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It's Worth A Try: The Treatment Experiences Of Rural And Urban Participants In A Randomized Controlled Trial Of Computerized Psychological Treatment For Comorbid Depression And Alcohol/Other Drug Use

Short Title: Computerized Treatment For Comorbidity

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Abstract

Objective: To examine the efficacy and acceptability of clinician-assisted computerized versus therapist-delivered psychological treatment for depression and alcohol/other drug use comorbidity in rural and urban communities. **Methods:** Participants in an Australian randomized controlled clinical trial who completed the three-month post-baseline assessment were examined (*n*=163), including those from remote/outer regional (*n*=16, 10%), inner regional (*n*=37, 23%) areas and major cities (*n*=110, 67%). Participants were using alcohol and or cannabis at hazardous levels in the month prior to baseline and reported at least moderate levels of depression. Treatments were manualized, with randomization occurring at the conclusion of the first treatment session (conducted face-to-face for all conditions). Participants were randomized to: (1) 9 further face-to-face sessions of combination cognitive behavior therapy and motivational interviewing; (2) 9 sessions of combination cognitive behavior therapy and motivational interviewing delivered via computer, with brief therapist assistance; or (3) 9 sessions of supportive counselling. Blind, independent follow-up occurred at 3 months post-baseline. Changes in depression, alcohol and cannabis use at 3 months post-baseline were the outcomes of interest, with rurality, treatment allocation and treatment preference fulfilment as independent variables. Self-reported helpfulness and experience of treatment by rural and urban participants were also explored. **Results:** Participants completing the 3 month post-baseline assessment (*n*=163) did not significantly differ from those who did not (*n*=111) on the majority of variables, however they were significantly older and attended significantly more treatment sessions than did their counterparts. Among the completers sample (*n*=163), rurality did not differentially affect changes in depression, alcohol or cannabis use. Perceived helpfulness of treatment was not affected by treatment allocation, nor was there an impact of rurality. Of the 92 participants indicating a treatment preference prior to randomization, 13 (14%) nominated a

preference for computer-delivered treatment. However, treatment preference did not affect retention, therapeutic alliance or the benefits reported by urban and rural participants in the trial receiving computerized treatment. Computerized treatment was associated with significantly greater reductions in alcohol use between baseline and 3 month post-baseline assessment relative to therapist-delivered cognitive behavior therapy/motivational interviewing (d=0.621) and supportive counseling (d=0.904). **Conclusions:** Computer-delivered cognitive behavior therapy and motivation interviewing (with clinical assistance) is an efficacious treatment for depressive and addictive disorders, with similar levels of acceptability and benefit in rural and urban participants. Computerized psychological treatment might be an acceptable treatment for underserviced populations, with real potential to bridge service gaps, and to overcome isolation and perceived stigma among isolated communities. This clinical trial is registered with the Australian New Zealand Clinical Trials Registry as trial #ACTRN12610000274077 (http://www.anzctr.org.au/trial_view.aspx?id=335314).

Keywords *computerized treatment, comorbidity, depression, alcohol, cannabis*

Depressed mood and alcohol misuse represent significant community problems, contributing first and fifth to the global disease burden in middle-high income countries (WHO, 2008). Cannabis is the most frequently used illicit drug in the western world (UN, 2007), with cannabis users accounting for almost 5% of the world's population (UNODC, 2011). Up to 89% of people with alcohol/other drug use disorders also experience comorbid depressed mood (Bolton, Robinson, & Sareen, 2009). Efficacious treatments for comorbid disorders have been developed, with available evidence supporting the use of integrated psychological treatments that address both addictive and psychiatric symptoms concurrently (Grant et al., 2004). If implemented widely in clinical practice, these integrated treatment programs could significantly impact the burden of illness (ABS, 2008).

Although the need for counseling treatments is substantial, the availability of and access to treatments by those in need is poor, particularly for depression, and is the poorest for alcohol disorders (Kohn, Saxena, Levav, & Saraceno, 2004). Even among those who do access mental health treatment, over 50% report that their needs for counseling are not met (ABS, 2008). The presence of comorbid disorders compounds these difficulties (Teesson, Slade, & Mills, 2009), with very few people with comorbid depression and alcohol/other drug use problems receiving integrated treatments targeting their concurrent conditions. Accessible treatments typically provide for single problems rather than comorbidity (McGovern, Lambert-Harris, Alterman, Xie, & Meier, 2011), and programs are often high intensity, require specialist input and training, and are therefore only accessible to a minority of clients (Brown et al., 2009).

The effect of inadequately treated depression and alcohol/other drug use comorbidity is significant. Left untreated, depression is as costly as heart disease or AIDS to the US economy (Greenberg et al., 2003). The toll of excessive drinking has been equated to about $2 per drink,

in terms of medical expenses and other costs to society (Bouchery, Harwood, Sacks, Simon, & Brewer, 2011). Functional impact and costs per person are further increased when depression and alcohol/other drug misuse co-occur (BeyondBlue, 2006).

These challenges will not be solved by health services providing treatments for these problems in the traditional way (AHMAC, 2008). The supply of treatment services is constrained by the workforce size and service budgets, with current health care service demands, costs and complexities already testing financial, physical and human resource limits (AHMAC, 2008). Given the high personal, societal, and global costs of comorbidity, it is imperative that cost-efficient and effective treatment models for depression and alcohol/other drug use comorbidity are identified and implemented.

The increased availability of technology as a supplement to health care is posited as a solution to these problems. Web-based interventions now have established efficacy for anxiety and depression (Griffiths, Farrer, & Christensen, 2010), and supportive evidence on alcohol-related problems is mounting rapidly (White et al., 2010). However, the majority of technology-based research has been conducted in people with mild symptomatology, and web/computerized interventions are still primarily recommended for people experiencing low severity problems, and not for comorbid issues (Andersson & Cuijpers, 2009). As far as we are aware, we have conducted the first and only randomized controlled trial of a computerized psychological intervention for comorbid depression and alcohol/other drug use problems, including a range of symptom severity.

The SHADE study (Kay-Lambkin, Baker, Kelly, & Lewin, 2011) recruited 274 participants with current, comorbid depression and alcohol and/or cannabis misuse to a randomized controlled trial that compared therapist-delivered cognitive behavior therapy and motivational

interviewing (10 sessions delivered face-to-face in research clinics), clinician-assisted computerized cognitive behavior therapy/motivational interviewing (1 face-to-face session followed by 9 computer-delivered sessions with brief weekly clinician assistance) and supportive counseling (control, 10 face-to-face sessions of nondirective support delivered face-to-face in research clinics). Therapist-delivered and computerized cognitive behavior therapy/motivational interviewing treatments were associated with superior reductions in depression, alcohol and cannabis compared to supportive counseling, indicating that improvements were not simply the product of nonspecific effects. Computerized cognitive behavior therapy/motivational interviewing was associated with improvement, which was at least equivalent to that achieved by therapist-delivered cognitive behavior therapy/motivational interviewing, with superior results in reducing alcohol consumption (Kay-Lambkin, Baker, Kelly, et al., 2011).

The current paper presents new data on the experience of participants in the SHADE trial and reports on their perceptions of computerized cognitive behavior therapy/motivational interviewing versus therapist-delivered treatment, as a function of rural and urban residence. There are a number of important reasons to focus on the experience of rural participants in this context. In general, rural residents report poorer availability and acceptability of services, and this is especially true in mental health (Judd, Jackson, Komiti, Murray, & Fraser, 2007). Mental health issues may thus go undetected, or exist for a longer period of time prior to help being sought. Rates of treatment utilization in rural areas are typically lower, even when individuals do have access, often attributed to concerns around confidentiality and anonymity, which may inhibit help seeking from traditional available services (Judd et al., 2007). Rural settings are where computerized treatments may be of most utility, however questions about the acceptability and feasibility of computerized treatments in rural settings currently remain unanswered. We

will also report on the influence of a range of pre- and in-treatment factors (treatment preference, therapeutic alliance, treatment allocation) on post-treatment outcomes for depression, alcohol and cannabis use, and explore how these factors influence the perceived effectiveness of treatments for comorbid depression and alcohol/other drug use problems. These issues affect engagement with treatments in real world environments, so a better understanding of client perceptions and experiences about computerized treatments is an important step in addressing the gap between need for and provision of integrated treatments for comorbidity.

