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

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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 symptoms and disorders and alcohol use are positively associated, both in 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 FinnTwin12 study (N=1782). Data were available for 169 female monzygotic (MZ) twin pairs, 170 male MZ twin pairs, 188 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).

Statistical Analysis
Descriptive statistics and regression analyses were conducted in Mplus Version 5 (Muthén & Muthén 1998-2007) or SAS 9.1.3, and were corrected for multiple comparisons. At age 17.5, participants were asked again 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.

RESULTS

Phenotypic Associations

<table>
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<tr>
<th>Age of</th>
<th>Alcohol Use</th>
<th>p-value</th>
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<tr>
<td>12</td>
<td>0.09141</td>
<td>0.712</td>
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<tr>
<td>14</td>
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<td>0.875</td>
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<tr>
<td>17.5</td>
<td>0.00055</td>
<td>0.906</td>
</tr>
<tr>
<td>17.5</td>
<td>0.00071</td>
<td>0.524</td>
</tr>
</tbody>
</table>

Twin Modeling

Variance was constrained to be equal across the sexes. Shared environmental factors (C1, C2, and C3 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 for depressive symptoms varied from 0.41-0.51 across adolescence, with some variation between the sexes. Heritability estimates for alcohol use varied from 0.24-0.45, with shared environmental effects accounting for a substantial portion of the remaining variance. Unique environmental factors accounted for 15-23% of the variance. Again, we observed genetic innovation and attenuation over time.

ACKNOWLEDGEMENTS

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