Cost-effectiveness of a Randomized Trial to Treat Depression among Latinos

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Abstract

Background: Rising mental health costs have brought with them the pressing need to identify cost-effective treatments. Identifying cost-effective treatments for depression among Latinos is particularly relevant given substantial disparities in access to depression treatment for Latinos compared to non-Latino whites.

Aims: The goal of this paper is to (i) compare the cost-effectiveness of telephone and face-to-face cognitive behavioral therapy (CBT) for depression to usual care received in primary care; (ii) compare the cost-effectiveness of telephone CBT directly to face-to-face CBT.

Methods: As part of a randomized trial study, primary care patients with depression were randomized into three groups: usual care, telephone CBT and face-to-face CBT. Incremental cost-effectiveness ratios (ICER) between respective groups are computed by dividing the incremental difference in mental health care costs by the incremental difference in mental health outcomes. Mental health care costs are computed as the sum of intervention costs (cost of administering sessions) and non-intervention costs (cost of mental health services used that are not part of the intervention). Prices for different types of mental health services are taken from the 2010 Medical Expenditure Panel Survey. Mental health costs are estimated using two-part models. Mental health outcomes are measured by two depression scales: Patient Health Questionnaire (PHQ-9) and Hopkins Symptom Checklist (HSCL), and are estimated using multiple linear regression models. The standard errors for ICERs are computed using 1000 bootstrapped samples and the delta method.

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Results: Each CBT intervention group is significantly more costly compared to usual care in terms of mental health care costs. Face-to-face CBT patients cost $732 more than usual care, and phone CBT patients cost $237 more than usual care. In terms of effectiveness, both intervention groups are associated with significantly reduced (improved) scores in PHQ9 and HSCL compared to usual care. Comparing the phone therapy directly to the same treatment offered face-to-face, we find that phone CBT is significantly less costly (by $501) and more cost effective than face-to-face when effectiveness is measures by improvement in PHQ9 scores. Specifically, for the phone CBT group, one score reduction in PHQ9 costs $634 less than face-to-face.

Discussion: One limitation is that we observe the mental health service use of patients for only four months. Phone CBT might potentially lead to substantial savings or even cost-offset in the long-run. Additional studies with long-run service use data are needed to establish these findings.

Implication for Health Policy: The finding that phone-based intervention is able to improve the depressive symptoms of patients just as effectively as face-to-face by spending less is crucial for policy makers and health institutions looking to adopt cost-effective depression treatments.

Introduction

As part of the Affordable Care Act (ACA), approximately 30 million uninsured individuals will become eligible for insurance coverage,[1] with an estimated fifth to a quarter suffering from a mental health or substance use disorders.[2] The expected rise in demand for mental health services have generated concern regarding the adequate supply of providers, rising expenditures for these services and the need to identify cost-effective treatments. Spending on mental health and substance abuse treatments increased from $84 billion to $172 billion from 1998 to 2009.[3] One potential strategy for reducing costs and dealing with the limited supply of providers has been the use of telephone-based cognitive behavioral therapy (CBT). [4] Telephone-based psychotherapy has been shown to significantly improve depression scores and mood,[5–6] with a small number of studies finding that telephone based treatment is as effective as face-to-face treatment in improving depression outcomes.[7,8] This paper is one of the first studies to compare the cost-effectiveness of telephone based CBT treatments to traditional face-to-face CBT treatments for depression.

Specifically, the focus of this paper is to examine and compare the cost-effectiveness of the telephone and face-to-face CBT interventions to treat depression among Latinos. Latino population is of interest since there are persistent disparities in depression care for Latinos compared to whites.[9,10] Although depression prevalence rates are comparable between Latinos and non-Latino whites,[11] and there is strong support for the effectiveness of CBT treatments for Latinos,[12] very few Latinos access treatment.[11]

As part of a randomized trial of treatment for depression among Latinos (CERED*), primary care patients with depression were randomized into three groups: usual care, telephone CBT and face-to-face CBT. Usual care participants received the regular care from their primary care provider which might potentially include medications but not CBT treatment.

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*CERED (*Comparative Effectiveness Research for Eliminating Disparities*) is a randomized controlled trial designed to test the comparative effectiveness of a telephone-based intervention compared to the face-to-face intervention to treat depression among Latinos. See the section titled "Study Background" for a detailed description of the study.

