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Telephone-based motivational interviewing enhanced with individualised personality-specific coping skills training for young people with alcohol-related injuries and illnesses accessing emergency or rest/recovery services: A randomized controlled trial (QuikFix)

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Running head: QuikFix brief intervention for young people

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Abstract

Background and Aims: Recent meta-analyses of motivational interviewing (MI) for reducing risky alcohol use in young people have reported modest effects. Few studies have targeted individual patient factors to increase MI effectiveness. This study determined if MI enhanced with individualised personality-specific coping skills training (QuikFix) was more efficacious than standard MI or an Assessment Feedback/Information (AF/I) control among young people with alcohol-related injuries or illnesses.

Design: Single-centre, single-blind, three-group superiority randomized controlled trial with 1-, 3-, 6- and 12-month follow ups

Setting: Telephone-intervention, Brisbane, Australia

Participants: 398 young people (16-25 years; $M_{age}=20.30$ years, $SD=2.12$; 54% female) with alcohol-related injuries and/or illnesses were recruited from an emergency department (ED) or rest/recovery service (RRS).

Measures: The primary outcome was total standard (10 grams ethanol) drinks in the past month (Timeline Followback, TLFB) at 12 months (primary timepoint). Secondary outcomes were total drinking days and standard drinks per drinking day (TLFB) in the past month and the frequency of alcohol-related problems in the past 3 months (Rutgers Alcohol Problem Index).

Interventions: Young people were randomized to two sessions of QuikFix enhanced with individualised personality-specific coping skills training ($n=132$), two sessions of MI ($n=136$) or one session of AF/I ($n = 130$), all delivered by telehealth.

Findings: QuikFix resulted in greater reductions (all $p < 0.0017$) in the primary outcome of total standard drinks ($M=19.50$, $CI\ 99.75\%=[11.31-27.68]$) than both MI ($M=32.61$, $CI\ 99.75\%=[24.82-40.40]$;Cohen's $D=0.40$) and AF/I ($M=34.12$, $CI\ 99.75\%=[26.59-41.65]$; $D=0.45$) at 12 months (retention $n=324/398$, 81%). QuikFix had greater reductions on drinking days ($M=3.16$, $CI\ 99.75\%=[2.37-3.96]$) than both MI ($M=4.53$, $CI\ 99.75\%=[3.57-5.48]$; $D=0.38$) and AF/I ($M=4.69$, $CI\ 99.75\%=[3.73-5.65]$; $D=0.42$) and fewer drinks per drinking day ($M=5.02$, $CI\ 99.75\%=[3.71-6.33]$) than AF/I ($M=7.15$, $CI\ 99.75\%=[5.93-8.38]$; $D=0.47$) at 12 months.

Conclusions: Young people with alcohol-related injuries and/or illnesses who attended emergency department and rest/recovery services and received an individualised personality-specific coping skills training intervention (QuikFix) had greater reductions in the amount of alcohol consumed at 12 months compared with those who received motivational interviewing or an assessment feedback/information intervention.

Introduction

Globally, alcohol and other drug (AOD) disorders are at their peak and are the leading cause of disability and death in young people (15-25 years) (1). Almost 40% of young adult Australians (18-29 years) drink at levels placing them at risk of harm (≥ 5 standard drinks (10 grams alcohol) on one occasion) at least monthly (2).

On weekends, large numbers of young people engage in heavy drinking in night-time economies populated by clubs and bars (3, 4). This increases the risk of alcohol-related injuries, illnesses (i.e. severe alcohol intoxication), and violence in night-time economies, and presentations to emergency departments (EDs) (3, 4). Rest and recovery services (RRS) have been set up in night-time economies in Australia, Europe and the United States to support intoxicated people to reduce the risk of harm to themselves or others, and to divert them from EDs.

EDs and RRS present a unique opportunity to engage non-treatment seeking youth into brief alcohol interventions comprised of 1-2 sessions of personalised assessment feedback and information (AF/I), and motivational interviewing (MI). Despite many studies demonstrating the efficacy of brief MI for reducing alcohol use and related problems in young people (5-7), recent meta-analyses have questioned the robustness of these findings. A Cochrane review of 84 randomized controlled trials (RCTs) comparing brief MIs with control conditions (no or alternative treatment) among young people (15-25 years, including 7 studies in EDs) found little evidence for the superiority for reducing alcohol consumption and related problems, and only small effect sizes when superiority was found (8). Similarly, a meta-analysis of six RCTs for young patients of EDs, concluded that compared to no or alternative treatment, at best MI resulted in small reductions in the frequency but not quantity of alcohol use, but at worst there was no difference in outcomes (9). Only two RCTs reported reductions in the frequency of alcohol use: both of these delivered MI after the ED visit or included booster sessions (9). Four studies reported MI resulted in larger reductions in specific alcohol-related problems (e.g., injuries, driving offences), but no differences on validated measures of alcohol-related problems. Finally, a systematic review of seven Screening, Brief Intervention and Referral to

Treatment (SBIRT; 6 containing MI) RCTs in young people accessing EDs for an alcohol-related event, injury or illness found reductions in alcohol use in only two studies (10). Kohler and Hoffman (9) suggested that existing studies may not have sufficiently adapted MI to the needs of young people, and urged researchers to consider individual patient factors that may moderate the effectiveness of MI in EDs.

