

## ORIGINAL RESEARCH



# Community-Partnered Cluster-Randomized Comparative Effectiveness Trial of Community Engagement and Planning or Resources for Services to Address Depression Disparities

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**BACKGROUND:** Depression contributes to disability and there are ethnic/racial disparities in access and outcomes of care. Quality improvement (QI) programs for depression in primary care improve outcomes relative to usual care, but health, social and other community-based service sectors also support clients in under-resourced communities. Little is known about effects on client outcomes of strategies to implement depression QI across diverse sectors.

**OBJECTIVE:** To compare the effectiveness of *Community Engagement and Planning (CEP)* and *Resources for Services (RS)* to implement depression QI on clients' mental health-related quality of life (HRQL) and services use.

**DESIGN:** Matched programs from health, social and other service sectors were randomized to community engagement and planning (promoting inter-agency collaboration) or resources for services (individual program technical assistance plus outreach) to implement depression QI toolkits in Hollywood-Metro and South Los Angeles.

**PARTICIPANTS:** From 93 randomized programs, 4,440 clients were screened and of 1,322 depressed by the 8-item Patient Health Questionnaire (PHQ-8) and providing contact information, 1,246 enrolled and 1,018 in 90 programs completed baseline or 6-month follow-up.

**MEASURES:** Self-reported mental HRQL and probable depression (primary), physical activity, employment, homelessness risk factors (secondary) and services use.

**RESULTS:** CEP was more effective than RS at improving mental HRQL, increasing physical activity and reducing homelessness risk factors, rate of behavioral health hospitalization and medication visits among specialty care users (i.e. psychiatrists, mental health providers) while increasing depression visits among users of primary care/public health for depression and users of faith-based and park programs (each  $p < 0.05$ ). Employment, use of antidepressants, and total contacts were not significantly affected (each  $p > 0.05$ ).

**CONCLUSION:** Community engagement to build a collaborative approach to implementing depression QI across diverse programs was more effective than resources for services for individual programs in improving mental HRQL, physical activity and homelessness risk factors, and shifted utilization away from hospitalizations and specialty medication visits toward primary care and other sectors, offering an expanded health-home model to address multiple disparities for depressed safety-net clients.

**KEY WORDS:** depression; community partnered participatory research; CPPR; community-based participatory research; CBPR.  
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## INTRODUCTION

Depressive symptoms and disorders are common in general populations and clients in healthcare settings, impact morbidity, and are priorities for comparative effectiveness research.<sup>1,2</sup> Depression is prevalent across cultural groups, yet African Americans may have more severe depression.<sup>3</sup> Ethnic minorities have worse access to depression care and

worse outcomes in primary care than white patients.<sup>4</sup> Evidence-based treatments include psychotherapies such as Cognitive Behavioral Therapy (CBT) and antidepressant medication; but the latter has limited efficacy in mild depression.<sup>5,6</sup> Some minority groups prefer psychotherapy,<sup>7</sup> which is less available in under-resourced areas,<sup>8</sup> where depressed adults suffer from medical and social problems and seek support from diverse service sectors. Quality improvement (QI) programs for depression that combine team leadership, care managers, clinician training, client education and system changes<sup>9</sup> improve health outcomes relative to usual primary care.<sup>10</sup> The Partners in Care study found greater improvement from QI relative to usual care for depressed African Americans and Latinos than for whites in primary care, while the IMPACT study found comparable benefits for minority and white depressed elderly.<sup>4,11,12</sup> Despite recommendations to disseminate such programs,<sup>13</sup> disparities persist,<sup>14</sup> exacerbated in under-resourced communities by homelessness and other social determinants of health.<sup>4,15</sup> Community-based participatory research (CBPR) is recommended to reduce disparities,<sup>16,17</sup> and CBPR-based interventions can improve outcomes.<sup>18,19</sup> CBPR studies confirm the importance of faith-based and community-based programs as partners to healthcare in addressing depression,<sup>20–22</sup> but there are no studies of the added value of an expanded health-home model including such partners to address depression outcome disparities.

To address this gap, we developed a CBPR approach to depression in under-resourced communities in Los Angeles<sup>23</sup> and used that experience to design Community Partners in Care (CPIC),<sup>24</sup> which examines the value of a community engagement and planning (CEP) intervention over and above resources for services (RS) for individual programs to implement depression QI programs across healthcare and community-based service sectors. We hypothesized that CEP, through promoting uptake of QI across a strengthened network of diverse community-based agencies, would be more effective than RS or technical assistance to individual programs plus outreach, in improving clients' mental health-related quality of life (HRQL) and reducing risk for probable depressive disorder, the study's primary outcomes. Community members prioritized mental wellness, physical activity, employment and homelessness as outcomes and thought that CEP would shift case management to alternative sectors and improve the ability of social service providers to engage depressed clients in addressing housing. We expected CEP to increase services use relative to RS. This study reports intervention effects on 6-month client outcomes and services use. Future studies will address effects on providers, longer-term client outcomes, costs and mechanisms.

## METHODS

Community Partners in Care (CPIC) is a group-level randomized comparative effectiveness trial of community

engagement and planning across service sectors over and above resources for services for individual programs plus outreach to implement depression QI toolkits in under-resourced communities.

