The Challenge of Expressing Evidence-based Practice (EBP) through a Digital Health Platform

Douglas E. Dormer[1], Jesi Sheldon[2]
[1]BGS, University of Michigan, Ann Arbor, MI, USA; [2]Masters, PhD candidate in Health Informatics, School of Informatics and Computing, Indiana University Purdue University at Indianapolis, Indianapolis, IN, USA.
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Abstract
Thinking of software applications generally, it wasn't long ago that users had to license "canned" software applications, good solutions but applications that were limited to expressing the subject matter as understood by the software designers and developers. Consider the ubiquitous personal finance application, Quicken. It provides a wonderfully capable tool, but every user has substantially the same experience, configurable only within a fairly narrow range. That's fine as long as all users' needs are similar and can all be met through one application experience. However, for many applications, we have moved into an age of configurable platforms where users, usually subject matter experts with little or no technology expertise, are able to configure applications to behave in complex and sophisticated ways that are unique to that user or set of users without requiring costly programming or customization. Think or programs like Wix, SquareSpace, or WordPress for web site development. These platforms allow users to configure their applications across a wide spectrum of user experience without requiring the services of a programmer or customization of the platform itself.

But this has not happened in healthcare. There are many reasons, including financial constraints including limited compensation for such innovation as well as a regulatory environment that, at least pre-COVID, has been reluctant to embrace such innovation. That said, one of the biggest barriers is the challenge of understanding evidence-based practice in such a way that those features that are suited to being expressed through online and mobile technologies can be easily, safely and consistently expressed through the technology platform but also be seamlessly integrated with the traditional practice and systems.

In this paper, we consider the challenges of expressing evidence-based practice (EBP) and evidence-based treatment (EBT) through a configurable digital health platform[1]. The goal of this paper is to provide useful information for anyone interested in digital health as a means of advancing the quadruple aim: improving the experience of care, lowering cost, improving population health and increasing provider satisfaction.

Introduction
The audience for this paper is application designers as well as health and social service providers, payers and policy makers across the continuum of care. This paper benefits from current and earlier work by one of the authors with a select group of healthcare and social service providers and payers from across the nation (collectively referred to as Team).

This analysis focuses on five specific domains: physical health (behavioral medicine), mental health, substance use disorder, food and housing insecurity (social determinants of health--SDOH) and offender reentry (criminal justice).

The primary treatment modalities considered in this analysis are health-related behavioral therapies, particularly psychotherapy and psychosocial treatments, with a secondary focus on biomedical and pharmacological treatments including medication adherence. The additional focus on digital health platforms implies a focus on services

[1] As discussed below, the term "digital health" refers to "asynchronous" interactions, meaning that the consumer interacts with the application without a clinician or staff person participating in the interaction at the same time. Digital health contrasts with telemedicine where the technology facilitates real-time, "synchronous" interactions, usually through video conferencing, between consumers and clinicians or staff. (American Academy of Family Physicians, 2019)

provided in community settings (i.e., outpatient care) rather than in institutional settings (i.e., hospital, in-patient treatment facility or prison).

Background
The value of evidence-based interventions in healthcare and social services is well established (Glasshelm, 2005). While some initiatives to translate EBP into online and mobile applications have been under way for several years, the COVID pandemic has created new demand for various forms on online and remote health, with changes that are not expected to expire as the pandemic diminishes or becomes endemic. These initiatives address two dimensions of health and social care that will have an impact digital health innovation:

1. They encourage innovations to break down the silos between physical health, behavioral health and social determinants of health in support of a truly integrated continuum of care.

2. They promote innovation in digital health solutions, including new funding models to compensate providers for using digital health solutions, to expand access, increase patient engagement and promote care coordination to improve health outcomes and lower cost while following and cultivating evidence-based practice across the continuum of care.

Project scope: For this analysis, the Team has identified five health and social domains that present the greatest opportunity for digital health solutions to improve outcomes and lower cost: (Dormer et al., 2018b)

1. Chronic physical health conditions
2. Serious mental illness
3. Substance use disorder
4. Food and housing insecurity(SDOH)
5. Offender reentry (criminal justice)

Methods
We began by conducting a limited-scope literature review to identify EBP registers (EBPRs), online sources that list and describe the range of EBPs and EBTs across each of the domains. We conducted a Google search using keywords related to each domain (such as "Homelessness" or "permanent supportive housing" for the Housing Domain) and "evidence-based practice," "evidence-based treatment" and other terms we identified in either our discussions or in the literature. Next, we conducted a limited-scope literature review to identify factors that affect outcomes variance. Then, we applied these results to a continuum of care model that has previously been used in an early digital health application that was shown to improve outcomes and lower cost across several of the domains. Finally, we summarized our findings to describe the high-level challenges and requirements for a digital health platform.