There is substantial scope to increase the impact of MI for alcohol use in young people. Process-based research has identified a number of moderators (e.g. sex, personality) and mediators (e.g. coping skills, self-efficacy, motives for use) of change in cognitive behaviour therapy trials for alcohol use, that if targeted could increase the impact of alcohol treatment (11-13). Conrod et al.(14) pioneered the development of personality risk-targeted interventions that differentially target four personality risk profiles for alcohol use: (i) anxiety-sensitivity; (ii) hopelessness; (iii) impulsivity; and (iv) sensation seeking. These four personality risk profiles differentially predict susceptibility to binge drinking, alcohol-related problems, and illicit drug use in young people (14). Brief MI incorporating cognitive behavioural coping skills training targeting these four personality dimensions can reduce alcohol use in female adult substance users and in adolescents in a school-based group format (15, 16). We previously found two sessions of brief MI enhanced with cognitive behavioural coping skills training resulted in larger reductions in alcohol use than an AF/I control at 1 and 3, but not 6 months follow-up, among young alcohol and cannabis users (17). However, research is yet to determine the relative effects on alcohol consumption and related problems of a personality-targeted brief MI intervention for young people attending EDs/RRS for alcohol-related injuries or illnesses, or compare its effects to MI and other active treatments.

The aim of this study was to determine if QuikFix MI enhanced with individualised personality-specific coping skills training was more efficacious than standard MI or an AF/I control among young people with alcohol-related injuries or illnesses presenting to an ED or RRS. The primary outcome was total standard (10 grams ethanol) drinks in the past month. Secondary outcomes were total

drinking days and standard drinks per drinking day in the past month and the frequency of alcohol-related problems in the past 3 months.

Methods

Design

A Phase II single-site, single-blind three-group superiority RCT with 1-, 3-, 6- and 12-month follow ups was conducted. Young people presenting to an ED or RRS with alcohol-related injuries and/or illnesses in Brisbane, Queensland, Australia were randomized to receive: (i) 1-session of AF/I; (ii) 2 sessions of MI; or (iii) 2 sessions QuikFix MI. An independent statistician generated the computerised random number sequence stratified by sex and age (16-20 years, 21-25 years). Participants were randomized following completion of the baseline measures. Treatment group allocation was communicated to participants at the beginning of session one. The follow-up assessors and trial statistician were blind to treatment group allocation. Ethical approvals were obtained from the relevant university and hospital human research ethics committees. SPIRIT and CONSORT Guidelines were followed (see Figure 1), the study was prospectively registered with the Australian and New Zealand Clinical Trials Registry (ACTRN12613000108718) and a protocol is available (18).

Insert Figure 1 about here

Participants

Young people aged 16-25 years, were eligible to participate if they either: (i) consumed ≥ 6 standard drinks on one occasion in the previous 2 weeks assessed using the *Timeline Followback* (TLFB; 19) or (ii) scored ≥ 8 on the 10-item *Alcohol Use Disorders Identification Test* (AUDIT), which is a reliable indicator of problematic alcohol use in adolescents and adults (20). Users of illicit drugs were eligible, as long as alcohol was the most frequently used drug (other than tobacco). Exclusion criteria were: (i) ED/RRS presentation for serious medical problem or traumatic injury; (ii) not fluent in spoken/written English; (iii) unmodified hearing impairment; (iv) estimated IQ < 70 ; (v) current high suicide risk; (vi) current or past history of psychosis; (vii) history of traumatic brain injury or organic

brain disease (viii) current acute alcohol or drug withdrawal, or (ix) past month psychological or pharmacological treatment for AOD use.

Psychological Interventions

Trained research therapists with at least a Masters degree in Clinical Psychology delivered the three phone interventions. All three interventions aimed to reduce alcohol use and related problems, and commenced with a conversation about the events that led up to their ED/RRS experience (including the role of alcohol use). Young people randomised to AF/I then received personalised AF on their alcohol use, and information on the physical, psychological and social sequelae of alcohol use and harm reduction strategies. The AF/I components of MI and QuikFix were the same, but were delivered in a MI style. Those in MI received AF/I followed by MI to (a) build readiness and commitment to make a change in alcohol use, (b) negotiate change goals and (c) develop a plan for making a change.

Session-one of QuikFix comprised AF/I and MI. The MI goal setting content was developed in a series of participatory design workshops with young people (21). MI strategies were used to engage the young person in a general discussion about their alcohol use on a “good night out”. They were then encouraged to explore how the amount of alcohol they consume may/may not vary according to the type of night out (e.g. fun, crazy) they have planned. They were then introduced to the concept of the ‘stupid line’ for drinking, the point where a good night out drinking stops being fun and starts to turn bad. MI strategies were used to collaboratively explore how their drinking patterns fit with this concept (and develop an alternative name, if desired), and identify some early warning signs (e.g. spilling drinks) they may be approaching their stupid line for drinking. They were then encouraged to set a good night out goal for their alcohol use in the next week (even if this meant drinking the same amount/just trying to stay below their stupid line) and identify alcohol harm reduction strategies to help them achieve it. The good night out plan takes the form of an implementation intention, a hypothetical or actual plan for change, which takes the form “When I go to X (situation/event), I’m going to use my Y (harm minimisation), to achieve my Z (alcohol use goal) (22).

