

Text messaging as an adjunct to CBT in low-income populations:

A usability and feasibility pilot study

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## Abstract

This paper will outline the development and initial implementation of a text messaging adjunct to cognitive behavioral therapy (CBT) for depression. The text-messaging adjunct is aimed at increasing “homework” adherence, improving self-awareness, and helping track patient progress. The adjunct involves sending daily text messages to patients inquiring about mood ratings as well as additional messages a day corresponding to 1) thought tracking (both positive and negative), 2) tracking of pleasant activities, 3) tracking of positive and negative contacts, 4) tracking of physical well-being.

Additionally, participants receive reminders of weekly group meetings in an effort to improve attendance and patients on medication can opt to receive reminders according to their regimen. Another component of the system allows patients to text the keyword STRESS to receive a randomly generated message suggesting cognitive and behavioral tips to counteract stressors and/or sad mood. They can also text the word HELP and receive the number for a suicide hotline or be prompted to contact 911 for an emergency. Lastly, participants will be given feedback on their mood, behaviors and cognitions through visual graphs that display their data over time. We highlight the promise that text messaging has to improve mental healthcare among low- income populations using cost effective means.

## **CBT Treatment for Depression barriers**

Depression is a leading cause of disability (Murray & Lopez, 1996) and is associated with a variety of negative health outcomes, there is a need for making quality treatments more accessible. Standard treatments for depression include pharmacotherapy as well as psychotherapy. In particular, cognitive behavioral therapy (CBT) for depression has been well studied and found to be efficacious in a variety of settings and among diverse populations (CITE). However a major barrier to CBT treatment effectiveness is adherence to treatment.

A major component of CBT is the completion of “homework,” which involves practicing skills that are discussed in psychotherapy sessions. These skill building experiences help strengthen the treatment by extending it beyond the once weekly psychotherapy session. Homework helps increase the dosage of treatment. However, patients are often inconsistent in their completion of these homework exercises. Not properly adhering to the homework portion of therapy compromises the efficacy of CBT, since studies of its efficacy include completion of homework exercises. The lack of therapeutic contact in between sessions makes it difficult to ensure that the intervention is being implemented as planned.

Another barrier to optimum benefit of therapy is sporadic attendance to therapy sessions. This is particularly relevant in group psychotherapy settings where new material is presented on a regular basis regardless of whether all patients are present. This results in absent patients not receiving new skills and disrupting the continuity of care that is important in the development of skills to combat symptoms of depression. Once a patient misses a therapy session, they are more likely to miss subsequent sessions (CITE?).

The challenges of adherence to CBT for depression are magnified in low-income and public sector settings. For example, attrition in therapy is particularly a problem in low-income settings where approximately 40-44% of patients can be expected to dropout of CBT (Miranda et al). Limited resources in public sector settings also necessitate the limitation of sessions that an individual can obtain psychotherapy. The time limitations further reduce treatment dosage when treatment is not adhered to as intended.

Recent reports highlight the disparities in access to depression treatment among racial and ethnic minority populations in the U.S. (Alegría et al., 2008) and call for innovative, evidence-based interventions for these populations in order to address existing disparities (Muñoz & Mendelson, 2005). In particular, the Latino population is now the largest ethnic minority group in the U.S, has poor access to quality mental health care, and thus merits attention as a target of intervention (Alegría et al., 2002; Vega et al., 1999).

### **Text Messaging as an adjunct to therapy**

Mobile phone based text messaging (SMS) is a ubiquitous and inexpensive tool that can be used as a tool to improve health outcomes. The use of technological tools such as the Internet and mobile phone technology provide new vehicles to reach large numbers of people while using fewer resources. Tech-based tools can be used as standalone or adjunctive interventions to increase effectiveness of existing services. Interventions range from basic reminders of appointments and medication to full on interventions for smoking cessation. In a recent review, Cole-Lewis and Kershaw (2009) identified 12 studies using SMS as a tool in behavior change interventions and found that of nine studies with sufficient power, eight of those supported the use of SMS as a tool for behavior change. However, only one of the eight studies was in a developed country and none of the interventions targeted mental health problems. The promise shown by

these approaches in developing countries and in other health problems highlight SMS as a tool for use in mental health problems and amongst low-income populations in developed countries. As the field of mobile health (mHealth) develops and becomes more sophisticated, it is crucial to use these tools in low-income and minority populations so that we do not further exacerbate health disparities due to lower access to advanced technologies. Historically marginalized and underserved populations in the U.S. can also benefit from simple but effective technologies to improve health communication.

The application of mobile phone technology to mental health interventions is in its infancy, making this a crucial time to include the most needy populations into the development of health information technology applied to health. Although there are advances in the application of sophisticated applications for smartphones, monitoring sensors and other advanced technologies, SMS remains the most pervasive technology, particularly among low-income populations. Examples from various areas of health show that SMS holds promise for application into mental health treatment. In particular SMS has the potential for increasing adherence to treatments, which is a major problem in mental health interventions such as psychotherapy and medication.

