Does training on inhibitory tasks influence alcohol consumption and attitudes?

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Introduction

Response inhibition – the suppression of a prepotent or ongoing action – is an executive function central to the regulation of behaviour. Response inhibition can be assessed in the laboratory using the Go/No-go or Stop-Signal tasks which both assess the capacity to withhold an inappropriate response. In the Go/No-go task, participants are required to respond rapidly to Go stimuli but to withhold that response upon No-go stimuli. In the Stop-Signal task, participants are required to respond to Go stimuli but to withhold the response when an auditory stop signal occurs subsequent to the Go stimulus.

Research suggests that poor inhibitory control may be both a contributing cause as well as a consequence of substance abuse (Dick et al., 2010). Whilst deficits in response inhibition may contribute to substance misuse, it follows that treatments designed to improve inhibitory control may help to prevent or treat substance abuse disorders.

Recently, two groups have provided evidence that modified versions of the Stop-signal and Go/No-go tasks, designed to modulate inhibitory control, can affect subsequent alcohol consumption. Jones et al. (2011a,b) instructed participants to undertake a stop-signal task emphasising either rapid responses (promoting disinhibition) or accurate inhibition (promoting restraint). They reported that participants told to focus on accurate inhibition during the task drank less beer in a bogus taste-test following the task, compared to participants who were told to respond rapidly, or a control group who were told to balance speed and accuracy during the task.

In a separate study, Houben et al. (2011) administered a Go/No-go task in which images of beer were consistently paired with either the Go or No-go stimuli. Participants in the Beer+No-go group reduced their alcohol intake during the week following the task, whereas participants in the Beer+Go group increased their alcohol intake over the same period. These changes in alcohol consumption were accompanied by corresponding changes in implicit attitudes to alcohol.

Aim

In this study we aimed to replicate the manipulation of response inhibition and associated effects on alcohol consumption as described by Jones et al. (2011a, b) with the exception of using the Go/No-go task instead of the Stop-signal task.

We aimed to extend the study by assessing alcohol consumption and implicit attitudes to alcohol both immediately and one week after the intervention, as described by Houben et al. (2011).

We hypothesise that participants receiving instructions designed to promote inhibitory control will drink less alcohol than control participants at both timepoints. The opposite effects are expected for the Disinhibited group. In contrast to the study by Houben et al. (2011) this manipulation of inhibitory control is not expected to affect attitudes to alcohol.

Method

Participants were recruited through the first year psychology course at UNSW or in response to flyers distributed around the UNSW campus. Participants were randomly assigned to one of three experimental groups given specific instructions for a Go/No-go task:

i) Restrained group: accurate inhibition of response upon No-Go cues was emphasised as the most important aspect of the task
ii) Disinhibited group: rapid response to Go cues was emphasised as the most important aspect of the task,
iii) Control group: these participants were instructed to simply count the number of stimuli presented.

The effect of these manipulations upon alcohol consumption was assessed acutely in a bogus taste-test of beer and soft-drink performed directly after the Go/No-go task. Longer-term effects were assessed by comparing alcohol consumption in the week before and the week following the task.

To determine if any effects on alcohol consumption were accompanied by alterations in attitudes to alcohol, participants completed an implicit association task before, directly after and one-week following the Go/No-go task.

Results

Groups were well matched for gender, age, alcohol use and trait impulsivity (Table 1).

Table 1: Baseline Characteristics

	Control	Restrained	Disinhibited
Gender Ratio (M:F)	15:4	16:4	15:4
Age (years)	21.0 ± 0.8	22.3 ± 0.9	21.1 ± 0.9
AUDIT total	9.9 ± 0.9	11.6 ± 1.0	11.2 ± 1.0
BIS total	66.6 ± 2.0	64.9 ± 2.7	62.1 ± 2.1

AUDIT, Alcohol Use & Disorders Identification Test; BIS, Barrett's Impulsivity Scale

Compared to the Disinhibited group, participants in the Restrained group exhibited slower responses to Go trials in the Go/No-go task, and achieved a lower proportion of correct Go responses within the deadline (Table 2). This indicates adherence to the group-specific instructions, designed to prime restraint or disinhibition.

