Digital Tools for the Treatment of Borderline Personality Disorder: A Critical Review of Smartphone Applications

Timothy I. Michaels[a,b], Sonali Singal[a], Emily Stone[a], Laura Braider[a], and John Kane[a,b]

[a] The Zucker Hillside Hospital, 75- 59 263rd Street, Glen Oaks, NY, 11004, USA
[b] The Donald and Barbara Zucker School of Medicine,500 Hofstra Blvd, Hempstead, NY, 11549, USA

Abstract
Digital tools provide an opportunity to increase access to and reduce costs of Dialectical Behavioral Therapy (DBT), the gold standard treatment for symptoms of Borderline Personality Disorder (BPD). Yet the integration of smartphone applications has been slow and fractured. This paper summarizes data on DBT digital intervention efficacy, and reviews the intelligent user interface (IUI) and user experience (UX) of four DBT-based smartphone applications. It concludes with suggestions for improved clinical-technology partnerships in order to address barriers to adoption, and presents considerations for expanding current offerings by leveraging passive monitoring, digital nudging and positive reinforcement.

Keywords
ecological momentary assessment (EMA), digital nudging, just-in-time feedback, dialectical behavioral therapy (DBT), suicide, self-harm, borderline personality disorder (BPD).

1. Efficacy of DBT Smartphone Applications

Borderline personality disorder (BPD) is a mental health condition that is characterized by a high level of disability, elevated suicide rates, and frequent psychiatric emergency hospitalizations (1). Dialectical Behavioral Therapy (DBT) is an intensive, efficacious therapy for the treatment of BPD, yet is associated with high costs, limited availability, and barriers to entry (2). Digital tools present an opportunity to increase access to DBT given increasing evidence for the efficacy and safety of delivering psychotherapy through smartphone applications (3). DBT may be especially well-suited to translating clinical components to digital formats, given the intervention's use of daily diary cards of emotions and impulsive urges, on-call crisis support, coping skills practice, and weekly homework assignments. A recent meta-analysis of 10 DBT-based apps that underwent

Figure 1. Risk of bias summary from (4).

randomized clinical trials (RCTs) (4) reported an overall low risk of bias (Figure 1). There were no significant differences between digital interventions and in-person treatment outcomes, yet some of the app-based interventions had high attrition, incomplete. This position paper reviews four DBT-based smartphone applications (*DBT Coach*, *DBT Self-Help*, *DBT App*, and *Diary Card*) that were readily available for Android and iOS devices, and free to download. Specifically, staff reviewed each application to determine its consistency with in-person components of DBT

treatment, its functionality, intelligent user interface, and user experience. A fifth DBT-based application (*DBT Diary*) met inclusion criteria for review but was not included as staff encounter numerous technical errors at sign-up.

2. Functionality and User Interface

All of the DBT apps included daily diary cards, and most included skills practice and digital libraries of self-help exercises (*Diary Card* had neither). Both *DBT Self Help* and *DBT Coach* enable users to create a digital safety plan and utilize crisis services, however the crisis features are hidden by an icon in *DBT Coach* (Figure 2A) and are more prominent in *DBT Self Help* (Figure 2B). The landing page of *DBT App* (3C) indicates its limited features (diary card and access to skills PDF), while the calendar layout of *Diary Card* (3D) is confusing and hard to read. All apps utilized ecological momentary assessment for symptom
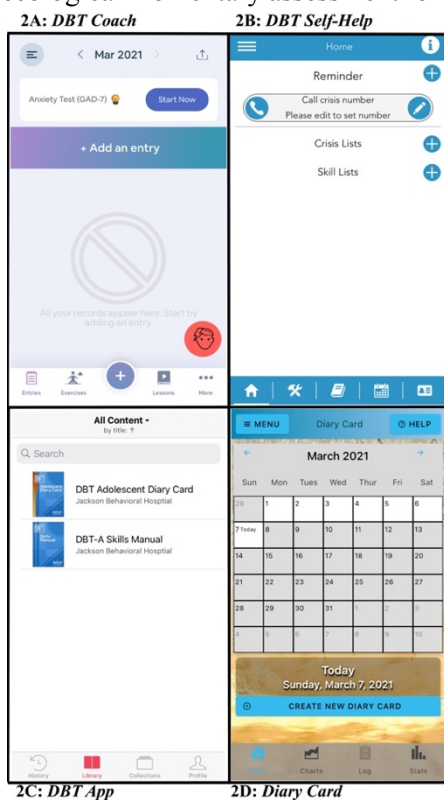

Figure 2: Landing page comparison

tracking; none of the apps utilized passive data collection. The user interface of DBT Coach and DBT Self-Help were intuitive although the later included unnecessary ink. *Diary Card* provided unnecessary animation that frustrated end users and excluded important diary card

features (e.g. target behaviors). (graphs and a calendar) that did not improve the interface and not typical in DBT treatment.

3. User Experience

DBT Coach (Figure 3A) and *DBT Self-help* (3B) including sliding scales which aided user experience when completing diary cards. Only *DBT Coach* include a tutorial of the app's features and had engaging animation when transitioning between pages. The navigation was logical in *DBT App* (3C) although there were blank spaces between forms. *Diary Card* (3D) excluded important diary card features (e.g. target behaviors) that took away from the quality of the experience.
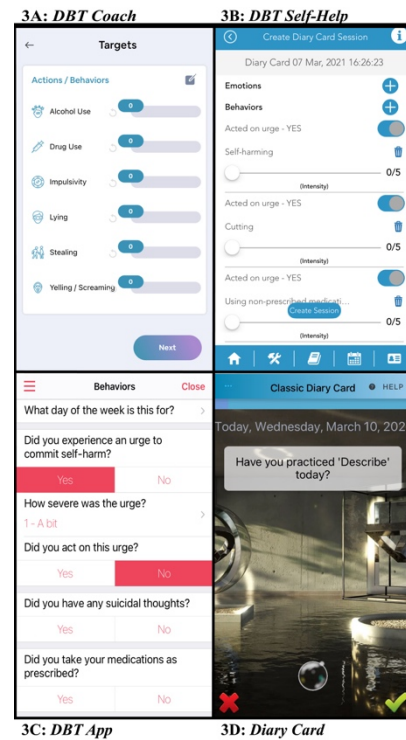

Figure 3: Experience completing diary cards

4. Future Directions

The current state of DBT-based smartphone applications is fragmented, with most applications excluding features integral to treatment. User feedback on the design and functionality has been negative. Among the four apps reviewed, *DBT Coach* and *DBT Self-Help* featured the most intuitive layouts and engaging designs, but would benefit, from including positive reinforcement and digital nudging to increase engagement and passive monitoring to complement user-inputted data.

5. Acknowledgements

6. References

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