Telephone and face-to-face participants got the CBT interventions on top of the primary care they received. Alegria *et al.*[8] show that both types of interventions were effective in improving depression symptoms compared to usual care in primary care.

The goal of this paper is to answer two questions regarding the costs and cost-effectiveness of the study. First, we examine the costs and cost-effectiveness of each form of CBT intervention compared to usual care, separately. Second we explore whether the telephone intervention is more cost-effective than face-to-face by comparing the two intervention groups directly. The goal is to evaluate whether it costs less to achieve the same level of improvement in mental health scores using the telephone CBT compared to face-to-face CBT. Evidence regarding the cost-effectiveness of different types of depression treatment for Latinos will be crucial for policy makers in their efforts to increase treatment rates and decrease disparities.

The cost-effectiveness literature has explored the cost-effectiveness of randomized interventions to treat different mental disorders such as panic disorder,[13–16] generalized anxiety disorder,[17,18] psychosis,[19] and depression.[20–22] To the best of our knowledge, few studies explore the cost-effectiveness of an intervention to treat depression among Latinos.[23] In addition, this paper extends the scope of related literature in cost-effectiveness by being one of the first to compare the cost-effectiveness of a telephone based intervention to face-to-face intervention.

In our analysis, intervention costs include the time costs incurred by patients to attend the sessions in addition to the cost of administering the sessions. By including patient time costs in our analysis, we take a social cost perspective; patient time costs are included in cost-effectiveness studies with a social perspective.[23,24] Costs do not, however, include one-time research costs associated with recruitment, outreach or data collection.

Study Background

CERED *(Comparative Effectiveness Research for Eliminating Disparities)* is a randomized controlled trial designed to test the comparative effectiveness of a telephone-based intervention compared to the face-to-face intervention to treat depression among Latinos.[8] The screening and enrollment process followed CONSORT guidelines*. Recruitment began in May 2011 with the final interviews completed in September 2012. Adult Latino patients (aged 18+) with depression were recruited from multiple clinics in two sites, Boston, Massachusetts and San Juan, Puerto Rico. Specifically, patients were recruited if they scored 10 or more in the Patient Health Questionnaire 9, met initial screening criteria for Major Depressive Disorder, had no psychosis or suicidal thoughts, and had not been in specialty mental health treatment within the last 3 months.

After the patients agreed to participate, they completed a baseline interview. The initial baseline interview assessed socio-demographic characteristics, depression, anxiety

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*For detailed CONSORT information please refer to Figure A.1 in the Appendix, and Alegria M, Ludman E, Kafali EN, *et al.*, Effectiveness of the CERED (Comparative Effectiveness Research for Eliminating Disparities) Intervention in Low-Income Latinos. 2014.

symptoms, trauma exposure, functional impairment, mental health service use and medication use[†]. After completing the baseline interview, patients were randomized into one of three groups: usual care, telephone CBT or face-to-face CBT. The usual care group received the typical standard of care from their primary care provider that potentially included antidepressant medication or brief counseling. The other two groups received a CBT intervention in addition to the usual care they received in primary care, called Engagement and Counseling for Latinos (ECLA) by telephone (ECLA-T) or face-to-face (ECLA-F). The ECLA consisted of six to eight sessions of CBT including psycho-education on depression, activities that decrease depressed mood, and challenging negative thoughts. The first four intervention sessions were conducted weekly, while the 5th and 6th sessions were conducted every two weeks unless the clinician felt the patient needed more immediate care. If the patient did not report improvement in depressive symptoms in the first six sessions, sessions were continued up to a total of 8 sessions.

Patients completed two follow up interviews at two and four months after the baseline interview. Follow up interviews assessed the same mental illness measures and symptoms as the baseline interview. For the purpose of this study, we limit effectiveness outcomes to reduction in depression symptoms as measures by the Patient Health Questionnaire (PHQ-9) and the Hopkins Symptom Checklist (HSCL).

Data

The final dataset includes a total of 257 patients across two sites with 86 in usual care, 84 in face-to-face, and 87 in phone intervention groups. Patients are comparable across the three study groups on socio-demographic characteristics including age, gender, education, employment status and income (Table 1). Overall, the majority of the patients are female (81.7%), aged 35–64 (71.2%), and only 16.3% are employed full-time (Table 1).

There are, however, significant differences across sites in terms of a few specific characteristics. Puerto Rico participants have a higher percentage of people who are out of labor force and earn less than $15,000 (data not shown). We control for site in all our analysis to account for site differences.

