On-Line Supplemental Appendix

I. Literature on the efficacy of peer support

Despite rapid dissemination in mental health settings, the evidence base for peer support interventions has been mixed, potentially because of the wide variety of program configurations and populations targeted. Four recent systematic reviews or meta-analyses of the efficacy of peer support interventions with varying configurations have been published, including one that examined peer support for depression (1)(2)(3)(4).
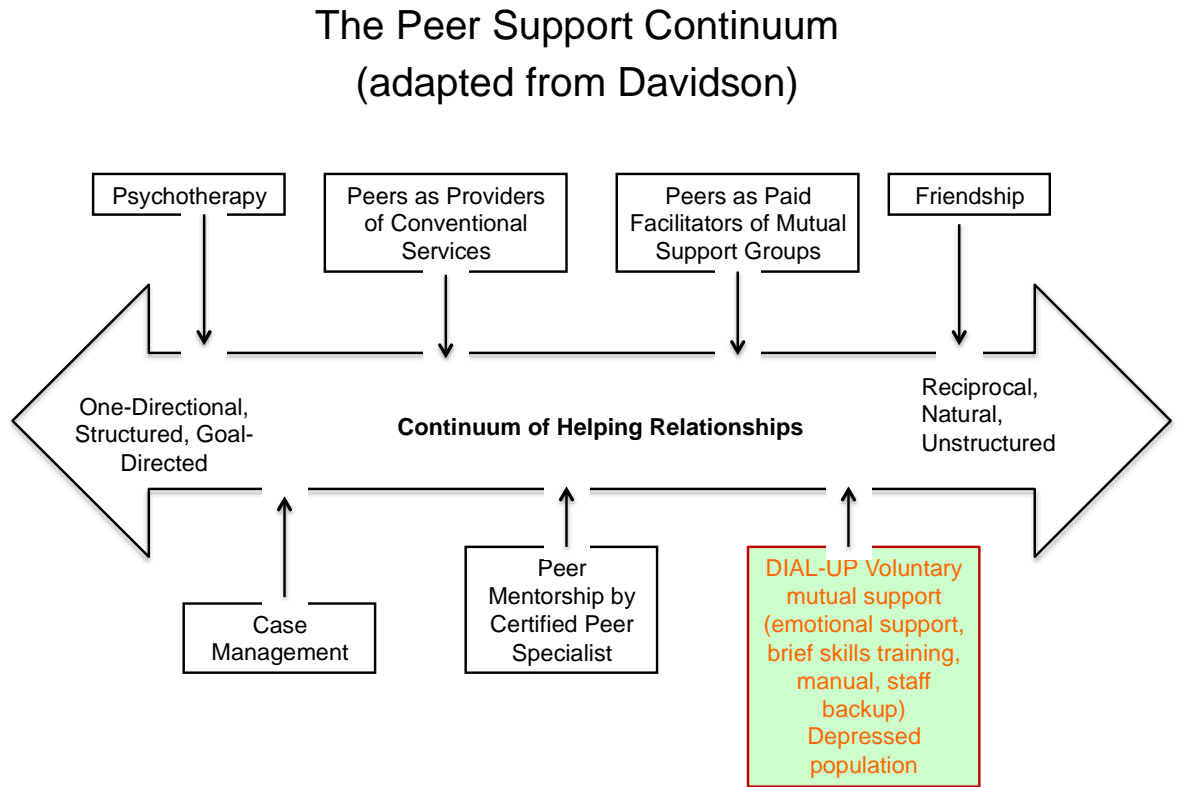
Three reviews were of studies of patients with severe mental illness (which may have included major depression). Llyod-Evans et al. reviewed randomized controlled trials (RCTs) and found only inconsistent, low-grade evidence regarding the impact of mutual or uni-directional peer support on psychiatric symptoms and hospitalization although there were more positive, albeit inconsistent, effects on recovery-oriented outcomes such as hope and empowerment (3). This review also found little evidence that peer staff delivering traditional services had differential effects on hospitalization or symptoms compared to professional counterparts, consistent with a Cochrane review of RCTs conducted by Pitt et al.(2). Pitt et al. also found little evidence of benefit from peer support "added on" to existing staff. A review by Chinman et al. included observational studies as well as RCTs and concluded that peers added to existing services and peers delivering structured curricula resulted in some favorable outcomes, such as increases in perceived recovery, empowerment, and hope (1). Finally, a meta-analysis of RCTs conducted by Pfeiffer et al. found peer support for individuals with depression were superior to usual care in reducing depressive symptoms (4).