The study and community engagement intervention were implemented using Community-Partnered Participatory Research (CPPR),<sup>25</sup> a form of CBPR that promotes equal authority of community and academic partners through trust building and two-way knowledge exchange. CPPR initiatives feature a council of academic and community members supporting partnered working groups and community forums for broad input.<sup>26</sup> Goals and procedures, such as data ownership and handling of disputes are documented in written memoranda. Working groups develop and implement action plans following standard group rules of order and using community engagement activities to foster participation and equality in decision-making. CPPR initiatives have three stages: Vision (goals, concepts, approaches); Valley (main work and evaluation); and Victory (products and celebration).

The CPIC protocol, including changes in response to community input, is available at [http://hss.semel.ucla.edu/documents/CPIC\\_Protocol\\_Dec2012.pdf](http://hss.semel.ucla.edu/documents/CPIC_Protocol_Dec2012.pdf). A supplemental appendix for this paper is available online.

**Intervention Design.** The CPIC Council modified depression QI toolkits<sup>4,27</sup> supporting clinician assessment and medication management (manual and pocket cards), case management (manual), patient and education (brochure, video), and CBT (individual and group manuals) for use by diverse agencies, adding a lay health worker manual and team support tools<sup>28</sup> from a post-disaster initiative blending QI toolkits<sup>8,12,29</sup> (Table 1). The toolkits were available to programs online and through flash drives and hardcopy. The CPIC Council developed two interventions: 1) Resources for Services (RS) offered programs in each community technical assistance in toolkit use under a "train-the-trainer" paradigm through webinars plus site visits to primary care for each community. The trainers included a nurse care manager, licensed psychologist CBT trainer, three expert board-certified psychiatrists for medication management and QI, support staff and community service administrator to support participation and cultural competence. 2) Community Engagement and Planning (CEP) invited administrators to bi-weekly meetings for 5 months to build training capacity for toolkits and networks for services. Planning was co-led by community and academic Council members and followed principles of CPPR,<sup>25,26</sup> such as equal authority for decisions and two-way knowledge exchange. CEP councils were provided with a workbook for developing written implementation plans tailored to the community and monitored plan implementation with course corrections as needed.

**Table 1. Toolkit Resources for Community Partners in Care (CPIC)**


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User Guide for Partners in Care/Community Partners in Care
Improving Depression Outcomes in Primary Care: A User's Guide to Implementing the Partners in Care Approach <sup>30</sup> (Partners in Care, updated)
Expert leader training materials (Partners in Care training slides)
IMPACT study team building process forms <sup>29</sup>
Overview to depression assessment and management (Partners in Care)
PIC philosophy ( <a href="http://www.rand.org/health/projects/pic.html">http://www.rand.org/health/projects/pic.html</a> )
Resources and Guidelines for Care Managers
Manual for the care manager and manager forms (Partners in Care, revised from Mental Health Infrastructure and Training (MHIT) Project) <sup>28</sup>
Patient Health Questionnaire 9-item version (PHQ-9) in English and in Spanish <sup>31</sup>
Cognitive Behavioral Therapy (CBT) Therapist Toolkit
CBT individual and group manuals (client and provider) in English and in Spanish <sup>32</sup>
Therapist forms, PHQ-9 and outcomes graphing; relapse prevention plan (Partners in Care)
Primary Care/Public Health Clinician Toolkit
Clinician guide to depression assessment and management in collaborative care (Partners in Care, updated)
Quick reference cards (Partners in Care)
Educational Materials
M. Jackson-Triche, KB. Wells, K. Minnium. <i>Beating Depression: The Journey to Hope</i> . New York: McGraw-Hill; 2002.
Patient education brochures and resources in English and Spanish (Partners in Care) <a href="http://www.rand.org/health/projects/pic.html">http://www.rand.org/health/projects/pic.html</a>
Articles cited or included as resources in the CPIC Toolkit <sup>4,8,12,25,27,29,30,32-48</sup>

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Within enrolled programs, providers could attend trainings and providers and clients could use intervention resources, even if not personally enrolled. Enrolled client lists were provided to CEP but not RS administrators, except one agency with a shared waiting room where both were given lists. Programs were not asked to limit toolkit use to enrolled clients.

**Implementation.** For RS, between December 2009 and July 2010 ten webinars were provided per community plus one make-up in one community; one primary care site accepted a visit. Khodyakov et al.<sup>49</sup> describe CEP planning including development of trust and partnered co-leadership and completion of a written plan. Common features of plans included multiple training conferences, follow-up for individual programs and telephone and webinar supervision for therapists and case-managers, between December 2009 and July 2011. Los Angeles County's Service Planning Area 6 (South LA) Council developed train-the-trainer capacities while the Service Planning Area 4 (Hollywood/Metro LA) Council used group case review to identify training modification needs. CEP offered more training and increased staff participation and total training hours relative to RS.

