

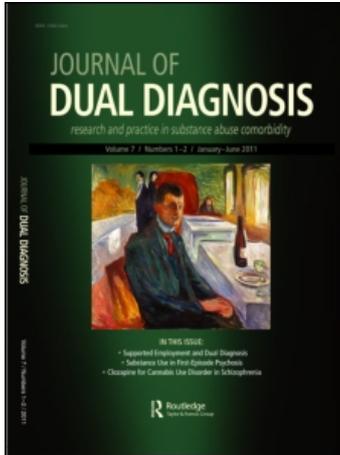
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Journal of Dual Diagnosis

Publication details, including instructions for authors and subscription information:

<http://www.informaworld.com/smpp/title~content=t792306890>

The Trauma Recovery and Empowerment Model: A Quasi-Experimental Effectiveness Study

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Online publication date: 11 May 2011

To cite this Article Fallot, Roger D. , McHugo, Gregory J. , Harris, Maxine and Xie, Haiyi(2011) 'The Trauma Recovery and Empowerment Model: A Quasi-Experimental Effectiveness Study', *Journal of Dual Diagnosis*, 7: 1, 74 – 89

To link to this Article: DOI: 10.1080/15504263.2011.566056

URL: <http://dx.doi.org/10.1080/15504263.2011.566056>

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SERVICES & POLICY

The Trauma Recovery and Empowerment Model: A Quasi-Experimental Effectiveness Study

Roger D. Fallot, PhD,¹ Gregory J. McHugo, PhD,²
Maxine Harris, PhD,¹ and Haiyi Xie, PhD²

Objective: A quasi-experimental study tested the effectiveness of the Trauma Recovery and Empowerment Model (TREM), a group intervention for women trauma survivors, in comparison to services as usual. **Methods:** Two hundred fifty-one women with histories of physical and/or sexual abuse and co-occurring serious mental illnesses and substance use disorders completed comprehensive study assessments at baseline and at 6 and 12 months. TREM groups were added to standard services at two community mental health agencies in Washington, DC ($n = 153$). Comparison group participants received usual services at two agencies in Baltimore, MD ($n = 98$). **Results:** TREM participants showed greater reductions in alcohol and drug abuse severity, anxiety symptoms, and current stressful events, and they showed greater increases in perceived personal safety. There were no group differences in change for posttraumatic stress disorder and global mental health symptoms, physical and mental health-related quality of life, and exposure to interpersonal abuse. Changes in trauma recovery skills were associated positively with gains in study outcomes for TREM group participants. **Conclusions:** Despite design limitations, this study provides preliminary evidence for the effectiveness of the TREM intervention for a heterogeneous population of women trauma survivors with co-occurring disorders when added to usual services. (*Journal of Dual Diagnosis*, 7:74–89, 2011)

Keywords *trauma, childhood abuse, co-occurring disorders, integrated treatment, gender-specific group interventions*

Surveys have documented the high prevalence rates of trauma exposure, especially of physical and sexual abuse, among women with diagnosed serious mental health disorders (Goodman, Dutton, & Harris, 1995; Mueser et al., 1998) and those with substance use disorders (Najavits, Weiss, & Shaw, 1997). The consequences of such trauma are both profound and wide-ranging

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(van der Kolk, Roth, Pelcovitz, Sunday, & Spinazzola, 2005), affecting many life domains and increasing the risk of social and physical difficulties as well as psychological ones. Trauma is especially central to the understanding and effective treatment of co-occurring substance use and mental disorders. Histories of exposure to interpersonal violence not only increase the risk of developing a substance use disorder (Hedtke et al., 2008) but complicate treatment for substance abuse, leading to poorer outcomes (Rosen, Ouimette, Sheikh, Gregg, & Moos, 2002). Further, posttraumatic stress disorder (PTSD) has been tied to poorer general mental health functioning among individuals in substance use treatment (Ouimette, Goodwin, & Brown, 2006). In mental health settings, the sequelae of interpersonal violence extend beyond PTSD to other psychiatric difficulties, primarily depression (Hedtke et al., 2008) and generalized anxiety (Grant, Beck, Marques, Palyo, & Clapp, 2008).

Violence against girls and women has been well-documented in both general populations (Moracco, Runyan, Bowling, & Earp, 2007) and among women with diagnosed severe mental disorders (Mueser et al., 1998). Recent reviews have confirmed that PTSD is more likely to develop in women than men (Olf, Langeland, Draijer, & Gersons, 2007), along with the complications of related comorbidity. In establishing a priority focus on the impact of violence in the lives of women, the Substance Abuse and Mental Health Services Administration funded a multisite project, the Women, Co-Occurring Disorders, and Violence Study (WCDVS; 1998–2003), to evaluate the effectiveness of integrated, comprehensive, trauma-informed, consumer-involved services for women abuse survivors with co-occurring mental health and substance use disorders. Each of the nine sites used a quasi-experimental design to compare this integrated approach, including a trauma-specific group intervention, to a “services as usual” comparison condition. A meta-analysis of study results demonstrated overall advantages for the experimental conditions in reducing participants’ self-reported problems: mental health symptoms and drug and alcohol use severity at 6 months after baseline (Cocozza et al., 2005) and mental health and trauma symptoms at 12 months after baseline (Morrissey et al., 2005). In addition to these overall differences, one of the study’s key findings was the specific advantage of “integrated counseling,” that is, counseling that addressed trauma, mental health, and substance abuse in the same time period, in achieving better outcomes.

