Longitudinal Associations between Emotion Regulation and Activity Level: a Cross-lagged Twin Study

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Introduction

- Children with ADHD often suffer from comorbid mood and anxiety disorders (Elaïa et al., 2009).
- Activity level (AL) and emotional self-regulation (ER) may serve as precursors of ADHD (Nigg, 2006) and mood/anxiety disorders (Gross, 1998), respectively.

Study Goals

- The present study examined the directionality issue regarding the association between ER and AL from ages 2 to 3.
- In addition, we examined genetic and environmental sources of stability across age, and sources of covariance between ER and AL both within and across age.

Methods

Sample

- 314 same-sex (145 monozygotic, 169 dizygotic) twin pairs assessed within approximately 2 weeks of their 2nd and 3rd birthdays.

Procedure

- At each age, twins completed two laboratory visits approximately 48 hours apart. On both visits, twins engaged in a variety of behavioral and cognitive assessments.
- At the initial visit, one twin was assessed with the Bayley Scales of Infant Development, 2nd edition (BSID-II; Bayley, 1993; Figure 1), while the other twin was assessed with the Laboratory Temperament Assessment Battery—Preschool Version (Lab–TAB; Goldsmith, Reidy, Lemery, Longley, & Prescott, 1995; Figure 2). At the second visit, the assessments were reversed for each twin.

Results

Phenotypic Correlations (Table 1)

<table>
<thead>
<tr>
<th>ER at age 2</th>
<th>AL at age 2</th>
<th>ER at age 3</th>
<th>AL at age 3</th>
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<tbody>
<tr>
<td>1.000</td>
<td>0.36</td>
<td>0.42</td>
<td>0.17</td>
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</table>

Table 1 Phenotypic Correlations Between Emotion Regulation (ER) and Activity Level (AL)

Model-Fitting Analyses

- A biometric cross-lagged model (Figure 4) was used to examine the relation between ER and AL across age.
- This model not only assesses the longitudinal stability of both ER and AL after controlling for the preexisting association between the two constructs, but also examines the cross-lagged effects, which are cross-age cross-construct independent from the stability of each construct.
- Additionally, this genetically-informative model examines sources of the variances of each phenotype, and sources of the covariance between phenotypes in the model.

Figure 4. Full Biometric Cross-lagged Model.

Figure 3. Actigraphs and Actical Attachment

Figure 5. Path estimates (95% CI) from the best-fitting Biometric Cross-lagged Model. At age 2, the standardized path estimates from the latent factors (A, C and E) to the observed variables represent the proportion of variance attributed to genetic, shared, and nonshared influences. At age 3, the standardized path estimates are residual effects representing novel variances independent of effects transmitted from age 2.

Conclusions

- Children’s AL at age 2 can independently predict their levels of ER at age 3, but the opposite direction is not significant.
- The current findings could demonstrate the predictive value of AL and might add support for using children’s profile of AL to identify possible change across age. The new genetic effects might result from the rapid brain development and new genetic factors emerge to regulate this development. The new nonshared environmental variance suggests that more individualized and age-appropriate programs with specific targets might be helpful for children to improve ER and maintain proper AL.

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