

Implementing Illness Management and Recovery Within Assertive Community Treatment: A Pilot Trial of Feasibility and Effectiveness

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Objective: In a pilot feasibility and effectiveness study, illness management and recovery (IMR), a curriculum-based program to help people with serious mental illness pursue personal recovery goals, was integrated into assertive community treatment (ACT) to improve participants' recovery and functioning.

Methods: A small-scale cluster randomized controlled design was used to test implementation of IMR within ACT teams in two states. Eight high-fidelity ACT teams were assigned to provide IMR (ACT+IMR; four teams) or standard ACT services (ACT only; four teams). Clinical outcomes from 101 individuals with schizophrenia-spectrum or bipolar disorders were assessed at baseline, six months, and one year.

Results: Exposure to IMR (session attendance and module completion) varied between the ACT+IMR teams, with participants on one team having significantly less exposure. Results from intent-to-treat analyses showed that participants in

ACT+IMR demonstrated significantly better outcomes with a medium effect size at follow-up on clinician-rated illness self-management. A nonsignificant, medium effect size was found for one measure of functioning, and small effect sizes were observed for client-rated illness self-management and community integration. Session and module completion predicted better outcomes on four of the 12-month outcome measures.

Conclusions: Findings support the feasibility of implementing IMR within ACT teams. Although there were few significant findings, effect sizes on some variables in this small-scale study and the dose-response relationships within ACT+IMR teams suggest this novel approach could be promising for improving recovery for people with serious mental illness. Further large-scale studies utilizing a hybrid effectiveness-implementation design could provide a promising direction in this area.

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Despite advances in pharmacological treatment, many individuals with serious mental illness experience significant functional impairments, severe psychiatric symptoms, and frequent rehospitalizations. Effective psychosocial treatments can improve functioning; however, only a small percentage of people receive those treatments (1–3).

Assertive community treatment (ACT) teams serve individuals with the most severe symptoms, who are often difficult to engage in services (4). Controlled studies show that ACT improves outcomes, including rehospitalization, housing, and treatment retention, but that it is less effective in improving psychiatric symptoms, social functioning, and other functional outcomes (5–15). Furthermore, ACT has been criticized for not being recovery oriented (16,17).

Illness management and recovery (IMR), a curriculum-based program designed to help individuals pursue personal recovery goals (18), seems well suited for enhancing outcomes in areas where ACT is less effective. A 2014 review of experimental studies reported that clients who received

IMR in community-based clinics (19,20) and in supported housing (21) showed significant positive effects on illness self-management, clinician-rated symptom severity, and psychosocial functioning compared with clients in treatment as usual or a waitlist control group, respectively. A more recent randomized controlled trial (RCT) comparing IMR to an active control group showed no significant differences, but participation rates in both treatments were low (22).

Several characteristics of ACT suggest that it may be a promising platform for IMR. These characteristics include a flexible nature, which allows IMR to be delivered in both individual and group modalities; a community-based approach, which provides more opportunities for practicing IMR skills in natural settings; and a focus on working with natural supports, which creates opportunities to marshal extra support to help individuals achieve recovery goals.

Although IMR has been implemented and evaluated within ACT, several implementation and methodological issues prevent strong conclusions about the effectiveness of

combining them. Two quasiexperimental studies of IMR embedded in ACT (hereafter referred to as “ACT+IMR”) found significant reductions in hospitalizations (23,24); one study also showed significant reductions in substance use (23), and the other study also showed significant reductions in emergency room visits (24). However, in both studies IMR was implemented only by specialists (one peer, up to two clinicians) rather than by training the whole team, and both studies lacked well-developed guidelines for implementing IMR. These and similar studies (25,26) suggest that IMR can be successfully integrated into ACT services, but only if careful implementation and integration of both are made.

Our team undertook a series of research and development activities for implementing ACT+IMR, including developing a manual for implementing IMR within ACT teams (unpublished report, Gingerich S, Miller J, Monroe-DeVita M, et al., 2013), conducting a small-scale, open pilot test of this manualized approach, and conducting a qualitative process evaluation to identify barriers to, facilitators of, and advantages of implementing IMR within ACT. In this article, we report on a pilot evaluation of ACT+IMR in a small-scale, cluster randomized clinical trial that aimed to provide data about the feasibility of implementing the program and preliminary data on its effectiveness (27).

