**Supplemental Materials**

Effectiveness of the Assertive Community Treatment program for severe mental illness in mainland China – a 12-month randomized controlled trial

Xingwei Luo, Samuel F. Law, **Xiang Wang**[[1]](#footnote-1)\*, Jingzheng Shi, Wu Zeng, Xiaoqian Ma, Wendy Chow, Shiyan Liu, Wei Zhao, Xiaoli Liu, Shuqiao Yao, Michael R. Phillips

**Method**

*Power Analysis*

Based on available literature and the results from the pilot study, a power analysis estimated that the current study required a minimum of 30 individuals per group, allowing for the detection of a moderate-sized effect (0.5) of reduction in readmission days with a significance level of α=0·05 and a power of 80% (β=0.20).

*Criteria for significant functional impairment*

Assessment of functional impairment was based on a set of criteria described in the standard ACT Manual by Allness and Knoedler (Allness & Knoedler, 2003). The assessors defined a participant as significantly functionally impaired if one demonstrated at least one of the following conditions: a) Inability to consistently perform practical daily living tasks (e.g., maintaining personal hygiene; meeting nutritional needs; caring for personal financial affairs; obtaining medical, legal, and housing services; recognizing and avoiding common dangers or hazards to self and possessions; budgeting; employment or carrying out child-care responsibilities), or persistent or recurrent failure to perform daily living tasks except with significant support or assistance from others (such as friends, family, or relatives); b) inability to maintain a safe living situation (e.g., repeated evictions or loss of housing); or c) high risk or recent (one year) history of criminal justice involvement (e.g. arrest and incarceration).

*Criteria for needing high level of services*

The assessment of having one or more indicators of a need for continuous high level of services was also based on criteria described in the standard ACT Manual (Allness and Knoedler, 2003). A participant was identified as such if one or more of the following indicators were present: a) Non-responsive to the standard current clinical community case management services; b) the member has a history of psychiatric hospital admissions or psychiatric emergency service visits in the last year; C) active co-existing substance use disorder greater than six months’ duration; d) currently admitted to an acute level of care or supervised community residence but able to be discharged if intensive community support services are provided; e) in danger of requiring acute level of care if more intensive services are not available; f) inability to keep office-based appointments.

**Reference**

[1] **Allness DJ & Knoedler WH** (2003a). ACT Clients: Whom Is ACT for? In: A manual for ACT start-up: Based on the PACT model of community treatment for persons with severe and persistent mental illnesses. *Arlington VA: NAMI.*, 9-13.

|  |
| --- |
| **Table S1. Fidelity score of ACT team that provided ACT during the study as measured by the Tool for Measurement of Assertive Community Treatment (TMACT)\* [Assessment was conducted by Mount Sinai Hospital ACT team of Toronto in August 2013]** |
| **Criterion** | **Score** |
| ***Operations and Structure*** | ***49*** |
| OS1 Low Ratio of Consumers to Staff  | 5 |
| OS2 Team Approach  | 5 |
| OS3 Daily Team Meeting (Frequency and Attendance)  | 4 |
| OS4 Daily Team Meeting (Quality)  | 4 |
| OS5 Program Size  | 5 |
| OS6 Priority Service Population  | 4 |
| OS7 Active Recruitment  | 4 |
| OS8 Gradual Admission Rate  | 5 |
| OS9 Graduation  | 3 |
| OS10 Retention Rate  | 5 |
| OS11 Coordination of Hospitalization  | 3 |
| OS12 Dedicated Office-Based Program Assistance  | 2 |
| ***Core Team***  | ***25*** |
| CT1 Team Leader on Team  | 2 |
| CT2 Team Leader is Practicing Clinician  | 4 |
| CT3 Psychiatric Care Provider on Team  | 4 |
| CT4 Role of Psychiatric Care Provider (In Treatment)  | 4 |
| CT5 Role of Psychiatric Care Provider (Within Team)  | 5 |
| CT6 Nurses on Team  | 3 |
| CT7 Role of Nurses | 3 |
| ***Specialist Team***  | ***18*** |
| ST1 Substance Abuse Specialist on Team  | 1 |
| ST2 Role of Substance Abuse Specialist (In Treatment)  | 1 |
| ST3 Role of Substance Abuse Specialist (Within Team)  | 1 |
| ST4 Vocational Specialist on Team  | 3 |
| ST5 Role of Vocational Specialist (In Employment Services)  | 4 |
| ST6 Role of Vocational Specialist (Within Team)  | 4 |
| ST7 Peer Specialist on Team  | 2 |
| ST8 Role of Peer Specialist  | 2 |