METHODS

Participants

The sample was drawn from rural and urban locations across New South Wales, Australia. Eligible participants for the trial (N=274) were currently experiencing moderate levels of depression (≥17 on the Beck Depression Inventory II (BDI-II), Beck, Steer, & Brown, 1996) and were concurrently using alcohol above Australian national guidelines (greater than 40g daily ethanol for men or 20g for women, NHMRC, 2009) and/or cannabis more than once weekly for the month prior to baseline (as measured by the Opiate Treatment Index, (OTI), Darke, Hall, Wodak, Heather, & Ward, 1992). Participants were eligible for the current analysis if they completed the three-month post-baseline assessment (n=163). Thirty-three percent of the sample (n=53) were classified as residing in a rural or remote area of New South Wales, Australia. Rurality was determined according to the Accessibility/Remoteness Index of Australia (ARIA), which uses a geographical information system to define road distance to service centers and produces a sliding scale of remoteness; major cities (≥250,000 persons), inner regional (48,000-249,999 persons), outer regional (18,000-47,999 persons), remote (5,000-17,999 persons) and

very remote (1,000-4,999 persons, AIHW, 2004). According to this index, 5% of our sample was categorized as remote (n=8), 5% (n=8) were outer regional, 23% (n=37) were inner regional and 67% (n=110) were in a major city. For convenience, categories were collapsed into two: rural (remote, outer regional, inner regional) and urban (major city).

Measures

Demographics, service utilization, treatment preference (therapist/computer), and retention data were collected, along with the following measures:

Structured Clinical Interview for DSM-IV (First, 2001) to establish the presence of major depressive disorder and substance abuse/dependence as evaluated by a clinician;

Opiate Treatment Index (Darke et al., 1992) to estimate self-reported past-month use of alcohol and cannabis, with participants asked to report on the quantity and frequency of substance used on the three most recent use occasions in the past month;

Beck Depression Inventory II (Beck et al., 1996) to measure past 2-week depressive symptom severity (21 items);

Global Assessment of Functioning (GAF, APA, 1994), a clinician rating of the psychological, social and occupational functioning of a participant;

Agnew Relationship Measure (ARM, Agnew-Davies, Stiles, Hardy, Barkham, & Shapiro, 1998), a 28-item measure of therapeutic alliance that is comprised of four subscales (bond, openness, confidence, client initiative); and

Treatment experience questionnaire (see Appendix A), a scale developed by the authors to encourage participants to reflect on the treatment they received in terms of its effectiveness in

treating depression and alcohol/other drug use, ways in which treatment was perceived to help, and suggested changes.

Interventions

Therapist cognitive behavior therapy/motivational interviewing, computerized cognitive behavior therapy/motivational interviewing and supportive counseling have been described previously (Kay-Lambkin, Baker, Kelly, et al., 2011). All three treatments were 10 sessions, completed over 10-15 weeks, with session 1 identical across conditions, and delivered face-to-face. Therapist-delivered cognitive behavior therapy/motivational interviewing was delivered face-to-face, in research clinics associated with the project, and each session was approximately 60 minutes in duration. Computerized cognitive behavior therapy/motivational interviewing was identical in content to the therapist-delivered version, however sessions 2-10 were delivered by a computer program (SHADE) located in research clinics associated with the study. Participants in the computer condition completed their sessions at the research clinics. The clinician input provided in support of computer treatment occurred at the conclusion of each session, was approximately 15 minutes in duration, and comprised a compliance check, plan for completing homework, suicide, mood and alcohol/other drug check. Supportive counseling was employed as the control condition, contained no skill development, and was entirely participant directed. Supportive counseling was delivered face-to-face in research clinics associated with the study. All treatment and clinician assistance to computerized sessions was provided by intern or registered psychologists, and each psychologist delivered all three treatment conditions throughout the trial period.

Procedure

This study was conducted in strict accordance with all human subject protections and good clinical practices (e.g., Declaration of Helsinki), and was approved and monitored by the following Human Research Ethics Committees: the University of Newcastle, Northern Sydney Central Coast Health, Mid-Western Area Health and Hunter New England Area Health Services, New South Wales, Australia. All participants provided written informed consent to participate in the study, which occurred after a detailed discussion of the study design and purpose.

A description of the study procedure has been reported previously (Kay-Lambkin, Baker, Kelly, et al., 2011), including the flow of participants through the study phases. Following completion of the baseline assessment, participants received one face-to-face session comprising assessment feedback and preliminary case formulation, followed by randomization (stratified by gender, antidepressant medication, and pharmacotherapy for alcohol/other drug use). Treatment was provided over the ensuing 9-week period with sessions occurring at weekly intervals for approximately 60 minutes. After sessions 1, 5, and 10, participants completed the Agnew Relationship Measure in private, and returned this to a project administrator not involved in their treatment. Three month follow-up assessments were conducted via telephone with independent blind assessors. At the conclusion of this assessment, assessors mailed the Treatment Evaluation Questionnaire to participants to ensure unblinding did not occur. Participants were asked to return the questionnaire using provided replied paid envelopes, and within one month of receiving the questionnaire. Up to two reminder mail outs were sent to participants who did not return the questionnaire. Thirty six (68%) rural and 69 (63%) urban participants returned a Treatment Evaluation Questionnaire. Participants received A$20 reimbursement for baseline and three month assessments.

Data Analysis

Analysis of variance (ANOVA) was used to compare completers of the 3-month follow-up assessment with non-completers on continuous variables (baseline depression, alcohol use, cannabis use, age, sessions attended) and chi-square was used for categorical variables (diagnoses, treatment allocation, treatment preference). ANOVA based techniques were used to analyze the continuous outcomes and comparable logistic regressions for the categorical outcomes. The ANOVAs included two fixed factors (rural/urban, treatment allocation), one repeat factor (baseline/three-month assessment), interactions between rurality and treatment allocation, age (expressed as a *z* score) as a continuous covariate, and one random factor (treatment preference being fulfilled). Interaction terms were also included in the parallel logistic regressions, in which therapist cognitive behavior therapy/motivational interviewing was the identified reference category (Odds Ratio=1.0). Logistic regressions also included the following predictor variables: changes in depression, alcohol and cannabis use between baseline and three month assessments, therapeutic alliance subscales of bond, openness, confidence and client initiative.

RESULTS

We have previously reported the key short-term randomized controlled trial findings (Kay-Lambkin, Baker, Kelly, et al., 2011). The following analysis reports on key outcomes and demographics for the study sample retained through to the 3-month post-baseline assessment (*n*=163), according to rurality. Figure 1 displays the flow of participants through the current study.

Insert Figure 1 about here

Study Participants

Participants who completed the 3 month post-baseline assessment (study participants, n = 163) were significantly older than their counterparts who did not complete, $F(1, 261) = 4.78$, p=.004. They also attended significantly more treatment sessions than those who did not complete the 3 month assessment, $F(1,223)=4.88$, p=.028. No further significant differences existed between the study participants who completed the 3-month post-baseline assessment and those who did not (see Table 1).

Insert Table 1 about here

Demographics

Rural participants were significantly younger than urban participants (see Table 2). Also, as shown in Table 2, there was a significant difference between rural and urban participants on education and referral source. Examination of the proportions indicates that urban, as compared to rural, participants were more likely to have completed secondary school. It also appears that a greater proportion of rural than urban participants were referred via their general practitioner or local mental health service, while more urban participants were referred by non-government organizations (e.g., Salvation Army, Samaritans). Finally, rural participants scored significantly lower on the GAF than did their urban counterparts.