METHODS

A pilot cluster randomized controlled trial was conducted in which ACT teams were randomly assigned to provide ACT+IMR or standard ACT (ACT only). The impact of ACT+IMR versus ACT only on IMR outcomes was based on assessments conducted with subsets of randomly selected clients from each team at baseline and six-month and one-year follow-ups. The study was approved by the institutional review boards affiliated with the two principal investigators (University of Washington, Community Alternatives and Places for People).

Study Teams and Randomization

Eight ACT teams in two states, four teams per state, were recruited. Selection criteria included no prior IMR training and good fidelity to ACT during state-sponsored fidelity assessments in 2012 (score of ≥ 3.5 out of 5.0 on the Tool for Measurement of Assertive Community Treatment [28,29]). The mean \pm SD fidelity score for teams assigned to ACT+IMR was $4.11 \pm .26$, compared with $4.02 \pm .35$ for teams assigned to ACT only.

Four teams served 80 to 100 clients each; four served 45 to 50 clients each. Randomization to ACT+IMR or ACT only was stratified by state and team size, resulting in one large team and one small team assigned to each condition in each state. ACT+IMR teams were compensated financially for service reimbursement that was lost because of staff training time.

Participants

Twelve to 15 clients from each ACT team were randomly selected for recruitment, based on the following criteria: chart

diagnosis of schizophrenia, schizoaffective disorder, or bipolar disorder; ACT admission at least 60 days prior to the study; and projected length of stay in ACT for at least 12 months. Researchers met potential participants to explain the study, inquire about participation interest, and obtain written informed consent from those interested. No clients refused, although one was replaced because of a program transfer.

The study enrolled 101 participants, 53 in ACT+IMR and 48 in ACT only, with a mean age of 43.9 ± 11.6 ; this sample size would require effect sizes equal to Cohen's d of $\geq .56$ to achieve power of .80, before the analyses controlled for baseline covariates and random effects of treatment site.

Treatment Conditions

ACT is a multidisciplinary, team-based approach to providing treatment, rehabilitation, and support to people with serious mental illness, who experience significant functional impairments and high service utilization. Most services are provided in the client's home or community, and services are available 24/7. IMR follows a manualized, 11-module curriculum to help individuals pursue personal recovery goals and to teach them information, strategies, and skills via group or individual format to manage their psychiatric illness.

ACT+IMR was developed and manualized for this study (unpublished report, Gingerich S, Miller J, Monroe-DeVita M, et al., 2013). This model involves providing IMR training to all ACT team members in the ACT+IMR condition; ACT+IMR specialists provide individual and group-based IMR, and all staff provide community follow-up assistance (for example, role-playing) to assist individuals with practicing IMR skills and pursuing recovery goals. ACT+IMR teams communicate regularly (for example, during daily meetings) regarding participants' IMR goals, progress, and follow-up interventions. The ACT team leader, also trained as an ACT+IMR specialist, provides regular IMR supervision.

The ACT+IMR teams received training that included written and video materials on IMR, the ACT+IMR treatment manual, a two-day training provided by IMR and ACT experts, a one-day booster training conducted six to eight months after start-up, and consultation by an IMR expert twice a month for the first six months and monthly for the second six months of implementation.

ACT-only teams provided usual ACT services, receiving no IMR training during the study period.

Outcome Measures

Masters-level interviewers were trained to administer standardized outcome measures. Interviewers conducted face-to-face interviews and were not blinded to treatment condition. Participants were paid \$15 at baseline, \$20 at six months, and \$25 at 12 months.

Illness self-management. The clinician and client versions of the IMR Scale evaluate illness self-management across 15 items, each rated on a 5-point behaviorally anchored scale, with higher scores indicating better illness management.

Overall scores are sums of the 15 items (each ranging from 1 to 5, with a possible total score of 75) (18). Clinician ratings were completed by the ACT team member other than a primary IMR provider who had the most knowledge about the research participant; primary IMR providers were excluded from completing clinician ratings to minimize rater bias. Client ratings were completed by each participant. The IMR scales have strong psychometric properties (21,30–32).

Mental health symptoms. The expanded Brief Psychiatric Rating Scale (BPRS) (33) is a semistructured interview with 24 items, each rated on 7-point Likert-type scale. Higher scores indicate greater symptom severity. The measure is reliable (34) and sensitive to change following IMR (21).

