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DRUG & ALCOHOL FINDINGS *Research analysis*

This entry is our analysis of a study considered particularly relevant to improving outcomes from drug or alcohol interventions in the UK. The original study was not published by Findings; click Title to order a copy. Free reprints may be available from the authors – click prepared e-mail. The summary conveys the findings and views expressed in the study. Below is a commentary from Drug and Alcohol Findings.

Links to other documents. Hover over for notes. Click to highlight passage referred to. Unfold extra text 👁

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▶ **Remote alcohol monitoring to facilitate incentive-based treatment for alcohol use disorder: a randomized trial.**
Koffarnus M.N., Bickel W.K., Kablinger A.S.
Alcoholism: Clinical and Experimental Research: 2018, 42(12), p. 2423–2431.
Unable to obtain a copy by clicking title? Try asking the author for a reprint by adapting this prepared e-mail or by writing to Dr Koffarnus at mickyk@vtc.vt.edu.

Can new digital technologies do anything to boost the 'limited, yet promising' evidence base for incentivising abstinence among people with alcohol use disorders?

SUMMARY In the United States, only around 20% of people meeting criteria for having an alcohol use disorder ever receive treatment (1 2). Many of the top 10 reasons commonly cited for not seeking treatment come under the umbrella of an inability or unwillingness to attend traditional in-person treatment, for example: "I should be strong enough to handle it alone"; "I'm too embarrassed"; "I can't afford it"; "I don't want to go to treatment"; "I hate answering questions"; "I don't think anyone can help"; "I don't know any place to go".

Contingency management is an approach to substance use treatment that involves repeatedly testing a client to see if they have used the target substance recently, and giving them a reward or incentive each time the test shows that they have been abstinent. Studies have shown that while it is an effective approach for reducing drinking and drug use, considerable logistical barriers prevent contingency management from being disseminated widely.

The featured US study developed and tested the efficacy, acceptability, and feasibility of a *remotely-delivered* contingency management intervention to encourage abstinence, which in theory carried the potential for broad dissemination due to the low burden on people involved, including professionals supporting delivery of the intervention.

> **Key points**
> **From summary and commentary**
>
> A US study tested the efficacy, acceptability, and feasibility of remotely-delivered contingency management.
>
> The chance that someone in contingency management would abstain from drinking was nine times that of people not in contingency management.
>
> Due to the low burden on researchers and participants, contingency management supported by new digital technologies seems to have potential for broad dissemination.

New digital technologies
The most reliable, non-invasive, and readily accessible measures of recent drinking come from breathalyser tests, typically repeated at multiple times during the day, and yielding a binary answer to the question of whether someone has recently drunk alcohol:
• a 'positive' screen indicates alcohol consumption;
• a 'negative' screen indicates abstinence.

Supervision has traditionally been considered necessary to confirm the identity of the person taking the test, though outside of an inpatient setting this can be difficult for staff to oversee. For example, while a previous contingency management intervention was associated with a significant decrease in drinking, breathalyser assessments had to be obtained by study personnel travelling to participants multiple times per day, accruing substantial financial and labour costs, and resulting in only 60% of breathalyser assessments being successfully collected.

Incorporating new technologies into contingency management interventions may help to reduce the burden on staff and increase the chances that they can be routinely implemented. For example, the Soberlink breathalyser used in the featured study enabled remote verification of the identity of the user, and remote monitoring of abstinence. It automatically took a picture of the user during the test, used facial recognition to verify that the uploaded picture matched a reference picture for that person, and uploaded the breathalyser results and the picture of the user to a centralised secure website available to research staff. The process was not completely automated. Research staff monitored the results and informed the participant via text message

of the consequences of the breathalyser screen. Text message feedback was sent as soon as possible after submissions were received (typically within a two-hour window).

Incentivising abstinence

In total, 69 participants were recruited from the community between 2014 and 2017. All expressed a desire to cut down or quit drinking, were at least 18 years old, met DSM-5 criteria for alcohol use disorder (unfold 👁 supplementary text), did not meet criteria for another substance use disorder, and scored below 23 on the alcohol withdrawal symptom checklist (when above this threshold would have indicated severe withdrawal symptoms, and the potential need for medical intervention).