Cost Measures

Mental health (MH) care costs are computed as the sum of non-intervention costs and intervention costs. Non-intervention costs are MH service use costs that are not part of the intervention. Specifically, they are the self-reported monetary costs of mental health services patients used in the four months prior to the final interview. In related literature, it is quite common to use self-reports for utilization of services.[21,23,25] Fenton *et al.*[25] checks the validity of patient reports to service volume estimates derived from other sources and finds that patient self-reports correlate highly with the standard estimates.

We include the patient-reported number of MH services used for five types of service categories: primary care visits related to mental health, psychologist/therapist visits,

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[†]Detailed explanation of these measures can be found in the Data section.

psychiatrist visits, emergency department visits, and medication prescriptions. Price per each type of service is taken from the average expenditures reported in 2010 Medical Expenditure Panel Survey (MEPS), and then applied to our data to monetize the quantities of services reported by participants. One important thing to note is that expenditures reported in MEPS are based on payments, not charges. Payments are actually a better representative of costs than charges given that they more accurately reflect the dollars spent on a service.[26] Table 2, Panel 1 shows the average prices from MEPS assigned to each of the five MH service categories.

The second component of MH care costs are the intervention costs, namely the cost of administering the individual CBT sessions and the cost of patient time lost during these sessions. Cost of administering a session is once again taken from MEPS. Specifically, we take the average price per individual psychologist/social worker visit from MEPS ($136.63) and assign it to the number of face-to-face sessions each patient completed. For telephone sessions, we assign half the price of regular psychologist/social worker visits ($68.32) as it was done in Katon et al. 2006.[13] Given the lack of publicly available data on the cost of this type of therapy, we follow the previous literature and price telephone sessions at half the value of regular sessions. To ensure this pricing strategy is not driving the estimated cost advantages of phone CBT compared to in-person CBT, we performed a sensitivity check and estimated the model by pricing phone therapy at 90% of the cost of regular therapy. The overall trends and significance of findings remained the same.*

One advantage of telephone CBT compared to in-person CBT is that it saves time for patients. Patients save on transportation time and waiting time associated with face-to-face CBT. Each telephone session is assigned one hour of patient time since the CBT intervention takes one hour on average. We assign one and a half hours of patient time to each face-to-face session assuming transportation and waiting time is half an hour. Assigning a time period of half an hour to transportation and waiting is quite short compared to the literature. [24,27] We wanted to keep the transportation and waiting time short to ensure we do not over-estimate the time-saving advantages of phone CBT compared to in-person. Patient time is priced using the reported hourly wage for each patient. Unemployed participants' time is priced using the gender and site specific average hourly wage following the literature.[20,23] Table 2, Panel 2 shows the average prices and patient times assigned to each face-to-face and phone session. Following the literature, research-specific costs associated with recruitment and outreach (material costs, reimbursements for taxi fares or cell phone minutes, etc.) are excluded from the analysis.[13,23] These costs generally are excluded in the cost-effectiveness analysis since they wouldn't be incurred in any possible real-life adoption of the interventions.

Effectiveness Measures: PHQ9 and HSCL

The measures used to assess the effectiveness of the intervention in improving depression outcomes are the Patient Health Questionnaire 9 (PHQ-9) and the Hopkins Symptom Checklist (HSCL-20). In cost-effectiveness studies, effectiveness is generally measured in

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*Phone CBT was still significantly less costly than face-to-face CBT, by $223 (p=.01).

quality adjusted life years (QALYs). Since we don't have the necessary information in our dataset to compute QALYs, we use the 1-unit change in these two widely used scales to measure effectiveness of treatment. Specifically, ICERs are computed in terms of $ per 1-unit improvement in PHQ-9 or HSCL-20 scores. Several other papers in related literature also measured effectiveness by 1-unit improvements in mental health scores.[14,28]

PHQ-9 is a 9-item screening questionnaire that is widely used in primary care settings to determine the level of depressive disorder.[29–31] It measures depression following DSM-IV criteria. Scores can range from 0 to 27, lower scores indicating lower levels of symptom severity. Scores greater than 20 are classified as indicating potentially severe major depressive disorder.

