# Does the addition of integrated cognitive behaviour therapy and motivational interviewing improve the outcomes of standard care for young people with comorbid depression and substance misuse?

Leanne M Hides, Kathryn S Elkins, Antonietta Scaffidi, Sue M Cotton, Steve Carroll and Daniel I Lubman


## ABSTRACT

**Objective:** To determine whether the addition of cognitive behaviour therapy and motivational interviewing (CBT/MI) to standard alcohol and other drug (AOD) care improves outcomes for young people with comorbid depression and substance misuse.

**Participants and setting:** Participants were young people with comorbid depression (Kessler Psychological Distress Scale score ⩾ 17) and substance misuse (mainly alcohol and/or cannabis) seeking treatment at two youth AOD services in Melbourne, Australia. The study was conducted between September 2006 and September 2008. Sixty young people received CBT/MI in addition to standard care (SC) (the SC+CBT/MI group) and 28 received SC only (the SC group).

**Main outcome measures:** Depressive symptoms and AOD use in the previous 30 days, measured at baseline and at 3-month and 6-month follow-up.

**Results:** Compared with participants in the SC group, those in the SC+CBT/MI group showed significant reductions in depression and cannabis use and increased social contact and motivation to change substance use at 3-month follow-up. However, at 6-month follow-up, the SC group had achieved similar improvements to the CBT/MI group on these variables. All young people achieved significant improvements in functioning and quality of life variables over time, regardless of treatment group. No changes in AOD use were found in either group at 6-month follow-up.

**Conclusion:** The delivery of CBT/MI in addition to SC may achieve accelerated treatment gains in the short term.


MJA 2011; 195: S31–S37

The high rates of depression (up to 89%) in young people seeking treatment for alcohol and other drug (AOD) misuse are linked to a more severe and chronic illness course, greater social and vocational impairment, and greater use of health services.[1-3] Yet there are low detection rates and limited treatment options available for young people with comorbid depression and AOD misuse in Australia.[4,5]

The evidence base for treatment of comorbid depression and substance misuse in young people is scant. However, cognitive behaviour therapy (CBT) combined with antidepressant (selective serotonin reuptake inhibitor) therapy is effective for treating alcohol- and substance-dependent adolescents with depression.[6-8] In adults, a series of 10 sessions of CBT and motivational interviewing (CBT/MI) targeting both depression and substance misuse without adjunctive pharmacotherapy is more effective than either a one-session brief MI intervention or 10 sessions of CBT/MI targeting either depression or substance misuse alone.[9,10] CBT/MI has also been shown to reduce depression, anxiety, and use of cannabis and other drugs among young people with comorbid major depression and substance misuse.[11] However, the efficacy of CBT/MI compared with standard care (SC) for AOD use in young people has not been tested.

The aim of our study was to determine whether SC combined with CBT/MI (SC+CBT/MI) leads to better outcomes than SC alone among young people with comorbid depression and substance misuse. We hypothesised that young people receiving SC+CBT/MI would have significantly reduced levels of depression and substance use and better functional and quality-of-life outcomes than those receiving SC alone.

## METHODS

### Definitions

Standard care (SC) was defined as case management plus brief MI for substance misuse delivered by an AOD worker in an outreach capacity. This consensus-based definition of SC was developed by representatives of the two youth AOD agencies before study commencement.

A standard drinking unit (SDU) was defined as a drink containing 10 g of alcohol.[12]

### Participants

Participants were 106 young people aged 16–25 years accessing two youth AOD services in Melbourne, Australia — Moreland Hall and the Youth Outreach Team at Drug and Alcohol Services West. The study was conducted between September 2006 and September 2008.

Selection criteria for our study were a Kessler Psychological Distress Scale (K10)[13] score of ⩾ 17 and weekly AOD use in the month prior to referral. Weekly alcohol use was required to exceed pre-2009 Australian national drinking guidelines[14] for long-term risk (males, > 5 SDU/day and/or > 7 SDU on any 1 day; females, > 3 SDU/day and/or > 5 SDU on any 1 day). Non-English speakers and people with past or current psychosis were excluded from the study.

### Measures

Participants were assessed using the following psychological measures.

#### *Kessler Psychological Distress Scale score*

The K10 score[13] was used to screen for psychological distress. A score of 17 or over reliably predicts the presence of a current depressive or anxiety disorder.[15]

#### *Structured Clinical Interview for DSM-IV, Patient Edition (SCID-I/P)*

The SCID-I/P[16] was used to assess participants for the presence of mood, anxiety, psychotic and substance use disorders according to criteria of the *Diagnostic and statistical manual of mental disorders*, 4th edition (DSM-IV).[17]

#### *Measures of depression*

Depression was measured using the Center for Epidemiologic Studies Depression Scale — Revised (CESD-R),[18] a 20-item self-report scale, and the Hamilton Depression Rating Scale (HAMD),[19] a 17-item clinician-rated scale. Both measures have well estab-

lished psychometric properties in youth populations.[19,20]

### *Measures of substance use*

Timeline Followback[21] was used to retrospectively assess the frequency and quantity of AOD use in the previous 30 days. Additional substance use measures included the 10-item Alcohol Use Disorders Identification Test[22] and the five-item Severity of Dependence Scale[23] relating to a particpant's drug of choice. These substance use measures have established reliability and validity in young people.[24-26]

The 12-item Readiness to Change Questionnaire (RTCQ)[27] was used to measure motivation and confidence to change drug-related behaviour.

