



# Child care and problem behaviors: is there evidence for a gene-environmental interaction?

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## BACKGROUND & AIM

Findings of the NICD study (NICHD, 2003, 2007) show more externalizing behaviors in children who are exposed to center child care at an early age. In this study we test whether the heritability of problem behaviors differs as function of child care (home or outside home).

## METHODS

- At age 3 mothers rated the twins' behavior on the Child Behavior Checklist (CBCL). To index externalizing problems we use the Aggression scale (AGG).
- To quantify child care (CC) during the first 3 years of life, the number of months and number of times per week were used. Twin pairs were divided into two groups: one with only parental CC (n=1460) and one with high amounts of non-parental CC (n=412).
- Models were fitted to raw data and parameters estimated by maximum-likelihood, using MX (Neale, 1997). Only data from same-sex twins were used.

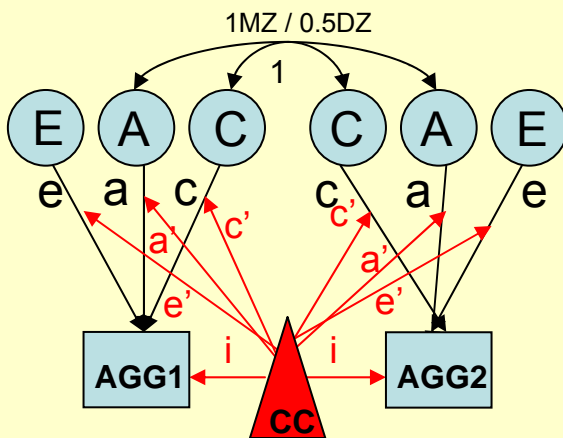


Figure: Path diagram for the gene-child care interaction model; A, C, and E refer to genetic, shared and non-shared environmental factors; a, c, e refer to the main effects of A, C, and E; a', c', e' represent the interaction of A, C, and E with child care (CC); i refers to the main effect of CC on AGG (measured phenotype).

- Heritability was calculated as:

$$(a+a'CC)^2$$

$$(a+a'CC)^2 + (c+c'CC)^2 + (e+e'CC)^2 + i^2*CC$$

## RESULTS

- No effects of child care on means of AGG were found for both boys and girls.
- For girls there was no significant moderator effect of child care on genetic and environmental variance components.
- For boys results indicate a significant interaction effect of child care. The effect was explained by an significant decrease of the genetic variance and increase of the shared environmental variance in the high CC group.

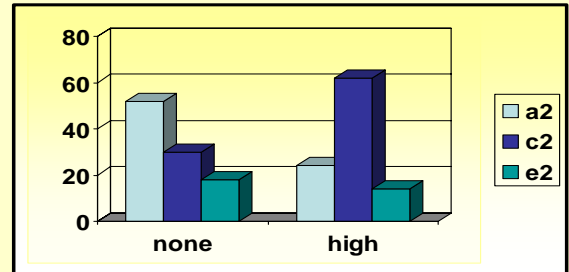


Figure: Percentage of variance explained by genetic and environmental factors for boys without child care (none) and boys with a high amount of child care (high).

## CONCLUSION

- Our results indicated an increase of shared environmental influences and a decrease of genetic influences on AGG for boys with high amounts of child care compared to boys with only parental care.
- The effects may be mediated by educational level of the mother: 50% of the mothers in the high child care group had a high educational level, while in the parental care group only 15% of the mothers had a high educational level.

**Acknowledgments:** This work was supported by a grant of the Netherlands organization for Scientific Research (P.I. Boomsma: Grant 904-57-094; Grant 575-25-006).