To date, no RCTs have examined the effectiveness of mutual dyadic peer support for patients in depression treatment with persistent symptoms. Two prior RCTs have examined mutual dyadic peer support for adults with diabetes and adults with heart failure, with the model proving more effective than nurse care managers in improving diabetes outcomes, (5) but no more effective than nurse practitioner outreach for patients with heart failure (6). In a pilot one-

arm study of mutual peer support for depression, decreases in depressive symptoms and

improvements in quality of life were found among participating patients (7).

1. Chinman M, George P, Dougherty RH, et al.: Peer support services for individuals with serious mental illnesses: assessing the evidence. Psychiatric Services (Washington, D.C.) 65: 429–441, 2014.

2. Pitt V, Lowe D, Hill S, et al.: Consumer-providers of care for adult clients of statutory mental health services [Internet]; in Cochrane Database of Systematic Reviews. John Wiley & Sons, Ltd, 2013 [cited 2013 Dec 13]. Available from: http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD004807.pub2/abstract

3. Lloyd-Evans B, Mayo-Wilson E, Harrison B, et al.: A systematic review and meta-analysis of randomised controlled trials of peer support for people with severe mental illness. BMC psychiatry 14: 39, 2014.

4. Pfeiffer PN, Heisler M, Piette JD, et al.: Efficacy of peer support interventions for depression: a meta-analysis. Gen Hosp Psychiatry 33: 29–36, 2011.

5. Heisler M, Vijan S, Makki F, et al.: Diabetes Control With Reciprocal Peer Support Versus Nurse Care ManagementA Randomized Trial. Annals of Internal Medicine 153: 507–515, 2010.

6. Heisler M, Halasyamani L, Cowen ME, et al.: Randomized Controlled Effectiveness Trial of Reciprocal Peer Support in Heart Failure. Circulation: Heart Failure 6: 246–253, 2013.

7. Travis J, Roeder K, Walters H, et al.: Telephone-based mutual peer support for depression: a pilot study. Chronic Illness 6: 183–191, 2010.

II. On-line Figure 1: Continuum of Mutuality, Professionalization, and Structure in Peer Support (Figure Adapted from Davidson)*

The Peer Support Continuum
(adapted from Davidson)

| Psychotherapy | Peers as Providers of Conventional Services | Peers as Paid Facilitators of Mutual Support Groups | Friendship |

One-Directional, Structured, Goal-Directed

Continuum of Helping Relationships

Reciprocal, Natural, Unstructured

| Case Management | Peer Mentorship by Certified Peer Specialist | DIAL-UP Voluntary mutual support (emotional support, brief skills training, manual, staff backup) Depressed population |

Footnote for On-Line Supplemental Figure 1:

Davidson et al. have outlined a continuum of mutuality and structure in support for mental health patients, ranging from natural friendship with informal interactions in the community, to voluntary mutual peers to professionalized peers with increasingly structured interactions, to mental health professionals providing uni-directional psychotherapy (1). The DIAL-UP intervention is shown along this theoretical continuum.