A primary mode for implementing such integrated counseling is through a single intervention, delivered either individually or in group settings, that explicitly and simultaneously addresses recovery in at least two of the three domains: trauma, mental health, and substance use. For example, a number of interventions focus on PTSD and substance abuse: Substance Dependence PTSD Therapy (Triffleman, Carroll, & Kellogg, 1999); Concurrent Treatment of PTSD and Cocaine Dependence (Back, Dansky, Carroll, Foa, & Brady, 2001); and Seeking Safety (Najavits, 2002). Other approaches attend primarily to the connections between PTSD and severe psychiatric disorders, for example, cognitive-behavioral treatment for PTSD in severe mental illness (Mueser et al., 2008). Still others emphasize a broad-based model of overlapping recovery from trauma, addictions, and/or mental health disorders, such as Addictions and Trauma Recovery (Miller & Guidry, 2001) and Trauma Affect Regulation: Guide for Education and Therapy (Ford & Russo, 2006).

This study was designed to assess the effectiveness of one of these integrated models, the Trauma Recovery and Empowerment Model (TREM) group (Fallot & Harris, 2002; Harris, 1998). TREM groups are designed specifically to be responsive to the complex needs of *women* with histories of interpersonal violence who have received diagnoses of severe mental disorders

and, very frequently, alcohol or other drug use disorders. TREM is not an adaptation of a preexisting approach; it was designed for women members with women group leaders and was initially developed by women professionals with iterative feedback from group members. Its gendered approach draws significantly on feminist/relational theories of development as well as the unique responses of women survivors to sexual and physical violence.

Previous studies of TREM have been reported from primary substance abuse treatment settings within WCDVS (Amaro et al., 2007; Toussaint, VanDeMark, Bornemann, & Graeber, 2007). In both the Boston (Amaro et al., 2007) and the Colorado (Toussaint et al., 2007) sites, modifications (e.g., shorter overall length, more frequent sessions, and open-ended structure) were made to the usual implementation of TREM. With these modifications, outcomes for women in TREM were significantly better than those for women receiving usual services in trauma-related and general mental health symptom domains, although not in drug or alcohol use severity.

The current study reports the results of the District of Columbia Trauma Collaboration Study (DCTCS), the Washington, DC, site of the WCDVS. This study was designed to test the effectiveness of TREM in comparison to services as usual, and it is the first to implement TREM according to its developers' model (full 33-session length, weekly sessions, closed groups after a specific period) and to report formal outcomes of the TREM intervention in mental health settings. In line with WCDVS, the primary hypothesis was that TREM would be more effective than services as usual in reducing PTSD symptoms, general mental health symptoms, and drug and alcohol use severity among women abuse survivors with co-occurring mental health and substance use disorders. Group differences were also tested on the following secondary outcomes: depressive, anxiety, and hostility symptoms; health-related quality of life; personal safety; and current exposure to interpersonal abuse and other stressful life events.

METHODS

The DCTCS shared the quasi-experimental design of the WCDVS. Women at two mental health agencies in Washington, DC, received usual community support services plus the TREM groups; women at two mental health agencies in Baltimore, MD, received usual community support services but no trauma-specific services. Standardized interviews were conducted at baseline, 6 months, and 12 months, thereby enabling assessment before, during, and after participation in the 8-month TREM group. A full description of the WCDVS design is available elsewhere (McHugo, Kammerer, et al., 2005).

Study Participants

Women were recruited from two community mental health agencies in Washington, DC, (TREM condition) and two in Baltimore, MD (Comparison condition). Community support specialists and clinical supervisors referred women to the research team for eligibility determination. Inclusion criteria for WCDVS and thus for DCTCS were as follows: (a) women 18 years or older, (b) a history of sexual and/or physical abuse, (c) co-occurring mental health and substance use disorders based on chart review (one current; both current within past 5 years), and (d) at least two service episodes within the formal mental health or substance abuse service system. Due to the

effectiveness nature of this study, there were no formal exclusion criteria, although clinicians were unlikely to refer women who were unable to provide informed consent. Prospective participants were informed fully about the purpose and procedures of the study and about their responsibilities prior to providing their written consent. The Dartmouth Committee for the Protection of Human Subjects approved the DCTCS, and it was conducted in accordance with the Declaration of Helsinki.

Women enrolled over a 14-month period from February 2001 through March 2002. Two hundred eighty-seven referred women were eligible, and 255 of them provided informed consent and completed the baseline assessments. Four participants were subsequently dropped from the study for administrative reasons, leaving 251 in the intention-to-treat study group. One hundred fifty-three women were enrolled at the intervention sites in Washington, DC (131 at site A and 22 at site B), and 98 women were enrolled at the comparison sites in Baltimore (85 at site A and 13 at site B). Study participants were paid \$30 for the baseline interview and \$20 for the 6- and 12-month follow-up interviews.