Insert Table 2 about here

Treatment Utilization

The most common treatment was medication, with 32 rural (67%) and 60 urban (58%) participants taking some sort of medication. The majority were taking antidepressants. Twenty-eight rural (58%) and 47 urban (46%) participants were taking an antidepressant only, while 4 rural (8%) and 13 urban (13%) were on a combination of antidepressants and anti-craving medication; χ^2=2.765, p=.482.

No significant differences existed between rural and urban participants in self-reported visits to a range of health professionals for the 12 months prior to baseline, with no significant differences between groups (see Table 2). Table 2 also displays the proportion of rural and urban participants reporting attendance at publicy funded treatment services for the prior 12 months to baseline. No significant differences were observed.

Baseline Comorbidity Profiles

At baseline, both rural and urban participants reported levels of depression in the severe range, according to the Beck Depression Inventory-II, with no significant differences between groups (see Table 2). No significant differences existed between rural and urban participants in baseline consumption of alcohol or cannabis, and diagnosis of Major Depressive Disorder or alcohol/cannabis dependence. Three quarters of the rural sample (n=37) and two thirds of urban participants (n=66) met entry criteria for hazardous consumption of alcohol at baseline, with approximately 40% of both urban (n=46) and rural (n=19) groups meeting the entry criteria for cannabis misuse. All participants met the depression entry criteria for the study.

Preference For Treatment Models

No significant differences were found between rural and urban participants in terms of their expressed preferences for face-to-face over computerized treatments for comorbid depression and alcohol/other drug use problems (χ^2_1=.498, p=.480). Prior to randomization, over half of the sample expressed a treatment preference (rural n=27, 51%; urban n=65, 59%). Of these, the majority wanted treatment provided by a therapist (rural n=23, 85%; urban n=56, 90%). Following randomization, for those who expressed a treatment preference, their allocation matched their preference in 17 (63%) cases for rural participants, and in 38 (58%) cases for urban participants.

Applicability And Feasibility Of Computerized Cognitive Behavior Therapy/Motivational Interviewing

Retention

Rural participants attended an average of 6.68 out of 10 sessions (*SD* = 4.08) and urban participants an average of 5.86 sessions (*SD* = 3.94). Univariate analysis of variance, using number of sessions attended as the outcome variable, revealed no main effect of rurality, treatment allocation, or treatment preference fulfilment on retention. However, the interaction between rurality, treatment allocation and treatment preference fulfilment was statistically significant (F(2,140)=3.47, p=.03), with Bonferroni posthoc analyses indicating that rural participants whose treatment preference was fulfilled attended significantly more sessions of computer therapy than did their urban counterparts (10.00 vs. 1.33 sessions) and significantly more supportive counseling sessions (10.00 vs. 6.41).

Therapeutic alliance

Table 3 displays therapeutic alliance ratings provided by participants.

Insert Table 3 about here

As indicated in Table 3, no significant differences were observed in participant-rated therapeutic alliance on any subscale according to treatment allocation, rurality, or the interaction between treatment allocation and rurality. The interaction between treatment allocation, rurality and treatment preference fulfilment (yes/no/no preference) was not statistically significant.

Treatment response

As per Table 3, there was a main effect of treatment allocation on changes in alcohol use between baseline and 3 months post-baseline assessment ($F(2,84)=4.183$, $p=.018$). Bonferroni posthoc analyses indicated that computerized cognitive behavior therapy/motivational interviewing participants reported significantly greater reductions in drinks/day than did those in the therapist cognitive behavior therapy/motivational interviewing (10.24 drinks/day vs. 5.43, $p=.043$) and supportive counseling (10.24 drinks/day vs. 2.62, $p=.006$) conditions. There was no main effect of rurality ($F(1,84)=.155$, $p=.695$) or treatment preference fulfilment ($F(2,84)=.411$, $p=.664$) on changes in alcohol use. A non-significant trend was observed for the interaction between treatment allocation, treatment preference, rurality and changes in alcohol use ($F(4,84)=2.412$, $p=0.055$). For rural participants who had no treatment preference, greatest improvement in alcohol use occurred in the computerized cognitive behavior therapy/motivational interviewing condition (9.25 drinks/day reduction vs. 7.11 for therapist cognitive behaviour therapy/motivational interviewing and 2.32 for supportive counseling). A similar profile was observed for urban participants with no treatment preference (computerized cognitive behavior therapy/motivational interviewing: 5.72 drinks/day reduction, therapist cognitive behavior therapy/motivational interviewing: 2.64, supportive counseling: -2.76). Rural participants whose treatment preference was not fulfilled responded best to therapist cognitive

behavior therapy/motivational interviewing (10.78 drinks/day reduction vs. 3.14 for computerized cognitive behavior therapy/motivational interviewing and a 1.90 drink/day increase for supportive counseling). However, urban participants with no treatment preference responded best to computerized cognitive behaviour therapy/motivational interviewing (11.84 drinks/day reduction vs. 6.05 for supportive counseling and a 4.64 drink/day increase for therapist cognitive behavior therapy/motivational interviewing).

Changes in depression were significantly associated with treatment preference fulfilment ($F(2,129)=3.183$, $p=.045$) with participants whose preference was fulfilled reporting greater change in depression than did participants with no treatment preference (15.50-point improvement vs. 8.48; $p=.014$). There was no main effect of rurality ($F(1,129)=.251$, $p=.617$) or treatment allocation ($F(2,129)=1.795$, $p=.170$) on changes in depression, and the interaction between treatment preference fulfilment, treatment allocation and rurality was not statistically significant ($F(4,129)=.931$, $p=.448$).

There was no main effect of rurality on changes in cannabis use between baseline and 3 month post-baseline assessment ($F(1,47)=.978$, $p=.328$). This was also true for treatment allocation ($F(2,47)=2.614$, $p=.084$) and treatment preference fulfilment ($F(2,47)=.111$, $p=.895$). A non-significant trend was observed for the interaction between treatment allocation, treatment preference and changes in cannabis use ($F(4,47)=4.253$, $p=0.057$). Posthoc analysis indicated that participants whose treatment preference was not fulfilled, but who were allocated to therapist cognitive behavior therapy/motivational interviewing, reported greater reductions in cannabis use than those allocated to computerized cognitive behavior therapy/motivational interviewing and supportive counseling conditions. The interaction between treatment

allocation, rurality and treatment preference fulfilment was not statistically significant ($F(3,47)=.194$, $p=.900$).

Experiences Of The Treatment Content And Modality

Effectiveness of treatment received for depression and alcohol/other drug use

For rural participants, 90% ($n=18$) of therapist cognitive behavior therapy/motivational interviewing, 92% ($n=12$) of computerized cognitive behavior therapy/motivational interviewing and 85% ($n=11$) of supportive counseling recipients felt that their treatment helped them with their depression and alcohol/other drug use problems. Eighty-four percent ($n=21$) of urban therapist cognitive behavior therapy/motivational interviewing participants, 75% ($n=21$) of computerized cognitive behavior therapy/motivational interviewing and 61% ($n=14$) of supportive counseling recipients reported that their treatment assisted them in addressing their depression and alcohol/other drug use problems.

The logistic regression predicting perceptions of treatment effectiveness was statistically significant ($\chi^2=43.416$, $p<.001$). Naglekerke's R^2 of .673 indicated a moderately strong relationship between predictors and outcome, with 91% prediction success (95% treatment effective for depression and alcohol/other drug use comorbidity, 75% treatment not effective). The Wald criterion indicated only one significant predictor in the model, number of sessions attended ($p=.002$), with each additional session of treatment associated with 1.623 times the odds of perceiving treatment as effective in assisting with depression and alcohol/other drug use comorbidity.

Perceptions of the ways in which treatment helped participants

Table 4 displays the frequency with which participants endorsed a range of benefits associated with the treatment they received.

