td>
<td>4 (40.0)</td>
</tr>
<tr>
<td>MSW/LCSW</td>
<td>12 (28.6)</td>
<td>1 (12.5)</td>
<td>9 (39.1)</td>
<td>2 (20.0)</td>
</tr>
<tr>
<td>PhD</td>
<td>8 (19)</td>
<td>0 (0)</td>
<td>6 (26.1)</td>
<td>2 (20.0)</td>
</tr>
<tr>
<td>Other</td>
<td>2 (4.8)</td>
<td>1 (12.5)</td>
<td>1 (4.3)</td>
<td>0 (0)</td>
</tr>
<tr>
<td><strong>Computer Use, n(%)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;1 hr/day</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>1-5 hrs/day</td>
<td>18 (43.9)</td>
<td>4 (50.0)</td>
<td>10 (43.5)</td>
<td>4 (40.0)</td>
</tr>
<tr>
<td>5-10 hrs/day</td>
<td>19 (46.3)</td>
<td>4 (50.0)</td>
<td>11 (47.8)</td>
<td>4 (40.0)</td>
</tr>
<tr>
<td>&gt;10 hrs/day</td>
<td>4 (9.8)</td>
<td>0 (0)</td>
<td>2 (8.7)</td>
<td>2 (20.0)</td>
</tr>
</tbody>
</table>

*Note. Low=participants who used one function of the portal; Moderate=participants who used 2-3 functions of the portal; High=participants who used >3 functions of the portal. Statistical differences between groups of participants on demographic variables could not be analyzed due to insufficient sample sizes of cells.*
Table 19. Usability section of questionnaire with post-hoc comparisons between Low (L), Moderate (M), and High (H) users

<table>
<thead>
<tr>
<th>Item</th>
<th>All (n=41) M(SD)</th>
<th>L (n=8) M(SD)</th>
<th>M (n=23) M(SD)</th>
<th>H (n=10) M(SD)</th>
<th>Post-hoc comparisons</th>
</tr>
</thead>
<tbody>
<tr>
<td>I think that I would like to use this assessment portal frequently</td>
<td>3.28 (.88)</td>
<td>3.50 (.84)</td>
<td>3.22 (.94)</td>
<td>3.25 (.88)</td>
<td>ns</td>
</tr>
<tr>
<td>I found the assessment portal unnecessarily complex</td>
<td>2.53 (1.04)</td>
<td>3.00 (.89)</td>
<td>2.56 (1.14)</td>
<td>2.13 (.83)</td>
<td>ns</td>
</tr>
<tr>
<td>I thought the assessment portal was easy to use</td>
<td>3.50 (.95)</td>
<td>3.67 (1.00)</td>
<td>3.22 (.94)</td>
<td>4.00 (.75)</td>
<td>ns</td>
</tr>
<tr>
<td>I think that I would need the support of a technical person</td>
<td>2.09 (1.22)</td>
<td>2.33 (1.21)</td>
<td>2.33 (1.32)</td>
<td>1.38 (.74)</td>
<td>ns</td>
</tr>
<tr>
<td>I found that the various functions of the assessment portal were well integrated</td>
<td>3.47 (.91)</td>
<td>3.50 (1.04)</td>
<td>3.11 (.75)</td>
<td>4.25 (.70)</td>
<td>ns</td>
</tr>
<tr>
<td>I thought there was too much inconsistency in the assessment portal</td>
<td>2.34 (.83)</td>
<td>2.67 (.81)</td>
<td>2.50 (.85)</td>
<td>1.75 (.46)</td>
<td>ns</td>
</tr>
<tr>
<td>I would imagine that most people would learn to use the assessment portal very quickly</td>
<td>3.78 (.87)</td>
<td>4.00 (.89)</td>
<td>3.50 (.70)</td>
<td>4.25 (1.03)</td>
<td>ns</td>
</tr>
<tr>
<td>I found the assessment portal very cumbersome to use</td>
<td>2.06 (.87)</td>
<td>2.50 (1.04)</td>
<td>2.22 (.80)</td>
<td>1.38 (.51)</td>
<td>ns</td>
</tr>
<tr>
<td>I felt very confident using the assessment portal</td>
<td>3.47 (.87)</td>
<td>3.67 (.81)</td>
<td>3.39 (.97)</td>
<td>3.50 (.75)</td>
<td>ns</td>
</tr>
<tr>
<td>I needed to learn a lot of things before I could get going with the assessment portal</td>
<td>2.44 (1.04)</td>
<td>3.17 (1.16)</td>
<td>2.56 (.98)</td>
<td>1.63 (.51)</td>
<td>ns</td>
</tr>
</tbody>
</table>

Note. Scores based on 5-point Likert scale (0=strongly disagree, 5=strongly agree). Scores are represented in mean (M) and standard deviation (SD). ns=ANOVA not significant; *p<.05; **p<.01; ***p<.001. L=low users (used one function); M=moderate users (used 2-3 functions); H=high users (used >3 functions).
Table 20. Intervention-level section of questionnaire with post-hoc comparisons between Low (L), Moderate (M), and High (H) users

<table>
<thead>
<tr>
<th>Item</th>
<th>All (n=41)</th>
<th>L (n=8)</th>
<th>M (n=23)</th>
<th>H (n=10)</th>
<th>Post-hoc comparisons</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M(SD)</td>
<td>M(SD)</td>
<td>M(SD)</td>
<td>M(SD)</td>
<td>L v. M  M v. H L v. H</td>
</tr>
<tr>
<td>I thought locating the assessment portal on the EBBP website was straightforward.</td>
<td>3.87 (.86)</td>
<td>3.50 (1.05)</td>
<td>3.88 (.88)</td>
<td>4.13 (.64)</td>
<td>ns ns ns</td>
</tr>
<tr>
<td>I found that creating my user account was overly complex.</td>
<td>2.07 (1.10)</td>
<td>2.60 (1.14)</td>
<td>2.06 (1.12)</td>
<td>1.75 (1.04)</td>
<td>ns ns ns</td>
</tr>
<tr>
<td>I thought navigating my Patient Management Page was simple.</td>
<td>3.55 (.87)</td>
<td>3.40 (1.14)</td>
<td>3.38 (.88)</td>
<td>4.00 (.53)</td>
<td>ns ns ns</td>
</tr>
<tr>
<td>I found that adding patients to my online tracking portfolio was complicated.</td>
<td>2.45 (.87)</td>
<td>2.80 (.83)</td>
<td>2.88 (.50)</td>
<td>1.38 (.51)</td>
<td>ns M&gt;H*** L&gt;H*</td>
</tr>
<tr>
<td>I thought initiating CATs in the moment was effortless.</td>
<td>3.48 (.73)</td>
<td>3.40 (.54)</td>
<td>3.06 (.25)</td>
<td>4.38 (.74)</td>
<td>ns M&lt;H** ns</td>
</tr>
<tr>
<td>I thought emailing CATs for future completion was simple.</td>
<td>3.31 (.81)</td>
<td>3.20 (.44)</td>
<td>3.06 (.25)</td>
<td>3.88 (1.35)</td>
<td>ns ns ns</td>
</tr>
<tr>
<td>I found the email text for the CATs was appropriate.</td>
<td>3.31 (.60)</td>
<td>3.40 (.54)</td>
<td>3.13 (.34)</td>
<td>3.63 (.91)</td>
<td>ns ns ns</td>
</tr>
<tr>
<td>I thought visualizing patient progress was not well-integrated.</td>
<td>3.41 (.68)</td>
<td>3.20 (.83)</td>
<td>3.13 (.34)</td>
<td>4.13 (.64)</td>
<td>ns M&lt;H** ns</td>
</tr>
<tr>
<td>I found that hiding data points was easy.</td>
<td>3.14 (.58)</td>
<td>3.00 (.71)</td>
<td>3.06 (.25)</td>
<td>3.38 (.91)</td>
<td>ns ns ns</td>
</tr>
<tr>
<td>I thought hovering for interpretation was straightforward.</td>
<td>3.38 (.91)</td>
<td>3.40 (.54)</td>
<td>3.31 (.71)</td>
<td>3.38 (.91)</td>
<td>ns ns ns</td>
</tr>
<tr>
<td>I thought logging out of session was difficult.</td>
<td>3.13 (1.35)</td>
<td>2.20 (.83)</td>
<td>2.13 (.88)</td>
<td>3.13 (1.35)</td>
<td>ns ns ns</td>
</tr>
</tbody>
</table>

Note. Scores based on 5-point Likert scale (0=strongly disagree, 5=strongly agree). Scores are represented in mean (M) and standard deviation (SD). ns=ANOVA not significant; *p<.05; **p<.01; ***p<.001. L=low users (used one function); M=moderate users (used 2-3 functions); H=high users (used >3 functions).
Table 21. Individual-level section of questionnaire with post-hoc comparisons between Low (L), Moderate (M), and High (H) users

<table>
<thead>
<tr>
<th>Item</th>
<th>All (n=41) M(SD)</th>
<th>L (n=8) M(SD)</th>
<th>M (n=23) M(SD)</th>
<th>H (n=10) M(SD)</th>
<th>Post-hoc comparisons</th>
</tr>
</thead>
<tbody>
<tr>
<td>I am familiar with CATs.</td>
<td>2.50 (.88)</td>
<td>2.40 (1.14)</td>
<td>2.60 (.82)</td>
<td>2.38 (.91)</td>
<td>ns</td>
</tr>
<tr>
<td>I am familiar with the purpose of the assessment portal.</td>
<td>2.96 (1.10)</td>
<td>2.60 (1.14)</td>
<td>3.33 (.97)</td>
<td>2.50 (1.19)</td>
<td>ns</td>
</tr>
<tr>
<td>Using the assessment portal improves patient care.</td>
<td>3.57 (.63)</td>
<td>3.00 (.71)</td>
<td>3.73 (.59)</td>
<td>3.63 (.51)</td>
<td>ns</td>
</tr>
<tr>
<td>Using the assessment portal is of limited value in clinical practice.</td>
<td>2.39 (.83)</td>
<td>3.40 (.54)</td>
<td>2.33 (.72)</td>
<td>1.88 (.64)</td>
<td>L&gt;M* ns L&gt;H**</td>
</tr>
<tr>
<td>Using the assessment portal makes it easier to track patient progress over time.</td>
<td>3.57 (.92)</td>
<td>3.40 (1.14)</td>
<td>3.33 (.90)</td>
<td>4.13 (.64)</td>
<td>ns</td>
</tr>
<tr>
<td>I'd find value in the assessment portal if it assessed areas other than depression, anxiety, and QOL.</td>
<td>3.50 (.63)</td>
<td>3.20 (.44)</td>
<td>3.47 (.74)</td>
<td>3.75 (.46)</td>
<td>ns</td>
</tr>
<tr>
<td>Tracking PROs is important in my day-to-day care and treatment for patients.</td>
<td>3.96 (.79)</td>
<td>4.20 (.83)</td>
<td>3.67 (.81)</td>
<td>4.38 (.51)</td>
<td>ns</td>
</tr>
<tr>
<td>Using the assessment portal places an unreasonable demand on my daily practice.</td>
<td>2.50 (.69)</td>
<td>2.80 (.83)</td>
<td>2.60 (.73)</td>
<td>2.13 (.35)</td>
<td>ns</td>
</tr>
<tr>
<td>I feel confident using the assessment portal to track patient progress and inform treatment.</td>
<td>3.29 (.71)</td>
<td>2.80 (.83)</td>
<td>3.13 (.51)</td>
<td>3.88 (.64)</td>
<td>ns M&lt;H* L&lt;H*</td>
</tr>
<tr>
<td>Having access to the assessment portal on my mobile device would increase my use.</td>
<td>3.61 (1.19)</td>
<td>3.60 (1.14)</td>
<td>3.67 (1.04)</td>
<td>3.50 (1.60)</td>
<td>ns</td>
</tr>
<tr>
<td>I would be more likely to use the assessment portal if it was integrated into our EHR system.</td>
<td>3.86 (.89)</td>
<td>4.20 (.83)</td>
<td>3.47 (.83)</td>
<td>4.38 (.74)</td>
<td>ns M&lt;H* ns</td>
</tr>
<tr>
<td>I am confident that patient confidentiality will be maintained when using the assessment portal.</td>
<td>3.29 (.65)</td>
<td>3.20 (.83)</td>
<td>3.40 (.63)</td>
<td>3.13 (.64)</td>
<td>ns</td>
</tr>
<tr>
<td>I am interested in learning or improving the skills necessary to use the assessment portal.</td>
<td>3.75 (.75)</td>
<td>3.80 (.83)</td>
<td>3.93 (.59)</td>
<td>3.38 (.91)</td>
<td>ns</td>
</tr>
<tr>
<td>I have sufficient time to administer and interpret assessments using the portal.</td>
<td>3.29 (.97)</td>
<td>3.40 (.89)</td>
<td>3.00 (.84)</td>
<td>3.75 (1.16)</td>
<td>ns</td>
</tr>
</tbody>
</table>

