Investigating Efficacy and Feasibility of a Multi-Modal Digital Psychotherapy Platform for Adult Depression

Abstract

Background: Although psychotherapy is one of the most efficacious treatments for depression, limited accessibility to trained providers significantly limits access to care. Many digital platforms seeking to provide these services using digital modalities (e.g. video, text, chat) have been developed in an attempt to overcome this obstacle. However, use of these modalities individually poses barriers to intervention access and acceptability. Multi-modal platforms, comprising those that allow users to select from a number of available modalities, may provide a solution to these concerns.

Objective: We investigated the efficacy and feasibility of a multi-modal digital psychotherapy platform, also examining differential responses to intervention by gender, physical status, and health status, plus the ways in which prior exposure to traditional face-to-face psychotherapy affected response to multi-modal digital psychotherapy. Finally, we examined the dose-effect relations.
Methods: Data was collected from a total of 318 active users of BetterHelp, a multi-modal digital psychotherapy platform. Information on physical status, health status, and prior exposure to psychotherapy was obtained using self-report measures. Symptom change was measured using the PHQ-9 at Time 1 (time of enrollment) and Time 2 (3 months after enrollment). Intervention dosage was measured as the sum of individual therapist-user interactions across modalities.

Results: Depression symptom severity significantly reduced after use of the multi-modal digital psychotherapy intervention \((P < .001)\). Individuals without prior traditional psychotherapy experience revealed increased improvement after intervention \((P = .006)\). We found no significant dose-response of therapy, nor significant differences in outcomes across gender, financial status, or physical health status.

Conclusions: Users of BetterHelp experienced significantly reduced depression symptom severity after engaging with the platform. Findings suggest that this intervention is equally effective across gender, financial status, and physical health status, and particularly effective for individuals without a history of psychotherapy. Taken together results of the study suggest that multi-modal digital psychotherapy is a potentially efficacious treatment for adult depression; experimental trials are needed. Implications for treatment delivery are discussed.

Keywords: mobile health, digital health, mental health, cognitive therapy, depression, text messaging, video, live-chat
**Introduction**

Major Depressive Disorder (MDD) is a commonly occurring condition [1-2] associated with a multitude of adverse health outcomes [3-4], and projected to be the second leading cause of disability worldwide by the year 2020 [5-6]. As such, development and dissemination of efficacious and accessible treatment for the disorder is an area of increasing importance. Psychotherapy has been shown to be one of the most efficacious psychosocial treatments for depression [7-8] and works by teaching patients cognitive strategies that enable them to target and manage undesirable thoughts, habits, and emotions underlying presenting depressive symptoms [9]. Although literature has demonstrated the need for psychotherapy in the successful treatment of depression [10-13] limited geographical access to trained professionals remains one of the most significant barriers to traditional face-to-face care [14]. Telemental health, or the use of digital technology to provide long-distance clinical mental healthcare, is a field rapidly growing in response to issues of access [15-18].

Multi-modal digital therapy platforms, i.e. platforms that offer multiple modes of digital communication, hold promise in overcoming persisting barriers to intervention access and acceptability. In the United States 1 in every 4 adults is in need of counseling, though only 13.4% of adults report receiving services [19]. This treatment gap is seen around the world [20] and is driven by combination of stigma surrounding mental health support seeking behavior [21] and limited geographical access to providers [14]. Digital psychotherapeutic interventions have been shown to increase intervention reach by providing efficacious alternatives to traditional therapy. These digital interventions increase both ease of access and anonymity of service seeking. To date digital therapy has largely centered around internet (e.g. videoconference or chat) and mobile (e.g. short messaging service (SMS) or phone) based modalities.

