NOVEL NEUROCOGNITIVE TRAINING APPROACHES IN ADDICTIONS

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Aim: In recognition of the need for novel, low-cost, scalable interventions to reduce harmful substance use, there has been a proliferation of research into neuroscience-informed interventions that directly target altered mechanisms or processes that underpin addictive behaviours. This includes the modification (dampening) of implicit biases and augmentation of inhibitory control. This symposium presents a series of Australian trials examining computerised and smart-phone delivered training interventions, including cognitive bias modification (CBM) for alcohol use disorders and inhibitory control-training for smoking. It includes world-first applications of neurocognitive training in new treatment settings (i.e., inpatient withdrawal), new populations (i.e., non-treatment seekers) and new delivery-methods (i.e., through personalised and gamified smartphone-apps).

PRESENTATION 1: COGNITIVE BIAS MODIFICATION DURING ALCOHOL WITHDRAWAL: RESULTS FROM A MULTI-SITE DOUBLE-BLIND RCT

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Introduction and Aims: More than half of patients undergoing inpatient withdrawal treatment for alcohol use disorders (AUD) relapse within 2-weeks of discharge, thus novel approaches that reduce early relapse are needed. In a previous pilot-RCT, we found that 4 sessions of cognitive bias modification (CBM) reduced relapse rate at 2-weeks by 22%. We therefore aimed to replicate these findings in a multi-site, fully-powered RCT examining short and long-term outcomes.

Design and Methods: Using a double-blind, sham-controlled, parallel-group design, the efficacy of 4 consecutive daily sessions of CBM (targeting approach bias) to increase abstinence rates at 2-weeks (primary outcome; already published*), 3, 6 and 12-months following discharge was examined, in 300 AUD patients from 4 withdrawal units. Abstinence (zero alcohol consumption during assessment period) was assessed using the Time-Line Follow-Back tool.

Results: With Intention-to-Treat analysis, the rate of abstinence was significantly higher in the CBM group relative to controls at 2-weeks (54.4% versus 42.5%; p=.039), and at 3-months (34.7% versus 21.6%, p=.001). However, no significant differences were found at 6-months (20.4% versus 19.6%; p=.86) or 12-months (19.7% versus 15.7%; p=.36).

Discussions and Conclusions: These findings add further weight to the growing body of research supporting the clinical efficacy of CBM in the treatment of AUDs. Being safe and easy-to-implement, requiring only a computer, joystick and no specialist staff training, CBM should be routinely offered during withdrawal treatment to prevent early relapse. Future

research should examine whether continuing to deliver CBM following discharge (e.g., via smartphones) could extend relapse-prevention effects beyond 3-months.

* Manning et al, JAMA Psychiatry. 2021;78(2):133-140. doi:10.1001/jamapsychiatry.2020.3446

PRESENTATION 2: THE EFFECT OF APPROACH BIAS MODIFICATION ON ALCOHOL CRAVING AND ITS RELATIONSHIP TO DRINKING OUTCOMES

Presenting Author:
JOSHUA B. B. GARFIELD

Introduction and Aims: Trials have shown that approach bias modification (ApBM) training reduces likelihood of relapse following alcohol withdrawal/rehabilitation treatment. However, few studies have examined ApBM's effect on alcohol craving, or whether these effects mediate ApBM's effect on relapse.

Design and Methods: In a randomised controlled trial, 300 alcohol withdrawal treatment ("detoxification") clients received 4 sessions of either ApBM or sham-training (control). Measures of alcohol cravings included: the Alcohol Craving Questionnaire (ACQ; administered at baseline, post-training, and 2-week follow-up); visual analogue scale (VAS) ratings of craving intensity (before and after each session); and cue-induced wanting ratings in response to alcohol images (baseline and post-training). Post-discharge alcohol use was assessed at 2-week follow-up.

Results: ApBM participants showed significantly more within-session reduction in VAS ratings (between pre-session and post-session ratings) than controls. All craving measures showed between-session reductions (between session 1 and session 4), although these effects did not differ significantly between groups. Nevertheless, ACQ "Expectancy" and "Emotionality" sub-scale scores were lower in the ApBM group than control group following training (Expectancy subscale post-training: p=.01; Emotionality subscale at 2-week follow-up: p=.04). Per-protocol analysis suggested that reduced Expectancy scores partially mediated ApBM's effect on alcohol abstinence.

Discussions and Conclusions: ApBM sessions acutely reduced alcohol craving intensity, but we did not find conclusive evidence of longer-term ApBM effects on craving. However, reduced expectancy of positive effects from alcohol may partially account for why ApBM helps people remain abstinent, consistent with recent theories that ApBM may work by reducing the perceived rewarding value of alcohol.

PRESENTATION 3: SWIPE: A PERSONALISED APPROACH BIAS MODIFICATION SMARTPHONE APP TO REDUCE ALCOHOL CONSUMPTION IN THE COMMUNITY

Presenting Author:
HUGH PIERCY

Introduction and Aims: Approach Bias Modification (ApBM) is a computerised intervention shown to reduce alcohol relapse rates when delivered in residential treatment. However, many individuals drinking at hazardous levels do not seek, or are not eligible for residential treatment. Smartphone-delivered ApBM could offer a simple, low-cost and remotely-accessible intervention available when support is most needed. We aimed to evaluate the

feasibility, acceptability and preliminary effectiveness of the first-ever smartphone-delivered, personalised and gamified ApBM app, called "SWiPE".