1. Davidson L, Chinman M, Sells D, et al.: Peer Support Among Adults With Serious Mental Illness: A Report From the Field. Schizophrenia Bulletin 32: 443–450, 2006.
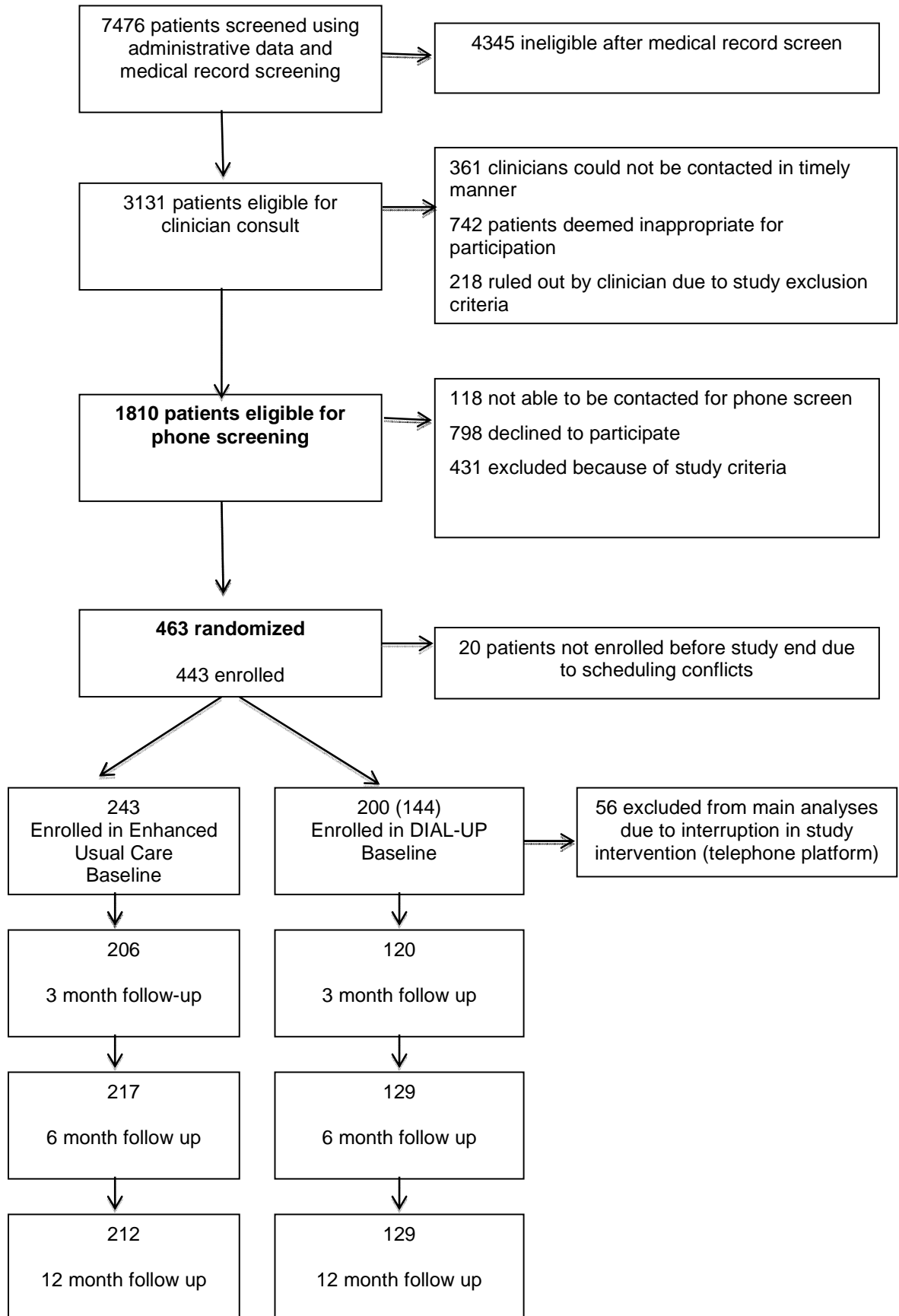
III. Additional Description of Study Groups

Patients in both Enhanced Usual Care and DIAL-UP groups received their usual mental health care. All participants also received a copy of the Depression Helpbook that provided information on depressive disorders, treatments, and self-management strategies and they also received bi-weekly study mailings with depression management tips, based on the SAMHSA Illness and Management patient handouts.