Extant literature demonstrates significant demographic differences in modality access and acceptance. Internet-based interventions have been shown to be efficacious [22], with a 2009 meta-analysis of 12 studies finding a mean effect size of $d = 0.41$ for internet-based psychological treatments for adult depression
This effect size was increased \( d = 0.61 \) when excluding standalone interventions and considering only those that included support or guidance from a therapist. Although efficacious, barriers to internet access keep these interventions beyond the reach of traditionally underserved populations [18]. In response to this persisting digital divide, researchers have investigated internet-free mobile phone and SMS-based therapies as a way of continuing to increase access to care. Mobile phone access is significantly more ubiquitous than internet access [15, 24], and the development of mobile platforms has enabled mental health professionals to provide care to an even greater percentage of individuals in need. Mobile phone-based psychotherapy for adult depression has also been demonstrated to be efficacious [25], yet this workaround does not come without its own set of limitations. Specifically, younger adults feel more comfortable communicating and building relationships remotely [26], though older adults prefer communication modalities that are able mirror more traditional in person interactions, such as video calls. A multitude of studies have examined and demonstrated efficacy of single- or even dual-modality digital psychotherapy platforms [22, 27-31], but we know of no existing work investigating efficacy of a multi-modal platform. A multi-modal psychotherapy platform that allows users to choose from internet-based video or live chat and internet-free mobile SMS or phone therapy interchangeably is proposed as a potential solution to this demographic variability in intervention usability and efficacy.

In addition to modality, other important predictors of digital psychotherapy outcomes include demographic characteristics, as well as level of engagement. Existing literature in face-to-face psychotherapy has focused on differences in outcomes between men and women, as well as on differences across ages and socioeconomic status (SES). Despite growing product innovation, the characteristics and demographics of populations for whom digital psychotherapies do and do not work remains unknown. Although evidence of gender effects on psychotherapy outcomes is mixed, research suggests that women see increased symptom reduction after traditional psychotherapy. Yet research on online psychotherapy suggests that men see increased symptom reduction when compared to women.
Given higher rates of stigma surrounding therapy-seeking behaviors in men [37] it has been suggested that the anonymity afforded by online platforms may be an explanation for this latter finding. Research examining the effect of age on psychotherapy outcomes also remains largely inconclusive. Some evidence suggests that younger clients may respond more quickly and see greater post-treatment improvement in psychotherapy though older adults are more likely to adhere to treatment [7, 38-39]. Literature focusing on broader socioeconomic predictors of traditional psychotherapy acceptance and response has focused on economic status, physical health status, and experience with therapy as key predictive variables, finding positive correlations between outcomes and these factors. We speculate that prior counseling experience and higher financial/health status will predict improved digital psychotherapy outcomes as well. Finally, we aim to examine the dose-effect of our digital psychotherapy platform. Although a number of researchers have examined the dose-response effect of psychotherapy in traditional settings [40], significantly fewer studies have examined this relationship in the context of digital psychotherapy [41-43].

We aim to investigate the feasibility and initial efficacy of multi-modal digital psychotherapy by examining changes in depressive symptom severity amongst individuals using BetterHelp, an internet- and mobile-based psychotherapy service provider. We also hypothesize that engagement with BetterHelp will significantly reduce depression symptom severity. Lastly, we aim to investigate the ways in which multi-modal digital psychotherapy outcomes vary by subpopulation (gender, age, financial and physical status, and prior therapy experience) as well as by level of engagement. Although the present investigation comprises a quasi-experiment (i.e., pre-post design without a randomly assigned control group), we are hopeful that it can generate useful data for further controlled intervention studies.
Method

Participants
318 (79.9% female) BetterHelp clients, recruited from a larger pool of active BetterHelp users, were invited and met eligibility criteria to participate in the present study. Participants were excluded from participation if pre-intervention levels of depression fell below mild clinical significance (i.e. a score of less than 5 on the PHQ-9 [44]), or if they had not engaged with BetterHelp for a minimum of 90 days. Users with pre-intervention depression in the mild to severe range (i.e. PHQ-9 scores ≥5 and ≤27) were included. Racial and ethnic makeup of the present sample is unfortunately unknown, as the BetterHelp platform does not currently collect this information. Ages of participants meeting eligibility criteria ranged from 19 to 72 (M = 33.27, SD = 11.29). At baseline, 37.4% of the sample met criteria for mild depression, 28.6% for moderate depression, 23.6% for moderately severe depression, and 10.4% for severe depression [44-46] (see Table 2).

