DRINKING WITH THE DEVIL YOU DON’T KNOW AND THE ONE YOU CAN’T CONTROL: ALCOHOL’S EFFECTS DURING UNPREDICTABLE AND UNCONTROLLABLE STRESSORS IN THE LABORATORY

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BACKGROUND
To better treat problematic drinking, we must develop a clearer understanding of how and under which circumstances alcohol affects emotions and cognitions.

Recent research on alcohol’s effects suggests that alcohol reduces subjective anxiety, innate defensive responding, and emotionally motivated attention more during unpredictable versus predictable stressors. Stressor predictability may be an important moderator of alcohol’s stress-reducing effects yet other related but distinct aspects of stressors remain untested with current experimental methods.

We manipulated stressor predictability and controllability in a 2 x 2 design to experimentally assess alcohol’s interactions with both stressor types in the same study.

ALCOHOL MANIPULATION
Participants were randomly assigned to one of three groups: Alcohol (N = 64), Placebo (N = 32), True No-Alcohol (N = 32). Participants were naive to the nature of the study.

Alcohol and Placebo groups were told they would receive a dose of alcohol designed to produce a peak blood alcohol concentration (BAC) of .08 percent. Actual achieved BAC was .074 before the start of the main task and .073 afterward.

For the Placebo manipulation, water was poured into placebo drinks from a vodka bottle in front of the participant. Out of participant view, 2 milliliters of 200 proof vodka was floated on the drink. A 200 proof alcoholic malt was also applied.

We observed no placebo effects in initial analysis so we combined True No-Alcohol and Placebo in final analysis to create equal No-Alcohol (N = 64) and Alcohol (N = 64) groups.

STRESSOR PREDICTABILITY AND CONTROLLABILITY TASK
Threat-of-shock cues (squares) were serially presented in blocks. There were 4 shock block types and a no shock block type.

Participants were told to pull a trigger on a joystick when each cue appeared on the screen. At end of shock cues, participants received electric shocks to their fingers (intensity set based on participant’s shock tolerance).

Uncontrollable blocks: participants told the level of shock.

Unpredictable shock blocks: participants only told a possible range of shock levels.

Controllable blocks: participants told the trigger pull lowered the shock by two levels. In reality all shock levels were predetermined and matched across all shock blocks.

CONTROLLABILITY TASK
For the Placebo manipulation, water was poured into placebo drinks from a vodka bottle in front of the participant. Out of participant view, 2 milliliters of 200 proof vodka was floated on the drink. A 200 proof alcoholic malt was also applied.

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SUMMARY AND FUTURE DIRECTIONS
Cues for all stressors elicited robust negative affective response and increased emotionally motivated attention among sober participants. However, unpredictable stressors increased defensive reactivity and subjective anxiety more potently than predictable stressors. These observations join recent experimental and other evidence indicating unpredictable stressors are more affectively aversive and/or anxiogenic than predictable stressors.

In a novel finding, uncontrollable stressors elicited greater subjective anxiety than controllable stressors. However, this difference was not significant for defensive reactivity and emotionally motivated attention.

Cues for all stressors recruited comparable attention resources. Thus, all stressors appear to increase attentional processing that may be critical to support adequate appraisal and subsequent adaptive behavioral response, at least among sober individuals.

Consistent with recent research, alcohol caused a significantly greater reduction of self reported anxiety, defensive reactivity, and attention during unpredictable compared to predictable stressors. This implicates CRF and NE sensitive pathways in the central extended amygdala that selectively mediate startle potentiation during unpredictable stressors.

Across measures, alcohol had similar effects during uncontrollable and controllable threat. This may add additional clarification/specificity to the neuromechanisms involved with alcohol’s effects and begins to rule out serotonergic and vmPFC relevant mechanisms responsible for response to uncontrollable stressors.

Recently emerging theory and empirical evidence implicates the role of strong negative affective reinforcement in the form of rebound response to unpredictable stressors among alcoholics with a history of chronic, heavy alcohol use.

These findings could inform pharmacological and psychological interventions for alcohol use disorders with emphasis on behavioral therapies or novel drugs that target the behavioral and/or brain mechanisms responsible for alcohol’s effects on response to unpredictable stressors.

RESULTS
We measured participants’ subjective emotional response, defensive reactivity, and emotionally motivated attention using self-reported anxiety, startle potentiation, and probe P3 suppression.

Participants retrospectively reported anxiety levels 1 week after the study (1 = Not Anxious/Fearful, 5 = Very Anxious/Fearful).

We measured the ERP P3 wave to the acoustic startle probes using standardized procedures.

We measured the EMG eye-blink potential (Probe P3 Suppression) to the acoustic startle probes.

Self-reported anxiety is calculated as increased anxiety during shock cues — no-shock cues.

Startle potentiation is calculated as increased startle during shock cues — no-shock cues.

Probe P3 Suppression is calculated as increased P3 during shock cues — no-shock cues.

The effects of alcohol are similar across uncontrollable and controllable stressors.

REFERENCES