**Sampling.** The two communities, Los Angeles County Service Planning Areas 6 (South Los Angeles) (1.5 million people) and 4 (Hollywood-Metro Los Angeles) (500K

people), have high rates of unemployment, homelessness, avoidable hospitalizations, and low rates of insurance.<sup>50</sup> We hosted community meetings to determine service sectors viewed as important to depressed clients,<sup>24</sup> and to identify vulnerable populations for oversampling. Across communities, sectors were mental health, primary care and public health, substance abuse, social services, and faith-based programs, parks, hair salons, and exercise clubs. South Los Angeles partners nominated substance abuse clients and African Americans and Hollywood-Metro homeless clients and seniors for over-sampling.

**Program Recruitment and Randomization.** With no standard approach to recruit diverse sectors, we used county lists supplemented by community nominations to identify agency names. We used an iterative process of contacting programs and assessing eligibility and interest to offer consent to 60 potentially eligible agencies having 194 programs, from which 133 potentially eligible programs (serving  $\geq 15$  clients per week, one or more staff, not focused on psychotic disorders or home services) were randomized (65 RS, 68 CEP) (Fig. 1). Within each community, programs were paired into exchangeable units or clusters of smaller programs, based on geographic location, service sector, size, population served, services provided, and funding streams; two larger agencies were their own stratum. One unit was randomized to CEP and the other to RS.<sup>51</sup> Randomization was conducted by a statistician uninvolved with recruitment. Council members produced seed numbers for the randomization program.<sup>52</sup> Site visits were conducted to finalize enrollment using recruiters blinded to assignment; 20 programs were ineligible, 18 refused and 95 programs from 50 consenting agencies enrolled (46 RS, 49 CEP; Fig. 1, Table 2). Administrators were informed of intervention status by letter. From census track data, participating and nonparticipating programs were comparable in age, sex, race, population density, and income at the zip code level (each  $p > 0.10$ ).

**Client Recruitment.** After changes in response to community input, the study was designed to achieve a follow-up sample of 780 depressed clients, for a detectable effect size of 0.20–0.22 and percentage point difference between groups of 9.98–10.91 %, assuming power of 80 % with  $\alpha = 0.05$  (two-sided), and intraclass correlation coefficient (ICC) = 0.00–0.02.<sup>51,53,54</sup> To achieve this, we planned to enroll 557–600 clients per condition assuming 65–70 % retention.

Within programs, clients were screened in waiting rooms (consecutive) or events (random) from March 2010 to November 2010. Staff blinded to intervention status approached 4,649 adults (age  $\geq 18$ ) on 2–3 days per program and 4,440 (95.5 %) agreed to screening. Eligibility