In particular, SMS may help overcome some of the barriers to adherence to homework in cognitive behavioral therapy, increase attendance and increase self-efficacy. It can be used to reinforce skills through regular messages between therapy sessions potentially increasing the frequency that skills are applied. Randomly generated SMS messages could help promote mood state awareness, which is a crucial step in enacting change and applying skills to improve or maintain positive mood states. An important predictor to outcomes in psychotherapy across theoretical orientations is the

therapeutic alliance (i.e. the connection that individual feels to the therapist), which results in patients being more willing to apply the skills they are being taught in therapy.

Since using SMS in mental health settings is a new endeavor with little research, it is particularly important to conduct thorough usability and feasibility testing to determine aspects of text messaging that are appealing and aspects that are less desirable. Before conducting a rigorous assessment of the utility of SMS in a low-income population, we should first obtain feedback from patients receiving mental health care. We expect that patients will react positively to the addition of SMS to their mental health care. We also hope to gauge the number of messages that is suitable to send on a daily basis as well as begin to determine whether sending text messages to patients might improve care, increase attendance, and increase the connection to the group and their therapists.

## **Method**

### Procedure

The first step in developing an SMS intervention is to determine how one wants to use SMS as a health improvement tool. In our case, we wanted to assess how SMS might be used as a tool for homework completion in group cognitive behavioral therapy for depression. We additionally wanted to provide patients with medication and group appointment reminders. Most importantly, we needed to do this on a limited budget.

We decided between possible SMS solutions through Internet searches as well as through hearing about other projects at an mHealth (mobile health) conference. The options for using SMS in health interventions are large and growing. The services that we considered fell into roughly three categories: 1) services that handle all of the sending and receiving of data for a monthly fee, 2) a low cost solution that required software

customization for automation, and 3) partnering with a private company. The first solution was prohibitively expensive so we started with the second solution, using open source software (FrontlineSMS), which sends and receives messages on a computer via a connected mobile phone. This solution is relatively inexpensive when combined with unlimited prepaid text messaging service on a monthly basis. We hoped to work with a software developer to help customize this software to send out messages on a scheduled basis but that proved to be difficult. For the first two months of the study, messages were sent manually by the PI everyday until a more ideal solution was identified. The data presented in this paper is from the first part of our study. Later, we identified a private company that was interested in partnering with us to send messages via their website after which the study evolved to add more components due to more technical resources.

The text-messaging adjunct involved receiving 2-3 messages daily. A mood-monitoring message was sent on a daily basis and was worded as follows: “What is your mood right now on a scale of 1 to 10?” Initially, the second message was going to correspond with the module of focus for that month (i.e. Thoughts, Behaviors, Interpersonal Relationships, or Physical Health). However, after the first week, patients gave feedback that the second message was repetitive. After this, we made the decision to alternate 1-2 messages from each module. Therefore on day 1, patients received two messages: “How many positive thoughts have you noticed today?” & “How many negative thoughts have you noticed today?” On the next day they received, “How many pleasant activities have you done today?” On the following day, “How many positive social interactions have you had today?” & “How many negative social interactions have you had today?” On the fourth day they received a message asking “How many things

have you done to improve your health today?" These messages were then repeated from the beginning.

### *Patients*

We began the usability and feasibility testing with patients enrolled in group cognitive behavioral therapy in English in an outpatient clinic at San Francisco General Hospital. The group therapy is based on Muñoz et al.'s (2000) CBT based "Healthy Management of Reality" manualized group treatment, which has been tested successfully among ethnic minorities and Spanish language speakers (Muñoz and Mendelson, 2005). Seven patients were approached for participation in the research study that would send them 2-3 text messages daily. We first assessed whether they had mobile phones, which all patients had. We then asked about previous use of text messaging -- four patients knew how to use SMS and three were willing to learn as part of the study. However, one patient that was willing to learn SMS did not participate in the study since she had difficulty adding text messaging to her phone plan. We were willing to compensate her for adding the service but she declined participation do to not knowing how to add the service. Another patient agreed to participate in the study but was not receiving messages that were sent to her, leaving a total of five participants in the study (3 Euro-American, 1 African-American, 1 Latina).

### **Results**

As part of the usability and feasibility testing we focused on the rate of response to text messages as well as quantitative and qualitative feedback from patients on their experiences with receiving messages as part of their mental health treatment. The overall response rate was ~85%. This level of response is high when compared to other studies that prompt patients for data via text messaging, although most of those are standalone

interventions or have less frequent contact with patients. After using text messaging for one month, all patients indicated that the text messaging made them feel closer to the group and their therapists by responding that they “somewhat agree” with that statement. On average, they also “somewhat agreed” that receiving text messages increased their attendance to sessions with one patient responding neutral to that statement and another reporting strong agreement.

With regards to feedback about the intervention, patients were overwhelmingly positive and were in line with our expectations about the benefits of SMS in a psychotherapy setting. Patients commented that receiving text messages improved self-awareness. One patient stated that the messages, “help me check in with myself” and another also stated, “it makes me check in with myself, it’s the best thing I’ve done, besides group.” We also received feedback that being prompted about mood helped make an individual aware of things that improve mood: “I noticed that when I got rung by the study that my mood was high when I was playing music or speaking with a woman I was interested in.” Lastly, we also received feedback suggesting that using SMS as a part of psychotherapy may help improve self-efficacy with one patient remarking, “we do have control over our mood.”