The HSCL-20 is a 20-item assessment depression scale comprised of the 13-items of the Hopkins Symptom Checklist Depression Scale and 7 additional items from the Hopkins Symptom Checklist-90-Revised.[32] The HSCL-20 was designed to assess all diagnostic symptoms of depression and is widely used in the literature.[6,13,33–39] HSCL-20 items are rated on a five-point scale and are assessed for the time period of previous 2 weeks. Responses are scored from 0 to 4. All items are averaged for a total score of 0–4, with higher scores indicating greater levels of depression.

Methods

The estimation methodology involves three main steps. First, we estimate the incremental effect of being in an intervention group on mental health outcomes PHQ9 and HSCL. Second, we estimate the incremental effect of being in an intervention group on MH care costs. Third, we compute the incremental cost-effectiveness ratios between the relevant study groups by dividing the incremental change in MH care costs by the incremental change in mental health outcomes. The ICER are in units of the form $/PHQ9 score and $/HSCL score.

First, to analyze the impact of the CBT intervention on effectiveness, we use multiple linear regression models. The outcome measures of interest are the values of the two depression measures (PHQ-9, HSCL) reported in the final interview. Respective baseline values of each depression measure (baseline PHQ-9 and HSCL) and a control for site are included as covariates in the regressions. Other socio-demographic characteristics are not used in regressions since patients are balanced in terms of socio-demographic characteristics after randomization as seen in Table 1. Sensitivity analysis conducted controlling for these covariates (i.e. age, sex, race/ethnicity and education level) showed that the results are not sensitive to the inclusion of these covariates. The magnitude and significance of our findings were essentially the same.

The model can be summarized by the following specification:

$$Y_{if} = \alpha + \beta_1 \text{ Face to face}_i + \beta_2 \text{ Phone}_i + \beta_3 Y_{ib} + \beta_4 \text{Site}_i + \varepsilon_i \quad (1)$$

where Y_{if} is the mental health outcome (PHQ-9 or HSCL) of patient i in the final assessment; *Face to face* and *Phone* are indicators for the two CBT intervention groups making usual care the reference group; Y_{ib} is the mental health outcome of patient *i* in baseline interview; and *Site$_i$* is an indicator for site (Boston vs. Puerto Rico). Estimated incremental effects and their standard errors as shown in Table 3 Columns (2) and (3) are based on the regression coefficients β_1 and β_2. Regression adjusted averages for usual care patients are computed using standardized predictions generated from regression coefficients.* To estimate the incremental effect of being in the phone group compared to face-to-face, we drop the usual care participants from the analysis and run the same regression as in Equation (1) without the indicator variable *Face to face*.

Second, we estimate the incremental effect of being in a CBT intervention group on MH care costs. Predicted MH care costs are estimated using two-part models. Two-part models are widely used in modeling costs since the characteristics of cost data such as restricted range (nonnegative observations), spike of zero values and skewness make ordinary least squares estimation biased and inefficient.[40] Explicitly, two-part models model the probability of nonzero costs separately from their level conditional on nonzero costs.[41,42] The first part of the model predicts the probability of any use (positive MH care costs) using a probit model. In practice, the outcome measure is an indicator variable taking the value of 1 if MH care costs are positive. From this probit regression, the predicted probability of having positive costs is estimated. In terms of econometric notation, the probit regression is of the form

$$\text{Prob}(y_i > 0 \,|\, x_i) = \Phi(x'\beta) \quad (2)$$

where y_i represents MH care costs, x is the vector of explanatory variables including baseline HSCL score and control for site, and is the cumulative distribution function of the standard normal.

The second part of the model is estimated using a Generalized Linear Model (GLM)[43–45] with a log link function.[40] We use the gamma distributional family to reflect the mean-variance relationship as implied by the results of our Park test ($\lambda = 1:8$). The second part predicts the level of costs conditional on nonzero costs. The formal specification of the model is given below.

$$E(y_i \,|\, y_i > 0; x_i) = \exp(x'\beta) \quad (3)$$

Once the two parts of the model are estimated, unconditional predicted MH care costs are obtained by multiplying the probabilities of use from the first part by the expected levels from the second part as in Equation (4). The standard errors for incremental effects in the two-part model are computed using the delta method.[46]

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*Similar to Schoenbaum *et al.*[21]

$$E(y_i | x_i) = \text{Prob}(y_i > 0 | x_i) * E(y_i | y_i > 0; x_i) \quad (4)$$

Finally, we compute the incremental cost-effectiveness ratios (ICER) between the relevant intervention groups by dividing the estimated incremental effect on MH care costs by the estimated incremental effect on MH outcomes. ICER are in units of the form $/phq9 score. Specifically,

$$ICER = \frac{\Delta \text{ MH care costs}}{\Delta \text{ PHQ9}} \text{ or } \frac{\Delta \text{ MH care costs}}{\Delta \text{ HSCL}}.$$