Note. Scores based on 5-point Likert scale (0=strongly disagree, 5=strongly agree). Scores are represented in mean (M) and standard deviation (SD). ns=ANOVA not significant; *p<.05; **p<.01; ***p<.001. L=low users (used one function); M=moderate users (used 2-3 functions); H=high users (used >3 functions).
reported that the assessment portal was less cumbersome to use in comparison to reports by both Moderate users (p=.020) and Low users (p=.033). High users, compared to Low users, also reported less of a need to learn things prior to using the portal (p=.014).

**Intervention-Level Characteristics: Functions of the Portal**

Of 11 items listed for the intervention-level characteristics section of the questionnaire (Table 20, p. 101), users generally reported that the most straightforward functions were locating the portal on the EBBP website (M=3.87, SD=.86) and creating a portal user account (M=2.07, SD=1.1). One-way ANOVAs revealed significant differences between Low, Moderate, and High users for adding patients to the online tracking portfolio (F[2,26]=19.67, p<.001), administering CATs in real-time (F[2,26]=19.54, p<.001), and using the outcome graphs (F[2,26]=9.81, p=.001). The online tracking portfolio was perceived as significantly more difficult to use by Moderate users (p<.001) and Low users (p=.03) in comparison to High users. Moderate users, when compared to High users, reported they experienced greater difficulty administering CATs in real-time (p=.003), and more strongly agreed that the graphical displays of outcome data were not well-integrated (p=.006).

**Individual-Level Characteristics: Participant Knowledge, Attitudes, and Self-Efficacy**

The individual-level characteristics section of the questionnaire contained 14 items that evaluated self-reported user knowledge, attitudes, and self-efficacy regarding the portal (Table 21, p. 102). Users, in general, most strongly agreed with the following two items: “Tracking PROs is important in my day-to-day care and treatment for patients” (M=3.96, SD=.79), and “I would be
more likely to use the assessment portal if it was integrated into our EHR system” (M=3.86, SD=.89). One-way ANOVAs revealed significant between-group differences for perceived value of the assessment portal in clinical practice (F[2,25]=7.97, p=.002), subjective confidence in using the portal to track patient progress (F[2,25]=5.71, p=.009), and likelihood of using the portal if it was integrated into an EHR system (F[2,25]=3.82, p=.036). High users, in comparison to Moderate users, reported a significantly greater likelihood of using the portal if it was embedded in an existing EHR system (p=.04). Low users agreed more strongly than Moderate users (p=.02) and High users (p=.003) that the "portal is of limited value in clinical practice. In terms of their subjective confidence in using the assessment portal to track patient progress, High users reported greater confidence relative to Moderate users (p=.03) and Low users (p=.01).

**Phase 2: Qualitative Analysis**

Of the 41 users who completed Phase 1 of the present study, nine consented to completing follow-up telephone interviews for Phase 2. Seven of the nine users were female. Most were High users (n=5), while the remaining were Moderate (n=2) and Low users (n=2). The majority of users were psychologists (n=6), while the remainder were in nursing (n=1) and social work (n=2). In terms of academic degrees, there was a broad range: 3 BA/BS (21.4%), 1 MA/MS (11.1%), 2 MSW/LCSW (22.2%), 2 PhD (22.2%), and 1 Other (11.1%).

*Which Themes Are Related to Engagement in the Assessment Portal?*

In qualitative analyses, a total of 352 codes were applied and theme saturation was reached at nine users. Initial coding structure was based on intervention-level characteristics and individual-level characteristics, two domains shown to influence engagement in a program or
intervention (Damschroder et al., 2009). The coding structure was composed of dominant codes, which represented broad categories (e.g., “Assessment Portal Characteristics”) and sub-axial codes, which represented detailed categories within dominant codes (e.g., “Logging Out”).

In Framework Method and thematic analyses, three primary themes and 10 sub-themes emerged from the coded excerpts. Primary themes were (1) Usability, (2) Assessment Portal Characteristics, and (3) User Characteristics. The 10 sub-themes were (1) Positive usability experiences, (2) Negative usability experiences, (3) Perceived purpose of the assessment portal, (4) Usability on mobile devices, (5) Outcome graphs, (6) Computer Adaptive Tests (CATs), (7) Entry and exit functions, (8) Training and knowledge, (9) Attitudes about patient assessment, and (10) Self-efficacy for portal implementation.

Table 22 (p. 107) summarizes the number of users and the number of excerpts associated with each theme and sub-theme. It should be noted that the total number of users or excerpts for a theme does not necessarily equal the sum of the corresponding sub-theme, as one excerpt could be coded with multiple themes and sub-themes. To illustrate themes and sub-themes, representative quotes are provided from users. To increase readability, repeated words have been deleted from users’ quotes. Ellipses were used to indicate places where portions of a quote have been skipped. Otherwise, quotes are presented verbatim.

Which Usability Factors Improve Engagement in the Assessment Portal?

First, we examined users’ perceptions of the overall usability of the assessment portal. In general, most participants (90%) described positive usability experiences. Excerpts coded for “Positive Experiences” contained terms such as “really straightforward” (User 6, Female, Social Work, LSW/LCSW, High) and “easy” (User 8, Female, Psychology, BA/BS, High). In general,
usability findings from Phase 2 appear to align with the quantitative data from Phase 1 in which participants generally agreed that the portal was “easy to use” (Table 9, p. 37). The following description in Phase 2 exemplified users’ common application of the sub-theme Positive Experiences:

I thought it was really easy to use. It was really user-friendly, and I felt like I could go in there without having a lot of — or any training at all and just kind of navigate and figure it out. I didn't really find any negatives about it just because it was very clear. (User 5, Female, Psychology, MA/MS, Moderate)

Without prompting, two users in Phase 2 discussed the perceived usability of the assessment portal from the perspective of patients, rather than clinicians. In general, perceived usability for patients was reported as positive, particularly in regards to access and use of CATs. The following description exemplified users’ application of the sub-theme Positive Experiences from the patient perspective:

It’d be very convenient. I guess just thinking about my patients at the clinic — it would be very simple for them to access […] It’s really just an e-mail and they access it through that. Sometimes dealing with certain populations, I’m concerned with more of the technology side, and then also the access side. But now since access to the Internet is pretty available and it was pretty simple for them — it would be pretty simple for them to open it up. It seems like it will be a more feasible option than some of the other options out there, where patients would really have to create an account. (User 8, Female, Psychology, BA/BS, High)

Six users, however, described neutral or negative usability experiences with the portal. Analyses in Phase 1 of the current study revealed that users who had less familiarity with the portal reported that it felt “cumbersome” and “inconsistent”, and they endorsed a perceived need for technical support and to “learn a lot of things” before using the portal (Table 16, p. 64). In Phase 2, the majority of users (n=6) described challenges navigating the portal because of a reported lack
Table 22. Themes and Sub-themes for Assessment Portal Interviews

<table>
<thead>
<tr>
<th>Theme and sub-theme</th>
<th>Excerpts, n</th>
<th>Users, n</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Usability</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positive experiences</td>
<td>40 (4.44)</td>
<td>9</td>
</tr>
<tr>
<td>Negative experiences</td>
<td>26 (4.33)</td>
<td>6</td>
</tr>
<tr>
<td>Purpose of portal</td>
<td>22 (2.75)</td>
<td>8</td>
</tr>
<tr>
<td>Mobile devices</td>
<td>30 (3.75)</td>
<td>8</td>
</tr>
<tr>
<td><strong>Portal Characteristics</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Graphs</td>
<td>21 (4.20)</td>
<td>6</td>
</tr>
<tr>
<td>CATS</td>
<td>32 (5.33)</td>
<td>6</td>
</tr>
<tr>
<td>Entry and exit functions</td>
<td>28 (4.00)</td>
<td>7</td>
</tr>
<tr>
<td><strong>Participant Characteristics</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Training and knowledge</td>
<td>22 (3.14)</td>
<td>7</td>
</tr>
<tr>
<td>Attitudes about patient assessment</td>
<td>79 (9.88)</td>
<td>8</td>
</tr>
<tr>
<td>Self-efficacy for portal implementation</td>
<td>29 (4.14)</td>
<td>7</td>
</tr>
</tbody>
</table>

Note. For the number of excerpts, the number in parentheses is the average number of excerpts provided per user. “Positive experiences” = User describes their experience as user-friendly, easy, enjoyable, and/or other favorable descriptors. “Negative experiences” = User describes their experience as frustrating, confusing, difficult to navigate, lacking instruction, time-consuming, and/or other critical descriptors. “Purpose of portal” = User reports perceived purpose of portal. “Mobile Devices” = User reports portal compatibility with a mobile device. “Graphs” = User identifies results, graphs, or elements of graphs. “CATs” = User reports perceived experience completing CATs. “Entry and Exit” = User identifies initiating and/or exiting use of portal. “Training and knowledge” = User reports aspects of training or orientation. “Knowledge and attitudes about patient assessment” = User reports attitudes/beliefs about assessment using CATs. “Self-efficacy for portal implementation” = User reports aspects related to self-efficacy to use portal.

of instructions or “intuitive flow” of the portal. The following description exemplified users’ application of the sub-theme Negative Experiences:

I did think it was a little odd just because it didn’t seem natural. It may also have been that there was a lack of instructions or something that just made it feel like a little bit of a problem. But […] it’s like — it’s so simple that once you know how to use it, it’s not going to be like a constant struggle, you know what I mean? But I did feel like it could have been a little more intuitive just to begin with. (User 4, Male, Psychology, BA/BS, Low)
Most users (n=8) also commented on the usability of the portal on mobile platforms (i.e., smartphones and tablets). Seven of those users perceived mobile platforms as a way to improve access and convenience of the assessment portal. Still, several users (n=3) described the importance of tailoring the design and functions of the assessment portal for the intended mobile platform. The following description exemplified users’ application of the sub-theme Mobile Devices:

My word of caution is if it were to be to another platform that it be designed for that platform because it gets more overwhelming and upsetting to people if it’s just like a web page on an app — like people don’t like it, it doesn’t work well, they start clicking the wrong buttons. It would be great if it was actually adapted for that purpose. (User 2, Female, Social Work, LSW/LCSW, High)

*Which Intervention-Level Characteristics Improve Engagement in the Assessment Portal?*

Three sub-themes that emerged within the dominant theme of Assessment Portal Characteristics included: 1) computer adaptive tests (CATs) (n=32 excerpts), 2) outcome graphs (n=21 excerpts), and 3) overarching drawbacks, most notably locating the assessment portal within the EBBP website and logging out of the assessment portal (n=28 excerpts).