Overall, patients generally liked the text messaging component of therapy and commented frequently during therapy sessions about times that they were prompted for their mood during the past week. At one point, a message was sent giving participants the option of not receiving messages if they chose by replying with the word REMOVE. No one requested removal but instead participants replied requesting that they not be removed, stating for example, “please don’t remove me.”

## **Discussion**

Our initial results indicate that psychotherapy outpatients in a primary care setting are responsive to and like using SMS as part of their healthcare treatment. SMS may be particularly well suited for application as an adjunct to psychotherapy due to regular therapist contact that encourages patients to continue participating in the intervention. It may also be beneficial for sustaining therapy gains after live sessions are complete. Speaking to this point, 3 patients that completed the CBT group and were moving on to a less structured group requested that they continue to receive text messages even if they were not participating in the CBT treatment. SMS is a simple and low cost technology that is received well by patients in diverse settings and has the potential to improve outcomes at relatively low costs.

Future interventions will have an increased emphasis on assessing outcomes over time, focusing on both symptom based measures but also on functioning and other factors that may be of importance to patients. Improve the efficacy of treatment resulting in increased and prolonged improvement in symptoms and functioning. SMS may help increase adherence to homework assigned as part of the CBT treatment which may lead to more robust positive outcomes for patients due to their increased involvement in therapy. SMS shows some promise for increasing patient attendance to therapy sessions as well. The patient population at SFGH, similar to other public service settings, has a high no-show and drop out rate. The SMS adjunct can help provide continuity of care for those who miss sessions, encourage consistency through reminders and can extend the intervention well after the group sessions have ended.

Most importantly, SMS helps maximize the resources needed to provide mental health services in a cost effective manner. If more patients complete treatment, show

improved outcomes, and have lower relapse rates they reduce their need for chronic treatment of depression and other comorbid disorders. SMS may be an important tool in the effort to reduce health disparities in a cost effective manner for a variety of health problems including mental disorders.

We plan to continue this project by offering SMS as adjunct to a Spanish language CBT group. Use of SMS for this population will be particularly important since Latinos tend to have less access to high quality services due to linguistic and socioeconomic barriers.

An obvious limitation of this study is the small sample size. We cannot make broad conclusions based on the feedback of this group. However, given the largely positive feedback, this small sample is a basis for expanding and testing SMS and psychotherapy in a larger population.

#### Implications

The use of mobile health applications such as SMS interventions have a role in reducing health disparities due to the pervasiveness of the technology across socioeconomic status. Given the accessibility of mobile phones and the relatively low costs of this form of intervention, more people can benefit from health interventions that encourage positive behavior change. While our focus is on depression, our project can help inform the development of other interventions focused on a variety of health problems. Another future direction would be the development of standalone SMS interventions that could reach large numbers of people at relatively low cost.

## References

- Alegría, M., Chatterji, P., Wells, K., Cao, Z., Chen, C., Takeuchi, D., et al. (2008).  
Disparity in depression treatment among racial and ethnic minority populations in  
the United States. *Psychiatric Services*, 59(11), 1264-72.
- Alegría, M., Canino, G., Rios, R., Vera, M., Calderon, J., Rusch, D., et al. (2002).  
Inequalities in use of specialty mental health services among Latinos, African  
Americans, and non-Latino Whites. *Psychiatric Services*, 53(12), 1547-1555.
- Limbo Mobile Marketing (2009). Variance in SMS user by profile.  
<http://www.marketingcharts.com/interactive/three-in-ten-us-mobile-users-recall-seeing-mobile-ads-3016/limbo-mobile-sms-usage-by-age-ethnicityjpg/>
- Muñoz, R.F., Mendelson, T. (2005). Toward evidence-based interventions for diverse  
populations: The San Francisco General Hospital prevention and treatment  
manuals. *Journal of Consulting and Clinical Psychology*, 73, 790-799.
- Muñoz, R.F., Ippen, C.G., Rao, S., Le, H., & Dwyer, E.V. (2000). Manual for Group  
Cognitive-Behavioral Therapy of Major Depression. San Francisco, CA: San  
Francisco General Hospital Depression Clinic.
- Murray, C. J., & Lopez, A. D. (1996). Evidence-based health policy--lessons from the  
Global Burden of Disease Study. *Science*, 274(5288), 740-743.
- Patrick, K., Raab, F., Adams, M.A., Dillon, L., Zabinski, M, Rock, C. et al. (2009). A  
Text Message-Based Intervention for Weight Loss: A Randomized Controlled  
Trial. *Journal of Medical Internet Research*, 11(1), 1-18
- Vega, W. A., Kolody, B., Aguilar-Gaxiola, S., & Catalano, R. (1999). Gaps in service  
utilization by Mexican Americans with mental health problems. *American Journal  
of Psychiatry*, 156(6), 928-934.