Overall, the mean age of the study group was 42 (\pm 8.6) years. The majority (82.1%) was African American, 14.7% were White, 76.8% completed high school, 33.9% had never been married, 25.5% were currently married or living as married, 59.7% lived in their own or someone else's house or apartment, 17.5% were employed, and 78.9% had children. Most participants had either a mood disorder (70.1%) or a schizophrenia spectrum disorder (23.9%). The majority (75.3%) reported at least one psychiatric hospitalization among these; the average number of psychiatric hospitalizations was 7.9 (\pm 16.2). The most common substance use disorders were alcohol (34.3%), crack/cocaine (22.7%), opioids (10.4%), and polysubstance use (23.1%). At baseline, 51% reported abstinence from alcohol, 44.6% reported abstinence from drugs of abuse, and 29.6% reported abstinence from both alcohol and drugs. These women reported exposure to an average of 16.5 (\pm 4.8) out of 31 types of stressful life events (as assessed by the Life Stressor Checklist-Revised [LSC-R]), and the rates of interpersonal abuse were uniformly high: childhood sexual abuse (72.1%), adulthood sexual abuse (57.4%), childhood physical abuse (59.4%), and adulthood physical abuse (55.8%).

Sites and Conditions

The TREM sites were two community agencies within the public mental health system in Washington, DC. TREM groups were offered in the context of integrated trauma services teams at both agencies. Integrated trauma services teams at both agencies had six to eight community support specialists who were cross-trained in trauma, mental health, and substance abuse. Each clinician worked with 15 to 20 women to ensure access to a range of support services. The clinicians also supported the TREM groups in three ways: (a) by addressing obstacles to TREM group attendance; (b) by offering to review that week's material with women who missed a TREM session, using a self-help workbook that parallels the TREM manual (Copeland & Harris, 2000); and (c) by developing recovery goals that supported the participant's acquisition of trauma recovery skills as assessed by the Trauma Recovery and Empowerment Profile (TREP; Harris & Fallot, 2001).

TREM groups included 33 weekly sessions for 75 minutes with two or three co-leaders. Based on a fully manualized curriculum, each session has a designated topic, specific goals, and

guiding questions, as well as at least one skills-oriented exercise. TREM draws on cognitive restructuring, psychoeducation, and skills-building exercises as well as group support to facilitate the development of members' recovery capacities. TREM explicitly limits the use of exposure techniques, focusing on the current impact of trauma and alternative coping skills.

A TREM group was started when 12 to 15 women had enrolled in the project. If a participant did not attend her assigned group, she was offered another group at a later time. Fourteen TREM groups were conducted. The number of participants per group ranged from 6 to 12; the average was 9.5 participants. Of the 153 women in the TREM condition, 133 (86.9%) attended at least one TREM group session. Only eight women used one-on-one sessions to make up missed TREM group sessions; the total number of make-up sessions was 23. Attendance, defined as exposure to TREM sessions, was computed by adding the number of one-on-one make-up sessions to the number of TREM group sessions attended. Given this definition, the average number of sessions attended was 18.7 ($SD = 11.5$); of those who attended at least one session, the average number attended was 21.4 ($SD = 9.46$).

The comparison sites were two community agencies within the public mental health system in Baltimore, MD. Clinicians offered an array of usual services, including psychiatric evaluation and follow-up, psychotherapy, and linkage to other needed supports via case management. These sites did not offer trauma-specific individual or group therapy. Substance abuse and dual diagnosis counseling and groups were available.

The TREM group fidelity scale assessed the consistency and quality of implementation. Independent fidelity assessors rated key elements of the treatment context and leader behaviors based on documentation and audio recordings. One to three sessions from each TREM group were chosen randomly for audio recording; an overall fidelity score was computed for each rated session. Based on 31 group sessions, the overall fidelity scores ranged from 4.04 to 4.93 (on a 1-to-5 scale). The mean rating was 4.73, indicating strong fidelity to the manual's content and leadership process.

Measures

An in-person interview that combined cross-site measures from WCDVS and site-specific measures from DCTCS was administered at baseline and at 6 and 12 months. The average duration of the interview was 86.4 minutes ($SD = 25.0$) at baseline, 67.8 minutes ($SD = 21.0$) at 6 months, and 72.0 minutes ($SD = 21.1$) at 12 months. The cross-site interview from WCDVS assessed personal history, behavioral health, service utilization, and consumer satisfaction. The four primary outcome variables for WCDVS, and thus for DCTCS, were described in McHugo, Kammerer, et al. (2005) and are described briefly here.

Posttraumatic symptom severity was assessed by the Posttraumatic Symptom Scale (Foa, Cashman, Jaycox, & Perry, 1997). Respondents rate how often each of 17 symptoms of PTSD has bothered them in the past month. Ratings range from 0 (*not at all or only one time*) to 3 (*5 or more times per week/almost always*), and the sum of the ratings indicates posttraumatic symptom severity. One-week test-retest reliability ($N = 186$) for the Posttraumatic Symptom Scale in the WCDVS was .79, as determined by the intraclass correlation coefficient.

Alcohol and drug problem severity were assessed by the corresponding sections from the Addiction Severity Index (McLellan et al., 1992). The Alcohol and Drug Composite Scores

are based on reported use and perceived problem severity during the past 30 days and range between 0 and 1, with higher scores indicating greater problem severity. One-week test-retest reliabilities for the alcohol and drug composite scores in the WCDVS were, respectively, .82 and .86.

Mental health symptom severity was assessed by the global severity index (GSI) from the Brief Symptom Inventory (BSI; Derogatis, 1993). The BSI has 53 items that cover nine symptom domains. Respondents rate how much each symptom has bothered them in the past week (ranging from 0 = *not at all* to 4 = *extremely*), and the GSI is the mean of the 53 items. One-week test-retest reliability for the GSI in the WCDVS was .87. Subscales from the BSI were used in DCTCS to assess the severity of depression, anxiety, and hostility symptoms.

