

Submitter Name: Helen Kamens
Submitted email: hmk123@psu.edu

Adolescent social stress influences later ethanol and nicotine behaviors and microRNA expression

Helen M. Kamens¹, Michael J. Caruso¹, and Sonia A. Cavigelli¹

¹Department of Biobehavioral Health, The Pennsylvania State University

Background: Epidemiological research has demonstrated an association between adolescent stress and increased alcohol and nicotine use, but the neurobiological mediators of this relationship are unknown.

Rationale: The goal of the current project was to develop an animal model to examine the effect of adolescent social stress on drug use and prefrontal cortex gene expression.

Hypothesis: We hypothesized that exposure to adolescent social stress would increase ethanol and nicotine consumption and that these effects might be mediated by changes in miRNA expression.

Results. Our results highlight gene by environment interactions. BALB/cJ mice exposed to adolescent stress were more sensitive to acute nicotine in late adolescence but consumed less nicotine in adulthood. In contrast, C57BL/6J mice had no long-lasting changes in these nicotine behaviors following adolescent social stress. Strain differences were also observed for binge-like ethanol consumption. BALB/cJ mice exposed to social stress during adolescence had decreased ethanol consumption in adulthood similar to the finding with nicotine consumption. In contrast, C57BL/6J mice exposed to social stress displayed increased ethanol consumption. Small RNA sequencing uncovered differentially regulated miRNA in the prefrontal cortex depending on stress condition which may provide a mechanism through which adolescent stress alters later drug behaviors.

Conclusion: These results suggest that adolescent social stress has long-term consequences on both ethanol and nicotine behaviors, but genetic background is critical. Further, stress-related changes in miRNA gene expression provide a mechanism underlying altered drug behaviors.