Insert Table 4 about here

As indicated in Table 4, the proportion of urban participants reporting that their treatment assisted them to understand how depression and alcohol/other drug use is connected was significantly different across the treatment conditions (χ^2=8.995, $\underline{p}$=.011), with some suggestion that supportive counseling participants endorsed this benefit less often than their counterparts. Significant differences were observed for urban participants across the treatment groups the frequency with which the following benefits of therapy were reported: *"unload my problems by talking"* (χ^2_2=6.830, $\underline{p}$=.033) and *"find someone who understood me and my problems"* (χ^2_2=8.148, $\underline{p}$=.017). Closer inspection of the data in Table 4 suggests that computerized cognitive behaviour therapy/motivational interviewing urban participants endorsed this benefit less often than did their counterparts in the other treatment conditions.

In predicting associations with the endorsement of *"understand how depression and alcohol/other drug use is connected"*, the logistic regression model was statistically significant (χ^2_{16}=35.703, $\underline{p}$=.003). The Nagelkerke R^2 value was .497, with 80% prediction success (72% of people who indicated "no" on this item, 84% of those indicating "yes"). Age was a significant predictor in the model (Wald=5.204, *p*=.023), with each one standard deviation increment in age being associated with 3.293 the odds of endorsing this benefit of treatment. Each one-point reduction in cannabis use was associated with 1.281 times the odds of endorsing this treatment benefit (Wald=4.452, *p*=.035). In addition, people whose treatment preference was not fulfilled were at reduced odds of endorsing this benefit of therapy, compared with people who did not have a preference (*p*=.037, *OR*=.028) and those whose preference was fulfilled (*p*=.010, *OR*=.010).

Logistic regression was also used to predict the endorsement of *"unload my problems by talking about them"* as a benefit of therapy. The model was statistically significant (χ^2_{16}=37.230, $\underline{p}$=.002). Nagelkerke R^2 was .503, indicative of moderate strength of relationship between predictors and outcome, with 77% accuracy in prediction (69% no, 84% yes). Three significant predictors in the model emerged: computerized cognitive behavior therapy/motivational interviewing participants were at reduced odds of endorsing this benefit of therapy relative to therapist cognitive behavior therapy/motivational interviewing participants (Wald=6.500, *p*=.011, *OR*=.051); younger age was associated with reduced odds of endorsing this benefit (Wald=4.204, *p*=.040, *OR*=.435); and for each session attended the odds of endorsing this benefit increased by 1.299 (Wald=7.618, *p*=.006).

For the outcome "*finding someone who understood me and my problems"*, the logistic regression was statistically significant (χ^2_{16}=28.122, $\underline{p}$=.031), with 76% prediction accuracy (79% no, 72% yes, Nagelkerke R^2=.400). The significant predictor in the model was the therapeutic alliance domain of client initiative (Wald=4.088, *p*=.043), with each one-point increase in client initiative being associated with reduced odds of endorsing this benefit of therapy (*OR*=.481).

In predicting the likelihood of participants endorsing *"take more control in my life"* as a benefit of therapy, the logistic regression model was statistically significant (χ^2_{16}=42.446, $\underline{p}$<.001). The Nagelkerke R^2 was of moderate strength at .556, with 77% prediction accuracy (79% yes, 75% no). Wald criterion indicated that the number of sessions attended was a significant predictor in the model (*p*=.019), with the odds of endorsing this benefit of therapy increasing by 1.286 times with each additional session attended. Rural participants were 14.971 times more likely to endorse this benefit of treatment (Wald=5.759, *p*=.016).

Suggested changes to the treatment received

Two thirds of the rural (n=21) and urban participants (n=42) felt they would make changes to the treatments they received during the research trial, with no significant differences according to rurality (χ^2_1=1.000, p=1.000) or treatment allocation (χ^2_2=2.215, p=.330). Table 5 displays the suggested changes.

Insert Table 5 about here

As indicated in Table 5, *"more face-to-face contact"* was recommended significantly more often by urban computerized cognitive behavior therapy/motivational interviewing recipients than urban participants in the other treatment groups (χ^2_2=7.285, p=.026). *"More skills"* was suggested significantly less often by urban therapist cognitive behavior therapy/motivational interviewing participants than by urban participants in the other treatment allocations (χ^2_2=7.164, p=.028)

DISCUSSION

The aim of this analysis was to examine the experience of participants in a trial of computerized psychological treatment for comorbid depression and alcohol/other drug use problems, with a particular focus on rurality. Notwithstanding the limitations of the study outlined below, several key findings emerged, with important public health significance related to the acceptability and feasibility of computerized cognitive behavior therapy/motivational interviewing, and the experience of the content and modality of treatment delivery for comorbid depression and alcohol/other drug use problems.

Service Utilization and Rurality

Our results indicated that no significant differences existed in the rates at which rural and urban participants accessed services for their mental health or alcohol/other drug problems in the 12 months prior to baseline. Overall, approximately 60% of both urban and rural samples reported contact with a mental health or alcohol/other drug service in the previous 12 months, a rate that is comparable with the Australian national average of 66% among people with combinations of mental and substance use disorders (ABS, 2008). The Australian National Survey of Mental Health and Wellbeing (ABS, 2008) reported that people with comorbidity were the most likely to use services for mental health problems than were people with single disorders; a result that has been replicated in other settings (Judd et al., 2007). Thus, as in other research, comorbidity seems to transcend geographical issues related to treatment access.

As in population-based surveys, among the health professionals identified with our study, general practitioners were the most commonly visited, with medication being the most frequently prescribed course of treatment. This is despite no clear medication strategy for people with depression and alcohol/other drug use comorbidity being developed or tested at the commencement of the study (Pettinati, 2004). Many forms of pharmacotherapy require the person to be abstinent in order to minimize drug interactions and potential complications (Ritson, 2005), and this was not the case for any of the participants in our study at baseline. Although, in Australia, government-funded initiatives have been introduced to increase the access of the community to psychological services (Hickie & Groom, 2002), engagement with psychiatrists and psychologists was less than 1 visit in the past 12 months across both samples, with no differences between urban and rural participants. A further one quarter of rural and urban participants reported no treatment at all for either their depression or alcohol/other drug use

problem (24% rural, 28% urban), and this represented the most frequently endorsed experience of treatment in the past 12 month period.

Despite recommendations for the treatment of comorbid mental health and alcohol/other drug use problems to include both psychiatric and addiction components (Kay-Lambkin, Baker, & Lewin, 2004), just one fifth of both our rural and urban samples reported engagement in these integrated treatments in the prior 12 months to baseline. Although this was not an epidemiological study, these results do support the observation that integrated treatments for comorbid depression and alcohol/other drug use are difficult to access (Roeloffs, Fink, Unutzer, Tang, & Wells, 2001). It also suggests that, prior to the commencement of our trial, evidence from the literature was slow to impact on clinical service provision for comorbidity.

The Potential Of Computerized Psychological Treatment For Comorbidity

Given the service utilization results of our study, the potential of our computerized SHADE intervention (computerized cognitive behavior therapy/motivational interviewing) is considerable. SHADE is the first evidence-based computerized psychological treatment for depression and alcohol/other drug use comorbidity, with data indicating similar efficacy to face-to-face treatment in reducing depression and cannabis use problems, and superior efficacy for alcohol misuse at post-treatment assessment (Kay-Lambkin, Baker, Kelly, et al., 2011). These results were consistent across urban and rural participants in the current study. However, equally important is the extent to which users of the computerized cognitive behavior therapy/motivational interviewing resource benefitted from the experience, relative to face-to-face therapy, as this will potentially impact on uptake of this important treatment approach in the real world. Importantly, our results indicated that, although the majority of participants reported a clear preference for therapist-delivered treatment prior to randomization, once exposed, they

reported computerized cognitive behavior therapy/motivational interviewing equally as effective in managing their depression and alcohol/other drug use problems, as the other treatment conditions. This was true for both rural and urban participants, with no significant differences between groups. No significant differences were observed between urban and rural participants in the rates of treatment attendance or therapeutic alliance for computerized cognitive behavior therapy/motivational interviewing versus the other treatment conditions. This is an important result given the significantly poorer functioning and lower levels of education reported by the rural sample at baseline.