Definitions
We start with a simple question: What are the terms that best describe the range of therapies, treatments and interventions across the health and social domains?

We quickly agreed that the term "evidence-based practice" is not sufficient to describe the range or role of psychotherapy and psychosocial treatments that can be expressed through a Digital health platform. Among the related terms we identified were the following:

- Evidence-based medicine (EBM)
- Empirically validated treatment (EVT)
- Empirically-supported treatment (EST)
- Evidence-based treatment (EBT)
- Evidence-based practice (EBP)
- Evidence-based therapy

- Evidence-based principles
- Evidence-based programs
- Evidence-based behavioral practice (EBBP)
- Evidence-based assessments (EBA)
- Evidence-based relationships
- Research-based interventions (RBI)
- Research-supported treatment
- Best practices
- Emerging Practices
- Research-based guidance.
- Evidence-based principles
- Value-based practice

Each of these terms may have a precise definition and provide unique value in a specific context, however, in practice the terms often overlap or are used interchangeably regardless of the formal definition. As one county community mental health authority concluded in its discussion of the distinctions of EBP and EBT, the county "continues to use the more broadly applicable term Evidence-Based Practice to describe all reliable interventions and models that are backed by a preponderance of research which demonstrates responsiveness to needs, leading to enhanced health, and efficiently and effectively improving outcomes." (Evidence-based Practices and Systems Leadership Report: Improving Practices at SCCMHA, 2017)

For this analysis, the Team determined that two terms, grounded in psychology, have the most applicability across the five domains that will facilitate this discussion:

Evidence-based Treatment (EBT) refers to "Well-established treatment" that is supported by a high standard of evidence "that could be met in two ways: First was to have at least two experimental, between-group studies that demonstrate statistically significant gains when compared to another treatment, pill, or psychological placebo, or show equivalence with another established treatment. Second was for a treatment to have had more than nine single-subject design studies considered to be of high quality, and included a comparison of the treatment to another treatment. For both, the studies had to use treatment manuals with a well-defined population, and include studies from two independent researchers." (Chambless et al., 1997). The central idea behind EBT is that if you know the diagnosis for an individual that is represented by the study population, you can identify a specific treatment and follow a manual to guide the delivery of the treatment with little or no variation by the clinician or for the specific patient.

Evidence-based Practice (EBP): "The integration of the best available research with clinical expertise in the context of patient characteristics, culture, and preferences" (EBP, 2006)

EBT and EBP "describe two fundamentally different approaches to defining and disseminating evidence (Littell, 2010)—one that seeks to improve clinical practice via the dissemination of treatments meeting a minimum standard of empirical support (EBT) and another that describes a process of research application to practice that includes clinical judgment and client preferences." (EBP). For EBTs, "there is a certain seductive appeal to the idea of making psychological interventions dummy-proof, where the users—the client and the therapist—are basically irrelevant." Whereas the EBP approach allows for much greater freedom to express the experience of the clinician taking into consideration the unique attributes and needs of the patient. (Duncan, 2013)

Stated broadly, payers and policy makers lean towards the fixed nature of EBTs that is roughly analogous to biomedical interventions (e.g. pills) that can be delivered consistently with predictable results. Indeed, some payers require that billing for services conform with EBT protocols. On the other hand, providers emphasize the need to tailor research-based therapy according to their own expertise as well as the needs of each client or patient.

While the differences between EBT and EBP are clear, both rely on the same set of core elements in the evaluation of evidence which, we distill as follows:

1. It has been studied using appropriate scientific methodology;
2. It has been replicated in more than one geographic or practice setting, with consistent results;
3. It has been recognized in scientific journals by one or more published articles;
4. There is an implementation manual to follow consistently (fidelity); and
5. It produces specific, measurable outcomes. (Ganju, 2001)

Not all interventions that are presented as EBPs or EBTs meet these requirements. Some observers separate interventions into three tiers: EBPs/EBTs (practices and treatments that purport to meet appropriate requirements of evidence), best practices, (common practices that practitioners believe are effective but which do not meet the requirements for EBP or EBT), and emerging practices (which are relatively new or untried but which practitioners believe could be effective and may become EBPs or EBTs over time. In addition, other terms are needed to express the relationship between practice and technology. Therefore, we incorporate the following additional functional definitions:

The terms "**Domain**" or "**Care Unit**" refer to a specific health or social interest. Domains or Care Units are organized around specific health or social interests that often vary in the nature of the provider as well as the funding and regulatory overlap. The five Domains or Care Units that are the subject of this analysis are: physical health (behavioral medicine), mental health, substance use disorder, housing & food insecurity (SDOH) and offender reentry (criminal justice).