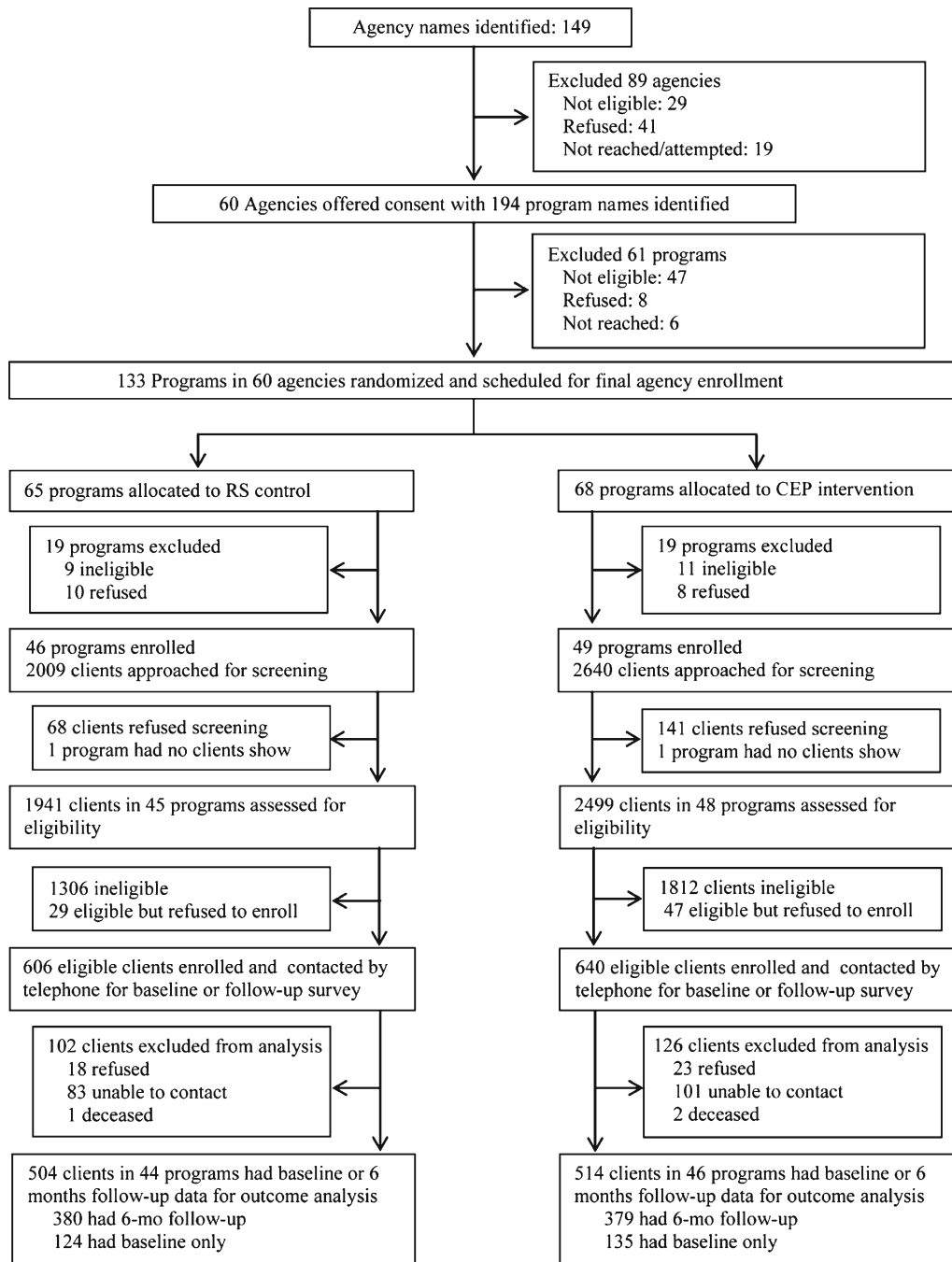


Figure 1. Trial profile. \*Three programs (RS: 1, CEP:2) had no clients with data for outcome analysis.

was limited to clients providing contact information and having at least mild depression (score  $\geq 10$  on the 8-item Patient Health Questionnaire (PHQ-8), with the same scoring characteristics and cut-point as the PHQ-9.<sup>55</sup> Based on community input we counted a response on either of two versions of one PHQ-8 item with and without the word “depression”; Pearson correlation coefficient of items was 0.99. Of 4,440 screened, 1,322 (29.8 %) were eligible and of these 1,246 (94.3 %) consented, a high rate for QI studies.<sup>10,12,29</sup> Between April 2010 and January 2011, 981

(78.7 % of consented) completed baseline telephone surveys (interviewers blinded to assignment) and between November 2010 and August 2011, 759 completed 6-month follow-up telephone surveys (61.1 % of consented minus three deaths), a lower rate than some QI studies,<sup>27,29</sup> but similar to studies of safety-net clients<sup>8,31</sup>; 1,018 (81.9 % of consented minus deaths) with baseline or follow-up data (Fig. 1) comprise the analytic sample. One RS and two CEP programs had no clients completing surveys, yielding 90 programs with clients in the analytic sample. The study,

Table 2. Number of Enrolled Programs Having Screened Clients by Service Sector, Community and Intervention Group Status

	Combined			Hollywood-Metro			South Los Angeles		
	All	RS	CEP	All	RS	CEP	All	RS	CEP
Type of Program									
Primary care or public health	17	8	9	13	6	7	4	2	2
Mental health specialty	18	10	8	11	7	4	7	3	4
Substance abuse	20	11	9	3	2	1	17	9	8
Homeless social services	10	5	5	7	3	4	3	2	1
Other social and community*	28	11	17	9	4	5	19	7	12
Total Programs	93	45	48	43	22	21	50	23	27

RS Resources for Services or individual program technical assistance; CEP Community Engagement and Planning or collaborative capacity building, each, implement depression QI programs

\*Family preservation, prisoner re-entry, faith-based, parks and recreation community and senior centers, hair salons, and exercise clubs; two additional social services programs (one RS and one CEP) were enrolled and participated in training, but had no enrolled clients

funded in 2007, was not considered a clinical trial by the National Institutes of Health and no data safety monitoring board was required; post data collection the study was registered (ClinicalTrials.gov NCT01699789). No major design changes were made after recruitment began. Patients reporting recent suicidal ideation on surveys were contacted by telephone by a study clinician following a protocol. Procedures were approved by Human Subjects Protection Review Committees of RAND and participating agencies.

**Measures.** Baseline measures include program intervention assignment and sector and client data from the screener and baseline survey on demographics (age, sex), presence of three or more chronic conditions from 18 conditions, education level, race/ethnicity; from the 12-item Short Form health survey (SF-12)<sup>56</sup> physical and mental health composite scores (PCS12, MCS12) and meeting federal family poverty criteria. Using the Mini-International Neuropsychiatric Interview (MINI),<sup>57</sup> we assessed using Diagnostic and Statistical Manual of Psychiatric Disorders, Fourth Edition (DSM-IV) criteria 12-month major depressive or dysthymic disorder, current manic episode, recent anxiety disorder (1-month panic or post-traumatic stress or 6-month generalized anxiety disorder), and alcohol abuse or use of illicit drugs in 12 months. Study outcomes are based on client self-report at 6-month telephone follow-up. Pre-planned primary outcomes are poor mental HRQL (MCS12  $\leq$  40, one standard deviation below population mean)<sup>56</sup> and exceeding the cut-point for mild/moderate depression on the PHQ-9<sup>55</sup> (score  $\geq$  10). In response to community priorities, we developed indicators of mental wellness (three items of having in the prior 4 weeks some feeling of being calm or peaceful, having energy or being happy<sup>56</sup>); responding somewhat or definitely true to “my life is organized”<sup>58</sup> as a resiliency measure; being at least fairly physically active from a single item; working for pay; missing work in the past 30 days; and either currently homeless/living in a shelter or having multiple risk factors for future homelessness,<sup>59,60</sup> including no place to stay for at least two nights in the past 6 months or eviction from

primary residence, financial crisis or food insecurity in the past 6 months from life events measures.<sup>61</sup>