Results of the current study indicate the content and modality of treatment provided during the trial were acceptable to participants in the programs, including computerized cognitive behavior therapy/motivational interviewing, and generally of the right duration and intensity. Only one participant (urban therapist cognitive behavior therapy/motivational interviewing) wanted fewer sessions than the ten planned for treatment during the trial, and for rural participants, approximately one third wanted more than ten sessions of treatment. One urban therapist cognitive behavior therapy/motivational interviewing participant wanted less face-to-face contact than was provided in their condition; however 48% of urban computerized cognitive behavior therapy/motivational interviewing participants wanted more (a statistically significant result). Rural participants did not necessarily feel the same way, with only 18% of computerized cognitive behavior therapy/motivational interviewing participants suggesting more contact (similar rates to therapist cognitive behavior therapy/motivational interviewing 11% and supportive counseling 17%). Participants found the amount of homework associated with treatment acceptable, and very few suggested that less homework would have improved treatment. An important result for our study was the experience that computerized cognitive

behavior therapy/motivational interviewing most frequently assisted them by "*taking more control in my life"*. We have previously reported that this level of client initiative in therapy is associated with superior post-treatment alcohol use outcomes (Kay-Lambkin, Baker, Lewin, & Carr, 2011), and potentially may empower people with comorbidity to become more active agents in their own mental health care. Hence, the challenge for computerized psychological treatments for comorbid disorders may be more in the initial promotion of this treatment modality, and in providing support to engage with these approaches, rather than in developing effective computerized treatments. We have previously cautioned that biases against the use of non face-to-face treatments may be a major impediment to widespread uptake of these approaches, outweighing the potential benefits of accessibility, confidentiality and cost-effectiveness (Kay-Lambkin, White, et al., 2011), and results from the current paper seem to support these concerns.

Interesting results were observed for the interaction between treatment preference fulfilment, treatment outcomes, and rurality. For example, rural and urban participants allocated to computerized cognitive behavior therapy/motivational interviewing reported superior reductions in alcohol use to the other conditions, particularly for people with no treatment preference. However, in cases where treatment preference did not match treatment received, rural participants benefitted most from therapist cognitive behavior therapy/motivational interviewing in terms of their alcohol use (although response to computerized cognitive behavior therapy/motivational interviewing was still significant), whereas urban participants responded the poorest to therapist-based approaches, reporting increases in alcohol consumption. Thus, from these results, particularly in urban areas, computerized cognitive behavior

therapy/motivational interviewing is recommended as a first step in treating comorbid depression and alcohol use comorbidity, regardless of treatment preference.

It has previously been reported that cannabis use, when comorbid with depression, is more difficult to shift than alcohol misuse (Baker, Turner, Kay-Lambkin, & Lewin, 2009), with cannabis users typically being more difficult to engage, with higher treatment 'drop-out' rates and lower therapeutic bond than users of other drugs, including alcohol (Copeland & Martin, 2004; Healey, Kay-Lambkin, Bowman, & Childs, in submission). Our results indicate that cognitive behavior therapy/motivational interviewing (whether therapist or computerized) was associated with greater reductions in cannabis use than was the non-skills-based supportive counseling treatment condition, highlighting the further potential of computerized cognitive behavior therapy/motivational interviewing in addressing comorbid depression and cannabis use. Our results suggest that the key to further reducing cannabis use may be in taking time to explicitly make links between depression and cannabis use problems, and to ensure that client preferences for treatment are taken into consideration. This may be more important for cannabis use than for alcohol or other drugs.

Limitations

There are several limitations of the current study that are important to mention. Firstly, the outcomes reported in this paper are considered short-term, and longer term follow-up is required to test for enduring effects of treatment. The eligible sample for the current study was limited to those participants who provided 3 month post-baseline assessments, and treatment experience data was only provided by a subset of participants who returned surveys via mail. This may have meant that we retained a sample who was better engaged in both the treatment and study activities, and/or who had a particularly positive experience of treatment. For some analyses, our

sample size was small, and although significant group and interaction effects were observed, larger scale studies of this nature are important to conduct.

Conclusions

The results of the current study are innovative and significant for the treatment of three major, modifiable disease burdens; depression, alcohol and cannabis misuse. We have shown that computerized cognitive behavior therapy/motivational interviewing is associated with similar improvements in depression, alcohol and cannabis use as face-to-face alternatives, and that this modality of treatment is acceptable to people in both rural and urban locations, including those whose preference is for face-to-face therapy. With the increasing prevalence of depression, alcohol and cannabis use problems globally, the public health benefits of an effective psychological treatment for these problems that can be delivered in computerized format, in a cost and time efficient manner, without specialist input is great. More work in this area is required.

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DISCLOSURES

Drs. Kay-Lambkin, Baker and Kelly, and Mr Lewin report no financial relationships with commercial interests with regard to this manuscript. Dr Kay-Lambkin and Professor Baker have a licensing agreement with Cobalt Therapeutics LLC (http://www.cobalttx.com/home.html) for the dissemination of the computerized cognitive behavior therapy program evaluated in the study. This agreement was initiated subsequent to completion of the trial. Professor Kelly is member of the board of the Centre for Rural and Remote Mental Health Queensland. He has received consultancy fees from the Sax Institute and the Australian Primary Health Care Research Institute.

REFERENCES

ABS. (2008). *National Survey of Mental Health and Wellbeing: Summary of results, 2007* (Publication No. 4326.0). Canberra: Australian Bureau of Statistics. Retrieved from: http://www.abs.gov.au/ausstats/abs@.nsf/mf/4326.0

Agnew-Davies, R., Stiles, W. B., Hardy, G. E., Barkham, M., & Shapiro, D. A. (1998). Alliance structure assessed by the Agnew Relationship Measure. *British Journal of Clinical Psychiatry, 37*, 155-172. Retrieved from: http://www.ncbi.nlm.nih.gov/pubmed/9631204

AHMAC. (2008). *National e-health strategy: Summary*. Melbourne, Victoria: Australian Health Ministers' Advisory Council. Retrieved from: http://www.ahmac.gov.au

AIHW. (2004). *Rural, regional and remote health: a guide to remoteness classifications* (AIHW cat. no. PHE 33). Canberra, Australia: Australian Institute of Health and Welfare. Retrieved from: http://www.aihw.gov.au

Andersson, G., & Cuijpers, P. (2009). Internet-based and other computerized psychological treatments for adult depression: A meta-analysis. *Cognitive Behavior Therapy, 38*(4), 196-205. doi: 10.1080/16506070903318960

APA. (1994). *Global assessment of functioning scale. Diagnostic and Statistical Manual, Fourth Edition.* Washington, DC: American Psychiatric Association. Retrieved from: http://www.cpspsych.com/2011/04/the-global-assessment-of-functioning-scale-gaf-in-rating-permane-psychiatric-disability/

Baker, A. L., Turner, A., Kay-Lambkin, F., & Lewin, T. J. (2009). The long and the short of treatments for alcohol or cannabis misuse among people with severe mental disorders. *Addictive Behaviors, 34*(10), 852-858. doi: 10.1016/j.addbeh.2009.02.002

Beck, A. T., Steer, R. A., & Brown, G. K. (1996). *The Beck Depression Inventory, Second Edition: Manual*. San Antonio, TX: The Psychological Corporation. Retrieved from http://www.acf.hhs.gov/programs/opre/ehs/perf_measures/reports/resources_measuring/res_meas_phic.html

BeyondBlue. (2006). *Opening our eyes to the cost of depression in the workplace*. Retrieved from http://www.beyondblue.org.au/index.aspx?link_id=4.541