Soberlink breathalyser designed for remote verification of the identity of the user, and remote monitoring of abstinence

👁 Close supplementary text

In the past year, have you:

1. Had times when you ended up drinking more, or longer, than you intended?
2. More than once wanted to cut down or stop drinking, or tried to, but couldn't?
3. Spent a lot of time drinking? Or being sick or getting over other aftereffects?
4. Wanted a drink so badly you couldn't think of anything else?
5. Found that drinking – or being sick from drinking – often interfered with taking care of your home or family? Or caused job troubles? Or school problems?
6. Continued to drink even though it was causing trouble with your family or friends?
7. Given up or cut back on activities that were important or interesting to you, or gave you pleasure, in order to drink?
8. More than once gotten into situations while or after drinking that increased your chances of getting hurt (such as driving, swimming, using machinery, walking in a dangerous area, or having unsafe sex)?
9. Continued to drink even though it was making you feel depressed or anxious or adding to another health problem? Or after having had a memory blackout?
10. Had to drink much more than you once did to get the effect you want? Or found that your usual number of drinks had much less effect than before?
11. Found that when the effects of alcohol were wearing off, you had withdrawal symptoms, such as trouble sleeping, shakiness, restlessness, nausea, sweating, a racing heart, or a seizure? Or sensed things that were not there?

👁 Close supplementary text

After a six-day monitoring period, during which time participants were asked to give daily reports on their previous day's drinking and symptoms of withdrawal, 40 participants who reported at least two heavy-drinking episodes (four or more drinks in one day for women; five or more drinks in one day for men) and adhered to the reporting schedule on five of the six days were invited to continue in the study.

These participants were then randomly allocated to one of two groups: (1) contingency management; or (2) non-contingency management. In the contingency management group, payments were based on a system of escalating amounts and bonuses for consecutive negative screens for alcohol. If participants screened positive for drinking alcohol, payments were recalibrated to a lower level (1 2 3 4). The non-contingency management group also received incentive payments, but the payments were not contingent on their breathalyser results. Instead, participants were matched to someone in the contingency group and received a payment equal to the payment that participant would have received on that study day if s/he screened negative for alcohol. This way, both groups experienced the same payment schedule with the same likelihood of payment increases, bonuses, and payment resets (unfold 👁 supplementary text to read details of payments). Both groups also experienced the same 'treatment events'; for 21 consecutive days they were asked to take three breathalyser tests each day, and during this period reported daily on their previous day's drinking and current withdrawal symptoms in response to a text message and/or phone call.

👁 Close supplementary text

Contingency management group: Participants earned payments based on the results of their breathalyser tests. Any missed submission or breath alcohol concentration reading of 0.02% or above

was considered a positive result for drinking. If, after a positive sample, the participant recorded three consecutive days of negative samples, their contingency payment reverted back to the value it was before being reset. For participants recording negative samples, payments increased incrementally as participants continued to submit three negative samples per day from $5 to a maximum daily payment of $25 if no drinking was recorded for 21 days. In addition, participants received a $5 bonus for every third consecutive day of negative samples. A participant who never recorded a positive sample and never missed a screen earned $350 in abstinence incentive payments over three weeks. If a positive sample was recorded, the participant received no breath-sample payments that day other than the $1 adherence incentive for each submitted sample and their escalating pay schedule was reset to the base rate of $5.

Non-contingency management group: Like the other group, participants in this group were required to submit three breathalyser samples per day and received a $1 adherence incentive for each submitted sample.

 Close supplementary text

Participants completed three assessment sessions with researchers – one just before the monitoring-only phase, one immediately after the treatment phase, and another one month after the end of the treatment phase. These included:
• The timeline followback assessment: used to assess daily drinking quantity for the 30 days preceding each assessment session.
• The Alcohol Use Disorders Identification Test (AUDIT): used to assess alcohol use disorder risk factors.
• The treatment services review: use of treatment resources including professional counselling and attendance at groups such as Alcoholics Anonymous.
• The Addiction Severity Index-Lite (ASI-Lite): medical, legal, employment, psychiatric, and social factors related to substance use.

The primary outcome of the study was drinking during the intervention period, and was determined by results from the breathalyser tests: positive (at least one screen testing positive for alcohol during the day); negative (all three screens submitted on time and negative for alcohol consumption); missing (at least one missing screen with any submitted screens recorded as negative). The secondary outcome was self-reported drinking during the previous day.

Based on the sample size of 40 participants, the power of the study (ie, the probability that it could detect a treatment effect if the effect was really there) was calculated at 80%; in other words, a statistically significant difference would be identified eight times out of ten.

Facial recognition verified participants 68% of the time; submissions that included poor lighting or eyeglasses were less likely to be automatically approved. Where facial recognition was unsuccessful, identity was verified manually by research staff.

Main findings

Adherence to the scheduled breathalyser assessments was high in both groups; the overall collection rate was 96%. While there was a significant tendency for collection rate to decrease as the study progressed, there was no significant difference between groups.