Trauma history and personal safety measures from the WCDVS were also used in DCTCS. *Lifetime and current trauma history* were assessed by the LSC-R (Wolfe & Kimerling, 1997), which was modified for the WCDVS (McHugo, Caspi et al., 2005). Primary modifications involved removing follow-up probes from items that were not about interpersonal abuse (e.g., age at the time, subjective response, and current effect on life), adding items pertinent to women with co-occurring disorders (e.g., institutional abuse, discrimination, hate crimes), and limiting probes for the interpersonal abuse items to age and frequency. The modified LSC-R contained 30 stressful life events and a final open-ended item. Each item asked about lifetime exposure (yes/no) and, if yes, about current exposure (yes/no in past 6 months). For the 14 items that dealt with interpersonal abuse and neglect, there were standard probes to determine frequency and age at onset.

Four summary variables were computed from the LSC-R: (a) *lifetime exposure to stressful events* is the count of the 31 items that were positively endorsed, (b) *lifetime frequency of interpersonal abuse* uses probes for 9 items to quantify the lifetime frequency of sexual and physical abuse (range: 0–36; higher scores indicate more interpersonal abuse), (c) *current exposure to interpersonal abuse* is the count of positive endorsement of eight items pertaining to recent experience of sexual or physical abuse, and (d) *current exposure to other stressors* counts how many of 14 other stressful events were experienced in the past 6 months. One-week test-retest reliability from WCDVS was acceptable for each of these scales (intraclass correlation coefficient = .77 to .88). The LSC-R was also used to create four categorical variables that encoded (yes vs. no) whether each woman had experienced childhood sexual abuse, childhood physical abuse, adulthood sexual abuse, and adulthood physical abuse.

A six-item scale was developed for WCDVS to measure perceived personal safety in the past 6 months. The items asked about feeling unsafe in general and in the home specifically. The frequency rating scale ranged from 1 = *not at all (or only one time)* to 4 = *almost always (or five or more times per week)*, and the total score was the mean of the six items; lower scores indicate greater feelings of safety. Internal consistency (Cronbach's alpha = .81) and test-retest reliability (intraclass correlation coefficient = .78) were acceptable in WCDVS.

The DCTCS supplemented the cross-site interview with site-specific measures of both process and outcome. The additional outcome measure was the SF-12 Health Survey, which is a 12-item self-report measure of health-related quality of life that yields physical and mental component summary scales (Ware, Kosinski, & Keller, 1996). The SF-12 is reliable and valid for people with serious mental illness (Salyers, Bosworth, Swanson, Lamb-Pagone, & Osher, 2000). The component scales are standard scores ($M = 50$, $SD = 10$), with higher scores indicating higher levels of functioning.

Site-specific process measures were collected on TREM condition participants. TREM group leaders provided attendance data for the TREM groups. TREM-condition clinicians used the Substance Use Scale (SUS) to rate participants' substance use disorders on a five-point scale that combined the Alcohol Use Scale and the Drug Use Scale into a single rating (1 = *abstinence*, 2 = *non-problematic use*, 3 = *abuse*, 4 = *dependence*, 5 = *severe dependence*). The Alcohol Use Scale and Drug Use Scale are reliable and valid ratings that are based on DSM criteria for substance use disorder (Drake et al., 1990). TREM-condition clinicians rated the status of the alcohol/drug use disorder during the past 6 months at baseline and 12 months.

The TREP (Harris & Fallot, 2001) gathers clinician ratings on 11 trauma recovery skills (self-awareness, self-protection, self-soothing, emotional modulation, relational mutuality, accurate labeling of self and others, sense of agency and initiative taking, consistent problem-solving, reliable parenting, possessing a sense of purpose and meaning, and judgment and decision making). Each skill is rated on a five-point scale, which has anchors specific to each skill domain. The total score is the average of the 11 ratings, and higher scores indicate more skills. TREP ratings were obtained at baseline and 12 months.

Independent interviewers were trained in standardized interviewing techniques, and they were monitored throughout the study by submitting audio recordings of both eligibility and outcome interviews. Regular conference calls were held with the interviewers to discuss assessment issues and to develop consensual solutions. Although separate sets of interviewers covered the Washington, DC, and Baltimore sites, they crossed over for about one-quarter of the interviews in order to reduce confounding. TREM-condition clinicians were trained at the outset in the use of the rating scales (SUS and TREP), and refresher training was provided throughout the study.

Data Analysis

Because this study used a nonequivalent control group design, the first step was to characterize the TREM ($n = 153$) and comparison ($n = 98$) groups in depth and to test for differences between them. Baseline group differences across a range of background and outcome variables (see Table 1) were examined by independent-groups *t*-tests for continuous measures and chi-square tests for categorical measures. The second step was to evaluate the effect of attrition by contrasting participants who completed neither a 6- nor 12-month follow-up interview ($n = 44$) against those who completed one or both follow-up interviews ($n = 207$) on the same set of variables. Independent-groups *t*-tests and chi-square analyses were conducted to test overall differences between research dropouts and follow-up participants. Two-way ANOVAs (study condition by study status) and multiway chi-square tests were conducted to determine whether there was differential dropout between the TREM and comparison conditions.