Psychosocial functioning. Research interviewers rated participants' functioning by using the Daily Living Activities Scale (DLA-20), the Global Assessment of Functioning (GAF), and the Quality of Life Scale–Abbreviated (QLS-A) (35–37). The DLA-20 is a functional assessment consisting of 20 items, each measured on a 7-point Likert-type scale. The DLA-20 has adequate internal consistency and interrater reliability (38). The GAF is a widely used measure of psychological, social, and occupational functioning with good reliability and validity (39,40). Scores range from 0 to 100; higher scores indicate better functioning. The seven-item QLS-A (35–37) has predictive validity similar to the longer version (36). Items are rated from 0 (virtually absent/low) to 6 (adequate/high), with questions focusing on social functioning, motivation, and positive emotions.

Recovery. The Recovery Assessment Scale (RAS) includes 41 items, each rated on a 5-point Likert-type scale. The RAS has good psychometric properties and is sensitive to change after IMR (20,30); the measure's total score was used as a primary outcome.

Community integration. Participants' involvement in community activities was rated by using the Community Integration Measure (CIM). The CIM consists of 10 items, each rated on 5-point Likert-type scale, with higher scores indicating poorer community integration. The CIM has shown good internal consistency (41).

Emergency mental health services. We examined emergency room and hospital admissions that were associated with mental health reasons. Research staff collected these data from ACT staff for the 12-month study period.

Statistical Analyses

We compared the two conditions on baseline demographic, clinical, and outcome measures, using *t* tests for continuous measures and chi-square tests for categorical measures. We used repeated-measures analysis of covariance (RM-ANCOVA) in a mixed-effects regression context to test for differences between groups at six and 12 months. Baseline

scores on each outcome were entered as covariates; ACT team (that is, site) was specified as a random effect to control for heterogeneity between teams. (Whether to control for site in a small-scale, clustered RCT is a matter of debate; thus, we analyzed the data both ways. Results were similar, except the analysis that did not control for site showed one additional significant finding: improved QLS-A scores for the ACT+IMR condition.) Analyses tested both main effects for condition and condition \times time interactions for differential change between conditions from six to 12 months. The between-groups effect size and 95% confidence interval were calculated as Cohen's *d*, based on the adjusted means at 12-month follow-up.

Secondary RM-ANCOVA analyses were conducted to test for differences between groups at six and 12 months on the subscale scores of the BPRS, RAS, and CIM. Given the low utilization of emergency rooms and psychiatric hospitalizations during the study period, these data were dichotomized as no admission versus any admission. We used Fisher's exact test to evaluate differences between conditions for these two binary outcomes, because the event rate was low. IMR session completion and module completion were used to evaluate the degree of exposure to IMR and to test whether exposure was associated with baseline and 12-month follow-up variables. Session completion was categorized as low (<10 sessions), medium (10–24), or high (≥ 25), and module completion was categorized as low (<5 modules) or high (≥ 5). Participants in the ACT+IMR condition were grouped by session completion and module completion categories, and the differences between these subgroups were then evaluated by ANOVA (for baseline values of demographic and outcome variables) or by ANCOVA (12-month outcomes), which controlled for baseline values of the same outcome variable. Secondary analyses used $p < .01$ to determine statistical significance.

RESULTS

Table 1 shows the characteristics of the overall study group and comparisons between the treatment groups on baseline demographic, clinical, and outcome measures. There were significant differences ($p < .05$) between participants in the two conditions in ethnicity, living situation, primary psychiatric diagnosis, and client IMR Scale score. Compared with ACT-only participants, ACT+IMR participants were more likely to be housed and to have a mood disorder, were less likely to be Latino, and had lower mean client IMR Scale scores. The two groups were similar on the other measures.

Table 2 presents an overview of each of the 11 IMR modules. ACT+IMR participants completed 21.3 ± 13.3 IMR sessions (range 0–42) and 4.5 ± 3.4 IMR modules. We found significant differences in ACT+IMR teams in terms of sessions completed and modules completed. Participants on team 3 had significantly lower exposure to IMR compared with participants on other teams (Table 3).