The standard errors for ICERs are computed by first creating 1000 bootstrapped estimates of incremental changes in MH care costs and effectiveness measurers, and then using first order Taylor expansion and delta method to compute the variance of each ratio as specified below. [13]

$$\text{var}\left(\frac{x}{y}\right) = \frac{\text{var}(x)}{\mu_y^2} + \frac{\mu_x^2}{\mu_y^4} \text{var}(y) - 2\frac{\mu_x}{\mu_y^3} \text{cov}(x, y)$$

Results

Summary statistics on socio-demographic characteristics including age, gender, education, employment status and income are presented in Table 1, Panel 1. The majority of the patients in the sample are female (81.7%), and only 16.3% are employed full-time. Socio-demographic characteristics are balanced across the three study groups.

Unadjusted summary statistics for MH care costs, number of services used (non-intervention) and baseline mental health scores are shown in Table 1, Panel 2. MH care costs and number of services used differ significantly across the three study groups (p=0.00 and 0.02 respectively). Both intervention groups are more costly than usual care. This is not surprising since MH care costs include the cost of administering the intervention sessions and patient time which are not incurred by the usual care participants. Phone group patients use a smaller number of MH services on average (0.89) compared to usual care (1.37), whereas face-to-face group patients use more (2.14). The three study groups are balanced in terms of baseline PHQ9 and HSCL scores.

Table 3 shows the estimated incremental effect of being in each intervention group compared to usual care on costs and effectiveness measures, along with the incremental effect of being in the phone CBT group compared to face-to-face CBT. The estimates are derived from regression models that control for baseline mental health severity and site differences as explained in the previous section.

Columns (2) and (3) of Table 3 compares each intervention group to usual care separately. Estimates show that each intervention group is significantly more costly compared to usual

care. Specifically, face-to-face group patients cost $732 more on average than usual care, and phone group patients cost $237 more than usual care.

Estimated incremental effects of the intervention on PHQ9 and HSCL scores reveal that both intervention groups are associated with significant improvement in MH outcomes. Being in the face-to-face group is associated with a 2.30 point reduction in PHQ9 score compared to usual care, whereas being in phone group is associated with a 2.98 point reduction. For HSCL, being in face-to-face and phone groups are associated with a 0.27 and 0.33 point reduction compared to usual care, respectively.

Column (4) of Table 3 compares the phone CBT group to the face-to-face CBT group. Estimates show that phone intervention is significantly less costly than face-to-face in terms of MH care costs. Specifically, phone group patients cost $501 less in terms of MH care costs compared to face-to-face. This is a rather important finding given that the level of effectiveness does not differ significantly between the two intervention groups. Phone intervention is as effective as face-to-face with significantly reduced costs.

Incremental cost-effectiveness ratios between each intervention group and usual care, and between the two intervention groups are presented in Table 4. As mentioned before, these ratios are computed by dividing the incremental change in MH care costs, by the incremental change in respective mental health outcomes (HSCL and PHQ-9).

The estimated ICERs for face-to-face group versus usual care show that it costs $318 and $2711 more to achieve one score reduction in PHQ9 and HSCL, respectively, for face-to-face group compared to usual care (Table 4, Column 1). ICER estimates for telephone group versus usual care reveal that one score reduction in PHQ9 and HSCL scores for the phone group costs $79 and $717 more than usual care. These estimates are statistically significant at p= .01.

Our most significant finding is that phone intervention is significantly more cost-effective than face-to-face in terms of improvements in PHQ9 scores. The negative ICERs comparing phone group directly to face-to-face demonstrate that achieving one score reduction in phone group costs less than one score reduction in face-to-face group (Table 4, column 3). Specifically, one score reduction in PHQ9 costs $634 less than face-to-face (and one score reduction in HSCL in phone group costs $8924 less, although not significant). In other words, the phone intervention is as effective as face-to-face in improving PHQ9 scores with significantly smaller costs.

Discussion

The finding that phone intervention is significantly more cost-effective than face-to-face in improving depression symptoms is crucial for policy makers or health institutions considering providing a similar intervention in real-life. The fact that the phone-based intervention is able to improve the depressive symptoms of patients just as effectively as face-to-face by spending less may help motivate their decisions on which type of therapy service to provide.