In session-two of QuikFix, the young person receives AF/I on their top one or two personality risk profiles (highest subscale mean scores) on the *Substance Use Risk Profile Scale* (SURPS; 14) and its association with alcohol use and coping behaviours (e.g., avoidance, aggression, risky behaviours). They were then provided with personality-specific training on up to two cognitive-behavioural coping skills. Those predominantly with anxiety proneness were provided with training in mind chill anxious thought awareness and acceptance skills, as well as mindful breathing. Young people high in depression proneness received behavioural activation (looking after yourself/positive event scheduling) and mind chill and change (thought challenging) depressive thought training. Sensation seekers were encouraged to identify and schedule natural (e.g. food, sex, music) and new/novel (e.g. skateboarding) highs, and receive training in savouring techniques to increase their ability to enjoy positive feelings/experiences. Young people with high levels of impulsivity received mindfulness training to increase awareness of their impulsive urges and urge surfing techniques to reduce them using the three D's (delay, distract, decide). Those with difficulties identifying impulsive urges were taught the Stop-Think-Do rubric to help them slow down their decision-making processes and think before they act. Finally, MI strategies were used to encourage the young person to develop a second good night out plan (implementation intention), where Y was their coping strategy.

Homework tasks in all three conditions were cued by emailed session summaries and a brief SMS, and four subsequent SMSs tailored to the content of each intervention were sent at 2, 4, 8 and 10 months post baseline (18). Participants in MI and QuikFix also received four 5-10 minute booster phone calls from their therapist to remind them of session content and conduct a TLFB at 2, 4, 8 and 10 months post-baseline.

Procedures

Recruitment took place between 11pm and 5am on Friday, Saturday, and Sunday nights between September 2014 and November 2016. After completing standard care (e.g., ED: medical assessment /treatment, RRS: nursing assessment/support in a sobering up space, volunteer assessment/support on foot/mobile patrols), young people were asked if they were interested in participating in a research

study on brief interventions for alcohol use. Trained assessors with at least an Honours degree in Psychology contacted the young person within 3 days, to obtain full informed consent and conduct a telephone eligibility screen and baseline assessment. Participants also completed an online baseline survey. Blind follow-up assessments, comprising a telephone interview and online survey, were conducted at 1, 3, 6 and 12 months post-baseline. All assessments and treatment sessions were audio-recorded. Therapists also completed treatment session component checklists. Independent clinical psychologists rated these for inter-rater reliability on the TLFB, MI treatment fidelity on the *Motivational Interviewing Treatment Integrity* (MITI 3.1.1; 23) and treatment adherence/contamination (See Supplement 1). Participants were reimbursed for completing the assessments (maximum 250AUD).

Baseline and follow-up measures

Primary outcome

Given participants engaged in risky drinking, the primary outcome variable was total standard drinks (10 grams ethanol) in the past month, measured on the TLFB at 12 months follow up. The TLFB uses calendar-based cues to obtain precise information on the frequency and quantity of alcohol and other substance use in the previous month (19). The TLFB has high test-retest reliability (intraclass correlation coefficients (ICC)=.70-.94), convergent and discriminant validity with other substance use measures, collateral information and biological measures of illicit drug use (19, 24).

Secondary outcomes

Included total standard drinks at 1 month follow up as an indicator of initial treatment response, and the number of drinking days, and mean standard drinks per drinking day at the 1 and 12 month follow up. These variables are important indicators of alcohol use and response to the treatment. Alcohol-related problems in the previous 3 months were also included as a secondary outcome at 12 months, given the well-established relationship between alcohol use and risk of alcohol-related injury/illnesses. This was assessed using the reliable and valid 23-item *Rutgers Alcohol Problem Index* (RAPI) (25).

Other measures

Personality was assessed using the 23-item SURPS (14). This scale measures anxiety sensitivity/proneness, hopelessness/depression proneness, impulsivity, and sensation seeking (14). The scale has high levels of internal consistency, test-retest reliability and construct, concurrent and predictive validity with respect to current and future alcohol use in adolescents, undergraduate students and clinical samples (14).

Statistical Analysis

Sample size calculations

Sample size calculations were generated using SamplePower 3.0. Small to medium between group effects on the primary outcome of total standard drinks in the past month were expected (Cohen's $D=0.25$). This estimate was based on our unpublished pilot data finding small to moderate effects (Cohen's $D=0.34$) of an earlier version of QuikFix ($M=20.07$, $SD=30.94$) versus MI ($M=31.44$, $SD=30.24$) on total standard drinks at 6-months follow up, among young people accessing an ED with alcohol related injuries/illnesses. A study comparing MI ($M=6.10$, $SD=8.33$) and AF/I ($M=8.33$, $SD=9.67$) in young alcohol users recruited from an ED, found small to moderate effects (Cohen's $D=0.33$) at 12 months follow-up, on the mean amount of alcohol consumed per week in the past month (26). With power set at 0.95 and α to 0.05, 82 cases per group, or a total sample of 246 was required. We planned to recruit a total of 390 participants, to allow for up to 30% attrition over 12 months. The final sample of 398 young people was sufficient to detect moderate effects with over 80% power.