|  |
| --- |
| **Table S1. Fidelity score of ACT team that provided ACT during the study as measured by the Tool for Measurement of Assertive Community Treatment (TMACT)\* [Assessment was conducted by Mount Sinai Hospital ACT team of Toronto in August 2013] (continued)** |
| **Criterion** | **Score** |
| ***Core Practices***  | ***37*** |
| CP1 Community-Based Services  | 5 |
| CP2 Assertive Engagement  | 5 |
| CP3 Intensity of Service  | 5 |
| CP4 Frequency of Contact  | 3 |
| CP5 Frequency of Contact With Natural Supports  | 5 |
| CP6 Responsibility for Crisis Services  | 3 |
| CP7 Full Responsibility for Psychiatric Services  | 3 |
| CP8 Full Responsibility for Rehabilitative Services  | 5 |
| ***Evidence-Based Practices***  | ***30*** |
| EP1 Full Responsibility for Dual Disorders Treatment  | 1 |
| EP2 Full Responsibility for Vocational Services  | 5 |
| EP3 Full Responsibility for Wellness Management Services  | 5 |
| EP4 Integrated Dual Disorders Treatment (IDDT) Model  | 4 |
| EP5 Supported Employment Model  | 4 |
| EP6 Engagement and Psychoeducation with Natural Supports  | 5 |
| EP7 Empirically Supported Psychotherapy  | 5 |
| EP8 Supportive Housing  | 1 |
| ***Person-Centered Planning and Practices***  | ***18*** |
| PP1 Strengths Inform Treatment Plan  | 5 |
| PP2 Person-Centered Planning  | 4 |
| PP3 Interventions Target Broad Range of Life Goals  | 4 |
| PP4 Consumer Self-Determination and Independence  | 5 |
| ***MEAN ITEM SCORE*** | ***3·8*** |
| \* The Tool for Measurement of Assertive Community Treatment (TMACT) is a relatively new fidelity measure scale that includes 47 items scored on a 5-level Likert scale (1-5) that cover six subscales: Operations & Structure, Core team, Specialist team, Core practice, Evidence-Based Practices, and Person-Centered Planning & Practices. The mean item score (total score/47) is classified as follows: below 3-poor fidelity (no ACT certification); 3·0 to 3·6 – basic fidelity; 3·7 to 4·2 – moderate fidelity, and 4·3 or higher – high fidelity. The results are used both to determine whether or not the model is being implemented and as a guide for quality improvement feedback and guided consultation to practitioners\* The fidelity assessment for implementation of ACT was conducted during the study, which was 6 months after the study began. The Clinical Director of the ACT team of Mount Sinai Hospital, Toronto, Canada, who is bilingual expert in ACT, performed the on-site assessment over two days using TMACT. The results of this assessment were used to provide feedback and to improve the quality of the services. |

