Depressive symptoms and alcohol use are genetically and environmentally correlated across adolescence

Alexis C. Edwards  
*Virginia Commonwealth University*

Jaakko Kapiro  
*University of Heisinki*

Richard J. Rose  
*Indiana University - Bloomington*

Danielle M. Dick  
*Virginia Commonwealth University*

Follow this and additional works at: [https://digitalcommons.wustl.edu/guzeposter2010](https://digitalcommons.wustl.edu/guzeposter2010)

Part of the *Medicine and Health Sciences Commons*

**Recommended Citation**  
Edwards, Alexis C.; Kapiro, Jaakko; Rose, Richard J.; and Dick, Danielle M., "Depressive symptoms and alcohol use are genetically and environmentally correlated across adolescence" (2010). *Posters*. Paper 20  
Samuel B. Guze Symposium on Alcoholism.  
https://digitalcommons.wustl.edu/guzeposter2010/20

This Poster is brought to you for free and open access by the 2010: Disentangling the Genetics of Alcoholism: Understanding Pathophysiology and Improving Treatment at Digital Commons@Becker. It has been accepted for inclusion in Posters by an authorized administrator of Digital Commons@Becker. For more information, please contact vanam@wustl.edu.
Depressive symptoms and alcohol use are genetically and environmentally correlated across adolescence

Alexis C. Edwards, Ph.D.¹, Jaakko Kaprio, M.D., Ph.D.¹, Richard J. Rose, Ph.D.¹, Danielle M. Dick, Ph.D.²

¹Virginia Institute for Psychiatric & Behavioral Genetics, Virginia Commonwealth University, Richmond VA, US; ²Department of Public Health, University of Helsinki, Helsinki, Finland; ³Department of Psychological and Brain Sciences, Indiana University, Bloomington IN, US

BACKGROUND

- Symptoms of internalizing disorders, such as depressive disorder, commonly manifest during adolescence, with lifetime incidence of adolescent depression around 14%. In addition, most individuals begin experimenting with alcohol during their teens.
- Multiple epidemiological studies indicate that depressive symptom disorders and alcohol use are positively associated in both adolescent and adult populations. However, the nature of this association is not clear.
- Twin studies suggest that the phenotypic association between these phenotypes could be accounted for in part by a shared genetic and/or environmental liability.
- The current study uses a genetically informative longitudinal sample of Finnish twins to assess the heritability of depressive symptoms and alcohol use across adolescence, and to assess the degree to which shared genetic and environmental factors account for the positive association between these phenotypes.

METHODS

Sample
We used same-sex twin pairs from the intensive sample of the FinnTwin1 study (N=1182). Data were available for 169 female monzygotic (MZ) twin pairs, 170 male MZ twin pairs, 158 female dizygotic (DZ) twin pairs, and 165 male DZ twin pairs. Twins were assessed at ages 12, 14, and 17.5.

Phenotypic Measures
Depressive symptoms were assessed at ages 12 and 14 using the Children’s Depression Inventory (CDI, Kovacs 1991), and at age 17.5 using a subscale of the General Behavior Index (GBI, Depue 1987).

Twin Modeling
At age 12, participants were asked whether they had ever used alcohol. Options ranged from never to daily. At age 14, they were asked the frequency with which they consumed alcohol, with options ranging from never to once per week or more. At age 17.5, participants were again asked the frequency with which they consumed alcohol, with options ranging from never to daily.

Statistical Analysis
Descriptive statistics and regression analyses were conducted in Mplus Version 5 (Muthen & Muthen 1998-2007) or SAS 9.1.3, and were corrected for sex differences, family, and age of twin. Twin modeling was conducted in Mx (Neale et al. 2003) using the raw ordinal data option. Accordingly, scores on the CDI and GBI, as well as alcohol use at ages 14 and 17.5, were converted to ordinal variables.

We used a Cholesky decomposition with six variables: depressive symptoms and alcohol use at ages 12.14, and 17.5. Model selection was conducted based on the change in -2 log likelihood between the full and nested model, and using the Akaike Information Criterion.

RESULTS

Phenotypic Associations

For girls, alcohol use and depressive symptoms were positively associated at each age. For boys, there was no association between phenotypes at age 17.5. In some cases, early drinking was significantly associated with later depressive symptoms or vice versa.

Twin Modeling

Variance was constrained to be equal across the sexes. Shared environmental factors (C, C, and C) which load first onto depressive symptoms) could be removed. Unique environmental (E) factors were trait-specific, but not time-specific.

Heritability, Genetic/Environmental Correlations, and Genetic Innovation/Attenuation

Heritability estimates were comparable to previous reports, ranging from 0.44 to 0.49 for alcohol use across adolescence, with lifetime incidence of adolescent depression around 14%. In addition, most epidemiological studies indicate that depressive symptoms and alcohol use are positively associated, in both adolescent and adult populations.

Towards a Dynamic View
The nature of this shared liability is dynamic across adolescence, with both genetic and shared environmental correlations decreasing over time even as individual heritabilities remain relatively stable.

DISCUSSION

- We observed a positive and statistically significant association between depressive symptoms and alcohol use across adolescence, with some variation between the sexes.
- Heritability estimates for depressive symptoms ranged from 0.41-0.51 across adolescence, with much of the remaining variance accounted for by unique environmental influences. Shared environmental influences account for 10% of the total variance at any age. Genetic effects were attenuated over time, with novel genetic influences becoming relevant at later ages.
- Heritability estimates for alcohol use varied from 0.24-0.45, with shared environmental factors accounting for a substantial portion of the remaining variance. Unique environmental factors accounted for 15-25% of the variance. Again, we observed genetic innovation and attenuation over time.
- Depressive symptoms and alcohol use were genetically correlated: within-age estimates of r ranged from 0.00 to 0.26. The model also supported shared environmental correlations, although loadings on depressive symptoms were quite low. Unique environmental correlations could be removed from the model.
- These results underscore the need for additional work in genetically informative adolescent samples to further our understanding of the relationship between these phenotypes and potential clinical implications.

ACKNOWLEDGEMENTS

This work is supported by The Academy of Finland Center of Excellence in Osteoarticular Disease Genetics, the National Institute on Alcohol Abuse and Alcoholism (AA09201, AA09202 to RJR, AA15416 to DMD), and the Academy of Finland 110499, 205689, and 110555 to JK. ACE is supported by institutional training grant M0100230.