Analysis

Alcohol use data were strongly skewed, and extreme observations (univariate Z score $>+/-3.29$ and/or extreme outliers $+/- 3$ SD from the treatment group mean) that were deemed implausible were coded as missing and imputed (see Supplement 2). These outliers and other missing data were multiply imputed in 30 datasets using iterated chained equations (27).

Mixed effect models were used to examine differences in the primary outcome of total standard drinks (TLFB), and the secondary outcomes of the number of drinking days, mean standard drinks/drinking day (TLFB) and the frequency of alcohol-related problems (RAPI) at the primary 12-month and secondary 1-month timepoint. The 3 and 6 months follow up data were included in the analyses to increase the accuracy of the model estimates over time. The predictors in each of the models were group, time, group x time interaction, baseline measures of the outcome, baseline use of illicit drugs (cannabis/ecstasy/amphetamine drugs; yes/no), sex and age. We then compared the model-based adjusted marginal estimates of the outcomes at each follow-up time point. Negative binomial models were used for the number of drinking days and linear models were used for other outcomes. Intent to treat principles were applied. A random intercept was used to account for the repeated measures design. All analyses were conducted in STATA. The margins command was used to compute and compare the adjusted marginal estimates. In light of recent recommendations for hypothesis testing, the overall significance level was set at 0.005 (28, 29). Given there were three comparisons at each time point (AF/I vs MI, AF/I vs QuikFix and MI vs QuikFix), the per-comparison significance level was set at 0.0017 (28, 29). Sensitivity analyses were conducted with outliers and missing data excluded to test the robustness of results.

Insert Table 1 about here

Results

Research assistants came into contact with 326 (19%) young people in the ED and 1,405 (81%) from the RRS, giving a total of 1,731 young people over 18 months. A total of 63% ($n=1,092$) met initial eligibility criteria and expressed interest in participating: 90% ($n=988$) of these met eligibility criteria, 45% ($n=441$) of whom agreed to participate. A total of 90% ($n=398$) of consenting participants were randomized. See Figure 1 for further information.

Insert Table 2 about here

Participants comprised 185 males (47%) and 213 (54%) females, with a mean age of 20.30 years ($SD=2.12$). The majority ($n=333$, 84%) attended the ED/RRS for alcohol intoxication, and only 16% ($n=65$) presented with injuries. Figure 1 shows the high numbers of young people who received/completed treatment. The mean time to deliver the 2-session QuikFix and MI interventions was 68.86 ($SD=16.60$) and 48.04 ($SD=13.57$) minutes respectively. The single-session AF/I intervention was delivered in a mean of 18.32 ($SD=5.60$) minutes (see Supplement 3 for further information). High follow up rates on the primary outcome variable were achieved at 1 ($n=346$, 87%), 3 ($n=339$, 85%), 6 ($n=328$, 82%) and 12 ($n=324$, 81%) months. Seventy-four (19%) of the 398 participants were lost to follow up at 12 months. The majority were uncontactable ($n=57/74$, 77%), and only 13 ($n=13/74$, 18%) had withdrawn. No significant treatment group differences related to the recruitment site, treatment completion or loss to follow-up were found, except attrition from the 1-, 3-, 6- and 12-month follow up was lower than expected in the AF/I group (e.g., at 12 months $\chi^2(2)=13.50$, $p=0.001$). See Supplement 1 for information on the inter-rater reliability of the TLFB, treatment adherence and fidelity.

Insert Figure 2 about here

Table 2 shows the model-based adjusted marginal estimates for standard drinks, drinking days, and mean standard drinks/drinking days at 1, 3, 6 and 12 months follow-up. Only the results of the analyses for the primary and secondary outcomes and timepoints are described here. On the primary outcome at the 12-month follow-up, participants in the QuikFix group reported consuming significantly fewer standard drinks than those who received either AF/I (Cohen's $D=0.45$) or MI (Cohen's $D=0.40$). Participants in the QuikFix group also reported significantly lower standard drinks than both AF/I (Cohen's $D=0.40$) and MI (Cohen's $D=0.40$) at the 1-month follow up. At 12 months follow-up on the secondary outcomes, QuikFix participants reported significantly less drinking days than both AF/I (Cohen's $D=0.42$) and MI (Cohen's $D=0.38$); they also reported significantly lower mean standard drinks/drinking days than AF/I (Cohen's $D = 0.47$). No between group differences on these variables were found at 1-month follow up. Table 3 shows the adjusted marginal estimates for

RAPI at 3, 6 and 12 months follow-up. There was no significant difference between groups at 12 months. Regression coefficients of the corresponding models were not the focus of our analysis and thus were shown in Supplementary Table 1 (for alcohol use outcomes) and in Supplementary Table 2 (for alcohol-related problems). Sensitivity analyses with both outliers and missing data excluded (see Table S3 and S4) had the same results as the current analyses.