Bolton, J. M., Robinson, J., & Sareen, J. (2009). Self-medication of mood disorders with alcohol and drugs in the National Epidemiologic Survey on Alcohol and Related Conditions. *Journl of Affective Disorders, 115*, 367-375. doi: 10.1016/j.jad.2008.10.003

Bouchery, E. E., Harwood, H. J., Sacks, J. J., Simon, C. J., & Brewer, R. D. (2011). Economic costs of excessive alcohol consumption in the US, 2006. *American Journal of Preventive Medicine, 41*(5), 516-524. doi: 10.1016/j.amepre.2011.06.045

Brown, C. H., Ten-Have, T. R., Jo, B., Dagne, G., Wyman, P. A., Muthen, B., & Gibbons, R. D. (2009). Adaptive designs for randomized trials in public health. *Annual Review of Public Health, 30*, 1-25. doi: 10.1146/annurev.publhealth.031308.100223

Collins, D., & Lapsley, H. (2008). The cost of tobacco, alcohol and illicit drug abuse to Australian society in 2004/05. Canberra: Commonwealth of Australia. Retrieved from http://www.nationaldrugstrategy.gov.au/internet/drugstrategy/publishing.nsf/Content/mono64/$File/mono64.pdf

Copeland, J., & Martin, G. (2004). Web-based interventions for substance use disorder: A qualitative review. *Journal of Substance Abuse Treatment, 26*, 109-116. doi: 10.1016/S0740-5472(03)00165-X

Darke, S., Hall, W., Wodak, A., Heather, N., & Ward, J. (1992). Development and validation of a multi-dimensional instrument for assessing outcome of treatment among opiate users: The Opiate Treatment Index. *British Journal of Addiction, 87*, 733-742. doi: 10.1111/j.1360-0443.1992.tb02719.x

First, M. B., Spitzer, R.L., Gibbon, M., & Williams, J.B.W. (2001). *Structured Clinical Interview for DSM-IV-TR Axis I Disorders, Research Version, Patient Edition.* New York, NY: Biometrics Research, New York State Psychiatric Institute. Retrieved from: http://www.scid4.org/info/refscid.html

Grant, B. F., Stinson, F. S., Dawson, D. A., Chou, S. P., Dufour, M. C., & Compton, W. (2004). Prevalence and co-occurrence of substance use disorders and independent mood and anxiety disorders: Results from the National Epidemiological Survey on Alcohol and Related Conditions. *Archives of General Psychiatry, 61*, 807-816. doi: 10.1001/archpsyc.61.8.807

Greenberg, P. E., Kessler, R. C., Birnbaum, H. G., Leong, S. A., Lowe, S. W., Berglund, P. A., & Corey-Lisle, P. K. (2003). The economic burden of depression in the United States: How did it change between 1990 and 2000? *Journal of Clinical Psychiatry, 64*(12), 1465-1475. Retrieved from: http://www.ncbi.nlm.nih.gov/pubmed/14728109

Griffiths, K. M., Farrer, L., & Christensen, H. (2010). The efficacy of internet interventions for depression and anxiety disorders: A review of randomised controlled trials. *Medical Journal of Australia, 192*(Supplement), S4-S11. Retrieved from: https://www.mja.com.au/journal/2010/192/11/efficacy-internet-interventions-depression-and-anxiety-disorders-review

Hickie, I., & Groom, G. (2002). Primary care-led mental health service reform: An outline of the Better Outcomes in Mental Health Care initiative. *Australasian Psychiatry, 10*(4), 376-382. doi: 10.1046/j.1440-1665.2002.00498.x

Judd, F., Jackson, H., Komiti, A., Murray, G., & Fraser, C. (2007). Service utilization by rural residents with mental health problems. *Australasian Psychiatry, 15*(3), 185-190. doi: 10.1080/10398560601123724

Kay-Lambkin, F., Baker, A., & Lewin, T. (2004). The 'co-morbidity roundabout': A framework to guide assessment and intervention strategies and engineer change among people with co-morbid problems. *Drug and Alcohol Review, 23*(4), 407-424. doi: 10.1080/09595230412331324536

Kay-Lambkin, F., Baker, A. L., Kelly, B., & Lewin, T. J. (2011). Clinician-assisted computerised versus therapist-delivered treatment for depressive and addictive disorders: A randomised controlled trial. *Medical Journal of Australia, 195*, S44-S50. Retrieved from: https://www.mja.com.au/journal/2011/195/3/clinician-assisted-computerised-versus-therapist-delivered-treatment-depressive

Kay-Lambkin, F., Baker, A. L., Lewin, T. J., & Carr, V. J. (2011). Acceptability of a clinician-assisted computerized psychological intervention for comorbid mental health and substance use problems: Treatment adherence data from a randomized controlled trial. *Journal of Medical Internet Research, 13*(1), e11p11-e11p11. doi: 10.2196/jmir.1522

Kay-Lambkin, F., White, A., Baker, A. L., Kavanagh, D., Klein, B., Proudfoot, J., . . . Young, R. (2011). Assessment of function and clinical utility of alcohol and other drug web sites: An observational, qualitative study. *BMC Public Health, 11*, 277. doi: 10.1186/1471-2458-11-277

Kohn, R., Saxena, S., Levav, I., & Saraceno, B. (2004). The treatment gap in mental health care. *British World Health Organization, 82*, 858-866. doi: 10.1590/S0042-96862004001100011

Mallinckrodt, C. H., Lane, P. W., Schnell, D., Peng, Y., & Mancuso, J. P. (2007). Recommendations for the primary analysis of continuous endpoints in longitudinal clinical trials. *Drug Information Journal, 42*, 303-319. doi: 10.1177/009286150804200402

McGovern, M. P., Lambert-Harris, C., Alterman, A. I., Xie, H., & Meier, A. (2011). A randomized controlled trial comparing integrated cognitive behavioral therapy versus individual addiction counseling for co-occurring substance use and posttraumatic stress disorders. *Journal of Dual Diagnosis, 7*(4), 207-227. doi: 10.1080/15504263.2011.620425

NHMRC. (2009). *Australian guidelines to reduce health risks from drinking alcohol* (ISBN Online: 1864963808). Canberra: National Health and Medical Research Council of Australia. Retrieved from: http://www.ag.gov.au/cca).

Pettinati, H. M. (2004). Antidepressant treatment of co-occurring depression and alcohol dependence. *Biological Psychiatry, 56*(10), 785–792. doi: 10.1016/j.biopsych.2004.07.016

Ritson, B. (2005). Treatments. In A. Paton & R. Touquet (Eds.), *ABC of Alcohol, Fourth Edition*. Carlton, Australia: Blackwell Publishing. Retrieved from: http://bookshop.blackwell.co.uk/jsp/id/ABC_of_Alcohol/9780727918147

Roeloffs, C. A., Fink, A., Unutzer, J., Tang, L., & Wells, K. B. (2001). Problematic substance use, depressive symptoms, and gender in primary care. *Psychiatric Services, 52,* 1251-1253. doi: 10.1176/appi.ps.52.9.1251

Teesson, M., Slade, T., & Mills, K. (2009). Comorbidity in Australia: Findings of the 2007 National Survey of Mental Health and Wellbeing. *Australian and New Zealand Journal of Psychiatry, 43*(7), 606-614. doi: 10.1080/00048670902970908

UN. (2007). *World drug report 2007* (United Nations Publication Sales No. E. 07.XI.5; ISBN 978-92-1-148222-5). United Nations Office on Drugs and Crime. Retrieved from: http://www.unodc.org/unodc/en/data-and-analysis/WDR-2007.html

UNODC. (2011). *World drug report 2011*. Retrieved from http://www.humansecuritygateway.com/showRecord.php?RecordId=35492