It is important to acknowledge that there are certain limitations to this study. First, in cost-effectiveness studies effectiveness is generally measured in quality adjusted life years (QALYs) or depression free days. Since we do not have the necessary information in our dataset to compute QALYs or depression free days, we measure effectiveness by 1-unit improvement in PHQ9 or HSCL scores. Even though 1-unit decrease in these scores might not have an obvious clinical significance, they do suggest improvement in depression symptoms. Moreover, the ICERs computed using 1-unit improvement in scores can easily be transformed into measures with clinical significance. For instance, a 5-point change on the PHQ-9 is shown to be clinically significant[47] where a drop of 5 points is the criteria for 'adequate' initial treatment response.[48,49] The ICER estimates in Table 4 can easily be transformed into units of $ per 5-unit improvement in PHQ9 scores. Specifically, our estimates show that for face-to-face CBT group it costs $1591 more to achieve a 5-unit clinically significant reduction in PHQ9, compared to usual care. For the phone CBT group, it costs $397 more to achieve a 5-unit reduction in PHQ9, compared to usual care.

The second limitation is that we are not able to properly monetize and include many advantages of the phone intervention in our costs that are relevant from a social cost perspective. For instance, phone therapy patients may possibly save on child care costs due to participation in therapy over the phone and achieve utility gains due to the privacy and flexibility with phone based care. Given this limitation patient costs may be much higher for face-to-face encounters than it is estimated in this paper, which would make the telephone intervention even more attractive. It is also important to note that not all individuals can have the financial means to make lengthy phone calls. In our study, phone group patients were provided with phone cards with extra minutes so this was not an issue. However, it is a potential limitation to replicating the study outside of a controlled research environment.

Third limitation is related to the service use data reported. Service use on general medical services is not reported as part of the study, and this turns out to be a drawback given the generally high rates of medical co-morbidity with depression. In addition, we observe MH service use of patients for only four months prior to the final interview. Both phone and face-to-face interventions can potentially be associated with significant cost savings in the long-run if we were to observe long-run service use. Additional studies would be needed to establish such findings.

As one of the first studies comparing the cost-effectiveness of telephone versus face-to-face interventions for the low-income Latino population, the findings of this study will assist policy makers and healthcare institutions considering adopting similar services to under-served minority populations.

Acknowledgments

Appendix

CERED CONSORT DIAGRAM

BostonSITE	San Juan SITE
1,138 Attempted to contact- CHA SITE	1,059 Attempted to contact- UPR SITE

854 Reachable
129 Declined at initial contact
138 Lost to follow-up
587 Screening Phase

284 Unreachable

1059 Reachable
242 Declined at initial contact
0 Lost to follow-up
817 Screening Phase

0 Unreachable

354 Pre-Screen Only
319 Ineligible
10 Declined
25 Lost to follow-up

233 Full Consent/ Screening
77 Ineligible
11 Declined
0 Lost to to follow-up
0 Extra Cases
145 (62.2%) Eligible-CHA SITE

526 Pre-Screened only
526 Ineligible
0 Declined following pre-screen
0 Lost to follow-up

291 Second Screening ***
70 Ineligible
15 Decline
53 Lost to follow-up
5 Extra Cases
148 (50.9%) Eligible- UPR SITE

293 (55.9%) Eligible BOTH SITES

257 (87.7%) Randomized

36 (12.3%) Lost to follow-up

Usual Care
86
3 (3.4%) Drop outs

Teplephone
87
18 (20.7%) Completed Session 1-3
60 (69.0%) Completed Session 4-6
9 (10.3%) Never started sessions