We assessed services use in the past 6 months for overnight hospital stays for mental health or substance abuse, overnight substance abuse rehabilitation, emergency room (ER) visits, outpatient mental health or self/family groups visits, hotline calls, and use of outpatient primary care or public health clinics, substance abuse or social services programs, parks and community centers, and faith-based and other community locations, counting as depression-related visits for which the client reported receiving information, referral, counseling, or medication management for depression or emotional problems. We developed indicators for any use and being above the baseline median visits and counts of contacts. Since a single overnight stay could reflect emergency room use, we included for sensitivity analyses having  $\geq$  four hospital nights. To account for potential bias in self-report, we asked participants to provide names and addresses for up to four providers per sector, and for high utilizers and “other” locations, confirmed sector assignment and feasibility of counts through internet searches and program telephone calls.

We conducted intent-to-treat, comparative-effectiveness analyses with intervention status as the independent variable, using logistic regression for dichotomous measures and log-linear models for counts. Consistent with group-randomized trial recommendations,<sup>51</sup> we adjusted for baseline status of dependent variables and covariates (age, sex,  $\geq$  three chronic conditions, education, race/ethnicity, family poverty, 12-month alcohol abuse or use of illicit drugs, 12-month depressive disorder, and community). We weighted data for 1,018 clients to characteristics of the eligible sample, with item-level imputation for missing data<sup>62,63</sup> and wave-level<sup>64,65</sup> imputation for missing surveys. Weights account for non-enrollment among eligible clients and attrition (see Supporting Online Material). All analyses were conducted using SUDAAN Version 10.0 (<http://www.rti.org/sudaan/>) and accounted for clustering (clients within programs),<sup>66</sup> weighting, and multiple imputations.<sup>64</sup> Significance of comparisons by

intervention status was based on regression coefficients. Results of logistic regression models are presented as odds ratios (OR) and log-linear models as rate ratios (RR) with 95 % confidence intervals. We illustrate results for intervention groups adjusted for covariates using standardized predictions generated from fitted regression models.<sup>27,67</sup> For outcomes, we provide adjusted differences in predictions with standard errors.<sup>68</sup> We present Cohen’s effect size index *h*, defined for dichotomous variables,<sup>53</sup> where *h*=0.20 is small, *h*=0.50 is medium and *h*=0.80 is large. We supplement adjusted models with unadjusted raw data to assess robustness. We applied a Bonferroni adjustment<sup>69</sup> considering two primary outcomes and compared the proportion of results across outcomes favoring one intervention to an assumed null-hypothesis of 0.5.

**RESULTS**

**Baseline.** Of 1,018 depressed clients, 57 % were female, 87 % were Latino and or African American; 43.6 % had less than a high school education, 73.6 % had income below poverty, 20 % worked and 54.1 % were uninsured. The percentage having 12-month depressive disorder was 61.9 %, while 39.3 % had substance abuse and 54.7 % had multiple chronic conditions. Over half had risk factors for homelessness. There were no significant differences by intervention status (Table 3).

**Outcomes.** Relative to RS, CEP reduced the percentage of clients having poor mental HRQL (primary) and overall poor mental health (confirmatory), with adjusted differences of seven percentage points. A similar trend for PHQ9 cut-point was not statistically significant; after Bonferroni adjustment for two primary outcomes, quality of life remains significant (*p*<0.025). Community Priorities: CEP increased the percentage reporting mental wellness, an organized life, being physically active and reduced the percentage currently homeless or having multiple recent homelessness risk factors (each *p*<0.05, adjusted differences from 8.98 to 12.27). There were no significant intervention differences in working or missing a workday (smallest *p*=0.09). The direction favored CEP on all outcomes (Table 4). All effect size indices (Cohen’s *h*) were ≤ 0.25.

**Utilization.** The percentage of clients hospitalized for behavioral health was lower in CEP relative to RS (from 10.5 to 5.8 % [*p*<0.05] [Table 5]), with a similar reduction for ≥ four nights. The percentage with two or more ER visits (baseline median) did not differ significantly by intervention status. CEP and RS clients had similar use of any specialty visit, but such CEP users had significantly fewer medication visits. The percentage with a primary