### *Other measures*

Cognition was assessed using the 30-item Automatic Thoughts Questionnaire (ATQ)[28] and the 20-item Drug Use Motives Measure (DUMM).[29] The 48-item Coping Inventory for Stressful Situations (CISS)[30] was used to measure emotion, task, and avoidance coping. The Quality of Life Interview (QOLI) (Brief Version)[31] and the Social and Occupational Functioning Assessment Scale (SOFAS)[17] were also administered.

## Procedure

Young people completed the K10 questionnaire as part of the routine intake assessment. A research assistant obtained the written informed consent of those with a positive K10 screen, and administered the baseline assessment.

All participants received up to 12 weeks of SC.

Young people in the SC+CBT/MI treatment group received SC (provided by AOD staff) plus up to 12 weekly sessions of CBT/MI, delivered by a clinical psychologist.[32] This individual case formulation-driven approach uses assessment feedback, psychoeducation (information about the signs, symptoms and impact of depression and substance use), and CBT/MI to simultaneously treat depression and substance misuse.[32] Allocation to the SC+CBT/MI or SC-only treatment groups was not random. Young people were allocated to the SC+CBT/MI group if the clinical psychologist had a vacancy in his or her caseload.

Follow-up assessments were conducted at 3 months and 6 months after baseline assessment by a research assistant blind to treatment allocation.

Participants were reimbursed $20 for their time and travel-related expenses for each assessment completed (at baseline, 3 months and 6 months).

## Data analysis

Data analyses were conducted using Statistical Package for the Social Sciences, version 18 (SPSS Inc, Chicago, Ill, USA). Data were initially screened for outliers and failure to meet assumptions of normality and homogeneity of variance. Data transformations (such as logarithmic transformation plus constant) for skewness were conducted when appropriate.

Because treatment allocation was non-random, the SC+CBT/MI and SC-only groups were matched on baseline K10 score, SOFAS score and drug of choice before treatment group comparisons of outcome were made. Differences between the groups with respect to baseline demographic and diagnostic characteristics were examined using $\chi^2$ tests and independent groups $t$ tests.

Differences between the two groups in the 3- and 6-month outcomes were assessed using a mixed-effects model repeated measures (MMRM) approach. The within-groups factor was time (baseline, 3 and 6 months), and the between-groups factor was group. A Toeplitz covariance structure was used to model the relationship between observations on different occasions.

From these models, the main effects for group (are the CBT/MI and SC groups different?) and time (how do ratings change over time, regardless of group?) can be examined, as well as the interaction between the two variables (how do the groups differ across the three time points?). When the main effect for time was significant, least-significant-difference post-hoc comparisons were used to determine which time points were significantly different. Simple main-effects analyses were used when the interaction was significant.

We also sought to determine whether the rate of reduction in symptoms and substance use differed between the groups. As this information cannot be obtained from the interaction analysis or the simple main-effects analysis, a series of planned comparisons within the MMRM was used to contrast change from baseline to each of the two follow-up time points (group differences in change from baseline to 3 months and baseline to 6 months).

**Abbreviations**

| | |
|---|---|
| AOD | Alcohol and other drug |
| ATQ | Automatic Thoughts Questionnaire |
| CBT | Cognitive behaviour therapy |
| CESD-R | Center for Epidemiologic Studies Depression Scale — Revised |
| CISS | Coping Inventory for Stressful Situations |
| DUMM | Drug Use Motives Measure |
| HAMD | Hamilton Depression Rating Scale |
| K10 | Kessler Psychological Distress Scale |
| MI | Motivational interviewing |
| MMRM | Mixed-effects model repeated measures |
| QOLI | Quality of Life Interview |
| RTCQ | Readiness to Change Questionnaire |
| SC | Standard care |
| SCID-I/P | Structured Clinical Interview for DSM-IV, Patient Edition |
| SDU | Standard drinking unit(s) |
| SOFAS | Social and Occupational Functioning Assessment Scale |

## Ethics approval

Ethics approval was obtained from the NorthWestern Mental Health Human Research Ethics Committee.

# RESULTS

## Sample characteristics

The majority of patients (55 [63%]) were male, and the average age of the cohort was 19.2 years (range, 16–25 years). About half the participants lived with their family or partner, and about two-thirds were receiving government benefits (Box 1).

The most common clinical diagnoses were mood disorder (64%) and anxiety disorder (51%), and 15% of the sample had both mood and anxiety disorders. Cannabis misuse/dependence was the most frequent substance use disorder (58%), followed by alcohol misuse (25%) and opiate misuse (17%) (Box 2).

## Participation and attrition

Fourteen young people (13%) refused to participate in the study. There were originally data on 93 participants, but five were excluded from the SC+CBT/MI group