Insert Table 3 about here

Discussion

The high rates of alcohol use and related harm and injury in young people highlight the need for effective treatment. This study tested the efficacy of the 2-session QuikFix brief intervention which combined MI adapted to the needs of young people, with individualised personality-specific coping skills training for reducing alcohol use and related problems, as compared to 1-session of AF/I, or to 2-sessions of MI.

On the primary outcome variable at 12 months follow up, young people who received QuikFix reported fewer standard drinks, compared to those who received MI or AF/I. They also consumed less standard drinks at the 1-month follow-up, than young people who received MI or AF/I. QuikFix's effects were moderately stronger than either the MI or AF/I group at both timepoints. Together these results indicate that QuikFix was more efficacious than both AF/I and MI for reducing the short- and long-term quantity of alcohol consumed by young people. QuikFix participants also achieved larger reductions on the secondary outcomes of drinking days than both the AF/I and MI groups, and mean standard drinks/drinking day than AF/I at 12 months follow up. Once again QuikFix had a moderately larger effect than either MI or AF/I. Together these results suggest the provision of personality-specific coping skills training may have equipped young people with some simple skills to continue reducing their alcohol use to a greater extent than those who received either AF/I or MI at 12 months. Such delayed treatment effects, also termed ' sleeper effects ' (30) have been reported at 12 months follow-up in previous trials of CBT for substance use disorders (31). Likewise, sleeper effects for

alcohol use outcomes were reported at 15 months follow-up among mandated college drinkers following one-session of written AF (32). The two session QuikFix brief intervention was developed to specifically target two of the putative mechanisms of change in CBT, personality and coping skills training in an individualised way to increase the impact of treatment (11-13). It could be argued that the provision of booster sessions could have helped maintain treatment effects in the QuikFix and MI groups at 12 months. However, the AF/I group maintained treatment effects without receiving booster sessions, suggesting they may have little additive effect (9).

No differential treatment effects were found on the secondary outcome of alcohol-related problems at 12 months. Mixed results on alcohol-related problems have been reported in previous MI research among young people with alcohol-related ED presentations (9). Two previous MI studies in EDs using the RAPI have also failed to find differential effects (26, 33). The RAPI was developed in adolescents, and while validated in young adults, does not assess some of the more common alcohol-related problems (e.g. sexual risk taking, vomiting) in young adults.

There was little difference in the impact of MI and AF/I on any primary or secondary alcohol use outcome variables. These results are consistent with meta-analyses finding limited evidence for the superiority of MI over control conditions (including AF/I) in young adults (8, 34), and the mixed evidence for MI delivered in ED settings (9, 10). The extent of change was similar across the three groups at 3- and 6-month follow-up. However, an increase in standard alcohol drinks in the past month was observed between 1 and 3 months in the QuikFix group. This could reflect the initial effects of QuikFix or the natural reductions in alcohol use following an ED/RRS visit for an alcohol-related injury/illness wearing off (36). However, this would have affected all three groups, and more likely reflects the dynamic nature of alcohol use in young people (35).

The majority of young people who present to EDs and RRS with alcohol-related injuries and illnesses do not view their alcohol use as problematic and are unlikely to seek or engage in treatment. This study found an early intervention model of care involving initial engagement in these settings,

followed by rapid and assertive follow-up with brief telephone-delivered alcohol treatment was an effective way of reducing alcohol use in this at-risk group. Participation rates were high, with 75% of young people agreeing to complete telephone screening, and 44% consenting to receive a brief alcohol intervention. Other strengths of the study include the high treatment completion rates (84-96%), the well-powered and controlled analyses, high research follow-up rates (81-87%) and high levels of inter-rater reliability on the TLFB primary and secondary alcohol outcome variables. Treatment fidelity to the competent delivery of both MI and QuikFix in a manner consistent with the MI spirit, and higher MI-consistent behaviours in the MI group were confirmed by an independent rater. Therapist adherence to the delivery of the core features of the allocated treatment was excellent. ITT were conducted with both missing data and outliers imputed to ensure all participants were included in the analyses. A stringent overall significance level of 0.005 was set, with a per-comparison significance level 0.0017 for the three group comparisons (28, 29). Sensitivity analyses with both outliers and missing data excluded were also performed. The same conclusions were drawn, supporting the robustness of results.

Weaknesses in this study include the lack of biological confirmation of self-reported substance use. However, the TLFB performs well against biological measures and there is little evidence of self-report bias in the alcohol literature (24). The longer mean duration of the QuikFix intervention could have influenced results. The payments participants received may have incentivised the reporting of reductions in alcohol use, but the incentives were for completion, and there is little evidence of similar self-report bias in the alcohol literature (24). Those in the AF/I group were less likely to drop out of follow up. The reason for this is unknown but may reflect less time commitment during treatment. Assessment reactivity could have affected the observed changes across all groups, as assessments alone can both increase awareness of alcohol problems and decrease alcohol use, although brief research assessments were used to minimize this effect (37). Similarly, regression to the mean may have impacted overall results across groups, since participants may have consumed more alcohol than usual prior to requiring ED or RRS (8). However, neither assessment reactivity nor regression to the mean explain the differential effects of the treatments.