Measures
Patient Health Questionnaire – The PHQ-9 [44-46] is a 10-item, self-report measure inquiring about the presence of symptoms in the previous two weeks. It is used in clinical practice to monitor depression symptoms and severity [47]. The measure probes how often the respondent has been bothered by specific problems, takes only a few minutes to complete, and is scored on a 4-Point Likert scale ranging from 0 = Not At All to 3 = Nearly Every Day. The scale has demonstrated high internal consistency (Cronbach’s α ranging from 0.86 to 0.89) as well as excellent test-retest reliability (r=0.84) [45]. Participants completed this measure at baseline and follow-up.

Working Alliance Inventory Short Revised – The WAI–SR [48] is a 12-item measure assessing quality of the therapeutic relationship. This measure of therapeutic alliance assesses the following domains: (a) agreement on the tasks of therapy, (b) agreement on the goals of therapy and (c) development of an affective bond. The measure has consistently demonstrated good reliability (α >0.80) as well as good
convergent validity ($r > 0.64$); it was administered at follow-up to assess user rapport with therapist.

**Prior Exposure To Therapy** – Before beginning therapy, a binary measure was administered to assess prior exposure to psychotherapy. BetterHelp users were asked the question “Have you ever been in counseling or therapy before?” and probed to reply with either “Yes” or “No.”

**Health and Financial Status/Stress** – At baseline, BetterHelp users were asked to rate their current physical health and current financial status. Responses were scored on a 3-point Likert scale ranging from Good to Poor.

**Intervention Description**
The BetterHelp psychotherapy platform is currently the largest multi-modal digital psychotherapy platform available worldwide [49]. BetterHelp users are able to make use of any combination of text, video, chat, or phone communication over the course of psychotherapy. BetterHelp procedures are as follows: before beginning therapy clients are asked to complete questionnaires probing symptom levels, personal history, and motivation for seeking therapy. Although BetterHelp counselors vary in approach, each BetterHelp counselor is a required to hold a PhD, PsyD, MFT, LCSW, LPC, or LMSW-level license to practice. BetterHelp’s algorithm then matches clients with an available BetterHelp counselor who best fits their objectives, preferences, and needs. After the match is made, BetterHelp provides client and counselor with a dedicated “room” in which all communication takes place. Video, live chat, and phone sessions require advanced scheduling, text message exchanges do not.

**Procedure**
After engaging with the BetterHelp platform for three months, users received a notification inviting them to participate in an ongoing research study. This three-month time window was selected in order to mirror existing dose-response research in psychotherapy, suggesting that over 50% of patients are able to respond after 12.7 sessions of weekly psychotherapy [50]. BetterHelp users were allowed two weeks to respond to prompts inviting them to participate in research. Users who did not respond within the allotted two weeks were excluded from study participation.
Respondents were asked to repeat the PHQ-9. A subset of clients indicated having also received prior traditional face-to-face counseling; these users were asked additional questions probing their satisfaction with counseling and experienced therapeutic alliance when using BetterHelp as compared to traditional psychotherapy. BetterHelp data analysts sent authors relevant data in a deidentified data file. All research procedures were approved by the Institutional Review Board at the University of California, Berkeley.

Results
All analyses were conducted in SPSS Version 25 and R version 2.13.1

Descriptive Statistics
Table 1 describes sociodemographic characteristics (age, gender, health/financial status, and prior exposure to therapy) of the present sample. 22.6% of the present sample rated their financial status as poor, 52.5% as fair, and 15.4% as good. 7.5% of the sample rated their health status as poor, 51.9% as fair, and 37.1% as good. 28.6% of the sample did not have prior exposure to counseling or therapy.

<table>
<thead>
<tr>
<th>Sociodemographic Characteristic</th>
<th>Frequency (N=)</th>
<th>% (N%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>254</td>
<td>79.9</td>
</tr>
<tr>
<td>Male</td>
<td>64</td>
<td>20.1</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
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<tr>
<td>18-34</td>
<td>200</td>
<td>62.6</td>
</tr>
<tr>
<td>35-49</td>
<td>89</td>
<td>27.7</td>
</tr>
<tr>
<td>50+</td>
<td>29</td>
<td>9.1</td>
</tr>
<tr>
<td>Physical Health Status</td>
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<td></td>
</tr>
<tr>
<td>Poor</td>
<td>24</td>
<td>7.5</td>
</tr>
<tr>
<td>Fair</td>
<td>165</td>
<td>51.9</td>
</tr>
<tr>
<td>Good</td>
<td>118</td>
<td>37.1</td>
</tr>
<tr>
<td>Financial Status</td>
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<td></td>
</tr>
<tr>
<td>Poor</td>
<td>72</td>
<td>22.6</td>
</tr>
<tr>
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<td>15.4</td>
</tr>
<tr>
<td>Prior Counseling Experience</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>91</td>
<td>28.6</td>
</tr>
<tr>
<td>Yes</td>
<td>216</td>
<td>67.9</td>
</tr>
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</table>
Overall Efficacy of BetterHelp