Abstinence was significantly more likely in the contingency group than the non-contingency group (85% vs. 38%). This difference corresponded to an odds ratio of 9.4, meaning that the chances that someone in contingency management would abstain from drinking was nine times that of people *not* in contingency management.

Average drinks per day were similar between the groups prior to the study, but diverged during the study and throughout the one-month follow-up period. This pattern resulted in an overall effect of contingency management on average drinks per day.

Differences in AUDIT scores emerged as the study progressed. This pattern resulted in an overall main effect of contingency management that approached the level of significance. Differences between the groups were not significant prior to or at the end of the 21-day intervention period, but reached the level of significance at the one-month follow-up.

The contingency group rated the intervention marginally higher overall, and significantly higher for payment helpfulness. Participants in the contingency group were significantly more likely to recommend the intervention to someone else, and the intervention was rated no more and no less difficult to participate in than the non-contingency intervention.

Daily reports of previous-day withdrawal symptoms indicated minimal withdrawal symptoms throughout the study in both groups. Self-reported withdrawal symptoms appeared to lessen over the course of the study, independent of what group participants were in or what phase of the study they were in.

Additional statistical analyses proposed after the data had been collected revealed fewer drinks per day in the contingency group both during the study and post-treatment.

The authors' conclusions

The findings of the featured study support the efficacy, acceptability, and feasibility of this remotely-delivered contingency management intervention for incentivising abstinence in adults with alcohol use disorder. Due to the low burden on staff and participants, this procedure has the potential for broad dissemination.

FINDINGS **COMMENTARY** This US study tested the efficacy, acceptability, and feasibility of *remotely-delivered* contingency management – that is, the use of new digital technologies to repeatedly test a client for substance use, and reward them each time the test shows that they have been abstinent.

The intervention performed favourably on all three fronts, and due to the low burden of the approach, the authors argued that the intervention had the potential for broad dissemination. However, as the intervention and assessments were facilitated by researchers, the trial would need repeating in a real-life context with treatment providers or practitioners in order to accurately understand whether it could be *easily* rolled out – the main strike against contingency management using 'older' breathalyser technologies – and would maintain its reported effectiveness.

According to the authors, "minimal exclusion criteria" were imposed to "increase the representativeness of a community population interested in reducing their alcohol use and therefore increase the generalizability of these results". This led to a modest 69 people being recruited, all of whom expressed a desire to cut down or quit drinking, were at least 18 years old, met DSM-5 criteria for alcohol use disorder, did not meet criteria for another substance use disorder, and did not have severe withdrawal symptoms. However, from this pool, another 11 participants were excluded after the study had begun – after the monitoring phase and before random allocation to one of the intervention groups – for the reason that these participants did not report enough instances of heavy drinking. This criterion was not specified when the trial was registered, pointing to a potential source of bias or at least the perception of bias, for example that additional exclusion criteria were introduced in order to boost the study's capacity to detect an effect of the intervention.

The study was an 'open-label trial', meaning both researchers and participants knew which intervention (or non-intervention) was being administered. This, in theory, also exposed the study to potential bias. In this case, the authors said it would not have been possible to 'blind' researchers and participants to the type of intervention "because knowledge of abstinence reinforcement contingencies and incentive schedule was an integral part of the intervention". It was unclear whether the authors took steps to mitigate against any bias – for example, whether they considered adding a layer of blinding to the study by requiring one set of researchers to facilitate the contingency management and monitor the data as it was collected, and another, independent set of researchers to perform the data analysis.

There is a limited (yet promising) evidence base for contingency management in the treatment of alcohol-related problems. For illicit drug use, on the other hand, the evidence base is "considerable and compelling". Contingency management was one of only two psychosocial therapies (the other being behavioural couples therapy) recommended by the UK's National Institute for Health and Care Excellence (NICE) for the treatment of problems related to illicit drug use. Typically the promising results which persuaded the NICE committee were seen during the time rewards and sanctions were in place, often just 12 weeks; many trials do not go beyond that time to see if benefits persist. These often transient benefits must be set alongside ethical concerns, including the possible aggravation of health inequality if only already advantaged patients qualify for prizes and benefit from any therapeutic effects, professional and public resistance to rewarding what most people do simply for their own welfare and to avoid crime, the common finding that in-treatment gains do not persist, and some evidence that intrinsic motivation may be undermined if patients see themselves as 'just doing it for the prizes'. These themes are explored in a dedicated Effectiveness Bank hot topic.

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