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Impulsivity, Executive Cognition and Reward Sensitivity in Relation to Excessive or Problematic Alcohol Consumption

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Background: Deficits of frontal lobe functioning and associated cognitive impairments are well known correlates of chronic alcoholism and are commonly interpreted as reflecting cumulative effects of high alcohol exposure (Lyvers, 2000). Alternatively, such associations may reflect traits predating alcohol exposure which predispose to risky drinking. For example, university students have a higher prevalence of alcohol use as well as risky drinking than do non-students of the same age, yet not all students drink at risky levels, suggesting that excessive alcohol use by young adults may be influenced by underlying trait factors in addition to social factors. Recent studies using self-report indices have identified frontal lobe related traits such as impulsiveness, reward sensitivity, disinhibition, and executive dysfunction as factors associated with risky drinking in young adults (Lyvers et al., 2009, 2011). The proposed project will extend this work by administering neuropsychological tests of frontal lobe function to young adults aged 18-26 years to assess whether deficiencies in frontal lobe function are related to risky alcohol use by young adults.

Pilot data. Young adults of both genders aged 18-26 years were recruited from university (n = 124) and from the community (n = 47). They were tested on a university computer and paid \$30 for participation. Alcohol breath test confirmed that no participant was intoxicated at time of testing. **Results:** Trait indices of impulsivity, reward sensitivity, disinhibition and executive dysfunction were significantly related to risky drinking in the university sample as in previous work, however performance on neuropsychological tests of frontal lobe functioning were unrelated to alcohol use in this sample. Because university students are selected for good problem-solving skills and thus might be expected to perform well on such tests irrespective of typical alcohol use, the smaller community sample was assessed separately. They were divided into Low Risk, Hazardous, and Harmful drinkers based on their Alcohol Use Disorders Identification Test (AUDIT; Saunders et al, 1993) scores. MANCOVA controlling for age and gender revealed a significant effect of AUDIT group on the Wisconsin Card Sorting Test (WCST), the Iowa Gambling Task (IGT) and the Tower Test, $F(8, 32) = 2.72, p = .02$, observed power = .86. Individual effects were significant for IGT, $F(2, 18) = 4.21, p = .03$, and the Tower Test, $F(2, 18) = 5.15, p = .02$. WCST perseverative errors (PE) approached significance ($p < .10$) (see below).

	Low Risk	Hazardous	Harmful
WCST-PE	4.03 (7.25)	8.89 (11.86)	8.34 (6.89)
IGT total	2246 (1054)	3355 (1129)	1907 (482)
Tower Ach	21.88 (3.27)	20.50 (2.92)	18.86 (2.19)

Discussion: These neuropsychological tests can distinguish patients with focal lesions of the frontal lobes from those with lesions of posterior regions as well as controls, thus our preliminary results in a non-clinical sample are striking. As participants were young adult social drinkers who reported never being treated for any alcohol or drug related problem, with no history of head injury or neuropsychological or psychological disorder, findings are consistent with our hypothesis that some of the executive function deficits reported in alcoholic samples may reflect premorbid traits rather than sequelae of chronic alcoholism. However, a sufficiently large and representative sample must be tested before such conclusions are justified. The current project aims to test 200 young adults recruited from both university and community settings. We anticipate that the final results will confirm and extend our intriguing pilot findings.

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