Patients randomized to DIAL-UP received a 2-3 hour training on being a peer partner that emphasized communication skills including active listening, behavioral activation, goal-setting, and self-management. They were provided with a peer-support manual that gave additional information in these areas and included telephone discussion topics with open-ended stems to move the peer pairs' discussions forward. However, using the structured discussion topics was optional and patients could determine the discussion content and how they would share their own experiences and approaches to self-management.

Patients in DIAL-UP had access to a specialized telephone platform that permitted free calls to their partners without divulging their personal phone numbers and allowed them to designate the hours during which they were available to receive calls. The telephone platform also provided easy access to research staff if patients needed assistance in connecting with or supporting their partner. Patients were encouraged to call their partners at least weekly. If peer partners did not talk within 7 days of their enrollment, staff called both partners to "trouble shoot" technical issues and to encourage them to make their first call. Study staff members also called peer partners when there were long gaps (>2-4 weeks) in calls to discuss potential problems or issues.

FIGURE 2

Screening for Eligible Patients and Enrollment

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┌─────────────────────────────┐              ┌──────────────────────────────────────┐
│ 7476 patients screened using│─────────────▶│ 4345 ineligible after medical record │
│ administrative data and     │              │ screen                               │
│ medical record screening    │              │                                      │
└─────────────────────────────┘              └──────────────────────────────────────┘
              │
              ▼
┌─────────────────────────────┐              ┌──────────────────────────────────────┐
│                             │              │ 361 clinicians could not be contacted│
│ 3131 patients eligible for  │─────────────▶│ in timely manner                     │
│ clinician consult           │              │                                      │
│                             │              │ 742 patients deemed inappropriate for│
│                             │              │ participation                        │
│                             │              │                                      │
│                             │              │ 218 ruled out by clinician due to    │
│                             │              │ study exclusion criteria             │
└─────────────────────────────┘              └──────────────────────────────────────┘
              │
              ▼
┌─────────────────────────────┐              ┌──────────────────────────────────────┐
│ 1810 patients eligible for  │              │ 118 not able to be contacted for phone│
│ phone screening             │─────────────▶│ screen                               │
│                             │              │ 798 declined to participate          │
│                             │              │ 431 excluded because of study criteria│
└─────────────────────────────┘              └──────────────────────────────────────┘
              │
              ▼
┌─────────────────────────────┐              ┌──────────────────────────────────────┐
│ 463 randomized              │─────────────▶│ 20 patients not enrolled before study │
│                             │              │ end due to scheduling conflicts      │
│ 443 enrolled                │              │                                      │
└─────────────────────────────┘              └──────────────────────────────────────┘
         │              │
         ▼              ▼
┌──────────────┐  ┌──────────────┐  ┌──────────────────────────────────────┐
│     243      │  │   200 (144)  │  │ 56 excluded from main analyses       │
│ Enrolled in  │  │ Enrolled in  │─▶│ due to interruption in study         │
│ Enhanced     │  │ DIAL-UP      │  │ intervention (telephone platform)    │
│ Usual Care   │  │ Baseline     │  │                                      │
│ Baseline     │  │              │  │                                      │
└──────────────┘  └──────────────┘  └──────────────────────────────────────┘
         │              │
         ▼              ▼
┌──────────────┐  ┌──────────────┐
│     206      │  │     120      │
│ 3 month      │  │ 3 month      │
│ follow-up    │  │ follow up    │
└──────────────┘  └──────────────┘
         │              │
         ▼              ▼
┌──────────────┐  ┌──────────────┐
│     217      │  │     129      │
│ 6 month      │  │ 6 month      │
│ follow up    │  │ follow up    │
└──────────────┘  └──────────────┘
         │              │
         ▼              ▼
┌──────────────┐  ┌──────────────┐
│     212      │  │     129      │
│ 12 month     │  │ 12 month     │
│ follow up    │  │ follow up    │
└──────────────┘  └──────────────┘
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Footnote for Figure 1: As shown in the above CONSORT diagram, a comprehensive screening process was initiated to identify eligible patients. Research staff first reviewed 7,476 medical records to ascertain basic eligibility criteria (i.e. being in treatment in the study clinics, having a depressive disorder coded in encounter data) and identified 3,131 patients who met initial eligibility criteria. After consultation with patients' mental health clinicians, 1,810 patients continued to meet study criteria and were sent letters describing the study.