The term "**Framework**" refers to an overall philosophy or set of principles for a Care Unit but which may not itself meet the criteria for EBP even though Frameworks may include elements that are commonly described as EBPs. For example, a Framework might describe a philosophy or principles that have been studied but which cannot be or have not been expressed in a specific implementation manual or where the range of variation in the way the philosophy or principles are implemented precludes them from being faithfully replicated in more than one geographic or practice setting. Examples of this include the Recovery Oriented System of Care (ROSC) for substance use disorder, the Housing First model of permanent supportive housing for housing and the Risk, Needs, Responsivity model for offender reentry. In each instance, the Framework is referred to as an EBP by some authoritative sources but, based on our review, does not meet the criteria for an EBP or EBT. Nonetheless, while Frameworks can be a critical part of the care process, they do not lend themselves to direct expression through digital health solutions. Rather, EBPs and EBTs are expressed through technology at a component, or element within the overall Framework.

The term "**Digital health**" refers broadly to electronic and telecommunications technologies and services used to provide care and services at-a-distance."[2] However, as used here, Digital health refers to "asynchronous" interactions, meaning that the consumer interacts with the application without a clinician or staff person participating in the interaction at the same time. Digital health contrasts with telemedicine where the technology facilitates real-time, "synchronous" interactions, usually through video conferencing, between consumers and clinicians or staff. (American Academy of Family Physicians, 2019) In most configurations, Digital health and telemedicine are complementary to each other.

Findings

1 Looking for the evidence: the search for authoritative lists of EBPs.

Having defined relevant terms, we sought to document how Practitioners in each of these Domains learn about new or updated EBPs for their practices. Practitioners learn of new or evolving EBPs through a combination of their formal training, continuing education and journals as well as word-of-mouth from colleagues. In addition, Practitioners look to evidence-based practice registers (EBPRs), online sources that list and describe EBPs across each of the domains. While the form and organization may vary, rating paradigms for EBPRs should include lists of

[2] We also noted the occasional use of the term "eHealth" to represent a similar concept, however, We concluded that the term eHealth was too broad and therefore was not preferred for this discussion.

EBPs, along with descriptions, an evaluation of the underlying evidence and guidance to find implementation manuals for each of the EBPs. (Means et al., 2015)

A search for EBPRs in each of the Domains identified several lists of evidence-based practice registers. Entries on these lists of EBPRs represent individual EBP registers, not specific EBPs. The Team found several lists of EBPRs, sometimes in the form of reviews, each having different criteria for the EBPRs included on their list. Some EBPR lists were quite narrow in scope while others were quite broad, containing EBPRs with entries that crossed all of the Domains. They ranged from as few as 7 EBPR entries for one list focused on social service programs (Horne, 2016) to 20 EBPR entries for a list focused on behavioral health. (Burkhardt et al., 2015) There was considerable overlap in entries between each of the lists, although, obviously, some lists had entries that were not included on others.

Based on this review, we selected for further consideration a list of EBPRs from 2015 titled: "An Overview of Evidence-Based Program Registers (EBPRs) for Behavioral Health" (EBPR Overview) (Burkhardt et al., 2015) (Exhibit A) This list of 20 EBPRs included the most and, in our view, used the strongest criteria for determining whether a specific EBPR should be included.[3] While this list of EBPRs is focused on behavioral health, it is evident that many of the EBPRs overlap with the other Domains.

Of those EBPRs on the EBPR Overview, the Team had most familiarity from past experience with two: The National Registry of Evidence-Based Programs and Practices (NREPP) and the Cochrane Collaboration. In the Team's experience, the NREPP was the go-to starting point to find new or updated EBPs and EBTs. The Cochrane Collaboration was viewed as the premier source for information about specific EBPs and EBTs but not as a source they would go to search for EBPs.[4] Similarly, the online resource UpToDate delivers evidence-based clinical decision support that is clear, actionable, and rich with real-world insights. Whether it provides the specific guidance that can be translated through a digital health platform was not evaluated by the Team. Other online decision support tools are also emerging.