The QuikFix brief intervention provides an easily disseminated and effective way of addressing the significant public health issue of alcohol use and related harm in young people. Future research is required to replicate these findings, using more age-appropriate measures of alcohol-related problems and to determine the sustainability of positive effects beyond 12 months. Nevertheless, the current study demonstrates that MI enhanced with individualised personality-specific coping skills training had stronger and more sustained effects on the alcohol consumption of young ED or RRS attendees than AF/I or MI.

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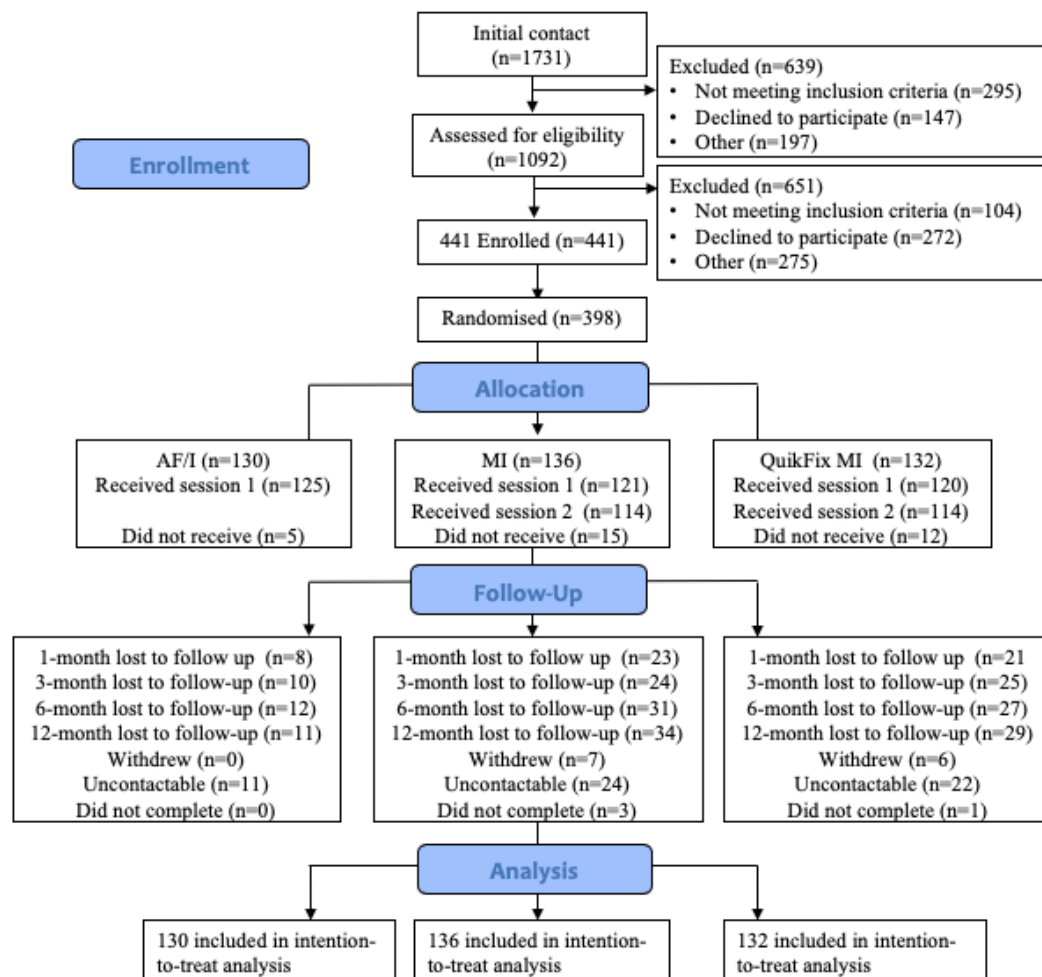


Figure 1: Study flow diagram

Table 1. Baseline demographic, personality, alcohol and other drug use and alcohol-related problems