Table 4 displays the statistical results at follow-up for the eight primary outcome measures. A significant group

TABLE 1. Characteristics at baseline of participants in ACT+IMR and ACT only^a

Characteristic	Total (N=101)		ACT+IMR (N=53)		ACT only (N=48)		Test statistic	df	p
	N	%	N	%	N	%			
Race							$\chi^2=4.26$	2	.119
White	53	53	31	60	22	46			
Black	40	40	16	31	24	50			
Other	7	7	5	9	2	4			
Ethnicity							$\chi^2=5.56$	1	.018
Latino	16	16	4	8	12	25			
Non-Latino	84	84	48	92	36	75			
Gender							$\chi^2=.002$	1	.961
Male	58	59	30	59	28	58			
Female	41	41	21	41	20	42			
Marital status							$\chi^2=2.84$	2	.242
Never married	71	71	34	65	37	77			
Married	5	5	2	4	3	6			
Widowed/divorced	24	24	16	31	8	17			
Education							$\chi^2=.18$	2	.914
Less than high school	32	33	17	33	15	33			
High school/GED	38	39	21	40	17	37			
More than high school	28	28	14	27	14	30			
Employment status							$\chi^2=.02$	1	.897
Working	17	17	9	18	8	17			
Not working	82	83	42	82	40	83			
Living situation							$\chi^2=5.81$	1	.016
Shelter or institution	5	5	0	0	5	5			
Housed	96	95	53	100	43	95			
Psychiatric diagnosis							$\chi^2=4.22$	1	.040
Psychotic disorder	82	81	39	74	43	90			
Mood disorder	19	19	14	26	5	10			
Substance use disorder							$\chi^2=.16$	1	.687
Yes	61	60	33	62	28	58			
No	40	40	20	38	20	42			
Age (M±SD)	43.9±11.6		43.7±11.7		44.2±11.6		t=.21	98	.832
Lifetime hospitalizations (M±SD)	11.0±9.3		10.9±10.3		11.0±8.1		t=.07	98	.941
Client Illness Management and Recovery Scale ^b	50.4±8.7		48.6±9.6		52.6±7.1		t=2.34	97	.021
Clinician Illness Management and Recovery Scale ^b	45.4±7.6		44.6±7.0		46.2±8.2		t=1.07	98	.285
Brief Psychiatric Rating Scale ^c	51.2±12.1		51.9±12.3		50.5±12.0		t=.56	99	.574
Global Assessment of Functioning ^d	39.8±10.0		40.6±10.4		39.8±10.0		t=.08	99	.428
Daily Living Activities Scale–20 ^e	4.0±.9		4.0±1.0		4.0±.9		t=.02	97	.983
Quality of Life Scale–Abbreviated ^f	2.4±1.0		2.3±1.1		2.4±.9		t=.62	99	.538
Recovery Assessment Scale ^g	159.3±25.5		159.1±23.1		159.6±28.2		t=.08	85	.934
Community Integration Measure ^h	3.9±.8		3.9±.7		3.9±.9		t=.28	96	.783

^a Totals vary because of missing data or less common responses for some categories, such as gender. ACT+IMR, illness management and recovery (IMR) in assertive community treatment (ACT)

^b Possible scores range from 1 to 5 on 15 items, with higher scores indicating better perceived illness management. Scores are based on a possible total score of 75.

^c Possible scores range from 0 to 144, with higher scores indicating greater symptom severity.

^d Possible scores range from 1 to 100, with higher scores indicating greater levels of global functioning.

^e Possible scores range from 1 to 7 on 20 items, with higher scores indicating greater levels of independent functioning. Scores are based on the mean score for each item.

^f Possible scores range from 0 to 6 on seven items, with higher scores indicating higher quality of life. Scores are based on the mean score for each item.

^g Possible scores range from 41 to 205, with higher scores indicating greater levels of improvement and recovery.

^h Possible scores range from 1 to 5 on 10 items, with higher scores indicating greater perceived integration. Scores are based on the mean score for each item.