Most users (n=6) viewed CATs ambivalently. In terms of perceived advantages, users (n=6) noted the brevity and precision of CATs without sacrificing quality of information. Users described having worried about burdening their patients with administration of longer, traditional assessment measures, and they viewed CATs as a potential solution to reducing patient burden. The following descriptions exemplified users’ positive application of the sub-theme CATs:

I appreciate them because I feel like if I was going to use them I wouldn’t want to be burdening people. So having something that’s computer adaptive that can be finished in four or five questions rather than taking ten is useful. (User 1, Female, Psychology, BA/BS, Moderate)
I like the idea that they can be so short and still get at things that longer measurements get at — at least that’s my understanding. [...] I think it’s a good use of technology to, you know, make filling out these assessments shorter and easier and still get the information you need. (User 4, Male, Psychology, BA/BS, Low)

However, some users (n=5) also described perceived drawbacks related to CATs. This finding seems to align with quantitative data from Phase 1 in which participant ratings for CATs and outcome graphs were generally neutral or negative, particularly among users who engaged with more functions of the portal. In Phase 2, one user reported that the limited number of CATs offered on the portal was a drawback. (The portal currently contains three CATs to assess depression, anxiety, and quality of life.) Several users (n=2) also reported drawbacks related to target population (the portal currently offers measures for only adults, not children), which reportedly limits the extent to which the portal can be useful for clinicians. User 3 (Female, Psychology, PhD, High), for example, described the implications of having only three available CATs: “[...] with only […] depression, anxiety, and quality of life, there are other measures that would obviously still be paper-pencil versions.” Another user suggested concern about confidentiality when using the email function for administering CATs:

The email use […] kind of made me concerned that somehow the data would be less secure. I don’t use e-mail with patients anyway, so I guess it’s not a concern of how it would work, but I think that the reality is — I think I would not use that feature as much with an actual patient for the way I work with patients. (User 7, Female, Nursing, Other, Low)

Of the six users who provided excerpts for CATS, the majority (n=5) described concerns about their novelty in comparison to traditional measures used in clinical practice, such as the Beck Depression Inventory or Patient Health Questionnaires. While most users (n=6) reported appreciating the brevity and flexibility of CATs for their convenience and perceived patient
engagement, a common complaint was not being able to access specific items of the CATs that could be used for tailored feedback or treatment modifications. Furthermore, while users seemed to appreciate the outcome graphs of the assessment portal, they expressed confusion about how to clinically apply the explanatory text for the scores of the outcome graphs. The following description exemplified users’ co-application of the sub-themes CATs and Graphs:

I could tell you what a PHQ score of 15 […] means without even really knowing where they are in the general population, which is how it’s given back to me. So when I got my score back, like “This person is really high compared to the general population” or “This person is not too bad compared to the general population with depression”, I felt slightly at a loss as to what I would do with that clinically because I’m probably not even looking at my patients in terms of how they compare to the general population very early in treatment to begin with. (User 3, Female, Psychology, PhD, High)

Finally, seven users identified problems with initiating the assessment portal (e.g., finding it on the EBBP website) and exiting the assessment portal (e.g., logging-out). Users reported the absence of a log-out button on the assessment portal to be associated with a perception of reduced confidentiality and security of patient health information. This is in line with quantitative data from Phase 1 related to logging out, in which users generally rated the log-out process as slightly negative (Table 17, p. 68). The following description exemplified users’ application of the sub-theme Entry and Exit:

A log-out [button] […] feels secure even though it does the exact same thing if you just exit out of the page. So, probably, if I was actually dealing with patient data, I’d want that if it were available. I guess that I would want to know upfront that in order to log out, you just exit out of the page […]. (User 7, Female, Nursing, Other, Low)

### Which Individual-Level Characteristics Improve Engagement with the Assessment Portal?

Three sub-themes emerged within the dominant theme of Individual-Level Characteristics, including (1) Training and Knowledge, (2) Attitudes about Patient Assessment, and (3) Self-
Efficacy for Portal Implementation. Six users (67%) provided excerpts related to knowledge about CATs, and all of these users reported having limited knowledge. Although they reported being familiar with the acronym, these users described being unfamiliar with the clinical application of CATs. They also reported confusion regarding the graphs that displayed the outcome scores of the CATs. Phase 1 analyses, particularly among Low users, reported a similar lack of familiarity with CATs (Table 11, p. 40). Users in Phase 2 (n=5) described uncertainty about how to effectively administer CATs over time and then meaningfully translate the results for patients and other clinicians. The following description exemplified users’ application of the sub-theme Training and Knowledge:

I would want some examples of how the adaptive testing works and, really, how someone can be getting more questions or one question versus another and based on that — like if my clients are going to be asked more questions — how am I going to be able to get my hands all over that and figure out why they got a certain type of adaptive test. (User 2, Female, Social Work, LCSW, High)

Despite users’ reported unfamiliarity with how to use and apply CATs, their attitudes about integrating them into clinical practice were generally positive. Overall, most users (n=8) reported that they valued tracking patient progress using clinical measures, including CATs. They described the utility of the portal as a viable and more objective way of tracking patient progress for both clinicians and patients, as well as a means of informing treatment plans. These findings seem to align with Phase 1 results in which users agreed most strongly with the statement: “Tracking PROs is important in my day-to-day care and treatment for patients” (Table 18, p. 99) The following descriptions in Phase 2 exemplified users’ application of the sub-theme Attitudes about Patient Assessment:
I mean the value […] for tracking depression, anxiety, or quality of life is it gives some kind of picture of whether the patient’s improving — whether therapy is working. So I see some value in that. I didn’t do multiple time points over multiple days, but I’m imagining […] I could have different things that track over time. People are definitely into seeing the trends over time, and I would think that that would actually be — it might be really useful to be able to share that information back to the patient in some cases to show them where they’re at. (User 4, Male, Psychology, BA/BS, Low)

The more data I think I have at hand, probably the easier it’s going to be to see, “Okay, well, either this intervention is working or either not and we’ve regressed”. And it’s hard to sort of get that. I’d like to think that I’m objective, but the reality is I probably think that I'm a better clinician than what I am. (User 9, Male, Psychology, PhD, High)

In terms of users’ self-efficacy to implement the portal in their day-to-day practices, seven users (77.8%) commented on overall implementation of the portal. They described CATs and the outcome graphs as having the potential to be most helpful in reducing perceived burden and streamlining the process of tracking patient progress over time. For example, one user commented, “I see value in the graph just because that makes it easy to visualize all that without having to do any extra work” (User 4, Male, Psychology, BA/BS, Low). The following descriptions exemplified users’ application of the theme Self-Efficacy for Portal Implementation:

I think that [CATs] would be really helpful. The current way I do it in the clinic with my patients is obviously using paper and pencil measures. And so that can get to be a lot of paper work. I can see where using an online type assessment would be really helpful. I can also see — right now everything I'm doing is by hand in terms of a summary report whenever I want to compare measures over time. I can see it being helpful if you want to track progress over time. (User 3, Female, Psychology, PhD, High)

Let’s say I see a client this week who has expressed some concerns and then over the next few weeks does not express those concerns and comes back six weeks later and has expressed those concerns again. If I can review and follow and trace the patient electronically, it might help me over the time of those eight weeks to determine a better outcome or maybe we need to reset goals or try a different intervention. I just think it would be easier to track that way. (User 6, Female, Social Work, MSW/LCSW, High)
Phase 1 users, in general, agreed that integrating the portal into a pre-existing EHR system would increase the likelihood they would use the portal (Table 18, p. 99). Most users in Phase 2 (n=7) acknowledged the EHR as a viable means through which the portal could be used to track patient outcomes and provide tailored care. They acknowledged that contemporary patient care is often multidisciplinary, and having the portal within the EHR would be an efficient way to use the portal for patient care and treatment coordination. For example, one user noted, “I was just thinking the portal in the [EHR] would be nice for tracking purposes. Then […] other providers could see the data, as well” (User 7, Female, Nursing, Other, Low). The following description exemplified users’ application of the sub-theme Self-Efficacy for Portal Implementation regarding the EHR:

If it was not embedded [in the EHR] then it would just be up to the personal preferences of the clinicians themselves as to whether or not they wanted to take the time to incorporate their files into the portal. It may be time-consuming, and it may not serve the purpose, unless that particular clinician just wanted it stored on that database electronically. It would seem like it would be more purposeful if it was embedded, especially where things are moving to multi-disciplinary care — information shared between a physician, or a psychologist, or a psychiatrist. (User 6, Female, Social Work, LSW/LCSW, High)

Most users (n=7) also acknowledged that embedding the portal in the EHR could improve actual and perceived confidentiality and security of patient health information contained in the assessment portal (34.4% of the excerpts coded with “Self-Efficacy for Portal Implementation”). The following description exemplified users’ application of the sub-theme Self-Efficacy for Portal Implementation regarding confidentiality:

It also might make it more secure because if you’re part of the EHR, you have to be HIPAA compliant; you have to have security aspects to it. I feel like there’s a lot more riding on privacy, so that would make it more secure probably. You could also limit who accesses and creates stuff in it. Since right now, it seems like anyone can go in there and
create something, and then send it to anyone, and that could cause some risks [...] So being part of the EHR [...] would limit who could access and create things in the portal, and prevent other people just from spamming other people with it. (User 8, Female, Psychology, BA/BS, High)

Seven users commented on solutions to anticipated engagement problems. The majority (n=6) described solutions involving structured trainings on the assessment portal for the purpose of improving users’ knowledge and attitudes regarding the portal. For example, User 6 (Female, Social Work, MSW/LCSW, High) noted, “I would definitely think that training for the portal would be a very, very important part.” Users viewed training as an important aspect of portal engagement because it might improve familiarity and facility with the portal: “I did initially have a hard time navigating, so I just think that training to use the portal would be perfection in and of itself” (User 6, Female, Social Work, LSW/LCSW, High). Moreover, it might serve as a way to advertise the purpose and advantages of the portal. Most users (n=5) commented on the importance of training staff, particularly directors or those with longevity at the clinic or institution, to obtain buy-in from potential stakeholders. The following descriptions exemplified users’ application of the sub-theme Training and Knowledge:

I would probably think that the easiest way to get people on board is to implement it when the new training year begins. So [...] in July when everyone's coming — like you have thee interns, you have the social work interns, and you have the practicum students. When we're doing orientation for the clinic in general, I think that would be the best time to just kind of introduce this. (User 5, Female, Psychology, MA/MS, Moderate)

People come and go, so some sort of training manual or video that can be left at the agency will be necessary. It would need to be done with maybe the director or the head supervisor of the agency — somebody who is going to have some longevity with that agency. You wouldn't want to give all of the comprehensive training to maybe a case manager who goes from agency to agency to agency. You need somebody who can be there to train new case managers. (User 6, Female, Social Work, MSW/LCSW, High)
DISCUSSION

Clinicians report substantial barriers to integrating patient assessments into standard clinical practice, including time-burden and low self-efficacy (Pagoto et al., 2007; Woody et al., 2005). While brief, precise measures exist in the form of computer adaptive tests (CATs), it remains unclear how to best integrate CATs into clinical practice (Wu et al., 2013). This study conducted a two-phase mixed-methods evaluation comprised of a quantitative questionnaire (Phase 1) and follow-up telephone interview (Phase 2) to assess user experiences with a novel web-based assessment portal that utilizes CATs for patient depression, anxiety, and quality of life.

