

**Development of Inhibitory Control from
School-Age to Pre-Adolescence and
Subsequent Aggressive Behavior: The
Effects of Prenatal Cocaine Exposure,
Gender, and Cumulative Risk**

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Background

- Most previous research has focused on the development of inhibitory control (IC) in low risk, typically developing children (1-4)
- Prenatal cocaine exposure has been consistently linked to difficulties with behavior, attention, and executive functions (5-10)
- In prenatally cocaine exposed children, gender and sociodemographic/medical risk factors may influence cognitive ability and IC (11-16)

The Current Study

- Goals

- Examine the development of IC over a 6 year period in prenatally cocaine exposed children and in high risk, non-cocaine exposed children
- Examine the effect of gender on IC development in both groups
- Examine the contributions of medical (e.g., low birth weight) and sociodemographic (e.g., low maternal education) risks to IC development outcomes
- Examine the effects of IC development on aggressive behavior in adolescence

The Current Study

- Hypotheses
 - Improvements in IC will be evident during the transition from late childhood to pre-adolescence in both groups of participants
 - Children exposed to cocaine in utero will display a pattern of development consistent with IC dysfunction
 - Interindividual differences in Stroop performance across time will be accounted for by gender, with males exhibiting greater difficulties while performing the Stroop task than females

The Current Study

- Hypotheses (continued)
 - Anticipated that sociodemographic/early medical adversity would also account for differences in IC development
 - After controlling for gender and cumulative risk, children who perform poorly during the initial Stroop evaluation as well as children who display slower, age-related changes in IC will have more difficulties with aggressive behavior as rated by parents

Participants

- 293 high-risk families
 - Low income, urban environment
 - 119 families of non-cocaine exposed (NCE) infants
 - 165 families of prenatally cocaine exposed (CE) infants
- Majority reported African-American background
 - 68.1% of NCE participants; 87.3% CE participants
- Low educational attainment in both groups
 - Primary caregivers of CE participants attained significantly less education than primary caregivers of NCE participants

Measures

- Cumulative Risk (0-3)
 - Maternal education < high school degree or equivalent
 - Birth weight < 2500 grams
 - Second APGAR score < 7
- Cocaine exposure
 - Maternal report
 - Urine toxicology

Measures (continued)

- Stroop Paradigm – Incongruent condition
 - Completion time
 - Total errors
- Kaufman Assessment Battery for Children (K-ABC)
- Child Behavior Checklist (CBCL)
 - Aggression scale