37.8% (N=120) of participants demonstrated a clinically significant improvement and 62% (N=194) of participants demonstrated a partial response (as defined by at least a 5 point score reduction on the PHQ-9 and a post-intervention score ≤ 9, respectively [46]) after engaging with BetterHelp for three months. 19.8% (N=63) of participants qualified as being in remission (as defined by a post-intervention score < 5) by Time 2. To further examine the efficacy of this multi-modal psychotherapy platform, we examined changes in symptom severity amongst BetterHelp users from pre- to post- treatment using paired samples t-tests. Results revealed a significant decrease in symptom severity post-treatment with effect size in the medium range (pre-treatment: $M = 12.57, SD = 5.35$; post-treatment: $M = 9.36, SD = 5.51$), $t(317) = 10.80$, $P < .001$ (one-tailed), Cohen’s $d = 0.61$ (see Figure 1). Mean PHQ-9 pre-treatment scores reflected moderate levels of current depression whereas mean post-treatment scores reflected mild levels of current depression, as determined by PHQ-9 clinical cutoffs [45]. As shown in Table 2, 19.8% of participants met criteria for minimal depression, 41.2% for mild depression, 20.8% for moderate depression, 12.6% for moderately severe depression, and 5.7% for severe depression [45-46] after using BetterHelp for three months.

Table 2. Pre-intervention and post-intervention PHQ-9 scores by diagnostic category

<table>
<thead>
<tr>
<th>PHQ-9 Diagnostic Category</th>
<th>Pre-intervention</th>
<th>Post-intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Frequency (N=)</td>
<td>% (N%)</td>
</tr>
<tr>
<td>Minimal Depression</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>PHQ-9 Total Score 0-4</td>
<td></td>
<td></td>
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<tr>
<td>Mild Depression</td>
<td>119</td>
<td>37.4</td>
</tr>
<tr>
<td>PHQ-9 Score 5-9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moderate Depression</td>
<td>91</td>
<td>28.6</td>
</tr>
<tr>
<td>PHQ-9 Score 10-14</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moderately Severe Depression</td>
<td>75</td>
<td>23.6</td>
</tr>
<tr>
<td>PHQ-9 Score 15-19</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Severe Depression</td>
<td>33</td>
<td>10.4</td>
</tr>
<tr>
<td>PHQ-9 Score 20-27</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>318</td>
<td>100</td>
</tr>
</tbody>
</table>
Demographic influence on outcomes
To examine the differential effects of age and gender on therapy outcomes, we conducted a one-way ANCOVA, covarying baseline symptom severity. No significant differences were found, in that outcomes did not significantly differ across age, $F(45, 242) = .98$, $P = .51$, or gender $F(1,242) = .092$, $P = .762$.

Socioeconomic and environmental influence on outcomes
To examine the effect of financial status, health status, and prior exposure to therapy on treatment outcomes, we conducted a second one-way ANCOVA, again adjusting for baseline symptom severity. Results revealed a significant effect of prior exposure to therapy on treatment outcome, $F(1, 260) = 7.531$, $P = .006$. Individuals with prior therapy exposure experienced significantly fewer gains after treatment as compared to individuals without prior exposure (see Figure 2). Treatment outcomes did not significantly differ across participant financial status, $F(2, 260) = 1.563$, $P = .211$, or health status $F(2,260) = 1.575$, $P = .209$. 