TABLE 2. Topics covered in each module of illness management and recovery

Number	Title	Topics
1	Recovery strategies	Defining recovery and learning what helps in the recovery process; exploring areas of life client wants to improve; identifying personal recovery goal; breaking down goal and taking the first step toward achieving it; following up on goals and solving problems
2	Practical facts about mental illness ^a	Understanding the disorder and its diagnosis; learning what happens after people develop symptoms; taking positive steps to manage the disorder; dealing with negative attitudes and beliefs about mental illnesses (stigma)
3	The stress vulnerability model	Understanding the causes of mental illness; learning what improves symptoms and reduces relapses; understanding treatment options; reducing relapses
4	Building social support	Recognizing the importance of social support; connecting with people; having enjoyable conversations; sharing personal information; understanding other people; developing closer relationships
5	Using medication effectively	Learning about the role of medication in managing symptoms; recognizing and responding to side effects; making informed decisions; getting the best results from medication
6	Drug and alcohol use	Identifying common reasons people use alcohol and drugs; recognizing the problems that alcohol and drugs can cause; weighing the pros and cons of sobriety; identifying personal reasons for sobriety and planning for high-risk situations; finding new ways of getting needs met; making a personal sobriety plan
7	Reducing relapses	Identifying triggers of relapse; recognizing and monitoring early warning signs of relapse; developing a relapse prevention plan; putting the relapse prevention plan into practice
8	Coping with stress	Learning what causes stress; identifying the signs of stress; prevention and coping with stress; using relaxation techniques; making a plan for preventing and coping with stress
9	Coping with persistent symptoms	Identifying persistent symptoms; coping with depression; coping with anxiety; coping with hallucinations and coping with delusions (false beliefs); coping with sleep problems, low stamina, and low energy; coping with angry feelings and concentration problems; making a plan for continuing to use coping strategies
10	Getting your needs met in the mental health system	Overview of community mental health services; financial and health benefits; advocating for yourself in the mental health system
11	Healthy lifestyles	Diet, part I; diet, part II; exercise; personal hygiene; sleep

^a Specific handouts were available for schizophrenia (2A), schizoaffective disorder (2B), bipolar disorder (2C), major depression (2D), and multiple diagnoses (2E, used only in groups).

difference favoring participants in the ACT+IMR condition was found for the clinician IMR Scale, with a medium effect size ($d=.51$). There were no significant group differences on the other seven primary outcomes; however, a medium effect size favoring participants in ACT+IMR was observed on the QLS-A ($d=.64$). Effect sizes for the other continuous measures were small.

Differences in binary outcomes between participants in the two conditions were also small: eight (15%) ACT+IMR participants had at least one ER visit versus one (2%) ACT-only participant (Fisher’s exact test, $p=.03$), and 11 (21%) ACT+IMR participants had at least one psychiatric hospitalization versus four (8%) ACT-only participants (Fisher’s exact test, $p=.10$). RM-ANCOVA analyses of the five BPRS subscales, the five RAS subscales, and the three CIM subscales found no significant differences between treatment conditions.

Baseline variables were evaluated as predictors of IMR session and module completion to identify which participants were more likely to receive greater IMR exposure (Table 5). Participants who completed high school/GED, did not have a co-occurring axis II disorder, or had higher baseline QLS-A scores were more likely to complete 25 or more sessions (high exposure) compared with fewer than 10 sessions (low exposure). Participants with higher baseline DLA-20 scores were more likely to complete 10–24 sessions (medium exposure) compared with fewer than 10 sessions

(low exposure). Participants who completed high school/GED, did not have a co-occurring substance use or axis II disorder, or had higher baseline QLS-A scores were more likely to complete five or more IMR modules compared with fewer than five.

Results of analyses of associations of IMR session and module completion with 12-month outcomes, adjusted for baseline measures of each outcome, are also presented in Table 5. Completing 25 or more IMR sessions was associated with more improvement at 12 months on the client IMR Scale and the DLA-20. Completing 10 to 24 IMR sessions

TABLE 3. Completion of IMR modules and attendance at IMR sessions among participants in ACT+IMR, by team^a

Variable	N	M	SD	F	df	p
Modules completed				4.99	3, 52	.004
Team 1	12	4.8	2.2			
Team 2	12	5.6	3.3			
Team 3	15	2.1	2.4			
Team 4	14	6.1	4.0			
Sessions attended				5.02	3, 52	.004
Team 1	12	27.3	8.7			
Team 2	12	29.3	13.6			
Team 3	15	14.8	13.9			
Team 4	14	16.4	10.7			

^a ACT+IMR, illness management and recovery (IMR) in assertive community treatment (ACT)

TABLE 4. Difference in outcomes among participants in ACT+IMR and ACT only at six and 12 months, by domain and measure^a

