Early Deprivation, BDNF Genotype and Executive Function in Post-Institutionalized Youth

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Introduction
- Post-institutionalized youth experience mild to severe deprivation in the form of inadequate social and physical attention while in the institution (Rutter, 1981).
- This can potentially result in physical, behavioral or cognitive delays which persist to a greater or lesser extent following removal from institutional conditions (Gunnar, Bruce, and Grotevant, 2000).
- Not all children experiencing early deprivation show adverse outcomes. Some youth appear resilient in the face of early deprivation, while others show vulnerabilities to these early stressors.
- One’s genetic inheritance and age at adoption may moderate the relationship between early experience and later cognitive performance.
- In rodent studies, the presence of a Met allele (any Met) polymorphism of the brain-derived neurotrophic factor (BDNF) gene is associated with reduced availability of BDNF, and has been identified as a potential risk allele for altered learning and memory (Korte et al., 1995; Chen et al., 2006).
- The current study examines the impact of early deprivation and BDNF genotype on cognitive control in 12- to 14-year-olds with a history of institutional conditions (Rutter, 1981).

Participants
- Individuals with the Val66Val BDNF genotype will have greater accuracy scores on a measure of cognitive control than individuals with either the Val66Met or the Met66Met genotype.

Set-Shifting/Cognitive Control Task
- This task requires participants to shift between two rules: the motion rule and the color rule.
- Easy trials repeat the same rule for multiple trials and present no conflict between rules.
- Difficult trials switch between rules and distracting elements of the opposite rule are enhanced.

Motion Rule: Choose the circle with upward moving lines.
- The lines inside each of the circles are moving either up or down.
- The line thickness varies to create easier or harder trials.

Color Rule: Choose the red circle.
- Each trial has both a green and red circle.
- The color saturation varies to create easier or harder trials.

Results
- Group differences are observed only on difficult trials.
- Earlier adopted Met carriers perform better than:
  - Earlier adopted Val/Val carriers
  - Later adopted Met carriers
- For Met allele carriers there is a significant negative correlation between accuracy and age at adoption (p = .467, p = .000).
- Age at adoption does not correlate with performance for individuals with the Val/Val genotype.

Future Directions
- Compare PI youth’s performance on this task to other comparison groups of the same age, for example children internationally adopted from foster care, children born pre-term, or non-adopted youth.
- Examine the performance of these individuals on other measures of executive function to further examine the role of early deprivation.

Discussion
- Longer duration of orphanage care was associated with greater performance costs on this measure of cognitive control.
- However, the impact of early deprivation varied by genotype.
- For youth carrying the more common Val66Val genotype, older age at adoption was associated with overall slower reaction times and poorer accuracy.
- In contrast, in Met allele carriers, later adoption was associated with significant performance decrements under conditions of high conflict, but earlier adoption was associated with performance improvements during high conflict conditions.
- This indicates a potential sensitivity to context for this genetic polymorphism.

Selected References

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