|  |
| --- |
| **Table S2. Cox regression of incidence of readmission, relapse, andreemployed over the 12-month follow-up** |
|  | Hazard. Ratio | Std. Err. | Z value | P value | 95% CI |
| **Readmission** |  |  |  |  |  |
| Assertive Community Treatment (ACT) Group (reference: Control group) | 0.072 | 0.084 | -2.26 | 0.024 | 0.007~0.705 |
| Duration of illness >8 years (reference: ≤8 years) | 0.875 | 0.833 | -0.14 | 0.888 | 0.135~5.651 |
| Number of hospitalization >3 times (reference: ≤3) | 3.762 | 3.210 | 1.55 | 0.121 | 0.706~20.037 |
| Age 26-30 years (reference: 18-25 years) | 0.407 | 0.364 | -1.00 | 0.315 | 0.071~2.350 |
| Age 31-45 years (reference: 18-25 years) | 0.232 | 0.306 | -1.11 | 0.268 | 0.018~3.074 |
| Baseline PANSS score | 0.987 | 0.037 | -0.35 | 0.727 | 0.918~1.061 |
| Baseline SDSS score  | 0.846 | 0.175 | -0.81 | 0.419 | 0.563~1.269 |
| **Relapse** |  |  |  |  |  |
| Assertive Community Treatment (ACT) Group (reference: Control group) | 0.114 | 0.101 | -2.45 | 0.014 | 0.020~0.649 |
| Duration of illness >8 years (reference: ≤8 years) | 0.657 | 0.550 | -0.50 | 0.616 | 0.128~3.384 |
| Number of hospitalization >3 times (reference: ≤3) | 4.842 | 3.897 | 1.96 | 0.050 | 1.000~23.446 |
| Age 26-30 years (reference: 18-25 years) | 0.702 | 0.552 | -0.45 | 0.652 | 0.150~3.277 |
| Age 31-45 years (reference: 18-25 years) | 0.254 | 0.323 | -1.08 | 0.280 | 0.021~3.055 |
| Baseline PANSS score | 0.967 | 0.035 | -0.93 | 0.353 | 0.901~1.038 |
| Baseline SDSS score  | 0.830 | 0.155 | -1.00 | 0.318 | 0.576~1.196 |
| **Re-employment** |  |  |  |  |  |
| Assertive Community Treatment (ACT) Group (reference: Control group) | 31.168 | 43.839 | 2.45 | 0.014 | 1.979~490.875 |
| Duration of illness >8 years (reference: ≤8 years) | 0.130 | 0.118 | -2.26 | 0.024 | 0.022~0.765 |
| Number of hospitalization >3 times (reference: ≤3) | 0.351 | 0.319 | -1.15 | 0.249 | 0·059~2.084 |
| Age 26-30 years (reference: 18-25 years) | 0.715 | 0.681 | -0.35 | 0.725 | 0.111~4.626 |
| Age 31-45 years (reference: 18-25 years) | 5.085 | 4.757 | 1.74 | 0.082 | 0.813~31.817 |
| Baseline PANSS score | 0.915 | 0.039 | -2.06 | 0.039 | 0.841~0.996 |
| Baseline SDSS score  | 0.637 | 0.152 | -1.89 | 0.058 | 0.400~1.016 |