**Table 3. Baseline Characteristics of Depressed Clients (N=1018) in Outcomes Analysis, by Intervention Group Status**

	Overall (N=1018)	RS (N=504)	CEP (N=514)
Service sector, no. (%)			
Primary care or public health	290 (29.9)	134 (27.9)	156 (31.8)
Mental health services	195 (17.8)	110 (20.9)	85 (14.9)
Substance abuse	230 (21.8)	111 (21.1)	119 (22.4)
Homeless services	162 (16.4)	92 (18.7)	70 (14.2)
Community-based	141 (14.1)	57 (11.4)	84 (16.7)
Age, years	45.8±12.9	44.9±12.4	46.6±13.2
Female, no. (%)	595 (57.0)	286 (54.8)	309 (59.1)
Ethnicity, no. (%)			
Latino	409 (41.0)	194 (38.8)	215 (43.1)
African American	488 (46.0)	239 (46.9)	249 (45.0)
Non-Hispanic white	86 (9.2)	45 (9.7)	41 (8.8)
Other	35 (3.8)	26 (4.6)	9 (3.1)
Married or living with partner, no. (%)	231 (22.6)	116 (22.6)	115 (22.6)
Less than high school education, no. (%)	446 (43.6)	221 (43.7)	224 (43.5)
≥ 3 chronic medical conditions of 18, no. (%)	548 (54.7)	270 (54.4)	278 (55.1)
Family income from work, past 12 months ≤ \$10,000, no. (%)	755 (73.6)	374 (75.2)	381 (72.1)
Family income under federal poverty level, no. (%)	750 (73.7)	373 (74.5)	377 (73.0)
No health insurance, no. (%)	545 (54.1)	286 (57.3)	259 (51.1)
Working for pay, no. (%)	205 (20.0)	105 (20.6)	100 (19.4)
Homeless or ≥ 2 risk factors for homelessness, no. (%)*	536 (52.7)	283 (56.2)	253 (49.2)
12-month depressive disorder, no. (%)	629 (61.9)	311 (62.4)	318 (61.4)
Alcohol abuse or use of illicit drugs 12 months, no. (%)	398 (39.3)	180 (36.3)	218 (42.2)
Poor mental health quality of life, no. (%)†	546 (53.2)	271 (53.8)	275 (52.7)
Good physical functioning and activity, no. (%)‡	114 (11.0)	60 (11.8)	54 (10.3)
Mental wellness, no. (%)§	407 (39.7)	200 (39.2)	207 (40.1)

Plus-minus values are means ± SD; data were multiply imputed and weighted for eligible sample for enrollment; Chi-square test was used for a comparison between the two groups accounting for the design effect of the cluster randomization; *P*> 0.05 for all comparisons  
 RS Resources for Services or individual program technical assistance, CEP Community Engagement and Planning

\*Homeless or living in a shelter, or at least two risk factors of four (at least two nights homeless, food insecurity, eviction, financial crisis)

†Mental Health Composition Score of SF-12 (MCS12) ≤ 40; one standard deviation below population mean

‡At least fairly physically active and not being limited by health in moderate activities and climbing stairs

§At least good bit of time on any of three items: feeling peaceful or calm, being a happy person, having energy

care/public health depression visit did not differ significantly by intervention status, but such CEP users were more likely to have two or more depression visits (baseline median), adjusted difference of 17.9. There were

Table 4. Six-month Client Health and Social Determinant Outcomes by Intervention Group Status

	Unadjusted Estimates <sup>†</sup>			Adjusted Analysis <sup>‡</sup>			Group Difference	OR (95% CI)	ES h <sup>s</sup>
	N	RS no./total no. (%)	CEP no./total no. (%)	N	RS % (95% CI)	CEP % (95% CI)			
<b>Primary outcomes</b>									
Poor mental health quality of life, MCS12 ≤ 40	755	198/379 (52.2 %)	166/376 (44.1 %)	1018	51.4 (46.4, 56.4)	44.1 (40.1, 48.0)	-7.35 (3.1)	0.74 (0.57, 0.95)*	0.15
At least mild depression PHQ9 (≥ 10)	754	253/378 (66.9 %)	234/376 (62.2 %)	1018	67.0 (60.4, 73.6)	61.7 (54.4, 69.1)	-5.25 (4.5)	0.78 (0.48, 1.26)	0.11
<b>Secondary outcomes</b>									
Mental wellness	758	131/379 (34.6 %)	173/379 (45.6 %)	1018	33.6 (27.9, 39.3)	45.9 (40.7, 51.1)	12.27 (4.1)	1.75 (1.19, 2.59)**	0.25
My life is organized <sup>  </sup>	757	159/379 (42.0 %)	193/378 (51.1 %)	1018	42.7 (36.7, 48.7)	51.7 (45.1, 58.2)	8.98 (3.9)	1.45 (1.03, 2.04)*	0.18
Physically active <sup>¶</sup>	759	150/380 (39.5 %)	186/379 (49.1 %)	1018	40.3 (34.6, 46.0)	49.6 (44.5, 54.6)	9.27 (3.1)	1.50 (1.14, 1.98)**	0.19
Homeless or ≥ 2 risk factors for homelessness	758	150/379 (39.6 %)	109/379 (28.8 %)	1018	39.8 (32.8, 46.7)	29.7 (23.6, 35.8)	-10.08 (4.3)	0.61 (0.38, 0.96)*	0.21
Working for pay	759	90/380 (23.7 %)	92/379 (24.3 %)	1018	23.5 (18.3, 28.6)	24.7 (18.8, 30.7)	1.25 (2.9)	1.09 (0.69, 1.70)	0.03
Any missed work day in last 30 days if working	177	56/89 (62.9 %)	44/88 (50.0 %)	249	63.1 (53.4, 72.8)	51.5 (43.3, 59.7)	-11.6 (6.7)	0.59 (0.32, 1.09) <sup>††</sup>	0.24