Figure 1. Overall PHQ-9 pre-post change
Dose-Response
Effect of dosage on treatment outcomes were examined using probit dose-response regression. Across extant dose-response literature, probit analysis is utilized to predict the amount or dose of treatment needed to achieve a desired response or effect [50]. Treatment dosage was measured as the sum of individual therapist-user interactions across modalities (text message, phone, video, and livechat). Response was measured as a binary variable indicating presence or absence of clinical improvement, as defined by a PHQ-9 score change of 5 points or more. Mean number of interactions in the present study was 125.3 ($SD = 392.5$). Following methodology laid out in Howard et al. (1986), in the probit model dose corresponded to the log of the number of total interactions, to reduce skew. Because participants who did not interact with BetterHelp were not included in the sample, taking the log of 0 was not a possibility. Results revealed no significant dose effect ($P > .05$), which was maintained after adding baseline severity into the model.
Discussion

Our results indicate that multi-modal digital psychotherapy may be a feasible and efficacious treatment for adult depression. Multi-modal digital psychotherapy holds promise in overcoming existing issues of psychotherapy access and efficacy. Users of a multi-modal digital psychotherapy platform experienced significantly improved self-reported symptoms after engaging with BetterHelp, with 37.8% (N=120) experiencing clinically significant improvement in depressive symptoms within 3 months. Moreover, no significant associations were found between changes in depressive symptoms and sociodemographic variables including age, gender, and financial/physical stress. We suspect that increased accessibility and flexibility provided by a multi-modal platform may be driving these latter findings. Multi-modal digital psychotherapy may be one viable solution to reduce existing barriers to accessible, appropriate, and user-friendly psychotherapy.

Participants who had previously engaged in traditional face-to-face psychotherapy showed significantly less symptomatic improvement compared to those who had not. Among several potential explanations, we postulate that individuals with prior therapy experience may present with more complex, co-morbid, or treatment resistant forms of depression requiring a higher level of care. Post-hoc analyses did not reveal any significant association between therapeutic relationship quality (as measured by the WAI) and prior therapy engagement, suggesting that this finding is not merely related to differences in therapist rapport and alliance linked to prior treatment exposure. Future research should seek to investigate differences in outcomes across diagnostic categories, taking into account commonly co-morbid conditions known to influence response to treatment such as Generalized Anxiety Disorder, Attention Deficit/Hyperactivity Disorder, and Panic Disorder. Baseline evaluation of presence and severity of additional diagnoses may ensure that those with co-morbid conditions are matched with an appropriately specialized therapist.
No general dose response was detected in the present study. Although this is not the first study to find nonsignificant dose-response effects of psychotherapy, we speculate that our existing measure of dosage may disguise existing dose-response effects, given that quantity and significance of content shared in a single message may vary greatly by individual. Future research may seek to examine effects of word count as opposed to message count, though due to user privacy concerns, researchers were not able to access this data at this time. Number of days spent interacting with the BetterHelp platform may also prove to be a more valid measure of engagement than total interactions.

**Limitations**
This exploratory investigation contains several limitations of note. First and foremost, we lacked a randomly assigned control group. Future investigations with appropriate controls, as well as a more comprehensive demographic and diagnostic screening, will enable a more valid approach. In addition, like many survey-based studies, results of the present work may be influenced by sample bias. It is possible that individuals who had notably positive or negative experiences with BetterHelp are those that chose to respond to our prompt to participate in research. Additionally, financial and health status were measured by self-report and may not be valid or objective measures. Lastly, we lacked data on the potentially crucial moderator variables of race/ethnicity and gender non-conformity.

**Conclusion**
Major Depressive Disorder is a pervasive and debilitating condition from which many individuals are unable to recover due to lack of accessible and appropriate treatment. The use of digital technology has been demonstrated as a feasible solution to this growing and widespread dilemma. The present study examined the effect of a multi-modal digital psychotherapy platform for the treatment of depression in adults. We proposed that a multi-modal platform may be able to overcome persistent barriers posed by single-modality alternatives. Results demonstrated the initial efficaciousness of such a model, with users experiencing
significant symptom reduction after intervention. This preliminary demonstration of such a platform’s acceptability and feasibility provides an important first step in understanding and tailoring such a model of mental healthcare delivery moving forward.

Conflicts of Interest
EM is a former consultant for BetterHelp. LN is a community and support manager for BetterHelp.
Multimedia Appendix 1
Schedule a session with your counselor.

If you are in a crisis or any other person may be in danger - don't use this site. These resources can provide you with:
References


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