**1 Baseline demographic characteristics of the cohort, by treatment group**

| Variable | Total sample ($n = 88$) | SC+CBT/MI group ($n = 60$) | SC group ($n = 28$) | Test | Value of test statistic | df | *P* |
|---|---|---|---|---|---|---|---|
| Male sex, *n* (%) | 55 (63%) | 34 (57%) | 21 (75%) | $\chi^2$ | 2.74 | 1 | 0.098 |
| Age (years), mean (SD) | 19.2 (1.6) | 19.1 (1.4) | 19.5 (2.0) | *t* | −0.89 | 86 | 0.375 |
| Accommodation, *n* (%) | | | | | | | |
| Rented house/flat/room | 23 (26%) | 19 (32%) | 4 (14%) | $\chi^2$ | 3.44 | 2 | 0.179 |
| House/flat with family | 49 (56%) | 32 (53%) | 17 (61%) | | | | |
| Other | 16 (18%) | 9 (15%) | 7 (25%) | | | | |
| Lives alone, *n* (%) | 6 (7%) | 5 (8%) | 1 (4%) | Fisher's exact | | | 0.660 |
| Highest year of education, mean (SD) | 10.9 (1.7) | 10.8 (1.8) | 11.1 (1.5) | *t* | −0.77 | 86 | 0.443 |
| Employment, *n* (%) | | | | | | | |
| Unemployed | 56 (64%) | 37 (62%) | 19 (68%) | $\chi^2$ | 0.70 | 3 | 0.873 |
| Employed | 21 (24%) | 15 (25%) | 6 (21%) | | | | |
| Student | 10 (11%) | 7 (12%) | 3 (11%) | | | | |
| Home duties | 1 (1%) | 1 (2%) | 0 | | | | |
| Financial support, *n* (%) | | | | | | | |
| Parents | 9 (10%) | 5 (8%) | 4 (14%) | $\chi^2$ | 0.76 | 3 | 0.859 |
| Employment | 16 (18%) | 11 (18%) | 5 (18%) | | | | |
| Government benefits | 60 (68%) | 0 | 18 (64%) | | | | |
| Other | 3 (3%) | 2 (3%) | 1 (4%) | | | | |
| Pretreatment, *n* (%) | | | | | | | |
| AOD detoxification | 54 (61%) | 40 (67%) | 14 (50%) | $\chi^2$ | 2.24 | 1 | 0.135 |
| Mental health treatment | 9 (10%) | 4 (7%) | 13 (46%) | $\chi^2$ | 0.01 | 1 | 0.930 |
| Medication | 60 (68%) | 41 (68%) | 19 (68%) | $\chi^2$ | 0.01 | 1 | 0.964 |
| Antidepressants, *n* (%) | 36 (41%) | 22 (37%) | 20 (71%) | $\chi^2$ | 1.40 | 1 | 0.236 |
| Antianxiety, *n* (%) | 14 (16%) | 6 (10%) | 13 (46%) | $\chi^2$ | 0.04 | 1 | 0.843 |
| Substance misuse, *n* (%) | 13 (15%) | 8 (13%) | 5 (18%) | $\chi^2$ | 0.31 | 1 | 0.577 |

AOD = alcohol and other drug. SC = standard care. SC+CBT/MI = standard care plus cognitive behaviour therapy and motivational interviewing. ◆

because of baseline differences between the treatment groups on the K10 score (31.8 [SC+CBT/MI group] v 28.1 [SC group]; $P = 0.021$) and CESD-R score (30.4 [SC+CBT/MI group] v 24.1 [SC group]; $P = 0.030$). This left 60 people in the CBT/MI group and 28 in the SC group. The two groups were well matched and did not differ significantly with respect to baseline demographic characteristics (Box 1), baseline lifetime diagnoses (Box 2), clinical and psychological characteristics (Box 3) or substance use characteristics (Box 4).

Young people receiving SC+CBT/MI saw their AOD worker for a mean of 3.05 sessions (median, 2.00; SD, 3.45; range, 0–14 sessions). Of the young people in the SC+CBT/MI group, 20 (33%) saw their AOD worker at least four times, but 17 (28%) did not attend any sessions. Participants receiving SC only saw their AOD worker for a mean of 2.96 sessions (median, 2.00; SD, 3.10; range, 0–10 sessions); nine (32%) saw their AOD worker at least four

**2 Baseline DSM-IV diagnoses (lifetime) of cohort, by treatment group***

| Variable | Total sample ($n = 88$) | SC+CBT/MI group ($n = 60$) | SC group ($n = 28$) | $\chi^2$ | df | *P* |
|---|---|---|---|---|---|---|
| Anxiety disorder | 45 (51%) | 31 (52%) | 14 (50%) | 0.02 | 1 | 0.884 |
| Mood disorder | 56 (64%) | 41 (68%) | 15 (54%) | 0.18 | 1 | 0.180 |
| Substance-induced psychotic disorder | 6 (7%) | 4 (7%) | 2 (7%) | 0.01 | 1 | 0.934 |
| Substance use disorders | | | | | | |
| Cannabis | 51 (58%) | 34 (57%) | 17 (61%) | 0.13 | 1 | 0.720 |
| Alcohol | 22 (25%) | 15 (25%) | 7 (25%) | 0.00 | 1 | 1.000 |
| Amphetamines | 21 (24%) | 16 (27%) | 5 (18%) | 0.82 | 1 | 0.397 |
| Opiate | 15 (17%) | 10 (17%) | 5 (18%) | 0.02 | 1 | 0.890 |
| Hallucinogen (includes ecstasy) | 9 (10%) | 7 (12%) | 2 (7%) | 0.43 | 1 | 0.514 |
| Inhalant, sedative, polysubstance | 11 (13%) | 9 (15%) | 2 (7%) | 1.08 | 1 | 0.299 |
| Past substance use disorder | 66 (75%) | 43 (72%) | 23 (82%) | 1.12 | 1 | 0.290 |

DSM-IV = *Diagnostic and statistical manual of mental disorders*, 4th edition. SC = standard care. SC+CBT/MI = standard care plus cognitive behaviour therapy and motivational interviewing.
* Data are *n* (%). ◆