The third step was to determine the effect of treatment. Because analyses of baseline variables revealed differences between groups (see Results), we computed propensity scores and included them as inverse probability of treatment weights in outcome analyses (Harder, Stuart, & Anthony, 2010; Stuart et al., 2009). In essence, each treatment group is weighted up to the "population," which is actually the study group itself, thereby reducing baseline differences between the TREM and comparison groups. The analog of repeated-measures analysis of variance in the mixed-effects regression framework (SAS PROC MIXED) was used to analyze differences between the TREM and comparison groups over time. We used covariance pattern models to contrast mean changes

TABLE 1
Demographic and Clinical Characteristics of the Study Groups at Baseline

Variable	Values	TREM Group (n = 153)	Comparison Group (n = 98)	Statistic	p
Age	<i>M (SD)</i>	42.03 (8.66)	42.04 (8.50)	<i>t</i> = 0.01	.99
Race/ethnicity	<i>n (%)</i> Black	133 (86.9)	73 (74.5)	$\chi^2 = 7.61$	.02
	<i>n (%)</i> White	15 (9.8)	22 (22.4)		
	<i>n (%)</i> Other	5 (3.3)	3 (3.1)		
Education level	<i>M (SD)</i> years	11.30 (2.38)	11.42 (2.20)	<i>t</i> = 0.41	.68
Relationship status	<i>n (%)</i> Married/partnered	31 (20.3)	33 (33.7)	$\chi^2 = 5.87$	.05
	<i>n (%)</i> Widowed/ separated/divorced	65 (42.5)	37 (37.8)		
	<i>n (%)</i> Never married	57 (37.3)	28 (28.6)		
Currently employed	<i>n (%)</i> Yes	26 (17.1)	18 (18.4)	$\chi^2 = 0.07$	.8
Ever had children	<i>n (%)</i> Yes	123 (80.1)	75 (76.5)	$\chi^2 = 0.53$	.46
Primary residence (past 30 days)	<i>n (%)</i> Homeless	29 (19.2)	9 (9.4)	$\chi^2 = 23.03$	<.001
	<i>n (%)</i> Institution	4 (2.6)	0 (0)		
	<i>n (%)</i> Independent	78 (51.7)	78 (81.3)		
	<i>n (%)</i> Supervised	40 (26.5)	9 (9.4)		
Primary psychiatric diagnosis	<i>n (%)</i> Schizophrenia spectrum disorders	42 (27.5)	18 (18.4)	$\chi^2 = 3.34$	.34
	<i>n (%)</i> Mood disorders	101 (66.0)	75 (76.5)		
	<i>n (%)</i> Anxiety disorders	5 (3.3)	3 (3.1)		
	<i>n (%)</i> Other	5 (3.3)	2 (2.0)		
Ever treated in psychiatric hospital	<i>n (%)</i> Yes	116 (75.8)	73 (74.5)	$\chi^2 = 0.06$	.81
Psychiatric hospitalization—lifetime	<i>M (SD)</i> Admissions	4.86 (7.61)	5.56 (7.59)	<i>t</i> = 0.72	.47
PTSD symptom severity (PSS)	<i>M (SD)</i>	24.74 (11.77)	27.03 (11.79)	<i>t</i> = 1.48	.14
Global severity index (BSI)	<i>M (SD)</i>	1.39 (0.77)	1.66 (0.82)	<i>t</i> = 2.69	.008
BSI depression subscale	<i>M (SD)</i>	1.49 (1.03)	1.84 (1.10)	<i>t</i> = 2.61	.01
BSI anxiety subscale	<i>M (SD)</i>	1.42 (0.95)	1.64 (1.04)	<i>t</i> = 1.70	.09
BSI hostility subscale	<i>M (SD)</i>	1.18 (0.94)	1.42 (1.02)	<i>t</i> = 1.86	.06
Primary substance use disorder	<i>n (%)</i> Alcohol	41 (26.8)	45 (45.9)	$\chi^2 = 23.74$	<.001
	<i>n (%)</i> Cocaine	43 (28.1)	14 (14.3)		
	<i>n (%)</i> Opioid	10 (6.5)	16 (16.3)		
	<i>n (%)</i> Polysubstance	45 (29.4)	13 (13.3)		
	<i>n (%)</i> Other	14 (9.20)	10 (10.2)		
Alcohol problem severity (ASI)	<i>M (SD)</i>	0.15 (0.26)	0.11 (0.18)	<i>t</i> = 1.17	.24
Alcohol use at baseline	<i>n (%)</i> Yes	72 (47.1)	51 (52.0)	$\chi^2 = 0.59$	.44
Drug problem severity (ASI)	<i>M (SD)</i>	0.10 (0.14)	0.09 (0.10)	<i>t</i> = 0.15	.88
Drug use at baseline	<i>n (%)</i> Yes	74 (48.4)	64 (66.0)	$\chi^2 = 7.45$	.006
Personal safety scale	<i>M (SD)</i>	1.90 (0.77)	1.87 (0.80)	<i>t</i> = 0.10	.92
SF-12: Physical component score	<i>M (SD)</i>	40.83 (7.10)	39.55 (8.05)	<i>t</i> = 1.31	.19

(Continued)

TABLE 1
Demographic and Clinical Characteristics of the Study Groups at Baseline (Continued)