Table 2: Performance on Go/No-go task

	Restrained	Disinhibited	p value
Made response to Go trial (%)	99.5 ± 0.2	99.6 ± 0.1	0.463
Go trial within deadline (%)	81.7 ± 2.7	92.9 ± 0.9	**0.001**
Correct Go trial RT (ms)	401.6 ± 9.4	380.5 ± 3.4	**<0.001**
Commission Error RT (ms)	389.8 ± 8.4	370.3 ± 9.1	0.123
No-go trial accuracy (%)	83.9 ± 2.4	81.0 ± 2.1	0.391

Contrary to our hypotheses, there was no difference in the mean volume of beer consumed by the experimental groups during the taste-test (Table 3). All groups reported similar levels of thirst and taste ratings of beer and soft-drink (data not shown).

Table 3: Consumption during taste-test

	Control	Restrained	Disinhibited
Beer (ml)	146.2 ± 22.6	207.1 ± 21.9	181.6 ± 24.7
Soft-drink (ml)	129.9 ± 22.3	135.6 ± 17.5	127.0 ± 10.9
Beer (% total consumption)	53.4 ± 4.6	60.1 ± 3.8	55.1 ± 4.5

There was also no significant difference in alcohol consumption during the week before compared to the week after the Go/No-go task (Figure 1).

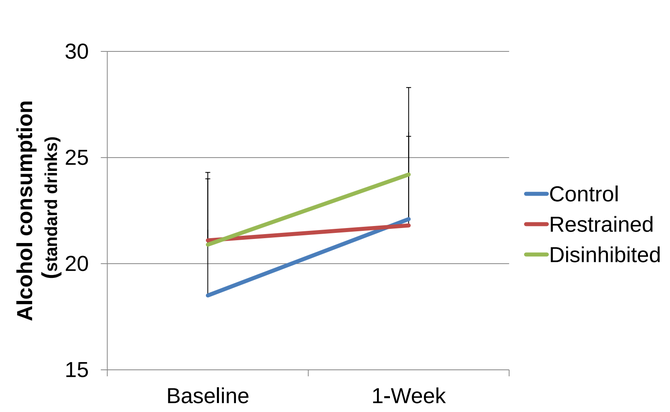

Figure 1. Weekly alcohol intake before and after the Go/No-go task

The implicit association task carried out before and at two timepoints after the Go/No-go task demonstrated no influence of experimental group, but did indicate a non-specific effect of the intervention to increase positive associations with alcohol immediately after the task.

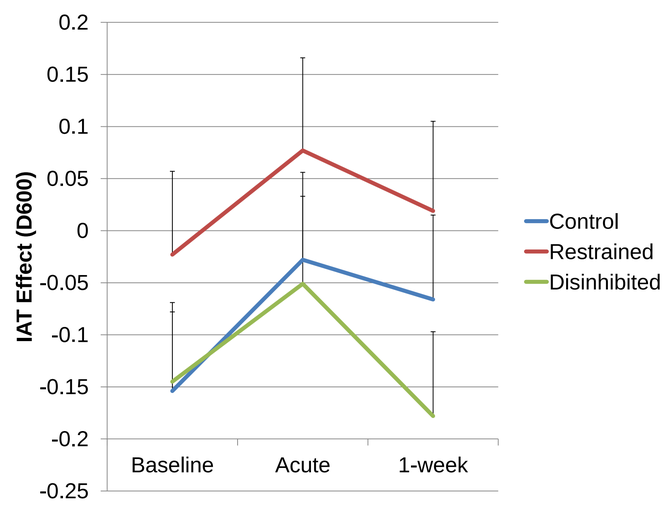

Figure 2. Implicit attitudes to alcohol before and after the Go/No-go task. More positive values reflect more positive association to alcohol

Conclusion

In this study we found that training on versions of the Go/No-go task designed to modulate levels of inhibitory control had no effect on alcohol consumption in either the immediate short-term or during the week following the task.

The difference in our results compared to those of Jones et al. (2011) may indicate that the Go/No-go task is less effective than the Stop-Signal task in terms of training response inhibition.

These results may also indicate that the reduction in alcohol consumption demonstrated by Houben et al. (2011) is more likely to be a consequence of alterations in attitudes to alcohol than to improvements in inhibitory control.

References

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