**3 Clinical and psychological measures at baseline, 3 months and 6 months: descriptive statistics derived from MMRM***

| Measure | Baseline | | 3 months | | | 6 months | | |
|---|---|---|---|---|---|---|---|---|
| | SC+CBT/MI group ($n = 60$) | SC group ($n = 28$) | SC+CBT/MI group ($n = 43$) | SC group ($n = 24$) | *P* | SC+CBT/MI group ($n = 43$) | SC group ($n = 24$) | *P* |
| Symptoms | | | | | | | | |
| K10 | 30.8 (1.0) | 28.1 (1.4) | 21.4 (1.1) | 21.7 (1.5) | 0.119 | 23.7 (1.1) | 22.2 (1.5) | 0.498 |
| HAMD | 14.3 (0.7) | 14.1 (1.0) | 9.3 (0.8) | 10.0 (1.1) | 0.516 | 11.3 (0.8) | 9.6 (1.1) | 0.292 |
| CESD-R | 29.1 (1.6) | 24.3 (2.4) | 18.9 (1.8) | 20.5 (2.5) | 0.027 | 22.3 (1.8) | 18.7 (2.5) | 0.731 |
| Functioning (SOFAS) | 60.1 (1.2) | 63.7 (1.8) | 69.8 (1.4) | 71.3 (1.9) | 0.401 | 69.0 (1.4) | 70.9 (2.0) | 0.588 |
| Coping style (CISS) | | | | | | | | |
| Emotion-orientated | 50.1 (1.6) | 45.5 (2.3) | 40.2 (1.8) | 41.7 (2.4) | 0.052 | 39.7 (1.8) | 39.5 (2.4) | 0.199 |
| Task-orientated | 42.1 (1.6) | 42.6 (2.4) | 43.4 (1.8) | 42.7 (2.4) | 0.678 | 41.1 (1.8) | 43.5 (2.5) | 0.535 |
| Avoidance-orientated | 41.9 (1.4) | 44.8 (2.1) | 44.9 (1.6) | 42.6 (2.2) | 0.053 | 42.3 (1.6) | 42.8 (2.2) | 0.422 |
| Social diversion | 14.2 (0.6) | 15.0 (0.9) | 15.8 (0.7) | 15.4 (0.9) | 0.326 | 14.3 (0.7) | 14.9 (0.9) | 0.898 |
| Distraction | 20.6 (0.7) | 21.8 (1.1) | 21.9 (0.8) | 19.6 (1.2) | 0.018 | 21.0 (0.8) | 20.3 (1.2) | 0.209 |
| Negative automatic thoughts (ATQ) | 88.4 (3.8) | 75.0 (5.7) | 63.8 (4.2) | 62.0 (5.8) | 0.064 | 64.7 (4.3) | 58.4 (5.9) | 0.354 |
| Quality of life (QOLI) | | | | | | | | |
| *Subjective scales* | | | | | | | | |
| Global life satisfaction | 3.7 (0.1) | 3.8 (0.1) | 4.0 (0.1) | 4.0 (0.1) | 0.770 | 3.9 (0.1) | 4.0 (0.1) | 0.576 |
| Living situation | 4.0 (0.2) | 4.8 (0.3) | 4.1 (0.2) | 4.3 (0.3) | 0.125 | 4.1 (0.2) | 4.6 (0.3) | 0.461 |
| Daily activities and functioning | 3.7 (0.2) | 3.9 (0.2) | 4.2 (0.2) | 4.2 (0.2) | 0.325 | 4.0 (0.2) | 4.0 (0.2) | 0.673 |
| Family relations | 3.9 (0.2) | 4.2 (0.3) | 4.2 (0.2) | 4.8 (0.3) | 0.434 | 4.2 (0.2) | 4.1 (0.3) | 0.390 |
| Social relations | 4.2 (0.2) | 4.5 (0.2) | 4.7 (0.2) | 4.6 (0.2) | 0.256 | 4.4 (0.2) | 4.6 (0.2) | 0.821 |
| Finances | 2.5 (0.2) | 3.0 (0.3) | 3.1 (0.2) | 3.3 (0.3) | 0.323 | 3.1 (0.2) | 3.5 (0.3) | 0.764 |
| Work and school | 4.8 (0.3) | 4.8 (0.5) | 5.0 (0.3) | 4.8 (0.4) | 0.661 | 4.7 (0.3) | 4.1 (0.4) | 0.377 |
| Legal and safety issues | 5.0 (0.2) | 4.9 (0.3) | 5.0 (0.2) | 5.4 (0.3) | 0.100 | 5.0 (0.2) | 5.1 (0.3) | 0.491 |
| Health | 3.3 (0.2) | 3.8 (0.2) | 4.1 (0.2) | 4.3 (0.2) | 0.281 | 3.9 (0.2) | 4.0 (0.2) | 0.191 |
| *Objective scales* | | | | | | | | |
| Daily activities and functioning | 0.6 (0.1) | 0.7 (0.1) | 0.7 (0.1) | 0.7 (0.1) | 0.979 | 0.6 (0.1) | 0.7 (0.1) | 0.727 |
| Frequency of family contacts | 3.4 (0.1) | 3.6 (0.2) | 3.7 (0.2) | 3.5 (0.2) | 0.113 | 3.6 (0.2) | 3.5 (0.2) | 0.254 |
| Frequency of social contacts | 3.3 (0.1) | 3.7 (0.2) | 3.6 (0.1) | 3.4 (0.2) | 0.013 | 3.4 (0.1) | 3.8 (0.2) | 0.599 |

ATQ = Automatic Thoughts Questionnaire (range, 30–150). CESD-R = Centre for Epidemiologic Studies Depression Scale — Revised (range, 0–60). CISS = Coping Inventory for Stressful Situations (range, 16–80; emotion-, task- and avoidance-oriented scales: range, 16–80; avoidance subscale: social diversion [range, 5–25], distraction [range, 8–40]). K10 = Kessler Psychological Distress Scale (range, 10–50). HAMD = Hamilton Depression Rating Scale (range, 0–50). MMRM = mixed-effects model repeated measures. QOLI = Quality of Life Interview. SC = standard care. SC+CBT/MI = standard care plus cognitive behaviour therapy and motivational interviewing. SOFAS = Social and Occupational Functioning Assessment Scale.