The purpose of this study was to determine how intervention-level characteristics and individual-level characteristics are related to user engagement in the portal. Intervention-level characteristics included specific usability aspects and functions of the portal, such as registration for the portal, visualization of patient data, and logging out of the portal. Individual-level characteristics comprised user knowledge, attitudes, and self-efficacy. It was hypothesized that ratings of both intervention- and individual-level characteristics would be positively associated with user engagement with the portal (i.e., users with higher engagement report more positive ratings of intervention- and individual-level characteristics).

Phase 1 (quantitative) results for intervention-level characteristics revealed significant differences between levels of user engagement (i.e., between Low, Moderate, and High users). In terms of overall usability of the portal, High users, compared to Low and Moderate users, agreed more strongly that the functions of the portal were well-integrated and that the portal was straightforward to navigate. Further, High users more strongly denied a need to learn things prior to using the portal, suggesting the importance of prior technical knowledge for engagement with web-based assessment tools. In terms of specific functions of the portal, Low and Moderate users,
compared to High users, reported greater difficulty in using the following functions: adding patients to the online portfolio, administering CATs in real-time, and using the outcome graphs.

This reported difficulty found in Phase 1 may be explained by a perceived lack of instructions or “intuitive flow” described by Phase 2 interviewees. Users in Phase 2 also reported limitations in the outcome measures and populations being assessed by the CATs, which may also explain the moderately negative ratings after using the online patient portfolio, administering CATs in real-time, and exploring the outcome graphs. The portal currently offers three CATs to assess adult depression, anxiety, and quality of life. In its current form, the portal cannot be used to assess adolescent and child populations nor any clinical domains other than depression, anxiety, and quality of life. Although nearly all Phase 2 users reported positive attitudes toward the brevity and flexibility of the CATs, they described concerns accessing specific items of the CATs that could be used for tailored feedback or treatment modifications. While most users reported positive attitudes regarding the use of the outcomes graphs of the portal, they expressed confusion about how to clinically apply the explanatory text of the outcome scores.

These findings are in line with previous research on users’ attitudes and self-efficacy regarding web-based systems that collect patient-reported outcomes (PROs). Many of these studies have shown that users are concerned with how PRO results can be applied clinically, and that web-based PRO collection applications have begun addressing the way in which PRO results are presented to users (e.g., Jones et al., 2007; Porter et al., 2016). Similarly, PROMIS, the web-based system that produced the CATs used in this study, provide crosswalk solutions to help users take advantage of the measurement properties while maintaining continuity from previous evidence-based assessment instruments (e.g., the Beck Depression Inventory II). In other words,
incorporating cross-walks into the current portal may address users’ concerns about interpreting and effectively using specific items of the CATS for improved patient care.

Phase 1 quantitative results also revealed significant differences in individual-level characteristics between Low, Moderate, and High users. Low users agreed more strongly than Moderate and High users that the "portal is of limited value in clinical practice." High users, in comparison to Moderate users, reported a greater likelihood of using the portal if it was embedded in an existing electronic health record (EHR) system. In terms of their subjective confidence in using the assessment portal to track patient progress, High users reported greater confidence relative to Moderate and Low users. These findings suggest that positive attitudes and greater self-efficacy may be associated with enhanced engagement with the assessment portal.

Although the majority of Phase 2 users reported having limited knowledge of CATs, they generally described positive attitudes regarding the portal, which was in line with Moderate and High users of Phase 1 who, compared to Low users, reported a more positive attitude regarding the portal’s clinical utility. Most users in Phase 2 reported that they valued tracking patient progress using CATs. They described the portal as a viable and more objective way of tracking patient progress for both clinicians and patients, as well as a means of informing treatment plans. Phase 2 users described CATs and the outcome graphs as having the potential to be most helpful in reducing perceived burden on providers and patients by streamlining the process of tracking patient progress over time. Several users in Phase 2 described the graphs as useful in making outcomes easy to interpret by providing simple and colorful visuals. Further, like those of Phase 1, Phase 2 users generally acknowledged the EHR as a viable means through which the portal could be used to track patient outcomes and provide tailored care. Moderate and High users in Phase 2 reported that contemporary patient care is often multidisciplinary, and having the portal
within the EHR would be an efficient way to use CATs for patient care and treatment coordination. Most users in both Phases also acknowledged that embedding the portal in the EHR could improve privacy and confidentiality of patient health information.

These findings regarding usability and users’ knowledge, attitudes, and self-efficacy with CATs appear in line with prior studies examining health providers’ engagement with web-based PRO assessments. Wu and colleagues (2013), for example, conducted a “review of the current state of PRO measures” on web-based platforms. They identified “key barriers and enabling factors”, which included intervention-level factors (e.g., lack of design integration) and individual-level factors (e.g., time constraints, lack of familiarity, negative attitudes, and lack of self-efficacy and outcome expectancy). Another study found that successful web-based PRO collection applications need to address clinician-specific needs related to workflow and the way in which results are presented (Jones et al., 2007).

Findings from Phases 1 and 2 of this study regarding users’ positive attitudes regarding the use of CATs appears somewhat divergent from existing literature on patient-reported outcomes and technological innovation. Studies have produced mixed findings regarding clinicians’ attitudes toward implementing traditional (i.e., paper-based) PRO assessments to track progress and inform clinical decision-making (Lohr and Zebrack, 2009; Holden and Karsh, 2010), and several studies have suggested that clinicians continue to question the usefulness of CATs data for clinical practice (Rose and Bezjak, 2009). Recent findings have also shown that clinicians report ongoing uncertainty in their capacity to successfully integrate web-based assessment instruments, such as CATs, into daily workflow procedures, largely attributing it to their belief that the data produced from CATs would be of little value to clinical care (Snyder et al., 2012).
The present study is unique in that it examined both quantitatively and qualitatively providers’ perceptions of using an online CATs-based assessment portal to longitudinally track patient outcomes of depression, anxiety, and quality of life. While previous empirical investigations regarding the use of web-based PROs have examined providers’ perceptions, they have largely been limited to quantitative evaluations that focused on traditional web-based PROs (i.e., not CATs) specifically in the context of an EHR (e.g., Wu et al., 2013).

There are four main limitations that warrant consideration regarding the current research. First, the findings must be interpreted within the limitations of mixed-methods research. Although the information provided by Phase 2 interviews was judged to be saturated using the current sample size, the number of users was insufficient to make strong inferences about group differences. Nonetheless, the sample size of Phase 2 interviews was in line with previous qualitative studies (Parkinson, G., & Drislane, R., 2011). A second limitation was the potential for selection bias given the method of recruitment, such that users with higher intrinsic motivation may have been more likely to participate in the study, potentially skewing perceptions of the portal. Third, the cross-sectional study design was another limitation that prevented making conclusions about causality nor understanding users’ experience with the portal over time. Finally, the portal, in its current form, provides CATs to assess only depression, anxiety, and quality of life among an adult population, preventing providers from using the portal to assess other physical and mental health domains among adults and any domains for adolescents and children.

Future mixed methods evaluations of online CATs-based assessment portals would benefit from longitudinal study designs to assess causal relationships between individual-level characteristics and engagement. Future evaluations would also benefit from study designs that, like the current study, incorporate domains of the CFIR throughout the research process, including
study design, data collection, and data analysis. Including additional domains of the CFIR in the evaluable framework, including outer setting, inner setting, and process (Damschroder et al., 2009), might add depth and thoroughness to the research protocol, and provide additional perspectives on user engagement. Evaluating outcomes using larger, more diverse samples would also improve generalizability and statistical power of the findings. Future studies would be more thorough and improve generalizability by incorporating CATs that assess patient domains beyond depression, anxiety, and quality of life for different age ranges. Given user preferences for embedding the portal in an EHR, future studies would benefit from evaluating engagement of the portal within the context of a pre-existing EHR system. Finally, supplementing self-report outcomes with more objective behavioral outcomes would allow for stronger conclusions to be made regarding the relationship between individual-level characteristics and other engagement domains.

--CONCLUDING REMARKS--
Despite numerous benefits and strong policy support of EBBP, findings indicate that clinicians generally fail to implement EBBP in standard clinical practice due to a lack of knowledge, negative attitudes, and low self-efficacy associated with an absence of resources (Harrison et al., 2010; Rainbird et al., 2006; Pagoto et al., 2007). Web-based resources that strive to improve compliance with the steps of EBBP, including asynchronous learning programs and CATs, have recently been disseminated. Are asynchronous web-based training modules effective in improving users’ knowledge, attitudes, and self-efficacy regarding EBBP? Which factors reduce attrition of asynchronous training modules? What are users’ perceptions regarding a clinician portal that uses CATs to assess patient outcomes? How do we optimize engagement in such a portal? These are the questions addressed by this dissertation, a portion of Northwestern University’s EBBP Project (www.ebbp.org), which strives to provide theory-driven, innovative training resources and clinical tools to bridge the gap between behavioral research and practice.

The overarching goal of this dissertation was to contribute to the ongoing evaluation and optimization of the EBBP Project, and web-based resources in general, by conducting summative and implementation-focused formative evaluations of the EBBP training modules (Aims 1 and 2) and assessment portal (Aim 3). We hypothesized that users who complete the training modules will improve scores from pre to post on knowledge, attitudes, and self-efficacy for each module, and that change in module scores will vary significantly by user degree, professional discipline, and number of modules completed (Aim 1). We also hypothesized that users will identify individual-level and intervention-level characteristics, two major domains of the CFIR (Damschroder et al., 2009), as barriers and facilitators of engagement with both the training modules (Aim 2) and the assessment portal (Aim 3).

In STUDY 1, we addressed Aim 1 and assessed the effectiveness of the EBBP training
modules on user knowledge, attitudes, and self-efficacy (n=10,083), and whether those outcomes varied by user characteristics (i.e., degree, professional discipline, and number of modules completed). Findings concluded that there exists a heightened interest and use of asynchronous, web-based training modules about EBBP in social work and psychology, and that these modules can produce short-term improvements in knowledge and self-efficacy about EBBP, while attitudes appear somewhat more resistant to short-term change. Overall, however, attrition continues to be a challenge.

In STUDY 2, we addressed Aim 2 and, using a mixed-methods approach, evaluated how intervention-level and individual-level characteristics were associated with different levels of user engagement with the EBBP training modules, potentially providing insight into ways in which to reduce attrition. Findings revealed that specific instructional guidance and interactive features of the training modules, coupled with user technical knowledge, are particularly important characteristics that may improve engagement in asynchronous web-based training modules.

In STUDY 3, we addressed Aim 3 and, using mixed-methods analyses, evaluated how intervention-level and individual-level characteristics were associated with different levels of user engagement with the CATs-based assessment portal. Results revealed that incorporating explicit instructions, a log-out button, and CATs cross-walks, coupled with addressing users’ technological literacy and perceptions of patient confidentiality, may be important characteristics to improving engagement with a CATs-based assessment portal.

In conclusion, findings from this dissertation provide valuable information on the short-term effectiveness of asynchronous web-based modules, and specific design and user characteristics that may contribute to engagement with online training and clinical tools for EBBP.

REFERENCES


Flood, J. (2002). Read all about it: online learning facing 80% attrition rates. TOJDE, Vol 3(2).


**APPENDIX**
Appendix A. Pre-module assessment for training modules
Section 1. Demographics

a. Sex

<p>| | |</p>
<table>
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<td>Male</td>
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<td></td>
<td>Female</td>
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<td>Other</td>
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b. Age

   

c. Field of Study

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<td>Public Health</td>
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<td>Social Work</td>
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<td>Medicine</td>
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<td></td>
<td>Psychology</td>
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<td></td>
<td>Nursing</td>
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<td>Other: __________________________</td>
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d. Degree

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<td></td>
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<td>MA/MS/MEd</td>
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<td>MSW</td>
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<td>MPH</td>
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<td>DO</td>
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<td></td>
<td>DrPH</td>
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</table>
Section 2: Self-Efficacy

Instructions: Please circle the number to the right of each item to that best describes your level of confidence.