Variable	Values	TREM Group (<i>n</i> = 153)	Comparison Group (<i>n</i> = 98)	Statistic	<i>p</i>
SF-12: Mental component score	<i>M</i> (<i>SD</i>)	41.43 (7.66)	40.48 (8.12)	<i>t</i> = 0.93	.35
Lifetime exposure to stressful events	<i>M</i> (<i>SD</i>)	16.15 (4.88)	17.02 (4.59)	<i>t</i> = 1.41	.16
Lifetime frequency of interpersonal abuse	<i>M</i> (<i>SD</i>)	16.32 (7.59)	16.26 (7.36)	<i>t</i> = 0.06	.95
Childhood sexual abuse	<i>n</i> (%) Yes	111 (71.4)	70 (71.43)	$\chi^2 = 0.04$	.85
Adulthood sexual abuse	<i>n</i> (%) Yes	88 (57.5)	56 (57.1)	$\chi^2 = 0.03$	.95
Childhood physical abuse	<i>n</i> (%) Yes	88 (57.5)	61 (62.2)	$\chi^2 = 0.55$	.46
Adulthood physical abuse	<i>n</i> (%) Yes	82 (53.6)	58 (59.2)	$\chi^2 = 0.76$	.38
Current exposure of interpersonal abuse	<i>n</i> (%) Yes	64 (43.5)	40 (41.2)	$\chi^2 = 0.13$	.72
Current exposure to other stressors	<i>M</i> (<i>SD</i>)	2.87 (2.33)	2.97 (2.14)	<i>t</i> = 0.32	.75

over time between groups (Hedeker & Gibbons, 2006). The between-subjects factor was group (TREM vs. comparison), and the repeated measure was time (baseline, 6 months, and 12 months). Time was treated as a classification variable, and the covariance structure was left unspecified (i.e., fully estimated), due to having only three time points. The group by time interaction tested the treatment effect. Because mixed-effects regression models can accommodate missing data and analyses of attrition did not indicate differences between dropouts and completers (see Results), all enrolled participants were included in the outcome analyses (intention-to-treat analyses).

The fourth step was to examine differences among participants within the TREM condition. Changes over time (baseline vs. 12 months) on TREM condition-specific measures were assessed by paired *t*-tests. The final step was to examine the association (Pearson product-moment correlations) between two process measures (TREM group attendance and TREP change) and study outcomes. A .05 level of significance was used in baseline and outcome analyses, and .01 was used for the TREM condition analyses.

RESULTS

Group Differences at Baseline

Table 1 presents the characteristics of the TREM and comparison groups at baseline. The groups were similar in age, education level, current employment, and having children. The TREM group had proportionally more African American, unmarried, and non-independently housed women than the comparison group. In the clinical domain, the two groups were similar in primary psychiatric diagnoses and lifetime hospitalization. The groups were similar in PTSD symptom severity, but the comparison group had higher scores on the GSI and the BSI depression subscale. The comparison group had more alcohol and fewer drug use disorders as well as more participants

who reported drug use in the past month, but the two groups did not differ in either alcohol or drug problem severity. The groups did not differ in health-related quality of life. No differences were found between groups in trauma history, current exposure to traumatic events, or personal safety. We note that these analyses were powered to detect small effects, and no correction for multiple tests was applied.

Based on these analyses, six baseline variables on which the two groups differed significantly (race/ethnicity, relationship status, primary residence, GSI, substance use disorder, and drug use at baseline) were used in a logistic regression analysis to compute a propensity score for each participant (i.e., the likelihood of being in the TREM group). Several participants were missing at least one of the variables used to compute the propensity scores, thereby reducing the TREM group size from 153 to 151 and the comparison group size from 98 to 95 for the outcome analyses.

Attrition Analysis

Although longitudinal analyses retained all participants regardless of missing outcome data, we examined differences between participants who completed one or both follow-up assessments and those who completed neither. One hundred thirty-one (85.6%) participants in the TREM group and 76 (77.6%) participants in the comparison group completed one or both follow-up assessments, which was a non-significant difference in retention rate. A range of baseline variables was examined for the effect of attrition (see variables in Table 1), and only one difference was found. Participants who completed neither follow-up interview had less severe alcohol problems ($n = 44$, $M = .05$, $SD = .13$) than those who participated in follow-up ($n = 207$, $M = .15$, $SD = .25$, $t(249) = 2.76$, $p = .006$). Likewise, 31.8% (14/44) of the dropouts reported recent alcohol use at baseline, whereas the rate was 52.7% (109/207) among those who participated in follow-up, $\chi^2(1, N = 251) = 6.31$, $p = .01$. No evidence for differential attrition by condition was found when examining study condition by study status (completer vs. dropout) interactions.

Primary Outcomes

The results for the four primary outcome measures are shown in the top part of Table 2. The group by time interaction was significant for two of the four outcome measures—alcohol problem severity and drug problem severity—and in each case the TREM group had better outcomes. The results for these two outcomes in Table 2 are for those participants who reported using alcohol or drugs at baseline. The results were similar when the entire study group was analyzed. The groups did not differ in change in PTSD or global mental health symptom severity. Although the focus was on differential change over time (i.e., the group by time interaction), it should be noted that all outcomes, except the two SF-12 scales and the two current trauma exposure variables, showed a significant main effect of time, indicating that both groups improved.