* Data are mean (SE). *P* values are derived from end point analyses within the MMRM that examine between-group differences in the rate of improvement from baseline to 3 months and separately from baseline to 6 months. ◆

times, but eight (29%) did not attend any sessions. There were no significant differences between the two groups in the number of SC sessions received.

The SC+CBT/MI group saw their clinical psychologist for a mean of 6.90 sessions (median, 6.50; SD, 4.29; range, 0–18 sessions). Eighteen young people (33%) saw the clinical psychologist for at least four sessions, 36 (50%) for six sessions, and 13 (22%) for 10 or more sessions.

At 3 months, 21 members of the cohort (24%) (17 [SC+CBT/MI group], 4 [SC group]) were not available for follow-up. Attrition was related to a failure to engage in treatment ($n = 4$), referral to a mental health service ($n = 1$), withdrawal or refusal ($n = 2$), or inability to contact the young person ($n = 14$). Similarly, at 6 months, 21 members of the original cohort (24%) (17 [SC+CBT/MI group], 4 [SC group]) were not assessed, due to failure to engage in treatment ($n = 5$), withdrawal or refusal ($n = 3$), referral to a mental health service ($n = 4$), or inability to contact the young person ($n = 9$). There were no significant differences between completers and non-completers at 3 and 6 months on any demographic, diagnostic, clinical or functional variable.

## Clinical outcomes

There was a significant interaction between group and time for CESD-R score ($F_{2,99.2} = 0.10$; $P = 0.049$). In the SC+CBT/MI group, there was a significant reduction in depression between baseline and 3 months ($P < 0.001$) and between baseline and 6 months ($P = 0.001$). In the SC group, there was a significant reduction in depression

**4 Substance use variables at baseline, 3 months and 6 months: statistics derived from MMRM***

| Variable | Baseline | | 3 months | | | 6 months | | |
|---|---|---|---|---|---|---|---|---|
| | SC+CBT/MI group ($n = 60$) | SC group ($n = 28$) | SC+CBT/MI group ($n = 43$) | SC group ($n = 24$) | *P* | SC+CBT/MI group ($n = 43$) | SC group ($n = 24$) | *P* |
| DSM-IV current substance use disorder, *n* (%) | 53 (88%) | 25 (89%) | 20 (47%) | 20 (83%) | 0.0031 | 23 (54%) | 19 (79%) | 0.037 |
| Alcohol | | | | | | | | |
| Days of use | 5.1 (0.9) | 7.5 (1.4) | 5.7 (1.1) | 7.5 (1.5) | 0.688 | 5.0 (1.1) | 8.8 (1.5) | 0.492 |
| SDU†‡ | 48.8 (10.1) | 60.0 (14.8) | 54.9 (11.7) | 62.8 (15.7) | 0.914 | 39.5 (11.4) | 53.1 (15.7) | 0.57 |
| SDU/day‡ | 7.9 (1.0) | 6.3 (1.5) | 8.0 (1.1) | 6.4 (1.6) | 0.728 | 5.5 (1.2) | 4.8 (1.6) | 0.699 |
| Cannabis | | | | | | | | |
| Days of use | 13.1 (1.4) | 14.5 (2.1) | 7.9 (1.6) | 11.8 (2.2) | 0.339 | 10.2 (1.6) | 10.5 (2.2) | 0.677 |
| Amount in grams†‡ | 23.4 (3.7) | 24.6 (5.5) | 3.3 (3.7) | 18.5 (5.4) | 0.046 | 7.7 (3.7) | 6.9 (6.0) | 0.79 |
| Grams/day†‡ | 1.2 (0.2) | 1.0 (0.2) | 0.6 (0.2) | 1.2 (0.3) | 0.033 | 0.6 (0.2) | 0.5 (0.3) | 0.744 |
| SDS | 9.6 (0.5) | 9.8 (0.8) | 5.8 (0.6) | 7.6 (0.8) | 0.133 | 6.1 (0.6) | 7.2 (0.8) | 0.432 |
| AUDIT | 12.2 (1.3) | 14.5 (2.0) | 10.3 (1.4) | 9.1 (2.0) | 0.088 | 9.5 (1.4) | 10.7 (2.0) | 0.619 |
| Drug use motives (DUMM) | | | | | | | | |
| Enhancement | 3.7 (0.1) | 3.7 (0.2) | 3.2 (0.2) | 3.1 (0.2) | 0.724 | 3.2 (0.2) | 3.4 (0.2) | 0.511 |
| Coping | 3.7 (0.1) | 3.8 (0.2) | 2.8 (0.2) | 3.1 (0.2) | 0.517 | 3.0 (0.2) | 3.2 (0.2) | 0.763 |
| Social | 2.9 (0.2) | 2.7 (0.2) | 2.3 (0.2) | 2.2 (0.2) | 0.714 | 2.3 (0.2) | 2.2 (0.2) | 0.732 |
| Conformity | 1.5 (0.1) | 1.4 (0.1) | 1.3 (0.1) | 1.3 (0.1) | 0.4 | 1.3 (0.1) | 1.5 (0.1) | 0.069 |
| Readiness for change (RTCQ) | | | | | | | | |
| Precontemplation | −3.4 (0.4) | −3.0 (0.6) | −1.0 (0.5) | −2.6 (0.7) | 0.021 | −2.3 (0.5) | −1.6 (0.7) | 0.831 |
| Contemplation | 4.5 (0.4) | 4.6 (0.7) | 2.4 (0.5) | 3.2 (0.7) | 0.508 | 2.4 (0.5) | 2.0 (0.7) | 0.618 |
| Action | 4.8 (0.4) | 4.1 (0.6) | 4.9 (0.5) | 4.0 (0.6) | 0.913 | 4.3 (0.5) | 4.3 (0.6) | 0.475 |