How confident are you in your ability to...

<table>
<thead>
<tr>
<th></th>
<th>Not Very Confident</th>
<th>Very Confident</th>
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</thead>
<tbody>
<tr>
<td>1.</td>
<td>skillfully apply the steps of the EBBP process?</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>2.</td>
<td>formulate questions about practice that can be answered with research evidence?</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>3.</td>
<td>find the best research evidence to guide my practice decisions?</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>4.</td>
<td>appraise the research evidence pertaining to my practice question?</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>5.</td>
<td>differentiate between very weak evidence and strong evidence?</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>6.</td>
<td>evaluate and adjust the outcomes of my practice decisions?</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>7.</td>
<td>make decisions that integrate the best research evidence, client/population characteristics, and available resources?</td>
<td>1 2 3 4 5</td>
</tr>
</tbody>
</table>

Section 3: Attitudes about EBBP

Instructions: Please circle the number to the right of each item that best describes your level of agreement with the statement provided.

<table>
<thead>
<tr>
<th></th>
<th>Strongly Disagree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>EBBP is nothing more than a way to cut treatment costs.</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>2.</td>
<td>EBBP helps improve clients' outcomes.</td>
<td>1 2 3 4 5</td>
</tr>
</tbody>
</table>
3. Engaging in EBBP hinders the use of practitioner judgment.  

4. The EBBP process allows enough room for considering unique client circumstances or preferences.  

5. The judgment of esteemed colleagues or supervisors offers a better basis than research evidence for improving practice effectiveness.  

6. Trying to engage in EBBP is more ethical than not engaging in it.  

7. I know what is best for my client/communities without examining the research evidence.  

8. EBBP is not practical in day-to-day practice.  

Section 4: Knowledge  
Instructions: Please circle the item that best answers the question provided.  

1. Evidence based behavioral practice is defined as...  
a. a cookbook intervention manual to guide decision making about behavioral health interventions for individuals and populations.  
b. a framework to guide decision making about behavioral health interventions for individuals and populations.  
c. a series of steps to help find research evidence.  
d. a framework to guide the assessment of a problem for individuals and populations.  

2. There are numerous benefits to engaging in EBBP. Which of the following does NOT represent one of the outcomes of adopting EBBP?  
a. Encouraging the use of empirically-supported treatments  
b. Evaluating client preferences and/or population data in the decision-making process  
c. Bridging the gap between research and practice  
d. Emphasizing clinical expertise over clients’ preferences throughout the decision-making process
3. The EBBP Process model is comprised of three domains that need to be taken into account when working with clients and/or communities in a context-sensitive manner. What are the three domains?

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<thead>
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<tbody>
<tr>
<td>a.</td>
<td>Clinical expertise, systematic reviews, and client/population characteristics</td>
</tr>
<tr>
<td>b.</td>
<td>Best available research evidence, client/population characteristics and preferences, and available resources</td>
</tr>
<tr>
<td>c.</td>
<td>Environmental context, guidelines, and clinical expertise</td>
</tr>
<tr>
<td>d.</td>
<td>Client characteristics and preferences, systematic reviews, and available resources</td>
</tr>
</tbody>
</table>

4. In what order are the steps of the EBBP process?

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<tbody>
<tr>
<td>a.</td>
<td>Research, Inquire, Apply, Evaluate</td>
</tr>
<tr>
<td>b.</td>
<td>Acquire, Appraise, Ask &amp; Apply, Analyze, Adjust</td>
</tr>
<tr>
<td>c.</td>
<td>Ask, Acquire, Appraise, Apply, Adjust &amp; Analyze</td>
</tr>
<tr>
<td>d.</td>
<td>Inquire, Research, Apply, Evaluate</td>
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5. You have been referred a new client who wants to begin a weight loss program. Before you initially meet with the client, what types of questions would help you best organize your research into weight loss interventions and/or treatments?

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<tbody>
<tr>
<td>a.</td>
<td>Background questions</td>
</tr>
<tr>
<td>b.</td>
<td>Foreground questions</td>
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<tr>
<td>c.</td>
<td>Evaluation questions</td>
</tr>
<tr>
<td>d.</td>
<td>Diagnostic questions</td>
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</table>

6. In the scenario described in question #5, in what stage of the EBBP process is the practitioner engaging?

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<tbody>
<tr>
<td>a.</td>
<td>Ask</td>
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<tr>
<td>b.</td>
<td>Acquire</td>
</tr>
<tr>
<td>c.</td>
<td>Appraise</td>
</tr>
<tr>
<td>d.</td>
<td>Apply</td>
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7. With regard to the scenario in question #5, which of the following is an example of a foreground question?

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<tbody>
<tr>
<td>a.</td>
<td>For a motivated adult, are there any risks associated with the use of Sibutramine as a weight loss drug?</td>
</tr>
</tbody>
</table>
b. What is cognitive behavioral therapy for weight loss?

c. For a motivated adult, would cognitive behavioral therapy combined with drug therapy, as opposed to cognitive behavioral therapy alone, be more likely to result in sustained weight loss?

d. What are the most effective weight-loss strategies for a motivated adult wanting to lose weight?

8. The “appraise” step in the EBBP process involves evaluating the relevant research evidence critically for validity and applicability to the problem at hand. Which of the following questions would be the least helpful when appraising a research study?

a. Does the study specify the clinical questions and populations to whom the results apply?

b. Was the study systematic, rigorous, and timely?

c. Are the recommendations clearly stated and policy applications discussed?

d. Who was the primary investigator?

9. Which of the following types of research falls highest within the hierarchy of evidence for a question about the effectiveness of treatment?

a. Case Control Studies

b. Systematic reviews and meta-analyses

c. Quasi-Experimental Studies

d. Cohort Studies

10. You have been working together with a community organization to develop a diabetes prevention program. At present, you are moving into the “apply” stage of the EBBP Process. What should you do now?

a. Collaboratively discuss the recommended strategy with the community group.

b. Refer the community group to another grant-making organization with similar interests.

c. Implement your preferred strategy without bothering the community group.

d. Explain your choice of strategy; then go ahead and implement it.

Appendix B. Structured survey for training modules

Instructions: Please complete our survey about your experience with the online EBBP training modules for which you registered. We are interested in your experience with the training modules as we continue to refine and improve these resources. Thank you for your time!
Section 1. Demographic Information

a. Sex

[ ] Male
[ ] Female
[ ] Other

b. Age

_________

c. Field of Study

[ ] Public Health
[ ] Social Work
[ ] Medicine
[ ] Psychology
[ ] Nursing
[ ] Other: ____________________________

d. Degree

[ ] BA/BS
[ ] MA/MS/MEd
[ ] MSW
[ ] MPH
[ ] MSPH
[ ] RN
[ ] DPN
[ ] PHD
[ ] PsyD
[ ] EdD
[ ] MD
[ ] DO
[ ] DrPH
e. How often do you use the computer each week?

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<tbody>
<tr>
<td></td>
<td>Less than 1 hr/day</td>
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<tr>
<td></td>
<td>Between 1-5 hrs/day</td>
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<tr>
<td></td>
<td>More than 5 hrs/day, but less than 10hrs/day</td>
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<tr>
<td></td>
<td>10 or more hrs/day</td>
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f. Please check the boxes next to the modules you completed.

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<table>
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<tbody>
<tr>
<td></td>
<td>EBBP process</td>
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<tr>
<td></td>
<td>Search for Evidence</td>
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<td>Systematic Review</td>
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<td>Critical Appraisal</td>
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<td>Randomized Controlled Trials</td>
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<td>Shared Decision Making with Individual Patients</td>
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<td>Collaborative Decision Making with Communities</td>
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<td></td>
<td>Stakeholder Dialogue about EBBP</td>
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<td></td>
<td>Implementation of EBBP</td>
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</table>

**Section 2. Usability**

*Instructions*: For each of the following statements, mark one box that best describes your reactions to the EBBP training modules.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>Strongly Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
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<tbody>
<tr>
<td></td>
<td></td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>I think that I would like to use these training modules frequently</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>I found the training modules unnecessarily complex</td>
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<tr>
<td>3</td>
<td>I thought the training modules were easy to use</td>
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</table>
### Section 3. Intervention Characteristics

**Instructions**: For each of the following statements, please mark one box that best describes your reactions to the components of the EBBP training modules.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>Strongly Disagree</th>
<th>2</th>
<th>3</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Registering a user account and logging in was easy</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Launching a new module was overly complex</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Navigating the content and pages of the module was straightforward.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>The duration of the module (60-90 minutes) prevented me from completing the module</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Logging out of my session was very manageable</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Section 4. Individual-Level Mediators**

**Instructions:** For each of the following statements, mark one box that best describes your reactions to the EBBP training modules.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>Strongly Disagree</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>I have the technical knowledge needed to use the training modules</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>The content made it easy to navigate and complete the training modules.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Web-based training modules make it easier to access resources about EBBP</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>I am more likely to complete web-based training modules than face-to-face ones</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>I felt confident I could solve technical problems if I encountered them</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>I felt confident I could receive technical support from EBBP staff if I encountered problems</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>I would be more likely to complete these training modules if they were available on mobile devices (e.g., smartphone, tablet)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

18. Is there anything else you would like us to know that might have influenced your completing the online training modules?
Appendix C. Interview guide for Training Modules

Participant ID:
INTRODUCTION (1.5 minutes)

Hello, my name is [name of interviewer]. You had completed our online survey about the training modules on the EBBP website (www.ebbp.org). As you may know, the purpose of the modules is to help you and other graduate students or clinicians become familiar with the process and steps of EBBP, which aims to bridge the gap between research and clinical practice.

I'd like to take this time to ask you some follow-up questions to better understand your experience with the modules. Your input will help us evaluate usability and implementation of the modules. In this way, we can maximize the likelihood that the modules will be most efficient for other graduate and clinicians.

This interview will be audio-taped so that we have an accurate record of your thoughts. Please be assured that the tapes and your transcript will be kept confidential. Our study has Northwestern University IRB approval. Once your interview has been transcribed, only a site identifier will be linked to the transcripts, while any information linking you to the transcript will be destroyed. The audio recording will be destroyed as soon as the transcript is verified and analyzed by research staff.

To help ensure confidentiality, it would help if you could refrain from mentioning the name of your university, practice, or facility wherever possible, or mentioning specific names of colleagues or other staff members during the interview. If, at any time, you feel that the questions are too sensitive, I would be happy to turn off the recorder during that portion of questioning. You may also skip any questions you wish during the interview.

I also wanted to remind you that we will be giving you a $20 Starbucks gift card as a small token of our appreciation for your participation.

Do you have any questions for me? [Answer any questions]

Are you ready to begin? I'm going to start recording now.

(Part 1) WARM-UP (2 min)

First, I'd like to get a sense of your overall experience with the training modules.

- Overall impression
- Favorite part
- Least favorite part

(Part 2) USABILITY (5 min)

Next, I'd like to ask you some general questions about the characteristics and features of the modules, themselves.

- Features of modules that are complex/well-integrated/facilitate use or competence
- Amount of information
- Level of difficulty of information
- Sufficient additional/supportive educational content
- Recommendation services

- Features of modules that necessitate technical support

- Features of modules that necessitate pre-learning
(Part 3) INDIVIDUAL-LEVEL (8 min)

Next, I'd like to ask you some questions about your own perceptions and beliefs about the training modules.

- Familiarity
- Value/patient care
- Effort/time/burden
- Access and competence
- Mobile phone or tablet use
- Motivation and learning style

(Part 4) IMPLEMENTATION PROCESS (4 min)

Finally, I'd like to hear more about your thoughts regarding completion of the training modules.