Secondary Outcomes

Significant group differences were found for the anxiety subscale of the BSI, for the personal safety scale, and for current exposure to other stressors (Table 2). In each case, the TREM group had better outcomes than the comparison group. There were no significant group differences for

TABLE 2
Outcome Means (SD) at Baseline, 6, and 12 Months for TREM and Comparison Groups

Variable	Month	TREM		Comparison		Group by Time	
		<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>F</i>	<i>p</i>
PTSD symptom severity (PSS) ^a	0	24.72	11.83	27.42	11.58	1.72	.18
	6	20.77	11.86	25.68	12.31		
	12	18.41	10.73	24.32	12.08		
Alcohol problem severity (ASI) ^b (baseline alcohol users only)	0	0.31	0.31	0.21	0.20	7.58	<.001
	6	0.10	0.18	0.18	0.25		
	12	0.15	0.25	0.15	0.21		
Drug problem severity (ASI) (baseline drug users only)	0	0.20	0.14	0.14	0.09	10.16	<.001
	6	0.07	0.09	0.12	0.12		
	12	0.12	0.13	0.11	0.11		
Global symptom severity (BSI)	0	1.39	0.78	1.69	0.81	1.20	.30
	6	1.18	0.81	1.60	0.81		
	12	1.14	0.75	1.55	0.81		
Depression subscale (BSI)	0	1.49	1.03	1.86	1.08	1.23	.29
	6	1.23	0.99	1.80	1.13		
	12	1.19	0.97	1.70	1.09		
Anxiety subscale (BSI)	0	1.42	0.96	1.67	1.03	3.33	.04
	6	1.14	0.94	1.70	0.99		
	12	1.11	0.94	1.60	1.00		
Hostility subscale (BSI)	0	1.18	0.94	1.45	1.02	1.44	.24
	6	0.93	0.86	1.27	0.91		
	12	0.90	0.89	1.33	0.94		
Personal safety scale	0	2.02	0.78	2.04	0.79	3.55	.03
	6	1.66	0.63	1.93	0.77		
	12	1.69	0.69	1.78	0.65		
Physical component score (SF-12)	0	40.81	7.14	39.55	8.11	0.09	.91
	6	41.06	7.67	40.54	6.81		
	12	41.34	7.12	41.74	7.68		
Mental component score (SF-12)	0	41.44	7.71	40.48	8.05	2.17	.12
	6	41.97	7.89	41.43	6.83		
	12	42.38	6.61	39.61	7.91		
Current exposure to interpersonal abuse	0	1.10	1.63	0.92	1.51	1.85	.16
	6	0.93	1.43	0.99	1.58		
	12	0.68	1.46	1.00	1.57		
Current exposure to other stressors	0	2.88	2.34	2.99	2.15	3.83	.02
	6	2.24	1.85	3.26	2.55		
	12	2.42	2.20	2.88	2.09		

Note. Statistical results are from repeated measures analysis of variance with inverse probability weights based on propensity scores.

^aAcross all variables, except substance abuse, the *n*'s for the TREM group vary from 151 to 145 at baseline, from 126 to 122 at 6 months, and from 107 to 103 at 12 months. The *n*'s for the comparison group vary from 95 to 91 at baseline, from 68 to 65 at 6 months, and from 60 to 56 at 12 months.

^bFor alcohol problem severity, the *n*'s were 72, 60, and 54 for the TREM group and 51, 42, and 38 for the comparison group at baseline, 6 months, and 12 months, respectively. For drug problem severity, the *n*'s were 74, 60, and 49 for the TREM group and 63, 48, and 40 for the comparison group at baseline, 6 months, and 12 months, respectively.

TABLE 3
Correlations of TREM Group Attendance and TREP Change With Change on Study Outcomes
(Baseline to 12 Months)

Variable	TREM Group Attendance ^a	Change in TREP ^b
PTSD symptom scale	-.19	-.29*
Global Severity Index	-.10	-.32*
ASI alcohol	.01	-.28*
ASI drug	-.19	-.36*
BSI depression	.01	-.26
BSI anxiety	-.10	-.24
BSI hostility	-.12	-.32*
Safety scale	-.08	-.29*
SF-12 physical	-.02	.08
SF-12 mental	-.03	.05
Current exposure to interpersonal abuse	.01	-.21
Current exposure to other stressors	.05	-.11

^aThe *n*'s for the correlations with TREM group attendance range from 107 to 104.

^bThe *n*'s for the correlations with TREP change range from 92 to 89.

**p* < .01.

depression and hostility symptoms, the physical or mental component scores from the SF-12, or current exposure to interpersonal abuse.

TREM Condition

Changes over time within the TREM condition were significant for the clinician ratings on the TREP ($M_0 = 1.86$, $SD = 0.66$; $M_{12} = 2.85$, $SD = 0.80$, $t(105) = 12.83$, $p < .001$) and the SUS ($M_0 = 3.05$, $SD = 1.61$; $M_{12} = 1.80$, $SD = 1.10$, $t(109) = 8.00$, $p < .001$). TREM participants improved in trauma recovery skills and decreased their substance use disorder status on average from abuse to use without impairment. Next we examined the relationship between attendance at TREM groups and changes in trauma recovery skills. TREM group attendance was significantly correlated with changes in TREP scores (12 months–baseline; $r = .39$, $n = 105$, $p = .001$). Women who attended more TREM group sessions showed greater gains in TREP scores. Finally, Table 3 shows the correlations between changes from baseline to 12-month follow-up on study outcomes and both TREM group attendance and change in TREP score. TREM group attendance was not associated significantly with outcomes at $p < .01$, but changes in TREP scores were associated significantly with 6 of the 12 outcomes.