AUDIT = Alcohol Use Disorders Identification Test (range, 0–40). DSM-IV = *Diagnostic and statistical manual of mental disorders*, 4th edition. DUMM = Drug Use Motives Measure (range, 5–25 for all subscales). MMRM = mixed-effects model repeated measures. RTCQ = Readiness to Change Questionnaire (range, −8 to 8 for all subscales). SC = standard care. SC+CBT/MI = standard care plus cognitive behaviour therapy and motivational interviewing. SDS = Severity of Dependence Scale (range, 0–15). SDU = standard drinking unit(s).

* Data are mean (SE) (based on Timeline Followback over previous month), except where otherwise specified. *P* values are derived from end point analyses within the MMRM that examine between-group differences in the rate of improvement from baseline to 3 months and separately from baseline to 6 months. † "No use" was scored as 0. ‡ Logarithmic transformation (plus constant) was used because of extreme positive skewness. ◆

between baseline and 6 months ($P = 0.043$), but not between baseline and 3 months. The rate of improvement from baseline to 3 months was significantly greater in the SC+CBT/MI group than the SC group ($P = 0.027$) (Box 3).

There were no significant differences between the groups with respect to diagnosis of a current mood or anxiety disorder at 3 months (mood disorder: 9 [21%] [SC+CBT/MI group] v 2 [8%] [SC group]; $P = 0.182$; anxiety disorder: 6 [14%] [SC+CBT/MI group] v 5 [21%] [SC group]; $P = 0.466$). Similarly, there were no significant differences at 6 months (mood disorder: 8 [19%] [SC+CBT/MI group] v 1 [4%] [SC group]; $P = 0.95$; anxiety disorder: 10 [23%] [SC+CBT/MI group] v 6 [25%] [SC group]; $P = 0.87$).

Outcomes improved significantly over time (time main effect) with respect to depression (HAMD score), social and occupational functioning (SOFAS score), social and coping motives for substance use (DUMM score), negative automatic thoughts (ATQ score), and emotion-oriented coping (CISS score). No improvements in CISS-defined task- or avoidance-oriented coping were found.

Based on the QOLI Frequency of Social Contacts subscale, there was a significant interaction between group and time ($F_{2,113.6} = 5.05$; $P = 0.008$). For the SC+CBT/MI group, there were significant differences between baseline and 3 months ($P = 0.020$), and between 3 months and 6 months ($P = 0.047$). For the SC group, there was a significant difference between 3 and 6 months ($P = 0.034$). Simple main-effects analyses indicated that at 6 months, the SC+CBT/MI group had significantly lower social contact compared with the SC group ($P = 0.040$). The rate of improvement in frequency of social contacts between baseline and 3 months was significantly greater for the SC+CBT/MI group than the SC group ($P = 0.013$).

For several QOLI subscales (Global Life Satisfaction, Daily Activities, Finances, and Health) there was a significant time main effect between baseline and 3 months (all $P < 0.05$). For Finances and Health subscales, there was also a significant difference between baseline and 6 months (both $P < 0.05$).

## Substance use outcomes

The proportion of participants with substance use disorders was significantly lower in the SC+CBT/MI group than the SC group at both 3 months ($P = 0.003$) and 6 months ($P = 0.037$) (Box 4). There were no reductions in the frequency or quantity of use of alcohol or other drugs (except cannabis), days of abstinence, total days of drug use or the severity of drug dependence. The reduc-

tion in cannabis use in grams ($P = 0.046$) and in grams/day ($P = 0.033$) between baseline and 3 months was significantly greater in the SC+CBT/MI group than the SC group (Box 4). Members of the SC+CBT/MI group were significantly less likely to be in the RTCQ precontemplation stage of change after 3 months than those in the SC group (interaction $F_{2,96.3} = 4.20$; $P = 0.018$), with a greater rate of improvement found in the SC+CBT/MI group between baseline and 3 months ($P = 0.021$).

## DISCUSSION

Our study is the first to determine whether the addition of CBT/MI to standard AOD care improves outcomes for young people with comorbid depression and substance misuse. We found only partial support for our hypotheses that SC+CBT/MI would be associated with significant reductions in depression and substance use and improvements in functional outcomes compared with SC alone.

Young people who received SC+CBT/MI achieved a significantly greater rate of change in depression, cannabis use, motivation to change and social contacts in the first 3 months. However, those who received SC only had achieved similar improvements in these variables at 6-month follow-up. All participants had achieved significant improvements in functional and quality-of-life outcomes at 6 months, regardless of their treatment group. They also were less inclined to endorse negative automatic thoughts and were less likely to use drugs for socialisation or coping purposes. This provided some indication of a change in vulnerability factors, thought to underlie depression and substance use. No reductions in the severity of drug or alcohol dependence or the frequency or quantity of use of alcohol or other drugs were found, although young people who received SC+CBT/MI were less likely to meet DSM-IV criteria for a substance use disorder at 3 and 6 months' follow-up.