- Barriers/challenges
- Facilitators
- Resources (e.g., IT help)

(Part 5) CONCLUSION (1 min)

Thank you very much for your time. Do you have any other information that you'd like to share or any questions for me?

Appendix D. Structured survey for assessment portal

Instructions: Thank you for taking the time to test our new CATs-based assessment portal on the EBBP website! We are interested in hearing about your opinion on usability and implementation of the assessment portal. Please visit www.ebbp.org/portal.html to revisit the portal if needed to answer the questions below. Thank you for your time!

Section 1. Demographics

a. Sex
b. Age

---

c. Field of Study

- [ ] Public Health
- [ ] Social Work
- [ ] Medicine
- [ ] Psychology
- [ ] Nursing
- [ ] Other: _______________________

d. Degree

- [ ] BA/BS
- [ ] MA/MS/MEd
- [ ] MSW
- [ ] MPH
- [ ] MSPH
- [ ] RN
- [ ] DPN
- [ ] PHD
- [ ] PsyD
- [ ] EdD
- [ ] MD
- [ ] DO
- [ ] DrPH
- [ ] Other: _______________________

**Section 2. Usability**
**Instructions**: Please circle the number below each item that best describes your level of agreement with the statement provided (1=strongly disagree, 5=strongly agree).

<table>
<thead>
<tr>
<th></th>
<th>Strongly Disagree</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>I think that I would like to use this assessment portal frequently</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>I found the assessment portal unnecessarily complex</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>I thought the assessment portal was easy to use</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>I think that I would need the support of a technical person to be able to use this assessment portal</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>I found that the various functions of this assessment portal were well integrated</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>I thought there was too much inconsistency in this assessment portal</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>I would imagine that most people would learn to use this assessment portal very quickly</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>I found the assessment portal very cumbersome to use</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>9</td>
<td>I felt very confident using the assessment portal</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>I needed to learn a lot of things before I could get going with this assessment portal</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Section 3. Portal Characteristics**

**Instructions**: For each of the following statements, mark one box that best describes your level of agreement regarding the assessment portal or CATs, in general (1=strongly disagree, 5=strongly agree).

<table>
<thead>
<tr>
<th></th>
<th>Strongly Disagree</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>I thought locating the portal on the EBBP website was straightforward.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>I found that creating my user account was overly complex.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Section 4. Individual-Level

**Instructions**: For each of the following statements, mark one box that best describes your level of agreement regarding the assessment portal or CATs, in general (1=strongly disagree, 5=strongly agree).

<table>
<thead>
<tr>
<th></th>
<th>Strongly Disagree</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>I am familiar with CATs assessments, including computer adaptive tests</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>I am familiar with the purpose of the CATs assessment portal</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Strongly Disagree</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>Strongly Agree</td>
</tr>
<tr>
<td>---</td>
<td>------------------</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>----------------</td>
</tr>
<tr>
<td>3</td>
<td>Using the CATs assessment portal improves patient care</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Using the CATs assessment portal is of limited value in clinical practice</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Using the CATs assessment portal makes it easier to track patient progress over time</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>6</td>
<td>I would find more value in the CATs assessment portal if it assessed areas other than those for depression, anxiety, and quality of life.</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>7</td>
<td>Tracking PROs is important in my day-to-day care and treatment for patients.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Using the CATs assessment portal places an unreasonable demand on my daily practice</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>I feel confident using the CATs assessment portal to track patient progress and inform treatment.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Having access to the CATs assessment portal on my mobile device would increase my use.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>I would be more likely to use the CATs assessment portal if it was integrated into our EHR system.</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>12</td>
<td>I am confident that patient confidentiality will be maintained when using the CATs assessment portal.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>I have sufficient time to administer and interpret CATs assessments using the portal.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Appendix E. Interview guide for assessment portal

Participant ID:

Date of Interview:

MM   DD   YY

Initials of Interviewer:

INTRODUCTION (1.5 minutes)
Hello, my name is [name of interviewer]. You had completed our online survey about the assessment portal on the EBBP website (www.ebbp.org). As you may know, the purpose of the assessment portal is to help you and other clinicians track PROs over time by providing you with a simple way to administer, interpret, and store patient assessment outcomes.
I'd like to take this time to ask you some follow-up questions to better understand your experience with the portal. Your input will help us evaluate usability and implementation of the assessment portal, and we'd like to understand the challenges and benefits of adopting the portal in your practice. In this way, we can maximize the likelihood that the portal will be most efficient for other clinicians and their patients.

This interview will be audio-taped so that we have an accurate record of your thoughts. Please be assured that the tapes and your transcript will be kept confidential. Our study has Northwestern University IRB approval. Once your interview has been transcribed, only a site identifier will be linked to the transcripts, while any information linking you to the transcript will be destroyed. The audio recording will be destroyed as soon as the transcript is verified and analyzed by research staff.

To help ensure confidentiality, it would help if you could refrain from mentioning the name of your practice or facility wherever possible, or mentioning specific names of other staff members during the interview. If, at any time, you feel that the questions are too sensitive, I would be happy to turn off the recorder during that portion of questioning. You may also skip any questions you wish during the interview.

I also wanted to remind you that we will be giving you a $20 Starbucks gift card as a small token of our appreciation for your participation.

Do you have any questions for me? [Answer any questions]

Are you ready to begin? I'm going to start recording now.

(Part 1) WARM-UP (2 min)
First, I'd like to get a sense of your overall experience with the assessment portal.

- Overall impression
- Favorite part
- Least favorite part

(Part 2) USABILITY (5 min)
Next, I'd like to ask you some general questions about the characteristics and features of the assessment portal, itself.

- Features of portal that are complex/well-integrated/facilitate use or competence
- Amount of information
- Level of difficulty of information
- Sufficient additional/supportive educational content
- Recommendation services

- Features of portal that necessitate technical support
- Features of portal that necessitate pre-learning

(Part 3) INDIVIDUAL-LEVEL (8 min)
Next, I'd like to ask you some questions about your own perceptions and beliefs about the assessment portal.

- Familiarity
- Value/patient care
- Effort/time/burden
- Access and competence
• Mobile phone use
• EHR integration
• Motivation and learning style

(Part 4) IMPLEMENTATION PROCESS (4 min)
Finally, I'd like to hear more about your thoughts regarding the implementation process of the assessment portal.

• Barriers/challenges
• Facilitators
• Resources (staff time, meetings, training, IT help)

(Part 5) CONCLUSION (1 min)
Thank you very much for your time. Do you have any other information that you'd like to share or any questions for me?

Appendix F. Task scenarios for assessment portal

Instructions: We are interested in your experience with the assessment portal as we continue to refine and improve this tool for trainees and clinicians. Please fill out demographic information, complete the following tasks using the portal, and then complete a brief survey about your experience. Your responses to the survey items will be kept confidential. Thanks very much for your time!

Task 1:
Let's assume you are interested in using a web-based portal to track the quality of life (QOL) of one of your patients. To begin, access www.ebbp.org and find the Portal tab. Create a user account for the portal.

Task 2:
You are interested in tracking QOL outcomes for one of your patients. Let's assume you are the patient (and clinician) in this scenario. Self-administer a QOL instrument.
Task 3:
Now you would like to display the results of the QOL instrument so you can visualize your score. Obtain the graph for your results.

Task 4:
Now let’s assume your patient (again, you) prefers to complete the instrument via email. Self-Administer a QOL instrument via email.

Task 5:
Again, now you would like to display the results of the QOL instrument so you can visualize your score. Obtain the graph for your results.

Task 6:
Your session is complete, and you would now like to end your session. Please log out.

Appendix G. Codebook for training module qualitative analysis

MOTIVATION: Reason(s) for completing module(s)

1. Code: Academic

   Brief description: User reports completing module to satisfy academic requirement. Full description: User reports starting or completing one or more training modules because they were assigned by the professor for an academic course.

   When to use: Apply this code when user describes starting or completing one or more training modules because it was assigned to them by a professor. Apply this code when the training module(s) is included in a syllabus, quizzed on, and/or deemed an academic requirement. This code can be applied with other Motivation codes (e.g., Clinical).

   When not to use: Do not use this code when user denies or does not state completing training module(s) to satisfy academic requirements.
2. **Code**: Clinical

**Brief description**: User reports completing module to inform clinical practice.

**Full description**: User reports starting or completing one or more training modules to acquire knowledge and/or skills to inform current or future clinical practice.

**When to use**: Apply this code when user describes starting or completing one or more training modules to inform current or future clinical practice. This code can be applied with other Motivation codes (e.g., Academic).

**When not to use**: Do not use this code when user denies or does not state completing training module(s) to inform clinical practice.

3. **Code**: Research

**Brief description**: User reports completing module to inform research practice.

**Full description**: User reports starting or completing one or more training modules to gain knowledge and/or skills to inform current or future career as a researcher.

**When to use**: Apply this code when user describes starting or completing one or more training modules to inform current or future career as a researcher. This code can be applied with other Motivation codes (e.g., Academic).

**When not to use**: Do not use this code when user denies or does not state completing training module(s) to inform research practice.

4. **Code**: Courses

**Brief description**: User reports completing module to inform other academic courses.

**Full description**: User reports starting or completing one or more training modules to gain knowledge and/or skills to assist with other academic courses.

**When to use**: Apply this code when user describes starting or completing one or more training modules to assist with other academic courses. This code can be applied with other Motivation codes (e.g., Research).

**When not to use**: Do not use this code when user denies or does not state completing training module(s) to inform other academic courses.

5. **Code**: Curious

**Brief description**: User reports completing module because curious.

**Full description**: User reports starting or completing one or more training modules for the sake of independent learning and/or to satisfy personal curiosity.

**When to use**: Apply this code when user describes starting or completing one or more training modules to engage in independent learning and/or to satisfy personal curiosity about module content.

**When not to use**: Do not use this code when user denies or does not state completing training module(s) for independent learning or personal curiosity. Do not use if user reports completing module(s) for academic requirements.

**USABILITY**: User experience and module(s) characteristics
6. **Code**: UserExperience

**Brief description**: User reports attitudes, perceptions, and/or emotions related to module.

**Full description**: User reports emotional reactions, attitudes, beliefs, and/or perceptions related to their overall experience using the training module(s).

**When to use**: Apply this code when user references emotional reactions, attitudes, beliefs, and/or perceptions related to their overall experience using the training module(s). Apply this code if user describes their own emotions, attitudes, beliefs, and/or perceptions or those of others.

**When not to use**: Do not use this code when user refers to specific characteristics of the module(s)

**Sub-axial**:

A. **Positive**: User describes their experience as user-friendly, easy, enjoyable, and/or other favorable descriptors.

B. **Negative**: User describes their experience as frustrating, confusing, difficult to navigate, lacking instruction, time-consuming, and/or other critical descriptors.

C. **Age**: User describes age as a perceived modifier of overall experience with the module(s).

7. **Code**: Trait

**Brief description**: User reports a module characteristic.

**Full description**: User reports a module characteristic in the context of describing their experience using or navigating the training module(s).

**When to use**: Apply this code when user references a specific characteristic of the module(s) when describing their experience using the module(s). Apply this code when user provides solutions or alternative characteristics to the stated problem.

**When not to use**: Do not use this code when user references a module characteristic outside of the context of usability, including content or learning. Do not use this code when user describes their overall experience using the module(s) without referencing a specific characteristic of the module.