White, A., Kavanagh, D., Stallman, S., Klein, B., Kay-Lambkin, F., Proudfoot, J., . . . Young, R. (2010). Online alcohol interventions: A systematic review. *Journal of Medical Internet Research, 12,* e62. doi: 10.2196/jmir.1479

WHO. (2008). *The global burden of disease: 2004 update*. Geneva: World Health Organisation (WHO) Press. Retrieved from: http://www.who.int/healthinfo/global_burden_disease/2004_report_update/en/index.html

Table 1 – Baseline comparisons of participants who completed both the baseline and 3-month post-baseline assessments with those who did not (N = 274)

	Value	Completers (n=163)	Non-completers (n=111)	Statistic	p
Age (years)	*M (SD)*	40.70 (10.57)	37.76 (10.73)	$F(1, 261)=4.78$	.004
Gender (males)	*n (%)*	96 (58.90)	58 (52.25)	$\chi^2=1.506$	.270
Baseline Symptoms					
Depression	*M (SD)*	31.40 (8.30)	32.19 (10.51)	$F(1,256)=.455$	.501
Alcohol use	*M (SD)*	7.79 (7.98)	7.97 (9.77)	$F(1,256)=.027$	.869
Cannabis use	*M (SD)*	5.22 (12.35)	5.15 (12.94)	$F(1,256)=.002$	.962
Diagnosis					
Major Depressive Disorder	*n* (%)	122 (74.85)	70 (63.06)	$\chi^2=4.338$	.114
Alcohol Dependence	*n* (%)	117 (71.78)	84 (75.68)	$\chi^2=1.332$	.722
Cannabis Dependence	*n* (%)	57 (34.97)	40 (36.0)	$\chi^2=3.421$	.331
Treatment sessions attended	*M (SD)*	6.02 (3.98)	4.03 (3.74)	$F(1,223)=4.88$	.028
Treatment allocation[4]					
Therapist CBT/MI	*n* (%)	57 (34.97)	31 (27.93)		
CAC CBT/MI	*n* (%)	59 (36.20)	38 (34.23)	$\chi^2=2.733$	.254
SC	*n* (%)	47 (28.83)	42 (37.84)		

Note. Completers = people who completed both the baseline and 3 month post-baseline assessments; Non-completers = people who completed the baseline assessment only. Therapist CBT/MI = therapist-delivered cognitive behavior therapy/motivational interviewing; CAC CBT/MI = clinician-assisted computerized cognitive behavior therapy/motivational interviewing; SC = supportive counseling (control).

Table 2 – Demographic and Clinical Characteristics of the Study Sample at Baseline (n = 163)

	Values	Rural Participants (n = 53)	Urban Participants (n = 110)	Statistic	p
Age (years)	*M (SD)*	36.65 (10.73)	42.43 (9.93)	$F(1,150)=10.617$	<.001
Males	*n (%)*	24 (45.28)	72 (65.45)	$\chi^2=3.348$	.067
Living alone	*n (%)*	14 (26.42)	35 (31.82)	$\chi^2=.299$	.585
Education					
Did not complete secondary school	*n (%)*	10 (18.86)	18 (16.36		
Secondary school only	*n (%)*	6 (11.32)	18 (16.36)	$\chi^2=8.941$	.028
Post-school, non-tertiary qualification	*n (%)*	33 (62.26)	66 (60)		
Tertiary qualification	*n (%)*	4 (7.55)	8 (7.27)		
Employment					
None	*n (%)*	27 (50.94)	51 (46.36)	$\chi^2=7.052$	.070
Full/part-time paid employment	*n (%)*	19 (35.85	43 (39.09)		
Other[1]	*n (%)*	7 (13.21)	18 (16.36)		
Current income					
Wage or salary	*n (%)*	15 (28.3)	39 (35.45)	$\chi^2=.277$	.598
Pension	*n (%)*	30 (56.60)	64 (58.18)		
Referral source					
Self referral	*n (%)*	31 (58.49)	64 (58.18)		
Alcohol/other drug service	*n (%)*	7 (13.21)	19 (17.27)	$\chi^2=30.171$	<.001
Mental health service	*n (%)*	5 (9.43)	0 (0)		
General practitioner	*n (%)*	5 (9.43)	2 (1.81)		
Non-government organization	*n (%)*	0 (0)	18 (16.36)		
Treatment Service Use (past 12 months)					
No treatment	*n (%)*	11 (20.75)	29 (26.36)		
General Practitioner only	*n (%)*	7 (13.21)	14 (12.73)		
Mental health treatment	*n (%)*	11 (20.75)	16 (14.55)	$\chi^2=2.584$	.630
Alcohol/other drug treatment	*n (%)*	7 (13.21)	24 (21.82)		
Both mental health & alcohol/other drug treatment	*n (%)*	9 (16.98)	18 (16.36)		
Number of health professional visits (past 12 months)					

General Practitioner	*M (SD)*	5.83 (6.85)	6.65 (7.78)	$F(1,147)=.379$	.539
Psychiatrist	*M (SD)*	.28 (1.17)	.58 (1.19)	$F(1,147)=.942$	.333
Psychologist	*M (SD)*	.13 (.499)	.74 (3.21)	$F(1,147)=.654$	.201
Private Health Insurance	*n (%)*	6 (11.32)	12 (10.91)	$\chi^2=.006$	.937
Depression (Beck Depression Inventory II)	*M (SD)*	33.02 (8.29)	30.61 (8.23)	$F(1,158)=2.99$	.08
Alcohol Use (Opiate Treatment Index)	*M (SD)*	8.29 (9.21)	7.55 (7.37)	$F(1,151)=.280$	.60
Cannabis Use (Opiate Treatment Index)	*M (SD)*	6.12 (15.95)	4.82 (10.34)	$F(1,151)=.36$	.55
Global Assessment of Functioning (GAF)	*M (SD)*	51.07 (11.32)	58.48 (8.42)	$F(1,137)=18.047$	<.001
Diagnosis (past 12 months)					
Major Depressive Disorder	*n (%)*	38 (71.70)	75 (68.18)	$\chi^2=1.664$	.197
Alcohol Dependence	*n (%)*	37 (69.81)	66 (60)	$\chi^2=.612$	.736
Cannabis Dependence	*n (%)*	19 (35.85)	46 (41.82)	$\chi^2=.005$	.997

Note. Referral source was not recorded for 12 participants (5 rural and 7 urban). Current income information was not available for 9 rural and 8 urban participants. Treatment service use was not available for 8 rural and 9 urban participants.

[1] "Other" includes volunteer work, self-funded retiree, home duties, studying.

Table 3 – Therapeutic alliance and changes in depression, alcohol use and cannabis use between baseline and 3 month post-baseline assessment, as a function of participant treatment allocation.

		Therapist CBT/MI[2] Mean (*SD*)	CAC CBT/MI [2] Mean (*SD*)	SC[2] Mean (*SD*)
Therapeutic Alliance[1]				
Bond	Rural	6.73 (.413)	6.31 (1.022)	6.05 (1.123)
	Urban	6.45 (.840)	6.26 (.772)	6.41 (.658)
Confidence	Rural	6.16 (.871)	6.35 (.448)	5.92 (1.054)
	Urban	6.12 (.971)	5.89 (.878)	5.87 (1.028)
Openness	Rural	5.73 (.921)	5.60 (.805)	5.67 (1.129)
	Urban	5.93 (.964)	5.46 (1.013)	5.67 (1.129)
Initiative	Rural	3.62 (1.076)	3.92 (.814)	4.85 (1.033)
	Urban	3.53 (.956)	3.57 (.825)	4.03 (1.279)
Depression	Rural	15.30 (11.10)	15.52 (10.41)	10.67 (14.17)
	Urban	9.69 (11.78)	10.59 (12.74)	7.24 (11.80)
Alcohol[2]	Rural	6.66 (9.25)	11.6 (13.20)	5.27 (9.44)
	Urban	3.75 (7.67)	9.76 (10.37)	0.70 (7.92)
Cannabis[2]	Rural	4.91 (8.31)	4.16 (10.56)	-2.84 (6.11)
	Urban	3.52 (7.62)	4.72 (16.82)	0.38 (8.88)

Note. Therapist CBT/MI = therapist-delivered cognitive behavior therapy/motivational interviewing; CAC CBT/MI = clinician-assisted computerized cognitive behavior therapy/motivational interviewing; SC = supportive counseling (control).
[1]Ratings are averages. Therapeutic alliance was measured at three points during the treatment period; following sessions 1, 5 and 10. Last observation carried forward was used to account for missing data, and is regarded as a conservative estimate of missing values that potentially counteracts biases caused by differential timing of assessment (due to slower treatment progression) and reasons for dropout in treatment arms
[2]Only includes those participants who met criteria for hazardous use of alcohol (n=103) or cannabis (n=65) at baseline.