Of the 1, 810 patients study staff attempted to contact, 118 could not be contacted by telephone and 431 were excluded because they did not meet additional study criteria on phone screening. Thus, 1,261 patients were contacted who were potentially eligible on phone screen. 798 patients declined participation prior to the further screening for eligibility.

20 randomized patients were still pending enrollment at the end of the recruitment period due to scheduling logistics.

A total of 443 eligible patients were enrolled in the trial, 200 in the DIAL-UP intervention and 243 in Enhanced Usual Care. The 443 enrolled patients constituted 35% of the 1,261 patients who were contacted and potentially eligible for the study.

On-line Supplement Table 1: Participant Characteristics, Overall and By Study Group

	All Participants (387)		Enhanced Usual Care (243)		Intervention (144)	
	N	**%**	**N**	**%**	**N**	**%**
Age group						
18-44 yrs	73	9	48	20	25	17
45-64 yrs	252	65	161	66	91	63
$\geq$ 65 yrs	62	16	34	14	28	19
Male	313	81	196	81	117	81
Race, white (384)	291	76	183	76	108	75
Hispanic/Latino	18	5	13	5	5	4
Living Situation						
Married/Live-in Partner	206	54	130	54	76	54
Others in home	76	20	52	22	24	17
Lives alone	98	26	58	24	40	29
# MH Visits 6 mos before enrollment	4.7 (+/-5)		4.7 (+/-5)		4.8 (+/-5)	
PTSD diagnosis	178	46	112	46	66	46
Charlson category $\geq$ 1	209	54	131	54	78	54

On-Line Supplement Table 2: Bivariate Comparisons of Outcome Measures

	Baseline N=387			3 months N= 326			6 months* N=346			12 months N=341		
	N	mean	p-value	N	mean	p-value	N	mean	p-value	N	mean	p-value
VR-36 MCS[1]			.45			.18			.51			.97
EUC	240	32.71 +/-9.91		202	34.77 +/-11.59		210	36.60 +/-11.48		205	36.99 +/-11.00	
Intervention	137	33.72 +/-10.97		114	36.58 +/-11.23		125	37.52 +/-11.65		120	37.24 +/-11.14	
VR-36 PCS [2]			.05			.06			.06			.31
EUC	240	36.63 +/-10.64		202	37.68 +/-11.10		210	36.91 +/-10.89		205	36.72 +/-11.16	
Intervention	137	34.62 +/- 10.44		114	35.14+/-11.18		125	34.64 +/-11.31		120	35.48 +/-11.13	
Q-LES-SF [3]			.84			.56			.40			.96
EUC	242	38.80 +/-8.74		206	41.14 +/-9.07		215	41.89 +/-9.76		207	42.69 +/-9.97	
Intervention	139	38.82 +/- 9.22		114	41.75 +/-9.42		124	42.55 +/-9.66		124	42.55 +/-9.55	
BDI-II[4]			.69			.40			.44			.70
EUC	243	25.60 +/- 10.29		206	20.77 +/-11.72		217	18.86 +/-11.63		208	17.82 +/-11.73	
Intervention	144	25.16 +/- 11.34		120	19.51 +/-11.23		127	18.17 +/-12.29		126	17.15 +/-10.86	
MHRM [5]			.97			.95			.59			.08
EUC	239	64.23 +/- 18.89		206	67.37 +/-19.98		215	71.25 +/-19.51		207	73.06 +/-19.82	
Intervention	138	64.10 +/- 18.73		115	68.47 +/-19.47		125	70.50 +/-20.08		124	69.81 +/-18.66	
BSS [6]			.65			.49			.58			.11
EUC	243	2.99 +/-5.25		206	2.54 +/-5.19		216	2.37 +/-4.56		209	1.73 +/-4.21	
Intervention	144	3.24 +/-5.49		120	2.67 +/-4.95		128	2.80 +/-5.06		126	2.59 +/-4.71	