**Sub-axial**:

A. **Website**: User identifies navigating EBBP website to access modules

B. **Registration**: User identifies registration process or log-in page of modules

C. **Contents**: User identifies table of contents page

D. **Simulation**: User identifies simulated part(s) of the training module(s)

E. **Questions**: User identifies multiple choice questions
   
   a. **Context**: User describes context as important factor related to questions
   
   b. **Reductionist**: User describes questions as too simplistic

F. **Hyperlinks**: User identifies hyperlinks, research links, and/or external webpages

G. **Progress Bar**: User identifies progress bar as a solution to showing progress of completed module

H. **Support**: User identifies technical support, critical factors related to support, and/or solutions to solve perceived lack of support.

   a. **Phone**: User identifies phone support as a solution.
   
   b. **Chatline**: User identifies web-based chats as a solution.
   
   c. **Email**: User identifies email as a solution.
d. **Availability**: User identifies availability of support as a critical area  
e. **Wifi**: User identifies Internet connection as a critical area

**CONTENT: Information provided by module(s)**

8. **Code: Organization**  
**Brief description**: User reports organization of content.  
**Full description**: User describes organization of the content of training module(s).  
**When to use**: Apply this code when user references organization of the content in a single or multiple training modules.  
**When not to use**: Do not use this code when user describes organization of the training modules on the website, without referencing organization of the module content.

9. **Code: Quantity**  
**Brief description**: User reports quantity of the content.  
**Full description**: User describes quantity of the content of training module(s).  
**When to use**: Apply this code when user references quantity of the content provided by the training module(s).  
**When not to use**: Do not use this code when user references quality of the content provided by the training module(s).

10. **Code: Quality**  
**Brief description**: User reports quality of the content.  
**Full description**: User describes quality of the content of training module(s) and/or quality of a specific component of training module(s) (e.g., videos)  
**When to use**: Apply this code when user references quality of the content of training module(s) and/or quality of a specific component of training module(s).  
**When not to use**: Do not use this code when user references quantity of the content of the training module(s).  
**Sub-axial**:  
A. **Negative**: User describes module(s) content as introductory, lacking depth, or patronizing, repetitive, and/or redundant.  
B. **Positive**: User describes module(s) content as balanced, fair, comprehensible, practical, and/or valuable.  
   a. **Scenarios**: User identifies simulated client scenarios, including videos.  
   b. **Hyperlinks**: User identifies research hyperlinks.  
   c. **Dilemmas**: User identifies ethical dilemmas.  
C. **Detail**: User identifies level of detail of module(s) content.  
D. **Modifications**: User identifies changes proposed for module(s) content (e.g., instructions/directions, clinical guidelines, clinical scenarios, downloadable content)

**SELF-EFFICACY: Implementing skills**

11. **Code: Practical**
12. Code: Tests

**Brief description**: User reports module(s) tests.

**Full description**: User describes module(s) quizzes, tests, and/or assessments as part of their learning of content and/or skills.

**When to use**: Apply this code when user references the quizzes, tests, and/or assessments as an important factor in their learning the content and/or skills of module(s).

**When not to use**: Do not use this code when user references quizzes, tests, and/or assessments without associating it with learning, internalizing, and/or using content and/or skills.

**Sub-axial**:
- B. Regurgitation: User identifies long-term comprehension.

13. Code: Style

**Brief description**: User reports learning style.

**Full description**: User describes their learning style (e.g., visual, discussion) as a perceived factor in their learning and/or using the content and/or skills of module(s).

**When to use**: Apply this code when user references their learning style as a perceived factor in their learning and/or using content and/or skills of module(s).

**When not to use**: Do not use this code when user does not reference their learning style as an element in the learning and/or using of content and/or skills.

**Sub-axial**:
- A. Visual: User identifies visual elements of module(s), including video or reading.
- B. Auditory: User identifies auditory elements of module(s).
- C. Tailoring: User identifies capacity to tailor learning style.
- D. Forum: User identifies discussion forum.

**MOBILE DEVICES**: Compatibility with mobile devices

14. Code: Convenience

**Brief description**: User reports convenience of mobile compatibility.

**Full description**: User describes convenience of use, accessing training module(s), and/or capacity to be mobile as an aspect of having training module(s) available on mobile devices.

**When to use**: Apply this code when user references convenience, accessibility, and/
or mobility in relation to training module(s) compatibility with mobile devices.

**When not to use**: Do not use this code when user identifies convenience, accessibility, and/or mobility in relation to devices that are not defined as mobile (e.g., laptop, desktop).

15. **Code: Financial**

**Brief description**: User reports financial aspects of mobile compatibility.

**Full description**: User describes financial aspects of having training module(s) compatible with mobile devices.

**When to use**: Apply this code when user references financial aspects when discussing compatibility of training module(s) with mobile devices.

**When not to use**: Do not use this code when user does not identify financial aspects of training module(s) compatibility with mobile devices.

16. **Code: Boundaries**

**Brief description**: User reports work/life boundaries of mobile compatibility.

**Full description**: User describes training module(s) compatibility on mobile devices in reference to maintaining boundaries between work and non-work activities.

**When to use**: Apply this code when user references work/life boundaries in the context of having training module(s) compatible with mobile devices.

**When not to use**: Do not use this code when user does not identify work/life boundaries and/or balance when discussing training module(s) compatibility on mobile devices.

17. **Code: Usability (mobile device)**

**Brief description**: User reports usability factors of mobile compatibility.

**Full description**: User reports aspects of usability when describing compatibility of training module(s) with mobile devices. User identifies functionalities or elements of mobile devices. User describes perceptions and/or attitudes related to usability.

**When to use**: Apply this code when user references usability of training module(s) on mobile devices, including specific functionality and/or attitudes.

**When not to use**: Do not use this code when user does not identify usability factors when discussing training module(s) compatibility on mobile devices.

**Sub-axial**:

- A. **Screen**: User identifies smartphone screen.
- B. **Connectivity**: User identifies mobile and/or WiFi connection.
- C. **Application**: User identifies mobile application (app).
- D. **Age**: User identifies age of user.
  - a. **Knowledge**: User identifies technical knowledge.
  - b. **Habit**: User identifies habits, routines, and/or behaviors.
  - c. **Attitudes**: User identifies attitudes, beliefs, and/or preferences.

**COMPLETION**: User and module elements related to module(s) completion

18. **Code: Time**

**Brief description**: User reports time as modifier of completion.
**Full description:** User describes time-related factors as something that might influence their completion of the module. Time-related factors could be module-specific (e.g., navigating website or module, duration of module) or user-specific (e.g., schedule).

**When to use:** Apply this code when user identifies time-related factors when describing elements that reportedly influence their completion of the modules and/or when describing module elements they might change.

**When not to use:** Do not use this code when user does not mention time-related factors.

**Sub-axial:**
   A. **Duration:** User identifies duration of modules.
   B. **Self:** User identifies perceived lack of time, busy schedule, and/or other time-related factors not associated with module(s).

19. **Code: Knowledge**

**Brief description:** User reports knowledge as modifier of completion.

**Full description:** User describes knowledge about the training module(s), content of the module(s) (e.g., EBBP), and/or technology in reference to factors associated with completing the module(s)

**When to use:** Apply this code when user references awareness of the training module(s), foundational knowledge about module(s) content, and/or technical knowledge (e.g., computer skills) in relation to completion of the module(s).

**When not to use:** Do not use this code when user does not report knowledge-related aspects when discussing completion of the module(s).

**Sub-axial:**
   A. **Awareness:** User identifies having information that the module(s) exists.
   B. **Content:** User identifies knowledge about module(s) content.
   C. **Technical:** User identifies technical knowledge.

20. **Code: Web-based**

**Brief description:** User reports web-based format as modifier of completion.

**Full description:** User describes web-based (or online) format of training module(s) as a factor in their interacting with and/or completing the training module(s).

**When to use:** Apply this code when user identifies the web-based format of the training module(s) as a factor in their interaction with and/or completing the training module(s). Apply this code when user compares online format with face-to-face or other training modalities.

**When not to use:** Do not use this code when user does not reference web-based format of the training module(s).

**Sub-axial:**
   A. **Access:** User identifies accessing the training module(s).
   B. **Novelty:** User identifies novelty of web-based format.
   C. **Flexibility:** User identifies flexibility or convenience of scheduling.
   D. **Tailored:** User identifies control and pacing of module(s).
   E. **Sequence:** User identifies required sequencing of web-pages of module(s).
   F. **Tests:** User identifies pre- and post-tests of training module(s).
   G. **Interpersonal:** User identifies relational elements of module(s).
      a. **Investment:** User identifies energy or emotional investment.
b. **Visual**: User identifies visual cues.
c. **Accountability**: User identifies accountability.
d. **Safety**: User identifies perceived safety of expression or contribution.

21. **Code: Procrastination**

**Brief description**: User reports procrastination as modifier of completion.

**Full description**: User describes procrastination as a barrier to completing training module(s).

**When to use**: Apply this code when user references procrastination when describing barriers to completing training module(s).

**When not to use**: Do not use this code when user references other perceived barriers to completing training module(s).

22. **Code: Distraction**

**Brief description**: User reports distraction by external factors as modifier of completion.

**Full description**: User describes distraction by external factors (e.g., tasks, responsibilities, websites) as a barrier to completing training module(s).

**When to use**: Apply this code when user references external factors that distract them from completing training module(s).

**When not to use**: Do not use this code when user references other perceived barriers to completing training module(s).
Appendix H. Codebook for assessment portal qualitative analysis

REGISTRATION: Reason(s) for accessing or using portal

1. Code: Testing

   **Brief description**: User reports using portal for testing purposes.
   **Full description**: User reports registering and using portal after being recruited to test the functionalities of the portal.
   **When to use**: Apply this code when user identifies registering and using the portal for testing purposes.
   **When not to use**: Do not use this code when user reports using the portal in error, coincidentally, or other reasons outside of pilot testing.

2. Code: Google

   **Brief description**: User reports accessing or using portal through Google search.
   **Full description**: User reports registering and/or using portal after finding it through an online search.
   **When to use**: Apply this code when user identifies registering and/or using the portal after finding it through an online search.
   **When not to use**: Do not use this code when user reports registering and/or using the portal to pilot test its functionalities or registering in error (e.g., tried to register for the training modules).

3. Code: Error

   **Brief description**: User reports using portal in error.
   **Full description**: User reports registering and/or using portal accidentally while attempting to access and use another feature of the EBBP website (e.g., training modules or other resources).
When to use: Apply this code when user identifies registering and/or using the portal despite other intentions (e.g., attempting to access and use other features of the EBBP website).
When not to use: Do not use this code when user reports registering and/or using the portal to pilot test its functionalities or registering via online search.

USABILITY: User experience and features of portal

4. Code: Access

Brief description: User reports accessing portal.
Full description: User describes their experience or reactions to accessing technology (e.g., computer) to access portal. User describes locating the portal on the EBBP website.
When to use: Apply this code when user identifies accessing required technology to use the portal (e.g., computer). Also apply this code when user describes accessing the portal on the EBBP website.
When not to use: Do not apply this code when user describes accessing the portal on a web browser.

5. Code: Usability

Brief description: User describes navigating the portal.
Full description: User describes their experience exploring, using, or navigating the portal and/or specific characteristics of the portal.
When to use: Apply this code when user describes their overall experience using the portal and/or specific characteristics of the portal.
When not to use: Do not use this code when user provides solutions to problems with usability (e.g., FAQs, video instructions, pop-ups).
Sub-axial:
   A. Positive: User describes portal as user-friendly, easy, comprehensible, convenient, and/or intuitive.
   B. Negative: User describes portal as overly-complex and/or unclear.
   C. Impression: User describes first impressions of usability.

6. Code: Purpose

Brief description: User reports perceived purpose of portal.
Full description: User describes their perceived purpose of the portal.
When to use: Apply this code when user describes the reasons for which they believe the portal exists and/or ways the portal could be used.
When not to use: Do not use this code when user does not report their perceived purpose of the portal.
Sub-axial:
   A. Clinical: User identifies clinical purposes.
      b. Homework: User identifies homework administration and/or clinical data collection.
   B. Research: User identifies research purposes.
      a. Screening: User identifies screening for eligibility.
b. **Data**: User identifies data collection, analysis, and/or display.