Face to Face
84
13 (15.5%) Completed Session 1-3
53 (63.0%) Completed Session 4-6
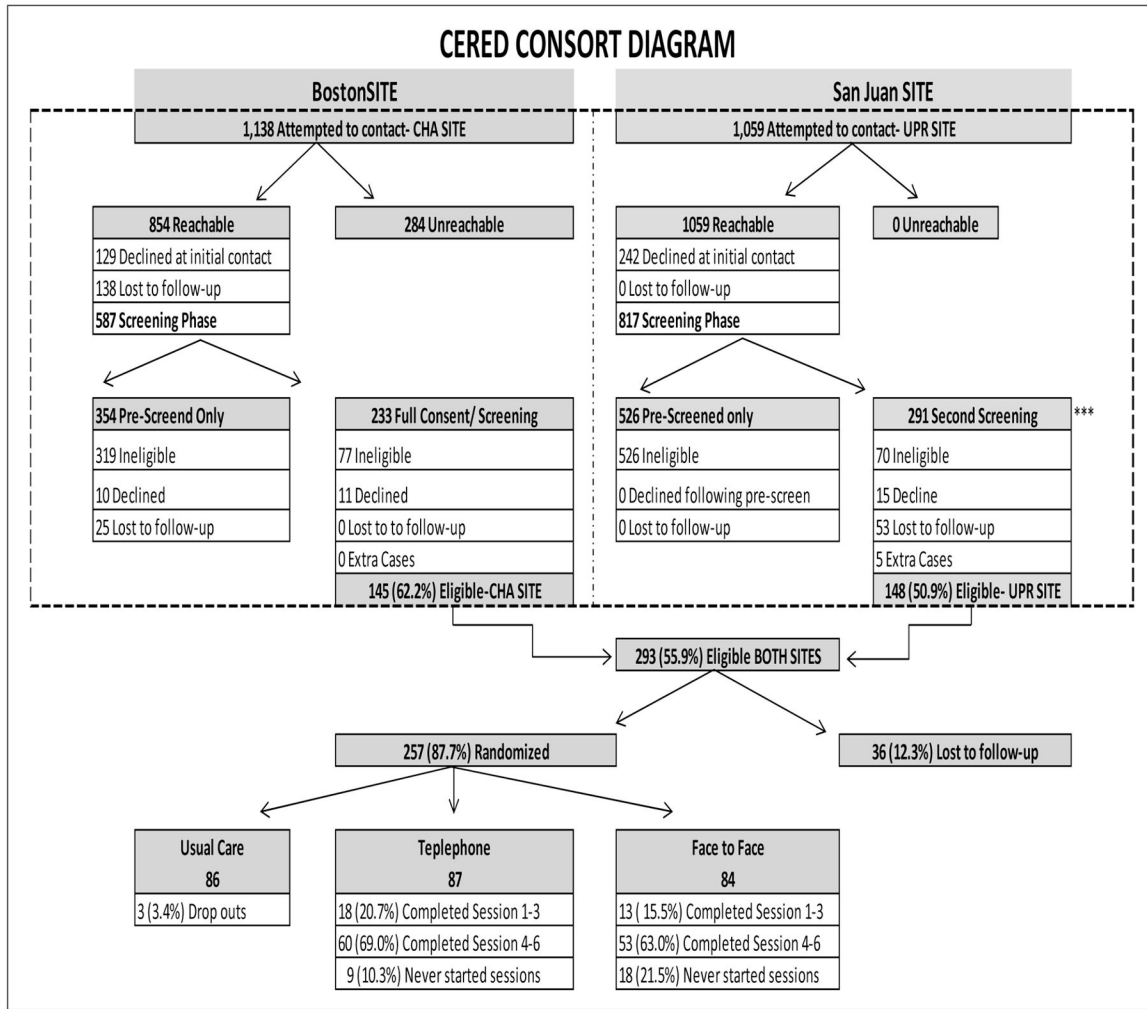18 (21.5%) Never started sessions

Figure A1.
CERED Consort Diagram

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Table 1.