Domain and measure	Six months ^b		12 months ^c		F ^d	df	p	Effect size ^e	95%CI
	M	SD	M	SD					
Illness management									
Client Illness Management and Recovery Scale ^f					2.11	1, 89	.15	.36	-.33 to 1.05
ACT+IMR	50.6	10.0	52.3	9.2					
ACT only	51.6	7.2	50.0	10.7					
Clinician Illness Management and Recovery Scale ^f					6.35	1, 89	.01	.51	-.16 to 1.18
ACT+IMR	50.8	8.1	51.0	8.9					
ACT only	48.1	9.0	47.8	10.7					
Symptoms									
Brief Psychiatric Rating Scale ^g					.32	1, 89	.57	.22	-.39 to .83
ACT+IMR	46.8	13.5	47.5	21.2					
ACT only	47.6	15.3	44.8	11.8					
Psychosocial functioning									
Global Assessment of Functioning ^h					.24	1, 89	.63	.24	-.67 to 1.14
ACT+IMR	41.6	9.8	46.2	13.1					
ACT only	39.2	9.2	44.0	11.4					
Daily Living Activities Scale–20 ⁱ					.17	1, 87	.68	.11	-.53 to .75
ACT+IMR	4.2	1.0	4.2	.1					
ACT only	3.9	1.0	4.1	.9					
Quality of Life Scale–Abbreviated ^j					1.15	1, 90	.29	.64	.02 to 1.24
ACT+IMR	2.7	1.1	3.1	1.2					
ACT only	2.5	1.0	2.5	1.1					
Recovery									
Recovery Assessment Scale ^k					<.01	1, 78	.95	.03	-.59 to .65
ACT+IMR	168.1	21.0	163.2	25.4					
ACT only	167.7	20.3	162.7	20.8					
Integration									
Community Integration Measure ^l					.63	1, 89	.43	-.31	-.91 to .29
ACT+IMR	4.0	.7	3.9	.8					
ACT only	4.0	.6	4.1	.7					

^a IMR, illness management and recovery. ACT, assertive community treatment

^b N=47, ACT+IMR; N=42, ACT only

^c N=42, ACT+IMR; N=46, ACT only

^d The adjusted group difference, determined by repeated-measures analysis of covariance, represents the treatment effect adjusted by the baseline value of the outcome, with team (that is, site) specified as a random effect to account for clustering of observations within teams

^e Effect size is Cohen's *d* for the difference between adjusted means at 12-month follow-up.

^f Possible scores range from 1 to 5 on 15 items, with higher scores indicating better perceived illness management. Mean scores are based on the sum of the ratings on the 15 items.

^g Possible scores range from 0 to 144, with higher scores indicating greater symptom severity.

^h Possible scores range from 1 to 100, with higher scores indicating greater levels of global functioning.

ⁱ Possible scores range from 1 to 7 on 20 items, with higher scores indicating greater levels of independent functioning. Mean scores are based on the mean score for each item.

^j Possible scores range from 0 to 6 on seven items, with higher scores indicating higher quality of life. Mean scores are based on the mean score for each item.

^k Possible scores range from 41 to 205, with higher scores indicating greater levels of improvement and recovery.

^l Possible scores range from 1 to 5 on 10 items, with higher scores indicating greater perceived integration. Mean scores are based on the mean score for each item.

was associated with more improvement on the DLA-20. Completing five or more IMR modules was associated with more improvement at 12 months on the client and clinician IMR scales, the DLA-20, and the CIM. Although nonsignificant, there was a trend toward lower BPRS scores and higher GAF and QLS-A scores among participants who completed more IMR sessions and modules.

DISCUSSION

These pilot results provide support for the feasibility of implementing IMR within ACT teams. Many participants were

able to achieve moderate to high levels of IMR exposure within 12 months, although the variability in exposure to IMR across participants and teams suggests that implementation was not without challenges. These challenges should be addressed in future studies.

This study found superior outcomes for ACT+IMR participants on only one of eight primary outcomes, clinician-rated illness self-management; however, the effect sizes for other variables and evidence for a potential dose-response relationship with four outcome measures provide some support for the potential effectiveness of ACT+IMR. Consistent with prior IMR research, we found significant

TABLE 5. Completion of IMR sessions and IMR modules among 53 participants in ACT+IMR, by characteristic at baseline and 12 months^a