|  |
| --- |
| **Table S3. Mixed effect model analysis for the repeated measurement of clinical and social outcomes of Assertive Community Treatment (ACT) and control groups,** **with their baseline scores and duration of illness as covariates**  |
|  | ACT group(n=30) | Control group(n=28) | Intervention effect |  | Time effect |   | Intervention× Time  |
|  | Mean | SD | Mean | SD |  | **F (1,54)** | *p* |   | **F (3,166)** | *p* |  | **F (3,166)** | *p* |
| ***PANSS total sore*** |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 3 months follow-up | 63.3a  | 11.2 | 73.0 | 13.1 |  | 25.56 | <0·001 |  | 8.90 | <0·001 |  | 5.23 | 0·002 |
| 6 months follow-up | 58.4 a   | 9.6 | 70.0 a  | 13.9 |  |  |  |  |  |  |  |  |  |
| 9 months follow-up | 54.9 a | 10.6 | 72.9  | 14.7 |  |  |  |  |  |  |  |  |  |
| 12 months follow-up | 55.9 a | 10.1 | 70.0 a | 16.9 |  |  |  |  |  |  |  |  |  |
| ***PANSS\_Positive scale*** |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 3 months follow-up | 13.9 a | 4·9 | 15·6 | 5.5 |  | 6.14 | 0·016 |  | 1.90 | 0·133 |  | 2.67 | 0·049 |
| 6 months follow-up | 12.3 a | 4·5 | 15·3 a | 5.7 |  |  |  |  |  |  |  |  |  |
| 9 months follow-up | 12.4 a   | 4·8 | 16·1  | 5.5 |  |  |  |  |  |  |  |  |  |
| 12 months follow-up | 13.1 a   | 4·6 | 15·1 a | 6.0 |  |  |  |  |  |  |  |  |  |
| ***PANSS\_Negative scale*** |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 3 months follow-up | 19.6 a | 3.7 | 22.4  | 5.0 |  | 30.64 | <0·001 |  | 6.05 | 0.001 |  | 6.61 | <0.001 |
| 6 months follow-up | 18.5 a | 2.8 | 22.4  | 4.6 |  |  |  |  |  |  |  |  |  |
| 9 months follow-up | 17.2 a | 3.0 | 23.1  | 4.2 |  |  |  |  |  |  |  |  |  |
| 12 months follow-up | 16.9 a | 3.1 | 21.9  | 5.2 |  |  |  |  |  |  |  |  |  |
| ***PANSS\_General psychopathology scale***  |  |  |  |  |  |  |  |  |  |  |
| 3 months follow-up | 29.8 a | 5.0 | 35.0  | 6.7 |  | 29.74 | <0·001 |  | 8.93 | <0.001 |  | 3.54 | 0.016 |
| 6 months follow-up | 27.6 a | 4.3 | 32.3 a   | 6.3 |  |  |  |  |  |  |  |  |  |
| 9 months follow-up | 25.3 a | 4.5 | 33.7 a   | 7.7 |  |  |  |  |  |  |  |  |  |
| 12 months follow-up | 25.8 a | 4.8 | 32.9 a   | 8.2 |  |  |  |  |  |  |  |  |  |
| ***CGI*** |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 3 months follow-up | 4.17 a | 0.8 | 4.71  | 0.9 |  | 9.36 | 0.003 |  | 3.72 | 0.013 |  | 0.57 | 0.634 |
| 6 months follow-up | 4.13 a | 0.6 | 4.54 a | 0.9 |  |  |  |  |  |  |  |  |  |
| 9 months follow-up | 4.20 a | 0.6 | 4.71 | 0.8 |  |  |  |  |  |  |  |  |  |
| 12 months follow-up | 4.00 a | 0.9 | 4.36 a | 0.9 |  |  |  |  |  |  |  |  |  |
| ***PSP*** |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  3 months follow-up | 59.4 a | 6.3 | 55.3  | 11.8 |  | 9.70 | 0.003 |  | 3.15 | 0.026 |  | 0.584 | 0.626 |
|  6 months follow-up | 57.2 a | 5.5 | 52.7  | 9.0 |  |  |  |  |  |  |  |  |  |
|  9 months follow-up | 57.6 a | 8.2 | 52.3  | 7.9 |  |  |  |  |  |  |  |  |  |
|  12 months follow-up | 57.4 a | 6.4 | 54.5  | 8.8 |  |  |  |  |  |  |  |  |  |
| ***SDSS*** |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  3 months follow-up | 12.0  | 1.9 | 12.7  | 1.6 |  | 11.98 | 0.001 |  | 3.15 | 0.026 |  | 3.51 | 0.017 |
|  6 months follow-up | 11.5  | 1.4 | 12.8  | 2.1 |  |  |  |  |  |  |  |  |  |
|  9 months follow-up | 11.4 a | 1.8 | 13.5  | 2.3 |  |  |  |  |  |  |  |  |  |
|  12 months follow-up | 10.8 a | 1.7 | 12.6  | 2.9 |  |  |  |  |  |  |  |  |  |

a  Significantly different from baseline.