Our findings are consistent with those of two previous studies, which found that 10 sessions of CBT/MI were associated with significantly greater reductions in depression and cannabis use than one session of brief MI.[9,11] However, young people who received SC+CBT/MI in our study achieved comparatively little treatment gain, despite receiving two to three times the amount of clinical care of those who had SC alone. The fact that brief MI sessions were part of SC in the two participating youth AOD services may be one reason for the lack of significant differences between the groups, given previous research supporting the efficacy of brief MI for improving depression and alcohol use outcomes in individuals with comorbid depression and substance misuse.[9,10] In addition, all young people achieved reductions in depression and improvements in functioning, quality of life, cognition and coping style.

Although young people in the SC+CBT/MI group achieved significantly reduced cannabis use in the first 3 months compared with those in the SC group, the lack of significant reductions in alcohol or illicit drug use in either group is surprising. However, previous studies finding treatment effects for alcohol misuse have focused on people with comorbid depression and alcohol dependence,[6-8,10] in contrast to the heterogeneous group of young substance users recruited for our study. Additionally, the low rates of alcohol and other illicit drug use and disorders in our cohort would have contributed to the lack of treatment effects for these variables.

Our study has a high level of external validity, as it was conducted in two real-world youth AOD settings and did not exclude young people with low levels of cognitive functioning, polydrug use or personality problems. The CBT/MI treatment was delivered by well trained clinical psychologists under regular supervision. Extensive baseline and follow-up evaluations were conducted by research assistants blind to treatment allocation. However, methodological limitations were associated with this real-world research, including the small sample size and non-random allocation to treatment group. Although using therapist availability to allocate young people to the two treatment conditions maintained a degree of random allocation, a slower than anticipated recruitment rate resulted in an uneven number of young people being allocated to the two groups. Although this was not ideal, the two treatment groups were well matched on key variables (K10 score, drug of choice and SOFAS), and there were no significant differences between the groups with respect to pretreatment or key outcome variables at baseline.

The use of standard AOD care as a treatment comparison was also problematic because of potential variability in the treatment delivered by different AOD workers and services. Such variability was minimised by using a consensus-based definition of SC and the fact that both groups of young people received similar amounts of SC. Nevertheless, it would have been beneficial to monitor the content of SC delivered by AOD workers to ensure that the SC received by the two treatment groups was comparable and sufficiently different from CBT/MI.

Our results were not related to treatment retention or the completion of follow-up assessments, and patients in both treatment groups received a similar amount of standard AOD care, indicating that the study achieved its aim of determining whether the addition of CBT/MI to SC improved outcomes.

In summary, compared with SC alone, the delivery of SC+CBT/MI was associated with accelerated treatment gains with respect to depression, cannabis use, motivation to change substance use and frequency of social contacts in the first 3 months. Longer follow-up periods are required to determine whether improvements in the outcome variables over time were the result of treatment effects or part of a natural recovery process. This will help to determine whether the additional time and resources required to deliver CBT/MI in addition to SC are justified by the faster response rate. Further research is required to compare the efficacy of CBT/MI with that of other types of psychotherapy as well as more clearly defined types of standard AOD care.

## ACKNOWLEDGEMENTS

Leanne Hides and Dan Lubman were supported by the Colonial Foundation at the time our study was conducted. Leanne Hides is currently supported by a Queensland University of Technology Vice Chancellor's Senior Research Fellowship. The study was completed with the assistance of funding from *beyondblue: the national depression initiative* and the Australian Government Department of Health and Ageing. These funding bodies had no involvement in the design or conduct of the study or in the collection, analysis or interpretation of data or preparation of the manuscript.

## COMPETING INTERESTS

None relevant to this article declared (ICMJE disclosure form completed).

## AUTHOR DETAILS

**Leanne M Hides,** BBehavSc(Hons), PhD(Clin), Senior Research Fellow[1]
**Kathryn S Elkins,** BA(Hons), Research Fellow[2]
**Antonietta Scaffidi,** BSc(Hons), PGDipPsych, Senior Research Assistant[2]
**Sue M Cotton,** PhD, Associate Professor[2]
**Steve Carroll,** DPsych, Clinical Psychologist[2]
**Daniel I Lubman,** MB ChB, FRANZCP, PhD, Associate Professor,[2] and Director[3]

1 Institute of Health and Biomedical Innovation, Queensland University of Technology, Brisbane, QLD.
2 Orygen Youth Health Research Centre, University of Melbourne, Melbourne, VIC.
3 Turning Point Alcohol and Drug Centre, Eastern Health, Melbourne, VIC.
*Correspondence:* leanne.hides@qut.edu.au

