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Computer and mobile technology-based interventions for substance use disorders: An organizing framework

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HIGHLIGHTS

- ► Interest in technology-based interventions (TBIs) for drug use is increasing.
- ► We summarize previous reviews of TBIs, focusing on moderators of efficacy.
- ► We present an organizing framework of TBI design considerations.
- ► The framework covers Accessibility, Usage, Human Contact, and Intervention Content.
- ► We offer suggestions for future research within these framework elements.

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ABSTRACT

Research devoted to the development of therapeutic, behavioral interventions for substance use disorders (SUDs) that can be accessed and delivered via computer and mobile technologies has increased rapidly during the past decade. Numerous recent reviews of this literature have supported the efficacy of technology-based interventions (TBIs), but have also revealed their great heterogeneity and a limited understanding of treatment mechanisms. We conducted a "review of reviews" focused on summarizing findings of previous reviews with respect to moderators of TBIs' efficacy, and present an organizing framework of considerations involved in designing and evaluating TBIs for SUDs. The four primary elements that comprise our framework are Accessibility, Usage, Human Contact, and Intervention Content, with several sub-elements within each category. We offer some suggested directions for future research grouped within these four primary considerations. We believe that technology affords unique opportunities to improve, support, and supplement therapeutic and peer relationships via dynamic applications that adapt to individuals' constantly changing motivation and treatment needs. We hope that our framework will aid in guiding programmatic progress in this exciting field.

Contents

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1. Introduction

In the last two decades we have witnessed unprecedented growth in computer and mobile technologies. Worldwide, Internet access increased 480% from 2000 to 2011, and now exceeds 50% of the population in North America, Europe, and Australia (Internet World Stats, 2011). Approximately 90% of the world's population now lives in an area where mobile phone service is available, and the total number of subscribers is equivalent to 77% of the population (International Telecommunication Union, 2010). In addition to information gathering and communication, uses of these technologies have expanded to incorporate various aspects of daily living, including entertainment, social networking, shopping, photography, organizational tools, and banking.

Given these trends, it is not surprising that there has been significant recent interest and work devoted to the development of therapeutic, behavioral interventions that can be accessed and delivered through these technologies. Our primary area of focus, substance use disorders (SUDs), is no exception. Relative to face-to-face interventions for SUDs, technology-based interventions (TBIs) may afford numerous advantages (Ondersma, Chase, Svikis, & Schuster, 2005). Primary among these is TBIs' portability, flexibility, and therefore, disseminability. These qualities give them potential to reach a far greater number of people who need treatment, and therefore ultimately to have a larger overall impact, than face-to-face interventions (Glasgow, Vogt, & Boles, 1999). TBIs require less clinician training and availability and as such they are generally more cost-effective than face-to-face treatments (McCrone et al., 2004; Olmstead, Ostrow, & Carroll, 2010). TBIs may be especially appealing in substance-abusing populations, for whom cost, privacy, and anonymity are of particular importance and represent barriers to treatment entry (SAMHSA, 2011). Finally, TBIs can provide automated and tailored information with a degree of standardization not always found in face-to-face interventions, which makes them attractive from a research perspective.

Nevertheless, Barak, Klein, and Proudfoot (2009) caution that the field of TBIs "has suffered from a lack of clarity and consistency" (p. 4) and may be described as "diffuse, incoherent, and sometimes even perplexing" (p. 5) with regard to defining what qualifies as a TBI, terminology, and methodology. Therefore, given the above listed advantageous and appealing characteristics of TBIs for SUDs, further exploration of the opportunities afforded by technology-based approaches through the development of an organizing framework would make an important contribution to this rapidly growing area of research. In presenting our framework, we do not provide a meta-analysis or systematic review of TBIs for SUDs *outcomes* because numerous such reviews have recently been published. Furthermore, we agree with Strecher (2007) that evaluating TBIs as a single "class of intervention," especially as they continue to proliferate and diversify, is becoming akin to asking "'Do movies entertain?' Clearly, some movies do and some do not." (p. 69). However, before presenting our framework, we will define what types of substance use TBIs our framework encompasses, and provide a brief "review of reviews" that summarizes findings in existing reviews with regard to moderators of outcomes.

1.1. Defining "technology-based intervention" (TBI)

Barak et al. (2009) proposed to standardize the classification of Internet-based interventions for health behavior change into four categories: web-based interventions (WBIs), online counseling and therapy (OCT), Internet-operated therapeutic software (IOTS), or other online activities (e.g., blogs, support groups) (OOA). WBIs are "primarily self-guided" (p. 5) programs further subdivided into education interventions (largely static websites that aim to educate about a specific problem), self-guided interventions (structured, "modularized," dynamic programs often modeled on a face-to-face intervention), and human-supported interventions (similar to self-guided but with adjunctive, tailored human support). OCT refers to synchronous (i.e., real time) or asynchronous (i.e., not in real time, such as email) communication between a therapist and client(s) via the Internet. Such communication may be text-, audio-, or video-based (e.g., King et al., 2009). IOTS encompasses a variety of technologies such as artificial intelligence ("robot simulation of therapists" p. 11), "expert systems" (provides assessment and feedback, e.g., Drinker's Check-Up, Squires & Hester, 2004), and virtual reality environments (e.g., Woodruff, Conway, Edwards, Elliott, & Crittenden, 2007). As the last category, OOA, consists of material generated and maintained by patients rather than clinicians, and we are interested in the development of TBIs from the perspective of clinical researchers, our framework will not be applicable to OOA except as such features are sometimes are included within a larger TBI. Although Barak et al. (2009) state that these categories are mutually exclusive and "significantly different" from one other, they recognize that their proposed taxonomy is more practical than empirical or theoretical. Indeed, existing interventions often incorporate aspects of multiple categories.