Table 4 – Self-reported benefits of the treatments received by rural and urban participants during the research trial.

Treatment helped me to…		Therapist CBT/MI *n* (%)	CAC CBT/MI *n* (%)	SC *n* (%)	Statistic	*p*
Reduce my drug use	Rural (*n*=36)	2 (5.56)	1 (2.78)	2 (5.56)	χ^2=1.885	.390
	Urban (*n*=69)	4 (5.80)	4 (5.80)	3 (4.35)	χ^2=.341	.843
Reduce my alcohol use	Rural (*n*=36)	10 (27.78)	4 (11.11)	2 (5.56)	χ^2=1.116	.572
	Urban (*n*=69)	12 (17.39)	12 (17.39)	8 (11.59)	χ^2=2.581	.275
Reduce my depression	Rural (*n*=36)	12 (33.33)	7 (19.44)	5 (13.89)	χ^2=.994	.609
	Urban (*n*=69)	13 (18.84)	13 (18.84)	8 (11.59)	χ^2=3.828	.148
Understand how my depression and alcohol/other drug use is connected	Rural (*n*=36)	13 (36.11)	7 (19.44)	4 (11.11)	χ^2=.071	.965
	Urban (*n*=69)	15 (21.74)	16 (23.19)	8 (11.59)	χ^2=8.995	.011
Cope better	Rural (*n*=36)	11 (30.56)	6 (16.67)	3 (8.33)	χ^2=.121	.941
	Urban (*n*=69)	10 (14.49)	9 (13.04)	6 (8.70)	χ^2=2.257	.324
Think differently	Rural (*n*=36)	17 (47.22)	8 (22.22)	3 (8.33)	χ^2=4.143	.126
	Urban (*n*=69)	13 (18.84)	13 (18.84)	10 (14.49)	χ^2=1.663	.435
Unload my problems by talking	Rural (*n*=36)	11 (30.56)	5 (13.89)	4 (11.11)	χ^2=.801	.670
	Urban (*n*=69)	15 (21.74)	6 (8.70)	14 (20.29)	χ^2=6.830	.033
Find someone who understood me and my problems	Rural (*n*=36)	10 (27.78)	4 (11.11)	4 (11.11)	χ^2=1.561	.458
	Urban (*n*=69)	13 (18.84)	5 (7.25)	10 (14.49)	χ^2=8.148	.017
Feel hopeful	Rural (*n*=36)	11 (30.56)	5 (13.89)	5 (13.89)	χ^2=2.473	.290
	Urban (*n*=69)	9 (13.04)	8 (11.59)	6 (8.70)	χ^2=1.360	.507
Feel motivated to make changes	Rural (*n*=36)	13 (36.11)	8 (22.22)	4 (11.11)	χ^2=.088	.957
	Urban (*n*=69)	12 (17.39)	9 (13.04)	10 (14.49)	χ^2=1.236	.539
Take more control in my life	Rural (*n*=36)	12 (33.33)	9 (25)	3 (8.33)	χ^2=2.072	.355
	Urban (*n*=69)	10 (14.49)	13 (18.84)	7 (10.14)	χ^2=3.694	.158

Note. Therapist CBT/MI = therapist-delivered cognitive behavior therapy/motivational interviewing (*n*=41); CAC CBT/MI = clinician-assisted computerized cognitive behavior therapy/motivational interviewing (*n*=34); SC = supportive counseling (control, *n*=30). Percentages in the Table are shown as a proportion of the rural and urban participants in the sample.

Table 5 – Changes suggested by urban and rural participants to the treatment they received during the research trial.

Treatment would be improved by…		Therapist CBT/MI *n* (%)	CAC CBT/MI *n* (%)	SC *n* (%)	Statistic	*p*
More sessions	Rural (*n*=36)	7 (19.44)	4 (11.11)	2 (5.56)	χ^2=.025	.988
	Urban (*n*=69)	4 (5.80)	3 (4.35)	3 (4.35)	χ^2=.347	.841
Fewer sessions	Rural (*n*=36)	0 (0)	0 (0)	0 (0)	-	-
	Urban (*n*=69)	1 (1.45)	0 (0)	0 (0)	χ^2=2.318	.314
More face-to-face contact	Rural (*n*=36)	2 (5.55)	2 (5.55)	1 (2.78)	χ^2=.387	.824
	Urban (*n*=69)	3 (4.35)	11 (15.94)	5 (7.25)	χ^2=7.285	.026
Less face-to-face contact	Rural (*n*=36)	0 (0)	0 (0)	0 (0)	-	-
	Urban (*n*=69)	1 (1.45)	0 (0)	0 (0)	χ^2=2.318	.314
More homework	Rural (*n*=36)	2 (5.55)	0 (0)	1 (2.78)	χ^2=2.459	.292
	Urban (*n*=69)	0 (0)	1 (1.45)	1 (1.45)	χ^2=1.565	.457
Less homework	Rural (*n*=36)	1 (2.78)	1 (2.78)	0 (0)	χ^2=.911	.634
	Urban (*n*=69)	2 (2.90)	2 (7%)	1 (1.45)	χ^2=.506	.776
More skills	Rural (*n*=36)	4 (11.11)	1 (2.78)	1 (2.78)	χ^2=.775	.679
	Urban (*n*=69)	1 (1.45)	6 (8.70)	8 (11.59)	χ^2=7.164	.028
Fewer skills	Rural	0 (0)	1 (2.78)	0 (0)	χ^2=2.437	.296
	Urban	0 (0)	0 (0)	0 (0)	-	-
More on depression	Rural	5 (13.89)	4 (11.11)	0 (0)	χ^2=4.167	.125
	Urban	5 (7.25)	3 (4.35)	7 (10.14)	χ^2=1.886	.389
Less on depression	Rural	0 (0)	0 (0)	0 (0)	-	-
	Urban	0 (0)	0 (0)	0 (0)	-	-
More on alcohol use	Rural	2 (5.55)	1 (2.78)	0 (0)	χ^2=1.163	.559
	Urban	3 (4.35)	2 (2.90)	3 (4.35)	χ^2=.308	.857
Less on alcohol use	Rural	1 (2.78)	0 (0)	0 (0)	χ^2=1.304	.521
	Urban	1 (1.45)	0 (0)	0 (0)	χ^2=1.743	.418
More on cannabis use	Rural	0 (0)	2 (5.55)	1 (2.78)	χ^2=4.814	.090
	Urban	0 (0)	1 (1.45)	2 (2.90)	χ^2=2.686	.261

Less on cannabis use	Rural	1 (2.78)	0 (0)	0 (0)	χ^2=1.304	.521
	Urban	0 (0)	0 (0)	0 (0)	-	-

Note. Therapist CBT/MI = therapist-delivered cognitive behavior therapy/motivational interviewing (*n*=41); CAC CBT/MI = clinician-assisted computerized cognitive behavior therapy/motivational interviewing (*n*=34); SC = supportive counseling (control, *n*=30). Percentages in the Table are shown as a proportion of the rural and urban participants in the sample.