Characteristic	Completion of IMR sessions						Completion of IMR modules			
	Low (<10 sessions) (N=13)		Medium (10–24 sessions) (N=16)		High (≥25 sessions) (N=24)		Low (<5 modules) (N=23)		High (≥5 modules) (N=30)	
	N	%	N	%	N	%	N	%	N	%
Baseline ^b										
White, non-Latino	7	54	10	63	12	50	12	52	17	57
Male	10	77	8	50	13	54	15	65	16	53
Divorced or widowed	3	25	6	38	7	29	7	32	9	30
High school/GED	5	42	10	63	20	83*	10	46	25	83**
More than high school	2	17	5	31	7	29	4	18	10	33
Employed or volunteering	1	8	4	25	4	17	2	9	7	24
Mood disorder	2	15	6	38	6	25	4	17	10	33
Substance use disorder	9	69	10	63	14	58	18	78	15	50*
Any axis II disorder	8	62	11	69	6	25*	18	78	7	23***
Hospitalized >10 times	3	25	8	50	10	42	8	36	13	43
Age (M±SD)	41.8±12.9		44.0±12.1		44.6±10.8		42.4±12.3		44.8±11.0	
Client Illness Management and Recovery Scale (M±SD) ^c	46.2±10.9		52.2±9.9		47.4±8.2		48.3±10.7		48.8±8.8	
Clinician Illness Management and Recovery Scale (M±SD) ^c	42.1±6.1		47.3±6.7		44.1±7.2		43.9±6.6		45.1±7.3	
Brief Psychiatric Rating Scale (M±SD) ^d	55.1±12.4		51.6±13.7		50.3±11.4		53.8±12.2		50.4±12.4	
Global Assessment of Functioning (M±SD) ^e	36.2±7.9		43.0±10.1		41.3±11.4		38.3±8.0		42.3±11.8	
Daily Living Activities Scale–20 (M±SD) ^f	3.4±.9		4.3±1.0*		4.0±.9		3.7±.9		4.1±1.0	
Quality of Life Scale–Abbreviated (M±SD) ^g	1.7±.9		2.4±1.1		2.6±1.0**		1.9±.9		2.6±1.1**	
Recovery Assessment Scale (M±SD) ^h	166.3±26.0		155.9±28.2		158.1±19.0		162.5±23.8		156.7±22.7	
Community Integration Measure (M±SD) ⁱ	3.8±.8		3.8±.9		4.0±.5		3.7±.8		4.0±.6	
12 months ^j										
Client Illness Management and Recovery Scale ^c (M±SD)	45.0±10.9		53.4±10.6		53.3±7.5*		48.1±10.1		54.4±8.1**	
Clinician Illness Management and Recovery Scale (M±SD) ^c	43.6±3.6		52.1±10.0		51.96±8.5		45.4±7.5		53.3±8.5*	
Brief Psychiatric Rating Scale (M±SD) ^d	57.5±13.4		44.0±12.5		46.9±26.0		51.7±13.5		45.4±24.1	
Global Assessment of Functioning (M±SD) ^e	32.8±9.5		50.9±11.0		48.2±13.3		38.3±9.4		52.0±12.6	
Daily Living Activities Scale–20 (M±SD) ^f	3.0±.8		4.5±1.0**		4.3±.8*		3.6±.9		4.4±.9*	
Quality of Life Scale–Abbreviated (M±SD) ^g	2.1±.6		3.4±1.6		3.1±.9		2.5±1.2		3.3±1.1	
Recovery Assessment Scale (M±SD) ^h	167.5±35.4		167.8±30.4		159.7±21.0		167.3±30.0		161.2±23.4	
Community Integration Measure (M±SD) ⁱ	4.0±1.0		3.6±.9		4.1±.6		3.4±.8		4.1±.6**	

^a IMR, illness management and recovery. ACT, assertive community treatment

^b For baseline variables, significance tests reflect differences in percentages (tested via Fisher’s exact tests) or means (tested via analysis of variance) between subgroups based on the extent of their IMR completion or module completion. Significance testing compares the medium- and high-completion groups with the low-completion group.

^c Scores range from 1 to 5 on 15 items, with higher scores indicating better perceived illness management. Mean scores are based on the sum of the ratings on the 15 items.

^d Scores range from 0 to 144, with higher scores indicating greater symptom severity.

^e Scores range from 1 to 100, with higher scores indicating greater levels of global functioning.

^f Scores range from 1 to 7 on 20 items, with higher scores indicating greater levels of independent functioning. Mean scores are based on the mean of the ratings on the 20 items.

^g Scores range from 0 to 6 on seven items, with higher scores indicating higher quality of life. Mean scores are based on the mean of the ratings on the seven items.