7. **Code: Characteristics**

   **Brief description:** User identifies specific characteristics of portal.
   **Full description:** User identifies and describes the usability of specific characteristics of the portal.
   **When to use:** Apply this code when user describes their experience using specific characteristics of the portal.
   **When not to use:** Do not use this code when user discusses usability of the portal in general.

   **Sub-axial:**
   A. **Registration**: User identifies sign-in, log-in, or registration.
   B. **Portfolio**: User identifies online patient portfolio or patient entry system.
   C. **Measures**: User identifies data collection, administration of measures or computer adaptive tests (CATs).
      a. **In-person**: User identifies in-person administration.
      b. **Email**: User identifies email administration.
   D. **Graphs**: User identifies results, graphs, or elements of graphs.
   E. **Dropdown**: User identifies drop-down box.
   F. **Logout**: User identifies log-out process.

8. **Code: Aesthetic**

   **Brief description:** User reports design of portal.
   **Full description:** User describes the aesthetic quality, design, and/or format of the portal in general or its specific characteristics (e.g., patient portfolio, graphs)
   **When to use:** Apply this code when user describes the physical layout of the portal, including critiques about aesthetic, design, and/or format.
   **When not to use:** Do not use this code when user does not report aesthetic quality, design aspects, and/or format of the portal and/or its specific characteristics.

9. **Code: Solutions**

   **Brief description:** User reports solutions to reported usability problems.
   **Full description:** User describes proposed solutions to improving usability of the portal and/or user engagement with the portal.
   **When to use:** Apply this code when user describes proposed solutions to improving usability and/or engagement.
   **When not to use:** Do not use this code when user discusses general usability or specific existing characteristics of the portal.

   **Sub-axial:**
   A. **Video**: User identifies video instructions or guidance.
   B. **Written**: User identifies written instructions or guidance, tip sheets, or FAQs.
   C. **IT**: User identifies technical assistance.
   D. **Popups**: User identifies pop-ups.
   E. **Visuals**: User identifies visual elements.
   F. **Tailored**: User identifies personalized or tailored approach.

**CLINICAL CARE:** User perception of relationship between portal and patient care
10. **Code: Assessment**

**Brief description:** User reports intervention or therapy effectiveness.  
**Full description:** User describes the portal as a valuable tool to assessing the effectiveness of a therapeutic intervention or treatment for patient care.  
**When to use:** Apply this code when user describes how the portal adds or can add value in assessing the effectiveness of a therapeutic intervention or treatment.  
**When not to use:** Do not use this code when user discusses providing treatment or delivering feedback to patients.  
**Sub-axial:**  
A. **Goals:** User identifies reviewing patient's treatment goals.  
B. **Symptoms:** User identifies monitoring patient symptoms over time.  
C. **Objectivity:** User identifies objectivity of assessment.

11. **Code: Delivery**

**Brief description:** User reports delivering tailored treatment.  
**Full description:** User describes the portal as a way of providing personalized, tailored treatment to patients.  
**When to use:** Apply this code when user describes using the portal as a tool to provide tailored interventions or treatments.  
**When not to use:** Do not use this code when user discusses assessing the effectiveness of interventions or treatments.

12. **Code: Feedback**

**Brief description:** User reports providing feedback to patients.  
**Full description:** User describes using the portal to provide feedback to patients on symptom severity, treatment progress, and/or intervention effectiveness.  
**When to use:** Apply this code when user describes using the portal to provide feedback to patients on symptom severity, treatment progress, and/or intervention effectiveness.  
**When not to use:** Do not use this code when user describes using the portal to assess treatment or intervention effectiveness.  
**Sub-axial:**  
A. **Comprehension:** User identifies patients’ comprehension.  
B. **Share:** User identifies mechanism to share feedback virtually.  
C. **Access:** User identifies consolidated or single location.

13. **Code: Rapport**

**Brief description:** User reports clinician-patient rapport.  
**Full description:** User describes the portal as a tool to initiating and/or developing the relationship between clinician and patient.  
**When to use:** Apply this code when user describes the portal as a tool to initiate and/or develop the relationship between clinician and patient.  
**When not to use:** Do not use this code when user describes using the portal to assess treatment effectiveness or provide feedback to patients about treatment.  
**Sub-axial:**
A. **Collaboration**: User identifies collaboration or a collaborative stance between clinician and patient.

B. **Communication**: User identifies communication or dialogue between clinician and patient.

C. **Interactive**: User identifies interactivity of portal.

D. **Structure**: User identifies structure of therapy session.

**CATs: Computer adaptive tests of the portal**

14. **Code: Access**

**Brief description**: User reports access to CATs.

**Full description**: User describes gaining access to CATs.

**When to use**: Apply this code when user describes gaining access to CATs.

**When not to use**: Do not use this code when user reports accessing other features of the portal (e.g., graphs, patients) or the portal, itself.

15. **Code: Validity**

**Brief description**: User reports validity of CATs.

**Full description**: User describes issues related to validity or thoroughness of the CATs (i.e., the extent to which the tests measure what they purport to measure).

**When to use**: Apply this code when users describe issues related to validity or thoroughness of the CATs.

**When not to use**: Do not use this code when user report respondent bias (i.e., biased self-report responses provided by patients) related to the CATs.

16. **Code: Experience**

**Brief description**: User reports perceived experience completing CATs.

**Full description**: User describes an aspect of the perceived experience of completing the CATs.

**When to use**: Apply this code when user describes an aspect of the perceived experience completing the CATs.

**When not to use**: Do not use this code when user reports usability of CATs.

**Sub-axial**:

A. **Bias**: User identifies respondent bias.

B. **Engagement**: User identifies engaging elements of CATs.

C. **Duration**: User identifies duration of CATs.

17. **Code: Insufficient**

**Brief description**: User reports insufficiency of CATs.

**Full description**: User describes aspect(s) of CATs that are perceived to be insufficient in their intended purpose.

**When to use**: Apply this code when user describes an aspect or aspects of CATs that are perceived to be insufficient in some way.

**When not to use**: Do not use this code when user reports aspects related to responder experience (e.g., respondent bias).

**Sub-axial**:
A. **Items**: User identifies limitation(s) related to items (i.e., questions) of CATs.
   a. **Number**: User identifies number of items.
   b. **Response**: User identifies response or modification of response.
   c. **Access**: User identifies accessing specific items.

B. **Clinical**: User identifies clinical focus or problem area (e.g., trauma, behaviors).

C. **Population**: User identifies clinical population (e.g., children, parents).

D. **Measures**: User identifies other measures (e.g., BDI, BAI).

E. **Score**: User identifies results or score.

F. **Optimization**: User identifies additional components for optimization (e.g., scheduled or delayed administration of CATs, forms and/or tables, notifications or alerts, and/or feedback about progress of CATs)

**MODALITY: Compatibility with other devices and systems**

18. **Code**: Mobile

   **Brief description**: User reports portal compatibility with a mobile device.

   **Full description**: User describes their perceptions, attitudes, and/or beliefs about having the assessment portal compatible with a mobile device (e.g., smartphone, tablet).

   **When to use**: Apply this code when user describes their perceptions, attitudes, and/or beliefs about using the assessment portal on a mobile device.

   **When not to use**: Do not use this code when user identifies using the portal on a laptop, desktop, or the Electronic Health/Medical Record (EH/MR).

   **Sub-axial**:
   A. **Time**: User identifies aspects of time.
   B. **Access**: User identifies accessing the portal.
   C. **Convenience**: User identifies convenience and/or flexibility.
   D. **Tracking**: User identifies completion of CATs.
      a. **Compliance**: User identifies compliance of completion.
   E. **Boundaries**: User identifies work-life boundaries/balance.
   F. **Confidentiality**: User identifies privacy and/or security issues.

19. **Code**: Electronic Health/Medical Record (EH/MR)

   **Brief description**: User reports portal compatibility with the EH/MR.

   **Full description**: User describes their perceptions, attitudes, and/or beliefs about having the assessment portal compatible with the EH/MR.

   **When to use**: Apply this code when user describes their perceptions, attitudes, and/or beliefs about using the assessment portal within the EH/MR.

   **When not to use**: Do not use this code when user identifies using the portal on a laptop, desktop, or mobile device.

   **Sub-axial**:
   A. **Time**: User identifies time-related concepts.
      a. **Time-saving**: User identifies positive aspects related to time.
      b. **Time-consuming**: User identifies drawbacks related to time.
   B. **Accuracy**: User identifies accuracy and/or reliability of patient tracking/data
entry.

C. Confidentiality: User identifies confidentiality, privacy, or security.

D. Tech: User identifies factors related to being tech savvy or knowledgeable.

E. Supervision: User identifies factors related to clinical supervision or auditing.

F. Implementation: User identifies process of implementing or integrating portal.

G. Care: User identifies factors related to patient care.
   a. Communication: User identifies communication or continuity.
   b. Team: User identifies multidisciplinary team.
   c. Holistic: User identifies an all-around conceptualization of patient.
   d. Trend: User identifies cultural trend to patient care.

IMPLEMENTATION: Factors related to integrating the portal in clinical practice

20. Code: Cost

Brief description: User reports financial aspects of portal implementation.

Full description: User describes cost or other financial aspects related to implementing the portal in clinical practice.

When to use: Apply this code when user describes cost or other financial aspects when discussing implementation of the portal in clinical practice.

When not to use: Do not use this code when user discusses other factors related to implementation of the portal.

21. Code: Culture

Brief description: User reports culture of the organization or institution.

Full description: User describes the culture, attitudes, mindset, and/or behaviors of the organization or institution in which the portal might be implemented.

When to use: Apply this code when the user describes the culture, attitudes, mindset, and/or behaviors of the organization or institution in which the portal might be implemented.

When not to use: Do not use this code when user describes attitudes, mindset, and/or behaviors of the health care provider or patient.

Sub-axial:
   A. Routine: User identifies habit formation or routine of individuals that make up the organization.
   B. Stakeholder: User identifies stakeholder or point-person.
   C. Popularity: User describes general popularity of the portal.

22. Code: Training

Brief description: User reports aspects of training or orientation.

Full description: User describes aspects related to training or orientation to introduce new users to the portal as part of the implementation process.

When to use: Apply this code when user describes aspects of training or orientation to assist with implementing the portal in clinical practice, including modality of training, location of training, and time of training.

When not to use: Do not use this code when user reports locations related to actual implementation or use of the portal.

Sub-axial:
A. **Modality**: User identifies method of training.
   b. **Video**: User identifies a video for training.
   c. **Virtual**: User identifies mobile-based training.
   d. **Email**: User identifies email component to training.
   e. **Person**: User identifies face-to-face training.

B. **Time-point**: User identifies when or where to provide training.
   a. **Seminars**: User identifies seminars and/or presentations.
   b. **Meetings**: User identifies meetings.
   c. **Departments**: User identifies departments of organizations.
   d. **Orientation**: User identifies clinical orientations or other transition periods.

C. **Intention**: User identifies core aspects of training.
   A. **Tailored**: User identifies tailored approach.
   B. **Sustainable**: User identifies sustainability.

23. **Code**: **Location**

   **Brief description**: User reports location(s) of portal implementation.
   **Full description**: User describes specific locations or sites for implementing or using the portal.
   **When to use**: Apply this code when user describes specific locations or sites for implementing or using the portal.
   **When not to use**: Do not apply this code when user reports locations for training or orientations for portal.
   **Sub-axial**:
   A. **Waiting**: User identifies waiting room in clinician’s office.
   B. **Office**: User identifies clinician’s office.
   C. **Home**: User identifies patient’s home.