|  |
| --- |
| **Table S4. UNIANOVA analysis for the social outcomes at 12 months of Assertive Community Treatment (ACT) and control groups, with their baseline scores and duration of illness as covariates** |
|  |  | ACT group(n=30) | Control group(n=28) | Intervention effect (Change-from-baseline ) |
|  |  | Mean | SD | Mean | SD | **F (1,57)** | p |
| ***PATIENTS*** |  |  |  |  |  |  |  |
| **UPSA-B** |  | 14.3 a  | 2.6 | 10.9  | 4.4 | 21.47 | <0.001 |
|  |  |  |  |  |  |  |  |
| **FAD (overall score)** |  | 2.2 a  | 0.3 | 2.4  | 0.3 | 12.42 | 0.001 |
| Problem solving |  | 2.2  | 0.5 | 2.2  | 0.4 | 0·01 | 0.985 |
| Communication |  | 2.1 a  | 0.5 | 2.3  | 0.3 | 11.86 | 0.001 |
| Roles |  | 2.2 a  | 0.4 | 2.4  | 0.3 | 8.15 | 0.006 |
| Affective responsiveness |  | 2.4 a  | 0.5 | 2.5  | 0.5 | 3.91 | 0.053 |
| Affective involvement |  | 2.3 a  | 0.4 | 2.5  | 0.3 | 6.10 | 0.017 |
| Behavioral control |  | 2.3  | 0.4 | 2.5  | 0.3 | 3.71 | 0.059 |
| General functioning |  | 2.2 a  | 0.4 | 2.3  | 0.3 | 4.80 | 0.033 |
| ***FAMILY CAREGIVERS*** |  |  |  |  |  |
| **WHOQOL –BREF (total score)** |  | 61.4 a  | 9.1 | 50.1  | 11.8 | 13.13 | 0·001 |
| Physical |  | 64.4 a  | 13.0 | 51.0  | 15.2 | 8.73 | 0·005 |
| Psychology |  | 61.7 a  | 12.4 | 50.9  | 14.5 | 9.51 | 0·003 |
| Social relations |  | 62.5  | 9.0 | 53.0  | 13.8 | 8.64 | 0·005 |
| Environment |  | 57.1 a  | 12.1 | 45.5  | 14.2 | 7.62 | 0·008 |
| Self-reported Quality |  | 79.7 a  | 10.7 | 67.3  | 9.8 | 21.81 | <0·001 |
|  |  |  |  |  |  |  |  |
| **FAD (overall score)** |  | 2.3  | 0.3 | 2.5  | 0.2 | 7.03 | 0·011 |
| Problem solving |  | 2.0 a  | 0.5 | 2.2  | 0.3 | 3.77 | 0·058 |
| Communication |  | 2.2  | 0.4 | 2.3  | 0.3 | 1.79 | 0·187 |
| Roles |  | 2.4  | 0.4 | 2.6  | 0.3 | 2·44 | 0·124 |
| Affective responsiveness |  | 2.5  | 0.4 | 2.5  | 0.3 | 0·72 | 0·399 |
| Affective involvement |  | 2.4  | 0.4 | 2.6  | 0.3 | 0.86 | 0·359 |
| Behavioral control |  | 2.3 a  | 0.3 | 2.5  | 0.2 | 6.40 | 0·014 |
| General functioning |  | 2.2  | 0.4 | 2.4  | 0.3 | 5·90 | 0·019 |

a  Significantly different from baseline.

1. \* Correspondence to:Xiang Wang (Medical Psychological Center, The Second Xiangya Hospital, Central South University, Changsha, Hunan,410011, China); E-mail: wang0916xia@gmail.com or wangxiang0916@csu.edu.cn; Tel: 86-731-85292126 [↑](#footnote-ref-1)