See Table 2 for variable definitions  
 RS Resources for Services or individual program technical assistance, CEP Community Engagement and Planning, N analytic sample  
 †Raw data without weighting or imputation  
 ‡Adjusted analyses used multiply imputed data, weighted for eligible sample for enrollment; logistic regression models adjusted for baseline status of the dependent variable, community, age, sex, ≥ three chronic conditions, education, race/ethnicity, income < federal poverty level, 12-month alcohol abuse or use of illicit drugs, and 12-month depressive disorder; and accounted for the design effect of the cluster randomization  
 §ES h: Cohen's effect size index for a difference in proportions  
 ¶A response of somewhat or definitely true to "my life is organized" versus unsure or somewhat false or definitely false  
 ¶¶I = Fairly/quite/very/extreme active to "How physically active you are?"  
 \*p < 0.05; \*\*p < 0.01; \*\*\*p < 0.001; ††p < 0.10

no significant differences by interventions status in rates of visiting faith-based or park programs, but among users, CEP clients had significantly more depression visits. There were no significant differences by intervention status in use of substance abuse, social services or hotlines for depression (not shown), antidepressant medication use, healthcare counseling visits, or outpatient depression contacts. Findings were similar using raw data (Table 5).

DISCUSSION

This is to our knowledge the first study of the added value to clients' health of community engagement and planning across sectors over and above resources for services for individual programs for implementing evidence-based depression QI across sectors in under-resourced communities. The collaborative model improved mental HRQL and mental wellness, physical activity and lowered an indicator of being homeless or having multiple risk factors for future homelessness. Outcomes improved in each condition, so RS may have been effective relative to no intervention, a hypothesis we cannot test. The standardized effect sizes were modest by conventional standards, but effects are based on a comparison of two active interventions, and progress in public health is often furthered by applying interventions of modest effect sizes to large populations. Actual effects, such as a seven percentage point reduction in poor quality of life or ten percentage point reduction in being homelessness or having multiple risk factors for future homelessness, seem meaningful in combination for a vulnerable sample. Further, program-level interventions may have affected clients beyond those enrolled, as resources were not limited to study clients. That the collaborative model had benefits spanning health and social determinants of health may have important implications for the design of health homes that activate community partners to co-manage depressed clients. Future research should determine whether intentional, two-way knowledge exchange in mental health and social competencies across healthcare and other community-based sectors further optimizes outcomes.

We found no significant intervention differences in use of antidepressants and healthcare counseling or in probable clinical depression. This may be because both conditions implemented depression QI; a stronger differential shift in treatment use is likely needed to shift depression status. Further, these findings suggest that the mechanism underlying outcome differences is not due to treatment exposure alone. Instead, we found shifts under CEP in depression services away from specialty medication visits toward primary care/public health, faith-based and park services, consistent with community members' expectation for task shifting. An alternative explanation is that the

Table 5. Client Services Utilization in Prior Six Months at Six-month Follow-up by Intervention Group Status

	Unadjusted Estimates <sup>†</sup>			Adjusted Analysis <sup>‡</sup>			
	N	RS Mean (SD) or %	CEP Mean (SD) or %	N	RS Mean or % (95 % CI)	CEP Mean or % (95 % CI)	OR or RR (95 % CI)
Hospitalization for Behavioral Health	759	35/380 (9.2 %)	22/379 (5.8 %)	1018	10.5 (6.4, 14.6)	5.8 (2.8, 8.8)	0.51 (0.28, 0.95)*
≥ 4 hospital nights for Behavioral Health <sup>§</sup>	759	19/380 (5.0 %)	8/379 (2.1 %)	1018	5.8 (2.4, 9.2)	2.1 (0.5, 3.6)	0.34 (0.14, 0.88)*
≥ 2 emergency room visits <sup>§</sup>	759	107/380 (28.2 %)	91/379 (24.0 %)	1018	28.3 (22.4, 34.3)	24.5 (19.0, 29.9)	0.81 (0.52, 1.25)
MHS outpatient visit	758	207/380 (54.5 %)	206/378 (54.5 %)	1018	53.9 (47.4, 60.4)	53.6 (46.2, 61.0)	0.99 (0.69, 1.41)
PCP visit with depression service	756	111/379 (29.3 %)	117/377 (31.0 %)	1018	29.2 (24.3, 34.2)	29.4 (23.7, 35.2)	1.01 (0.70, 1.46)
≥ 2 PCP visits with depression service, if any <sup>§</sup>	228	68/111 (61.3 %)	95/117 (81.2 %)	298	61.9 (53.6, 70.2)	79.8 (70.7, 88.8)	2.63 (1.40, 4.94)**
Faith-based program participation	759	229/380 (60.3 %)	217/379 (57.3 %)	1018	59.5 (52.9, 66.1)	57.1 (51.4, 62.8)	0.89 (0.66, 1.21)
Use of park or community centers	759	161/380 (42.4 %)	150/379 (39.6 %)	1018	41.1 (34.3, 48.0)	39.4 (32.8, 45.9)	0.92 (0.61, 1.40)
Took antidepressant for two months or more in past 6 months	759	149/380 (39.2 %)	125/377 (33.2 %)	1018	39.2 (30.4, 48.0)	31.5 (23.4, 39.7)	0.65 (0.34, 1.25)
Mean number of visits <sup>  </sup>		Mean±SD	Mean±SD		Mean (95 % CI)	Mean (95 % CI)	RR (95 % CI)
Medication visits among MHS users	413	10.0±26.4	5.4±7.6	553	10.9 (6.2, 15.5)	5.3 (4.1, 6.6)	0.49 (0.30, 0.82)*
Counseling visits from MHS or PCP <sup>¶</sup>	755	8.8±22.9	7.1±12.5	1018	9.6 (6.1, 13.0)	6.9 (5.3, 8.5)	0.72 (0.44, 1.18)
Faith-based visits with depression service if faith participation <sup>¶</sup>	445	0.7±2.1	1.8±6.4	588	0.7 (0.3, 1.0)	1.9 (0.9, 2.9)	2.84 (1.39, 5.80)**
Park or community center visits with depression service if park or community center <sup>¶</sup>	311	0.3±2.0	1.6±9.0	410	0.3 (0.0, 0.5)	1.6 (0.2, 3.1)	6.20 (1.54, 24.90)*
Total outpatient contacts for depression <sup>#</sup>	759	21.0±46.8	21.6±43.9	1018	22.9 (14.8, 30.9)	21.9 (16.3, 27.4)	0.96 (0.59, 1.57)