Summary Statistics for Demographic Variables and Outcomes by Study Group

Demographics	Usual care n=86	%	Face-to-face n=84	%	Phone n=87	%	p-value*	Total n=257	%
Sex									
Male	15	17.4%	19	22.6%	13	14.9%	0.417	47	18.3%
Female	71	82.6%	65	77.4%	74	85.1%		210	81.7%
Age									
18–34yr	19	22.1%	20	23.8%	25	28.7%	0.831	64	24.9%
35–49yr	32	37.2%	30	35.7%	32	36.8%		94	36.6%
50–64yr	30	34.9%	32	38.1%	27	31.0%		89	34.6%
> = 65yr	5	5.8%	2	2.4%	3	3.4%		10	3.9%
Race (all are Latino)									
White	27	31.4%	22	26.2%	24	27.6%	0.697	73	28.4%
Black/Dark-skinned	29	33.7%	27	32.1%	30	34.5%		86	33.5%
Unreported (only indicated Latino)	28	32.6%	28	33.3%	26	29.9%		82	31.9%
Mixed/American Indian	2	2.3%	7	8.3%	7	8.0%		16	6.2%
Education									
6th grade or less	18	21%	20	24%	20	23%	0.240	58	23%
7–11th grade	23	27%	31	37%	20	23%		74	29%
HS diploma, GED, voc. or more	45	52%	33	39%	47	54%		125	49%
Employment status									
Full-time	17	19.8%	14	16.7%	11	12.6%	0.676	42	16.3%
Part-time	19	22.1%	21	25.0%	20	23.0%		60	23.3%
Unemployed	15	17.4%	10	11.9%	20	23.0%		45	17.5%
Out of labor force	29	33.7%	30	35.7%	26	29.9%		85	33.1%
Illness/disabled	6	7.0%	9	10.7%	9	10.3%		24	9.3%
Personal Income									
< 15k	67	77.9%	61	72.6%	68	78.2%	0.576	196	76.3%
15k-35k	12	14.0%	13	15.5%	11	12.6%		36	14.0%
35–75k	5	5.8%	3	3.6%	2	2.3%		10	3.9%

Demographics	Usual care		Face-to-face		Phone		p-value*	Total	
	n=86	%	n=84	%	n=87	%		n=257	%
Unreported	2	2.3%	7	8.3%	6	6.9%		15	5.8%
Site									
Boston	43	50.0%	41	48.8%	43	49.4%	0.988	127	49.4%
Puerto rico	43	50.0%	43	51.2%	44	50.6%		130	50.6%
Outcomes	Mean	SD	Mean	SD	Mean	SD	p-value	Mean	SD
MH care costs	$237	$540	$986	$748	$498	$352	0.00	$570	$645
#MH services used (non-intervention)	1.37	2.39	2.14	3.87	0.89	1.95	0.02	1.46	2.88
Baseline HSCL	1.78	0.88	1.93	0.98	1.92	0.86	0.48	1.88	0.91
Baseline PHQ9	15.96	3.97	17.42	4.45	16.77	4.26	0.08	16.71	4.26

*
p-values for demographic variables computed by chi-squared test; p-values for continuous variables computed by one-way ANOVA.

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Table 2.

Mental Health Care Costs Assigned to Each Type of Service

		Non-intervention costs
Service type	Average cost (per service)	Source
Primary care visit	$122.34	Based on average expenditures reported in Medical Expenditure Panel Survey (MEPS) 2010 for each mental health care category
Psychologist visit	$136.63	
Psychiatrist visit	$146.39	
ER visit	$687.34	
Rx (prescription)	$39.91	
		Intervention costs
Service type	Average cost (per service)	Source
Psychologist visit (face-to-face)	$136.63	Based on average expenditures reported in Medical Expenditure Panel Survey (MEPS) 2010 for each mental health care category
Psychologist visit (phone)	$68.32	
Time costs (face-to-face)	1.5 hours	Patients time was priced using reported hourly wage
Time costs (phone)	1 hour	

Table 3.

Incremental Effect of Being in Intervention Group on Outcome Measures

	(1) average under usual care	(2) incremental effect of face-to-face compared to usual care	Incremental Effects	
			(3) incremental effect of phone compared to usual care	(4) incremental effect ofphone compared to face-to-face
Cost measure				
MH care costs	$239.80	$731.86 ***	$236.76 ***	– $501.18 ***
p-value		0.000	0.000	0.000
Effectiveness measures				
PHQ9 score	11.75	– 2.30 *	– 2.98 **	– 0.79
p-value		0.020	0.003	0.429
HSCL score	1.52	– 0.27 *	– 0.33 **	– 0.06
p-value		0.031	0.010	0.671

Notes:

***
    p <.001,

**
    p <.01,

*
    p <.05

Table 4.

Incremental Cost Effectiveness Ratios (ICER)

	(1) face-to-face vs. usual care	(2) telephone vs. usual care	(3) telephone vs. face-to-face
ICER ($/PHQ9)	318.20 *	79.45 **	− 633.78 **
p-value	0.018	0.001	0.009
ICER ($/HSCL)	2710.59 **	717.47 **	− 8923.65 †
p-value	0.008	0.001	0.068

Notes:

**
p <.01,

*
p <.05,

†
p <.10

– ICER is computed by dividing the estimated incremental difference in MH costs by the incremental difference in effectiveness measures.

– Standard errors of ICER are computed by creating 1000 bootstrapped estimates and using delta method.