Design and Methods: An open-label pilot trial with 1309 Australian adults (aged 18-77 (mean=47.0); 57.9% female) drinking at hazardous levels (AUDIT score >8). Participants downloaded SWiPE and were instructed to complete 2 weekly sessions of ApBM for 4-weeks.

Results: Participants completed a median of 5 ApBM sessions with 98.1% of initiated training sessions completed. 409 (31.2%) completed at least 8 sessions and 455 (34.8%) completed the post-intervention survey. Ratings on the uMARS Functionality (M=4.4), Aesthetics (M=4.2) and Subjective Quality (M=3.4) subscales supported SWiPE's acceptability. We observed significant reductions in mean past-week drinking days (from 5.1 to 4.2, p<.001), standard drinks (32.8 to 24.7, p<.001), craving (p<.001) and dependence severity scores (p<.001) at post-test.

Discussions and Conclusions: Findings suggest that smartphone-delivered ApBM is feasible, acceptable, and potentially effective at reducing alcohol consumption and cravings among Australians drinking at hazardous levels who are not seeking formal treatment. The efficacy of SWiPE now needs to be determined in a RCT, since it has the potential to serve as a highly-scalable, widely-accessible support tool for those in need.

PRESENTATION 4: INHIBTORY CONTROL TRAINING FOR SMOKERS: FINDINGS AND METHODOLOGICAL CONSIDERATIONS FROM A RANDOMISED CONTROLLED TRIAL

Presenting Authors:
LAURA K. HUGHES & PETRA K. STAIGER

Introduction and Aims: Inhibitory control training (ICT) has been found to reduce unhealthy food consumption in overweight individuals and experimental studies report reductions in alcohol use. However, two studies have reported ICT does not reduce smoking. Less is known about whether ICT improves other smoking outcomes (e.g. craving) nor has there been an examination of potential mediators. We hypothesised that ICT would result in reduced nicotine dependence and cigarette craving compared to controls. Increases in inhibition and devaluation of smoking stimuli were examined as mediators.

Design and Methods: In a pre-registered, double-blind, randomised controlled trial, 107 adult smokers completed an online smoking-specific go/no-go ICT intervention or an active control task once per day for 14 days, and were followed up to 3 months later.

Results: There were no differences in outcomes between ICT and active control. Both groups showed reductions in craving (d_z= -.48 to -.31) and nicotine dependence indicators (d_z= -.91 to -.48) at all follow-ups, and less motivation to quit (d_z= -.67 to -.37) at 1-month and 3-month follow-ups. Changes in inhibition and stimulus devaluation did not act as mediators, but devaluation of smoking stimuli independently predicted reductions in smoking and craving at follow-ups.

Discussions and Conclusions: ICT did not confer any additional benefit in smoking-related outcomes compared to an active control. Methodological issues such as choice of stimuli and the impacts of nicotine satiation will be discussed as potential confounders hindering the potential effectiveness of ICT in smokers.

Implications for Practice or Policy: Findings at this stage suggest that ICT is not effective for smoking reduction and related outcomes. However there is a need to consider issues of nicotine satiation and choice of stimuli before firm conclusions can be reached.

Implications for Translational Research: At this stage ICT is not a recommended intervention for smoking cessation programs.

Discussion Section: The discussion will focus on the practical implications of these findings for both clinicians and consumers. ApBM is emerging as a promising neurocognitive intervention across the spectrum of alcohol use disorder severity, including as a potential tool for reducing craving and consumption and preventing relapse. Future research directions and priorities will be examined, including the potential application of ICT and ApBM for other addictive behaviours and identification of specific sub-groups for whom it is most-effective.

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Presentation 1: *VM has received funding from National Health and Medical Research Council (NHMRC), VicHealth, and the National Centre for Clinical Research on Emerging Drugs. No pharmaceutical grants were received in the development of this study. This work was supported by the National Health and Medical Research Council (NHMRC) (GNT1124604), which included salary support for VM and JBBG. JR has reported receiving grants from AbbVie unrelated to the present work. He has also been a former employee of Novartis AG (2009-2012), and holds shares in Novartis AG and ALCON. DIL has provided consultancy advice to Lundbeck and Indivior, and has received travel support and speaker honoraria from Astra Zeneca, Camurus, Indivior, Janssen, Lundbeck, Shire and Servier. These organisations do not stand to benefit from this project. DIL has been an investigator on an untied education grant from Sequirus, unrelated to the current work.*

Presentation 2: *JR has reported receiving grants from AbbVie unrelated to the present work. He has also been a former employee of Novartis AG (2009-2012), and holds shares in Novartis AG and ALCON. No pharmaceutical grants were received for this study. DIL has provided consultancy advice to Lundbeck and Indivior, and has received travel support and speaker honoraria from Astra Zeneca, Camurus, Indivior, Janssen, Lundbeck, Shire and Servier. These organisations do not stand to benefit from this project. DIL has been an investigator on an untied education grant from Sequirus, unrelated to the current work. VM has received funding from National Health and Medical Research Council (NHMRC), VicHealth, and the National Centre for Clinical Research on Emerging Drugs. No other authors have interests to declare. This work was supported by a National Health and Medical Research Council (NHMRC) Project Grant (grant number 1124604), which included salary support for JBBG and VM.*

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