RS Resources for Services or individual program technical assistance, CEP Community Engagement and Planning, Behavioral Health alcohol, drug, mental health, MHS mental health specialty, PCP Primary care or public health, OR Odds ratio, RR Rate ratio

<sup>†</sup>Raw data without weighting or imputation

<sup>‡</sup>Adjusted analyses used multiply imputed data and weighted for eligible sample for enrollment; logistic regression models for binary variables (presented as odds ratio) or log-linear regression models for count variables (presented as rate ratio) adjusted for baseline status of the dependent variable, community, age, sex, ≥ three chronic conditions, education, race/ethnicity, income < federal poverty level, 12-month alcohol abuse or use of illicit drugs, and 12-month depressive disorder; and accounted for the design effect of the cluster randomization

<sup>§</sup>Median cut point for baseline variable

<sup>||</sup>A sensitivity analysis for count variables based on generalized negative binomial regression models using STATA (svy: gnbreg) provided similar results

<sup>¶</sup>For this sector, depression/mental health service is defined by client report of having assessment, counseling, education, medication discussion or referral for depression or emotional or mental health problems

<sup>#</sup>Including ER visit for ADM problem, MHS, visits with depression service from PCP, substance abuse, self-help, and social-community services

\*p < 0.05; \*\*p < 0.01



intervention increased capacity of alternative sectors to engage depressed clients in addressing social determinants such as physical activity and housing. Future research is needed to clarify mechanisms by exploring linkages of system and provider changes to client outcomes and examine long-term outcomes and intervention costs.

In response to the unexpected finding of reduced behavioral health hospitalizations with CEP relative to RS, community partners suggested that patients were stabilized in sectors they already visited and had less need for hospitalization. The community engagement intervention, CPPR model on which it was based and QI toolkits are manualized,<sup>25,26</sup> facilitating replication of this finding. CEP implementation required community engagement and trust building over several months and QI training co-led by community and clinical experts. Replication and sustainability may require infrastructure development, such as community-centered behavioral health homes with access to experts in QI for depression and community engagement. The toolkits, findings, and CPIC partners' experience may support such efforts.

CPIC is one of the largest randomized trials of community engagement for health improvement in the United States, but has important limitations. The study was conducted in two communities where leaders had a history of applying CPPR to depression;<sup>20,23</sup> most programs were new to this partnership. Response rates were moderate for agencies and high for programs. Most depression QI and participatory intervention studies use convenience samples of sites or integrated or government systems,<sup>4,8–10,18,19,22,27,29</sup>; our approach combined public lists and community recommendations to identify financially stable, safety-net programs, where task shifting for depression may be more effective.<sup>22</sup> Client enrollment rates were high, but retention lower relative to some QI studies, but comparable to safety-net studies.<sup>31,70</sup> Outcomes rely on client self-report at 6-month follow-up.

Overall, the study suggests that developing a collaborative network across healthcare and other community-based service sectors to implement evidence-based QI training for depression brings added value over and above resources for services plus outreach to individual programs, with benefits including mental HRQL, physical activity and reduced homelessness risk factors and behavioral health hospitalizations with shifts in outpatient services toward alternative sectors. While effect sizes are modest, in aggregate they appear meaningful for vulnerable groups that are difficult to stabilize. CEP may offer an approach to address multiple disparities for depressed clients through healthcare-community partnerships integrated by a common clinical QI model.

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