Variables	Total (n=398)	AF/I (n=130)	MI (n=136)	QuikFix (n=132)
Demographics				
Age, M (SD)	20.30 (2.12)	20.31 (2.22)	20.22 (2.11)	20.38 (2.06)
Female sex, n (%)	213 (54)	72 (55)	71 (52)	70 (53)
Single, n (%)	266 (67)	87 (67)	92 (68)	87 (66)
Children, n (%)	7 (2%)	1 (1)	1 (1)	5 (4)
Years educated, M (SD)	12.15 (1.18)	12.13 (1.13)	12.20 (1.34)	12.13 (1.04)
Employed, n (%)	318 (82)	105 (81)	105 (77)	108 (82)
Unemployed, n (%)	68 (18)	22 (17)	26 (19)	20 (15)
Student, n (%)	231 (58)	77 (59)	83 (61)	71 (54)
Living situation, n (%)				
Renting	148 (37)	53 (41)	50 (37)	45 (34)
With family	231 (58)	72 (55)	81 (60)	78 (59)
Student residence	10 (3)	2 (2)	3 (2)	5 (4)
Own home	5 (1)	2 (2)	0 (0)	3 (2)
Other ^a	4 (1)	1 (1)	2 (2)	1 (1)
Born outside of Australia, n(%)	59 (15)	19 (15)	21 (15)	19 (14)
Aboriginal or Torres Strait Islander, n(%)	12 (3%)	4 (3)	5 (4)	3 (2)
Personality				
SURPS, M (SD)				
Sensation seeking	2.84 (0.54)	2.79 (0.48)	2.84 (0.57)	2.88 (0.56)
Impulsivity	2.29 (0.47)	2.31 (0.47)	2.24 (0.47)	2.30 (0.48)
Hopelessness	2.96 (0.37)	2.90 (0.35)	2.97 (0.37)	3.00 (0.38)
Anxiety Sensitivity	2.53 (0.54)	2.52 (0.55)	2.56 (0.53)	2.49 (0.54)
AOD				
TLFB past 4 weeks, M(SD)				
Drinking days	5.98 (4.28)	5.57 (3.81)	5.90 (4.17)	6.47 (4.79)
Standard drinks	58.95 (59.25)	54.86 (56.18)	56.94 (50.62)	65.07 (69.57)
Standard drinks per drinking day	9.97 (5.44)	10.07 (5.57)	10.11 (5.69)	9.73 (5.04)
Cannabis days	0.56 (2.70)	0.63 (3.12)	0.65 (3.1)	0.4 (1.58)
Methamphetamine days	0.09 (.70)	0.15 (1)	0.01 (0.17)	0.11 (0.69)
Ecstasy days	0.31 (1.06)	0.19 (0.59)	0.25 (0.72)	0.47 (1.59)
Any Illicit drug use, n (%) ^b	79 (20)	28 (22)	25 (18)	26 (20)
AUDIT, M (SD)	13.82 (5.52)	13.56 (5.89)	13.88 (5.12)	13.99 (5.58)
RAPI, M (SD)	11.02 (10.48)	10.96 (10.47)	12.07 (11.09)	9.98 (9.78)

Notes. M: mean; SD: standard deviation; n: number; %: percentage; AUDIT: Alcohol Use Disorders Identification Test; RAPI: Rutgers Alcohol Problem Index; SURPS: Substance Use Risk Profile Scale; TLFB: Timeline Followback; ^aNone were homeless or living in an institution or hostel;

^bCannabis/methamphetamine/ecstasy.

Table 2. Adjusted marginal estimates of standard drinks, drinking days and mean standard drinks per drinking day of alcohol use (TLFB) by treatment conditions and time points.

TLFB	Follow up	AF/I		MI		QuikFix	
		Adjusted estimates	99.75% CI	Adjusted estimates	99.75% CI	Adjusted estimates	99.75% CI
Standard drinks	1-mth	36.51 ^a	(29.07, 43.95)	36.56 ^a	(28.83, 44.28)	23.75 ^b	(15.86, 31.63)
	3-mth	30.64 ^a	(22.94, 38.35)	31.19 ^a	(22.94, 39.44)	35.00 ^a	(26.91, 43.10)
	6-mth	31.27 ^a	(23.6, 38.93)	29.87 ^a	(22.19, 37.55)	33.21 ^a	(24.61, 41.81)
	12-mth	34.12 ^a	(26.59, 41.65)	32.61 ^a	(24.82, 40.40)	19.50 ^b	(11.31, 27.68)
Drinking days	1-mth	4.75 ^a	(3.78, 5.73)	4.97 ^a	(3.96, 5.98)	4.20 ^a	(3.31, 5.08)
	3-mth	4.34 ^a	(3.42, 5.25)	4.37 ^a	(3.46, 5.28)	4.29 ^a	(3.39, 5.19)
	6-mth	4.66 ^a	(3.70, 5.62)	4.25 ^a	(3.36, 5.14)	4.48 ^a	(3.53, 5.42)
	12-mth	4.69 ^a	(3.73, 5.65)	4.53 ^a	(3.57, 5.48)	3.16 ^b	(2.37, 3.96)
Standard drinks/ drinking day	1-mth	7.50 ^a	(6.28, 8.71)	6.81 ^a	(5.55, 8.08)	6.35 ^a	(5.09, 7.61)
	3-mth	6.30 ^a	(5.04, 7.56)	6.54 ^a	(5.14, 7.94)	6.98 ^a	(5.68, 8.29)
	6-mth	6.44 ^a	(5.20, 7.68)	6.39 ^a	(5.06, 7.72)	6.99 ^a	(5.65, 8.32)
	12-mth	7.15 ^a	(5.93, 8.38)	6.48 ^{ab}	(5.16, 7.80)	5.02 ^b	(3.71, 6.33)

Note. TLFB: Timeline Followback; AF/I: Assessment feedback/information; MI: Motivational interviewing; mth: month; Estimates with the same superscript are not statistically significant at 0.0017 within time point, adjusting for multiple comparisons (3 comparisons with each time point: AF/I vs QuikFix, QuikFix vs MI, and AF/I vs MI).