## REFERENCES

1 Lubman DI, Allen NB, Rogers N, et al. The impact of co-occurring mood and anxiety disorders among substance-abusing youth. *J Affect Disord* 2007; 103: 105-112.
2 Grella CE, Hser Y-I, Joshi V, Rounds-Bryant J. Drug treatment outcomes for adolescents with comorbid mental and substance use disorders. *J Nerv Ment Dis* 2001; 189: 384-392.
3 Sullivan LE, Fiellin DA, O'Connor P. The prevalence and impact of alcohol problems in major depression: a systematic review. *Am J Med* 2005; 118: 330-341.
4 Hides L, Elkins K, Catania LS, et al. Feasibility and outcomes of an innovative cognitive-behavioural skill training programme for co-occurring disorders in the youth alcohol and other drug (AOD) sector. *Drug Alcohol Rev* 2007; 26: 513-519.
5 Hides L, Lubman DI, Elkins K, et al. Feasibility and acceptability of a mental health screening tool and training programme in the youth alcohol and other drug (AOD) sector. *Drug Alcohol Rev* 2007; 26: 509-515.
6 Deas D, Randall CL, Roberts JS, Anton RF. A double-blind, placebo-controlled trial of sertraline in depressed adolescent alcoholics: a pilot study. *Hum Psychopharmacol* 2000; 15: 461-469.
7 Moak DH, Anton RF, Latham PK, et al. Sertraline and cognitive behavioral therapy for depressed alcoholics: results of a placebo-controlled trial. *J Clin Psychopharmacol* 2003; 23: 553-562.
8 Riggs PD, Mikulich-Gilbertson SK, Davies RD, et al. A randomized controlled trial of fluoxetine and cognitive behavioral therapy in adolescents with major depression, behavior problems, and substance use disorders. *Arch Pediatr Adolesc Med* 2007; 161: 1026-1034.
9 Kay-Lambkin FJ, Baker AL, Lewin TJ, Carr VJ. Computer-based psychological treatment for comorbid depression and problematic alcohol and/or cannabis use: a randomized controlled trial of clinical efficacy. *Addiction* 2009; 104: 378-388.
10 Baker AL, Kavanagh DJ, Kay-Lambkin FJ, et al. Randomized controlled trial of cognitive-behavioural therapy for coexisting depression and alcohol problems: short-term outcome. *Addiction* 2010; 105: 87-99.
11 Hides L, Lubman D, Carroll S, et al. Outcomes of an integrated cognitive behaviour therapy (CBT) treatment program for co-occurring depression and substance misuse in young people: a pilot study. *J Affect Disord* 2010; 121: 169-174.
12 National Health and Medical Research Council. Australian alcohol guidelines for low-risk drinking. Canberra: NHMRC, 2007.
13 Kessler RC, Barker PR, Colpe LJ, et al. Screening for serious mental illness in the general population. *Arch Gen Psychiatry* 2003; 60: 184-189.
14 National Health and Medical Research Council. Australian alcohol guidelines: health risks and benefits. Canberra: NHMRC, 2001.
15 Andrews G, Slade T. Interpreting scores on the Kessler Psychological Distress Scale (K10). *Aust N Z J Public Health* 2001; 25: 494-497.
16 First MB, Spitzer RL, Gibbon M, Williams JB. Structured Clinical Interview for DSM-IV-TR axis I disorders, research version, patient edition. New York: Biometrics Research, New York State Psychiatric Institute, 2001.
17 American Psychiatric Association. Diagnostic and statistical manual of mental disorders. 4th ed. Text revision. Washington, DC: APA, 2000.
18 Radloff LS. The CES-D scale: a self-report depression scale for research in the general population. *Appl Psychol Meas* 1977; 1: 385-401.
19 Dozois DJ. The psychometric characteristics of the Hamilton Depression Inventory. *J Pers Assess* 2003; 80: 31-40.
20 Van Dam NT, Earleywine M. Validation of the Center for Epidemiologic Studies Depression Scale — Revised (CESD-R): pragmatic depression assessment in the general population. *Psychiatry Res* 2011; 186: 128-132.
21 Sobell LC, Sobell MB. Timeline Followback user's guide: a calendar method for assessing alcohol and drug use. Toronto: Addiction Research Foundation, 1996.
22 Saunders JB, Aasland OG, Babor TF, et al. Development of the Alcohol Use Disorders Identification Test (AUDIT): WHO Collaborative Project on Early Detection of Persons with Harmful Alcohol Consumption — II. *Addiction* 1993; 88: 791-804.
23 Gossop M, Darke S, Griffiths P, Hando J. The Severity of Dependence Scale (SDS): psychometric properties of the SDS in English and Australian samples of heroin, cocaine and amphetamine users. *Addiction* 1995; 90: 607-614.
24 Dennis ML, Funk R, Godley SH, et al. Cross-validation of the alcohol and cannabis use measures in the Global Appraisal of Individual Needs (GAIN) and Timeline Followback (TLFB; Form 90) among adolescents in substance abuse treatment. *Addiction* 2004; 99 Suppl 2: 120-128.
25 Fairlie AM, Sindelar HA, Eaton CA, Spirito A. Utility of the AUDIT for screening adolescents for problematic alcohol use in the emergency department. *Int J Adolesc Med Health* 2006; 18: 115-122.
26 Martin G, Copeland J, Gates P, Gilmour S. The Severity of Dependence Scale (SDS) in an adolescent population of cannabis users: reliability, validity and diagnostic cut-off. *Drug Alcohol Depend* 2006; 83: 90-93.
27 Heather N, Rollnick S. Readiness to Change Questionnaire: user's manual. Newcastle, UK: Centre for Alcohol & Drug Studies, Newcastle City Health NHS Trust, and Centre for Clinical Psychology and Healthcare Research, University of Northumbria at Newcastle, 2000.
28 Hollan SD, Kendall PC. Cognitive self-statements in depression: development of an Automatic Thoughts Questionnaire. *Cognit Ther Res* 1980; 4: 383-395.
29 Mueser KT, Nishith P, Tracy JI, et al. Expectations and motives for substance use in schizophrenia. *Schizophr Bull* 1995; 21: 367-378.
30 Endler NS, Parker JD. Assessment of multidimensional coping: task, emotion, and avoidance strategies. *Psychol Assess* 1994; 6: 50-60.
31 Lehman AF. A quality of life interview for the chronically mentally ill. *Eval Program Plann* 1988; 11: 51-62.
32 Hides L, Lubman DI, Kay-Lambkin FJ, Baker A. Young people with co-existing mental health and drug and alcohol problems. In: Baker A, Velleman R, editors. Clinical handbook of co-existing mental health and drug and alcohol problems. London: Routledge, 2007: 132-158.

*(Received 12 Aug 2010, accepted 16 Jun 2011)* ❑