^h Scores range from 41 to 205, with higher scores indicating greater levels of improvement and recovery.

ⁱ Scores range from 1 to 5 on 10 items, with higher scores indicating greater perceived integration. Mean scores are based on the mean of the ratings on the 10 items.

^j For 12-month outcome variables, significance tests reflect differences between subgroups with adjustment for baseline measures on the same variable (tested by using analysis of covariance).

*p<.05, **p<.01, ***p<.001

improvement on clinician-rated illness self-management, with a medium effect size (42). It should be noted, however, that there was possible bias in the clinician ratings because the rater, a clinician, was not blind to the intervention. Inconsistent with prior research, this study did not find a main effect of treatment on client-rated illness self-management, psychiatric symptoms, or psychosocial functioning as measured by the QLS-A (42); however, a medium effect size was found for the QLS-A, and a small effect size was found for client-rated illness self-management, which is consistent with prior research (22). A small effect size for community integration was observed; although this variable has not been measured in other studies, it could be interpreted as an extension of functioning. The lack of significant treatment effect on other measures of functioning and other distal outcomes is consistent with the literature on IMR (42).

There are several potential reasons for the lack of significant treatment effects. First, this small-scale trial had relatively low power because of the use of an active treatment comparison condition and the relatively small sample size. Measures with low frequencies of endorsement—namely psychiatric hospitalizations and ER use—likely suffered from especially low power. In addition, the variable rates of exposure to IMR within the ACT+IMR condition, especially low exposure within one team experiencing high staff turnover, likely contributed to the lack of significant effects. Consistent with at least one IMR study, future ACT+IMR work may benefit from a longer period of evaluation (20), given that participants may have experienced delayed benefits that occurred beyond the study period, and from enhanced implementation strategies to address the need for follow-up IMR training due to staff turnover. Furthermore, it should be noted that most participants continued to receive IMR at the end of the study, suggesting that a longer interval is needed both to evaluate the effects and to effectively deliver IMR to this challenging population.

Our standardized measures may not have been sensitive to the benefits of the ACT+IMR intervention, given that subjective reports from participants and clinicians indicated that participants were making progress toward achieving personal recovery goals across several behavioral domains. Future research should explore idiographic improvements through qualitative research methods, examination of individual goals (43), or statistical methods that accommodate individual changes across a range of outcomes (44). Finally, it is possible that the lack of significant differences reflects the fact that ACT staff were in the relatively early stages of learning IMR and that greater practice using the model would yield stronger treatment effects.

Future work should also explore alternative ways of increasing the effectiveness and cost-effectiveness of recovery-oriented interventions within ACT. A qualitative process evaluation conducted across three small pilot studies, including this study, indicated that implementing ACT+IMR can be a time-intensive and complex process replete with

barriers (for example, symptom severity, staff workload, and communication problems); however many of these barriers can be overcome by specific consultation and implementation strategies, such as tailoring IMR consultation to ACT specifically, focusing on client engagement, providing peer support, being flexible with the order and number of IMR modules, and improving team communication and service integration. Future larger-scale research efforts on ACT+IMR should build on this knowledge of barriers and implementation strategies, which may then lead to better, more cost-effective outcomes; a hybrid effectiveness-implementation design would provide the mechanism for such study (45). Future work may also target ways to increase IMR exposure to clients who are likely to receive fewer sessions, including participants with less education, substance use or axis II disorders, and lower baseline psychosocial functioning.

A different research direction concerns the duration of IMR. Completing the 11-module IMR curriculum requires about one year of weekly sessions. A more “targeted” approach, delivered individually, that focuses only on IMR topics related to specific goals of each client, could potentially reach more clients in a cost-effective manner. Similarly, other personalized approaches to illness management, especially those that incorporate technology in the delivery of interventions (46–50), also have the potential to be cost-effective strategies for helping people manage their illness and pursue recovery goals.

CONCLUSIONS

This study provides support for the feasibility of implementing IMR within ACT teams. Although many results were not statistically significant, this study provides initial evidence of a potential dose-response relationship and some medium (but nonsignificant) effect sizes favoring ACT+IMR. Further, larger-scale efforts using a hybrid effectiveness-implementation design would help to directly test more rigorous consultation and implementation strategies to maximize IMR exposure and the effectiveness of IMR for improving recovery and functioning outcomes for people served by ACT teams.

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Short Descriptions of Novel Programs Invited

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