Table 3. Adjusted marginal estimates for alcohol-related problems (RAPI) by treatment conditions and time points

RAPI	AF/I		MI		QuikFix	
	Adjusted estimates	99.75% CI	Adjusted estimates	99.75% CI	Adjusted estimates	99.75% CI
3-month	0.87	(0.05, 1.69)	1.05	(0.23, 1.87)	1.23	(0.39, 2.07)
6-month	3.37	(2.51, 4.24)	3.03	(2.12, 3.94)	3.50	(2.56, 4.44)
12-month	2.76	(1.89, 3.63)	2.86	(1.87, 3.86)	3.41	(2.48, 4.35)

Note. AF/I: Assessment feedback/information; MI: Motivational interviewing; RAPI: Rutgers Alcohol Problem Index.

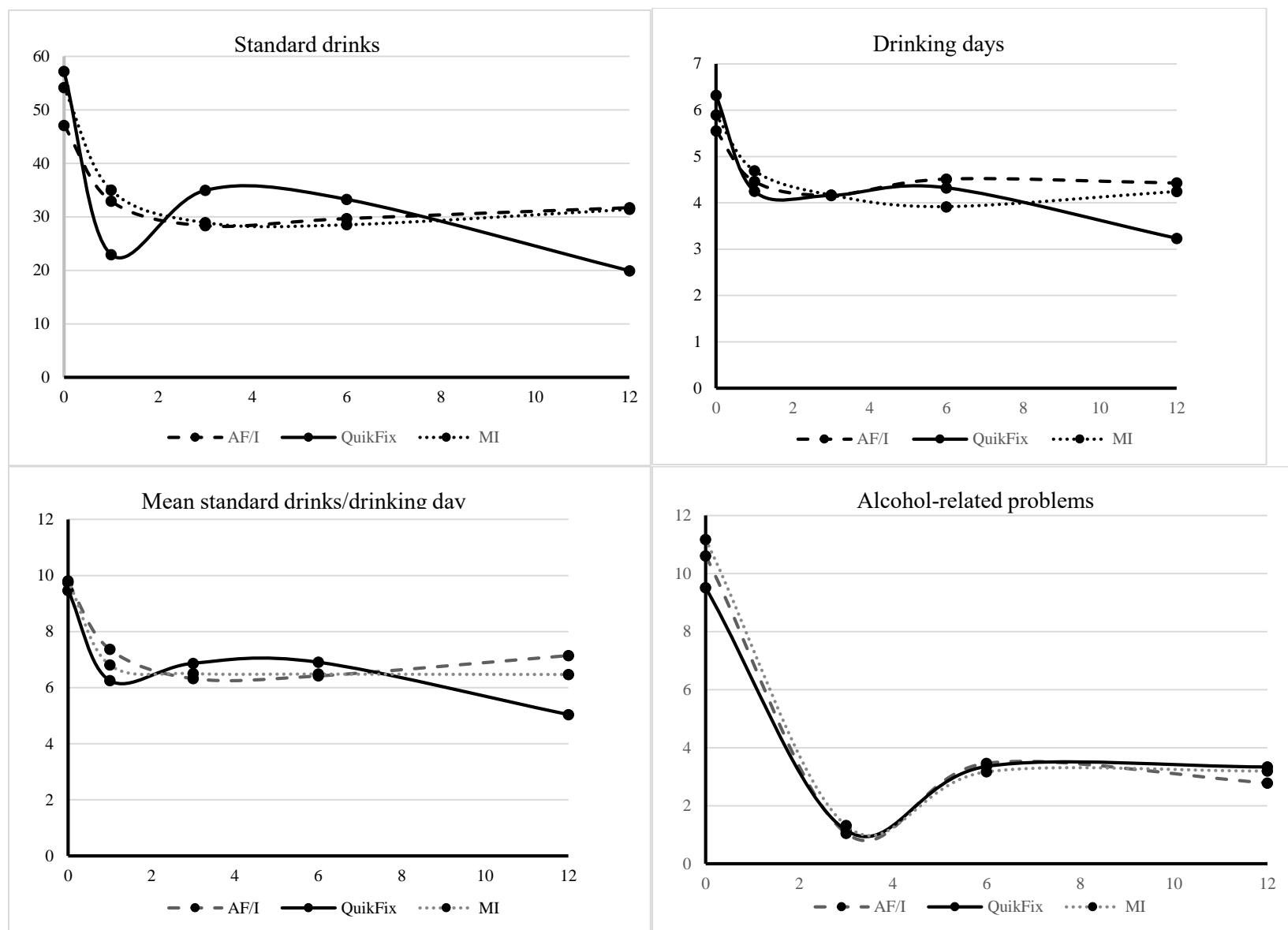


Figure 2. Mean number of standard drinks, drinking days, mean standard drinks/drinking day of alcohol use and alcohol-related problems, with smoothed lines