Footnote for Table 2:

[1]standardized using a t-score transformation and normed to a U.S. population (based on a 1990 norm) at a score of 50 +/-10; higher scores indicate better health.
[2]standardized using a t-score transformation and normed to a U.S. population (based on a 1990 norm) at a score of 50 +/-10; higher scores indicate better health.
[3]possible range 14-70; higher scores indicate better enjoyment and satisfaction with life.
[4]possible range 0-63; higher scores indicate more severe depression.
[5]possible range 0-120; higher scores indicate higher self-reported level of mental health recovery.
[6]possible range 0-38; higher scores indicate higher level of suicidal ideation.

On-Line Supplement Table 3: GEE Models of Intervention Effects on Study Outcomes at 6 months (primary endpoint)

	BDI-II (n=327)		VR-36 MCS (n=314)		VR-36 PCS (n=314)		Q-LES-SF (n=322)		MHRM (n=320)	
	β	95% CI	β	95% CI	β	95% CI	β	95% CI	β	95% CI
Baseline Score	.75***	.68, .83	.60***	.54, .66	.76***	.71, .82	.78***	.70,.87	.73***	.67, .79
DIAL-UP enrolled	-.39	-2.66,1.89	.22	-1.57, 2.01	-.39	-2.03, 1.24	.81	-.93, 2.55	-.08	-3.31, 3.16
45-64 years[1]	2.02	-.07,4.11	-2.80	-6.82, 1.22	-1.54	-3.29, .21	-.60	-3.43, 2.23	-1.26	-5.66, 3.13
GE 65 years[1]	1.48	-1.78,4.74	-2.24	-5.42, .95	-1.24	-5.20, 2.73	.07	-4.00, 4.14	-2.20	-6.22, 1.82
Male	1.46	-.96,3.87	-.18	-3.62, 3.27	-2.32***	-3.56, -1.08	-.71	-3.79, 2.37	-1.36	-5.76, 3.05
Non-White Race	-.87	-1.96, .22	1.28	-.15, 2.71	-1.28	-2.70, .14	.84	-.35, 2.04	3.42***	2.32, 4.51
Hispanic	-4.28**	-6.89, -1.67	.88	-.49, 2.24	6.52*	1.00, 12.05	1.37	-.83, 3.57	5.83**	1.88, 9.77
Prior MH visits[2]	.05	-.09, .19	-.01	-.19, .17	-.16	-.28, -.03	-.08	-..23, .07	-.08	-.18,.02
Charlson Cat ≥1	-.48	-2.03,1.06	.75	-.99, 2.49	-.69	-2.42, 1.05	.33	-1.06, 1.72	2.47	-.50, 5.44
PTSD diagnosis	3.36***	1.73, 4.99	-2.75**	-4,39, -1.10	.10	-1.31, 1.51	-1.74**	-3.01, -.47	-4.24	-8.50, .02

*p < .05; **p < .01; ***p < .001

Foot note for On-Line Table 3:

[1]Referent age group is 18-44 years old.

[2]Total number of mental health visits during 6 months prior to enrollment.