DISCUSSION

The results of this study provide partial confirmation of the hypothesis that TREM condition participants would have better outcomes than those receiving services as usual. Significant

differences were found for two of the four primary outcomes and for three of eight secondary outcomes. The results are consistent with findings from the multisite WCDVS by showing that TREM has advantages over usual services in reducing alcohol and drug use severity. This result was corroborated among TREM participants by community support specialist ratings of substance use disorders. TREM did not show the expected advantage in reducing posttraumatic symptoms or overall mental health symptoms, although there was a significant difference in reduction of anxiety symptoms. There was also a group difference in change in perceived safety, which is a core component of TREM, and in the experience of recent stressful life events. Expected differences were not found in depressive and hostility symptoms, health-related quality of life, or current experience of interpersonal abuse.

The drug and alcohol findings are in contrast to those reported by the Boston and Colorado sites of the WCDVS, which found no differences for TREM group participants on drug or alcohol use severity but did find differences in mental health and posttraumatic symptoms. Two factors may account for this different outcome pattern. First, these sites offered a modified version of TREM in which duration and dosage of TREM was lower than that in Washington, DC. Second, whereas the Washington, DC, study served women recruited mostly through the public mental health system, the Boston and Colorado projects were based in primary substance abuse treatment settings, which may have enhanced usual service outcomes in drug and alcohol use. The mental health settings involved in the current study may have provided comparatively stronger mental health (as contrasted with substance abuse) services, attenuating the differences somewhat between TREM and services as usual. Addressing trauma recovery along with substance abuse in the TREM groups in DCTCS, though, may have added a significant element to the TREM condition, strengthening the outcomes in drug and alcohol use, especially.

In addition, the relationships between trauma skill development, as assessed by the TREP, and study outcomes point to the potential value of the skills training component of TREM. Because TREP scores represent the clinician's perspective and the study outcomes represent participants' interview responses, the confluence of these findings warrants further investigation. In contrast to interventions that focus more intensively on symptom reduction, TREM adopts an overtly skills- and strengths-oriented approach. A formal mediation analysis was not possible in this study, because the TREP and other process measures were not collected from the comparison group. Additional research is needed to examine more directly the mechanisms of action for such interventions as TREM, including the links between intervention dose (e.g., attendance), skill development, and clinical outcomes.

There are limitations in the current study, the primary of which is inherent in the quasi-experimental (non-randomized) design. Although the two groups were similar at baseline across a range of measures, there were several significant differences, including a complicating difference in mental health symptoms, although it did not pertain to PTSD symptoms. There was also a difference in residential setting at baseline; a higher proportion of participants lived in supervised housing or were homeless in Washington, DC, whereas the proportion in independent housing was higher in Baltimore. These pre-enrollment residential differences declined during the 1-year study period, but they may have contributed to the group difference in change in substance abuse severity over time. To the extent possible, outcome analyses controlled for these baseline differences by using propensity scores as inverse probability of treatment weights.

The nonequivalence of the TREM and services as usual groups at baseline is heightened by possible differences between the two conditions' sites. The Washington, DC, mental health

agencies may have differed in other aspects of service delivery—that is, other than the TREM intervention—from the Baltimore sites. Although all sites were private, not-for-profit agencies funded primarily through the public mental health system, the intensity, organization, and quality of usual services likely varied among the sites, and the impact of this variation is unknown. That both groups changed over time, non-differentially in many cases, weakens the case for overall differences in service effectiveness between conditions. It is also customary to acknowledge the questionable validity of self-report data, especially of substance use, but the focus on differences in change over time between conditions minimizes this limitation.

There are also noteworthy strengths in this study. The pattern of findings is consistent across substance abuse domains and, to a lesser degree, in areas especially relevant for trauma survivors (anxiety, personal safety, and exposure to current stressors). Although not all outcomes showed a significant treatment effect, this consistency makes more credible TREM's effectiveness in working with women whose presenting difficulties are multiple and complex. In addition, the findings relating trauma skill development to outcomes are consistent with each other. Because the clinicians had no knowledge of the women's own self-reported outcomes in any domain, the coherent story that emerges between clinician ratings of trauma recovery skills on one side and participant self-reports on the other is worth noting.

Given the prevalence and powerful impact of interpersonal violence in the lives of women and the special challenges faced by women with co-occurring mental health and substance use disorders, there is a need for effective interventions that are engaging, that can be implemented with fidelity in usual mental health settings, and that facilitate recovery for women in this population. The results of this study suggest that TREM, a gender-specific group developed with and for women, is one such promising intervention.

ACKNOWLEDGMENTS

Funding was provided to Community Connections (Grant No. 6 UD1 TI11400-04) by the Substance Abuse and Mental Health Services Administration under the Women, Co-Occurring Disorders, and Violence Study. The authors would like to express their gratitude for the contributions of staff members at Community Connections and Lutheran Social Services in Washington, DC, and at the North Baltimore Center (especially Suzanne Bates-Crandall, the site coordinator) and People Encouraging People in Baltimore, MD.

The views expressed in this article are those of the authors and do not necessarily represent those of the Substance Abuse and Mental Health Services Administration.

DISCLOSURES

The authors report no financial conflicts of interest regarding the subject of this manuscript.

Dr. Fallot consults with and provides training through the Connecticut Women's Consortium (Hamden, CT) and has been compensated as a member of the Substance Abuse and Mental Health Services Administration's Advisory Committee for Women's Services.

Dr. McHugo consults with Psychological Applications, a small company that develops and tests computer-based assessments in several areas of physical health care.

Drs. Harris and Xie have no compensation for professional services to report.

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