Both from the experience of the Team and from the literature review, the NREPP was considered to be a primary source of information regarding evidence-based practices particularly for the prevention and treatment of substance used disorder (SUD) and mental illness. The NREPP, sponsored by the Substance Abuse and Mental Health Services Administration (SAMHSA), provided an easily accessible, public database for EBP-based programs; these programs were regularly audited and updated to reflect their efficacy in treating SUD and mental illness. In continuous operation from 2007 till 2017, at its conclusion, the NREPP included 479 entries. However, funding for the NREPP was cancelled effective January, 2018. (Green-Hennessy, 2018). The NREPP was removed from the SAMHSA website in early 2018. We could not find an archival or other online repository presenting the information from the NREPP.

In April, 2018, the NREPP was replaced with the Evidence-Based Practices Resource Center (EBP Resource Center). (Evidence-based Resource Center, 2020) This new EBP Resource Center differs significantly from the NREPP. Not only is the number of entries significantly reduced (from 479 to 266[5]), the nature of those entries is different. Where the NREPP adhered to strict criteria for entries in the NREPP[6], the EBP Resource Center has a more inclusive approach allowing entries that do not meet the same criteria as the NREPP. As noted on the EBP

[3] The co-authors of the EBPR Overview were also co-authors of study titled "Comparing Rating Paradigms for Evidence-based Program Registers in Behavioral Health: Evidentiary Criteria and implications for Assessing Programs. (Stephanie Means, 2015)

[4] The Team acknowledges that their view and use of the Cochrane Collaboration data bases may not be consistent with how others use it. Others may view the Cochrane resources as having more directly in common with the other EBPRs than they do.

[5] As of 1/31/2020, the EBP Resource Center showed 266 entries. https://www.samhsa.gov/ebp-resource-center

[6] The NREPP applied different levels of scrutiny through its 20 year life. Generally, entries accepted prior to 2015 were held to a higher standard than those accepted between late 2015 and the closing at the end of 2017. (Green-Hennessy, 2018)

Resource Center website, the EBP Resource Center "contains a collection of science-based resources, including Treatment Improvement Protocols, toolkits, resource guides, and clinical practice guidelines, for a broad range of audiences."

Partly in response to these shifts in policy with respect to EBP registers, a new set of vendors offering guidance on EBPs as well as current research is emerging. One example of this, UpToDate, "delivers evidence-based clinical decision support that is clear, actionable, and rich with real-world insights." Whether UpToDate delivers EBP guidance in a form that can be easily adapted to digital health technology platforms was not evaluated in this review, and will be considered in the next phase of this project.

2 The role of EBPs and EBTs in the Real World

What does the evidence say about the effectiveness of psychotherapy and psychosocial treatment in practice? Is the use of EBPs better than not using them? Are some EBPs better than others? What other therapeutic or extratherapeutic factors influence outcome variability?

The Team reviewed a number of papers and studies that addressed various aspects of these questions. One paper, Chapter 21, "Empirically Supported Treatments, Evidence-based Treatment and Evidence-based Practice" of the 2013 Handbook of Psychology, Second Edition, written by Barry L. Duncan and Robert J. Reese, edited by Irving B. Weiner, provided an excellent discussion of the history and challenges presented by the use of EBPs and EBTs. The following are some of the key takeaways from Chapter 21:

- The efficacy of psychotherapy is clear. The average treated person is better off than about 80% of those who do not receive treatment.
- There is no justification for mandating EBTs which require adherence to a specific protocol but do not allow for variation according to the expertise of the clinician or the unique characteristics or needs of the patient as is allowed with EBPs.
- Using EBPs as a part of treatment is better than a placebo or no treatment.
- However, there is no evidence showing differences in effectiveness between EBPs, meaning that, overall, any one EBP is as good as any other.
- At the same time, some EBPs are better for specific patients in certain circumstances, following the judgement of the clinician.
- In all, five factors account for outcome variability: client (extratherapeutic factors), therapist, alliance, model/technique delivered and feedback.
- EBPs are incorporated into "model/technique factors" and account for only about 1% of total outcome variability.

For a longer discussion of the five factors, including an excellent diagram of the relationships between the factors, see Chapter 21 and an earlier work edited by Duncan et al. in 2010, titled "*The heart and soul of change: Delivering what works* (2nd ed

These relationships are summarized in a table:

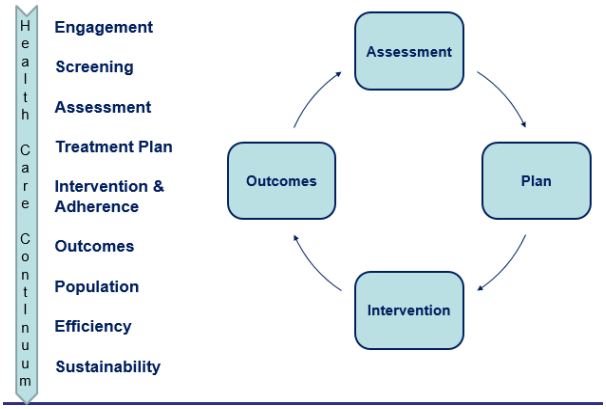
		Range of variance
Client/Extratherapeutic factors		87%
Therapeutic factors:		
Therapist effects	46-69%	
Alliance effects	38-54%	
Model/technique delivered effects	30-?%	
Feedback effects	15-31%	
Total therapeutic factors		13%
Total Client & Therapeutic effects	N/A	100%

Researchers emphasize the role of fidelity to the core components of EBP, along with flexibility to modify the EBP according to the experience of the Practitioner and the needs of the Consumer. This "flexibility within fidelity" approach is critical to maximizing outcomes. (Kendall & Frank, 2018) [42]. This also allows for variations in context, the environment and circumstances of both the Practitioners and the Consumer. Finally, this approach allows for variation in modality, particularly as online and mobile expressions of EBP and Frameworks promoted by the above mentioned incentives. Increasingly, EBPs are being developed that provide guidance with regard to both flexibility and fidelity (Cook, Schwartz, & Kaslow, 2017).

3 **How does this translate into workflow requirements for a Digital health platform?**

Understanding the challenges of identifying, selecting and implementing EBPs as well as the several factors that affect outcome variance only goes so far toward the goal of defining requirements for a digital health platform. To understand how EBPs and the several factors translate to requirements for a digital health platform, the Team overlaid the EBP and factors models with a continuum of care model that expresses at a high level the workflows followed by Practitioners in all Domains.[7]

The Continuum of Care Workflow



The Continuum of Care (CoC) can be thought of as a Framework that expresses how Providers organize the workflow for any single Care Unit, set of Care Units or Program. In addition, there are client management systems and electronic health records that may be a part of the workflow design.

Summary of findings. By their nature, EBPs are designed to be flexible to express the practitioner's experience and the consumer's unique needs while protecting the core evidence-based components. The range of variation in implementation across the CoC is very broad, making translation into requirements for digital health technology difficult. Studies show that while therapy generally, and EBPs in particular, show significant improvement in outcomes, there is little evidence to show that one EBP is better than another in general, although a specific EBP might be more effective than another for a particular consumer. In the last few years, a new class of internet-enabled EBPs, such as Internet-based cognitive behavioral therapy (iCBT), has emerged, but these allow limited flexibility to modify the EBP workflow. They require the practitioner to accept the implementation of the EBP as interpreted by the technology designer.

[7] This specific Continuum of Care model was used by White Pine in its earlier work designing and implementing the "electronic Recovery Oriented System of Care," a digital health platform focused on substance use disorder that also included elements for employment services, offender reentry and behavioral medicine.

Further, when considering all the attributes that might affect outcomes, EBPs account for only a small part of the outcomes or the variation in outcomes. Other factors must be incorporated in the design of the digital health solution. Thus, the range of variation in implementation of EBPs and related workflows makes it difficult to define a fixed set of EBP-based requirements that can be expressed through a digital health platform.

Conclusion

The critical requirement for successfully implementing not just EBPs but the full range of therapy workflow is a guided user configurable platform that protects fidelity to the core components of the EBPs while allowing an appropriate range of flexibility in implementation and use. Following models developed for other industries, like SurveyMonkey or Qualtrix for surveys or Wix or Square Space for web design, now is the time to create a low cost, easy to support Digital health platform that provides a guided configuration process that allows practitioner/users to configure the digital health platform for their unique requirements without costly consulting or programming services. As important is the creation of a marketplace that allows providers and practitioners to exchange configurations. The resulting data base of user experience provides a platform for research to improve treatment, not just through digital health but broadly. Such a user-configurable digital health platform can improve outcomes and lower cost across the continuum of care.

Risk Considerations

This analysis is based on a limited review of the literature. There is no assurance that all relevant information was considered or that the information that is presented is representative of the totality of the evidence. Further, many of the studies and opinions expressed represent those of the source, author or researcher, and may not reflect the consensus of opinion on these matters.

Conflicts of Interest

The two principal authors of this paper, Doug Dormer and Jesi Sheldon, are affiliated with White Pine Systems, a vendor of a guided user configurable Digital health platform. Doug Dormer is the holder of certain pending patents unique to that Digital health platform. As noted in the introduction and at various points throughout this paper, the intent is to inform requirements for White Pine's proVizor Digital health Platform. This is a conflict of interest.

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