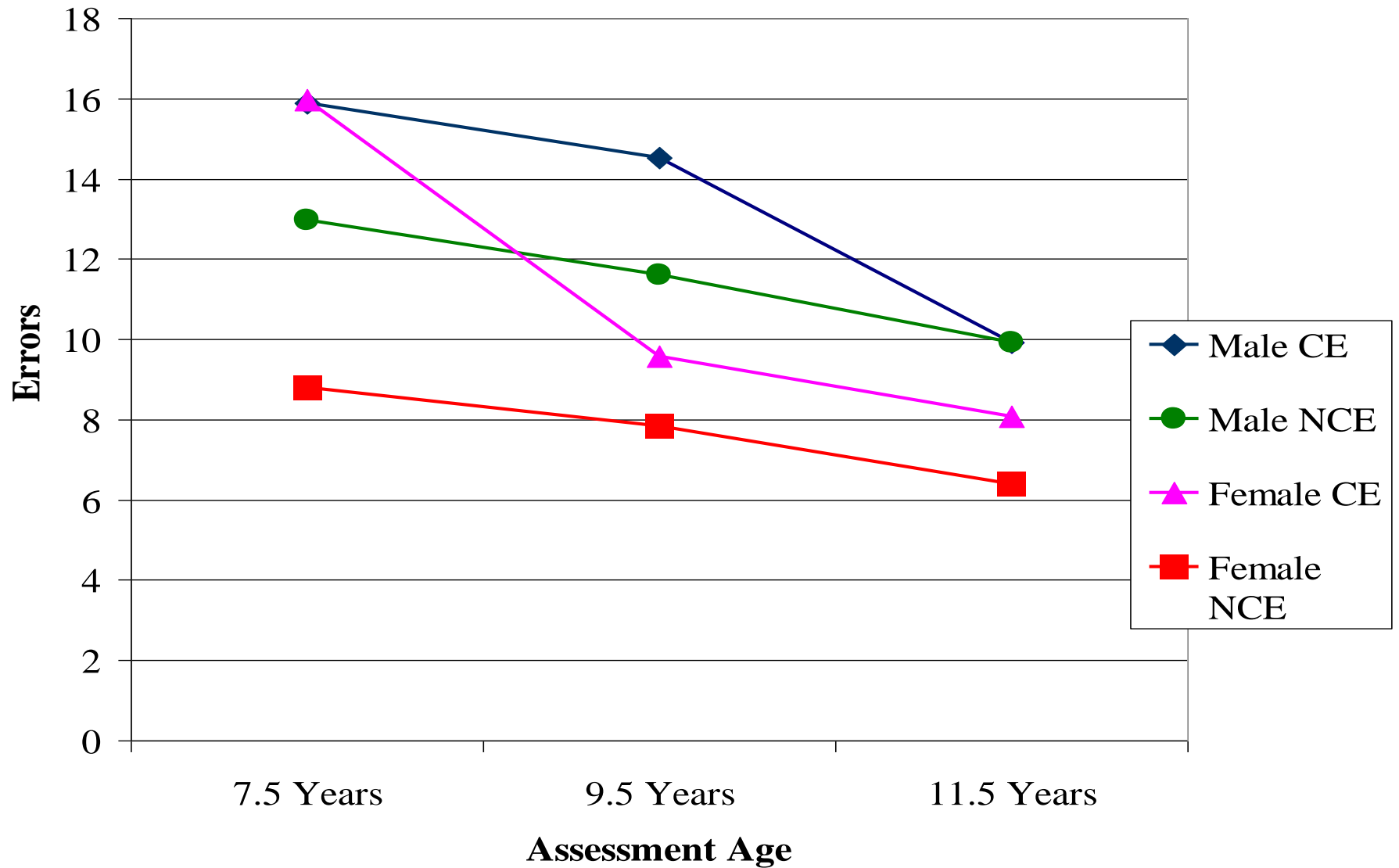
Procedure

- All participants were followed from birth at predetermined intervals
- Cocaine exposure assessed at the time of recruitment and/or delivery
- Toddler IQ assessed at 4 years of age
- Stroop task administered to children at 7.5, 9.5, and 11.5 years of age
- Primary caregivers completed the CBCL when children reached 14 years of age

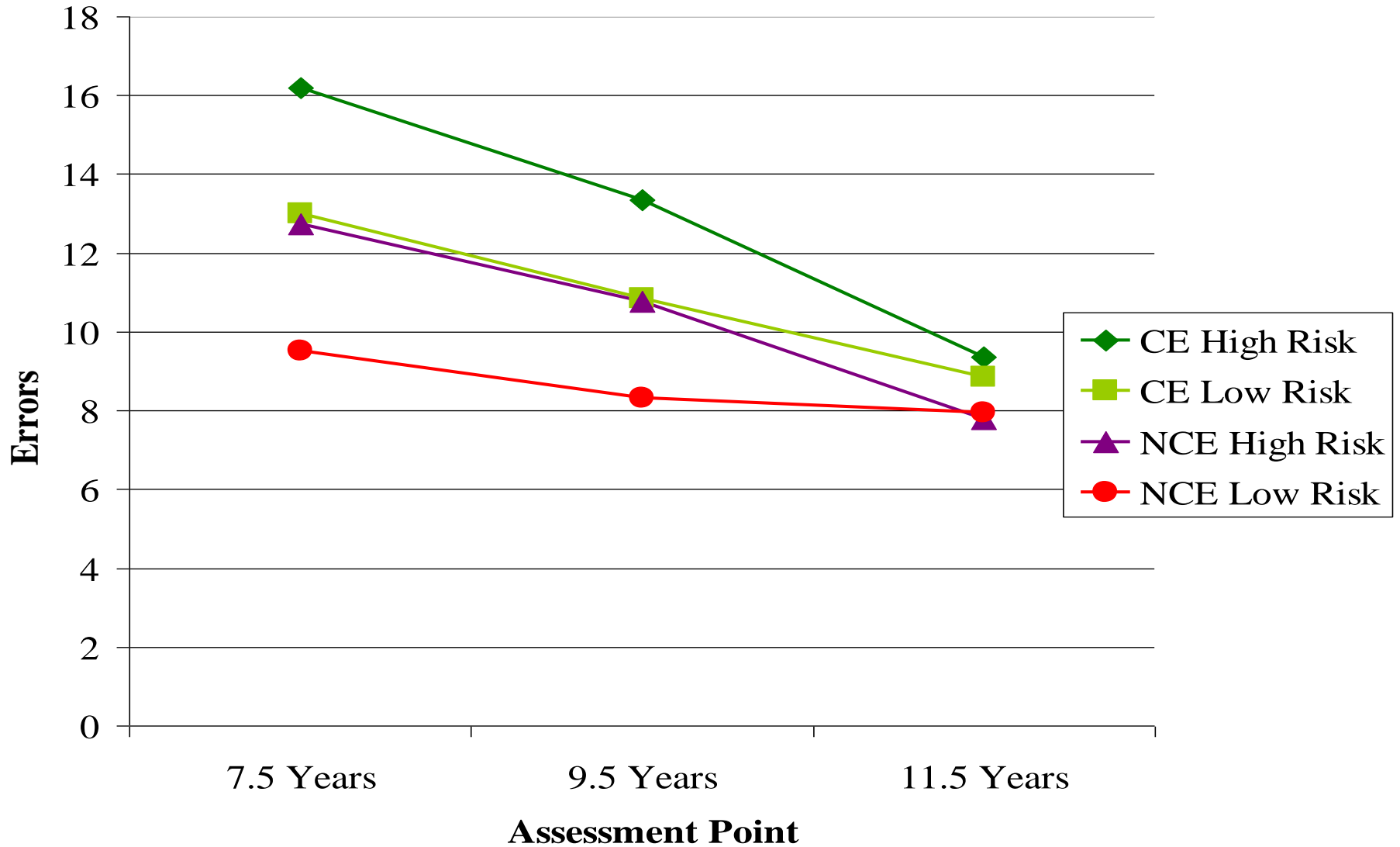
Analyses

- Multiple Group Latent Growth Modeling (LGM) conducted with EQS 6.1 (17)
- An initial growth model is fit to repeated measures for each participant, resulting in intercept and slope factors with corresponding residuals
- Missing data
 - 3 out of 124 missing data comparisons were statistically significant
 - Handled with Maximum Likelihood Estimation (MLE)

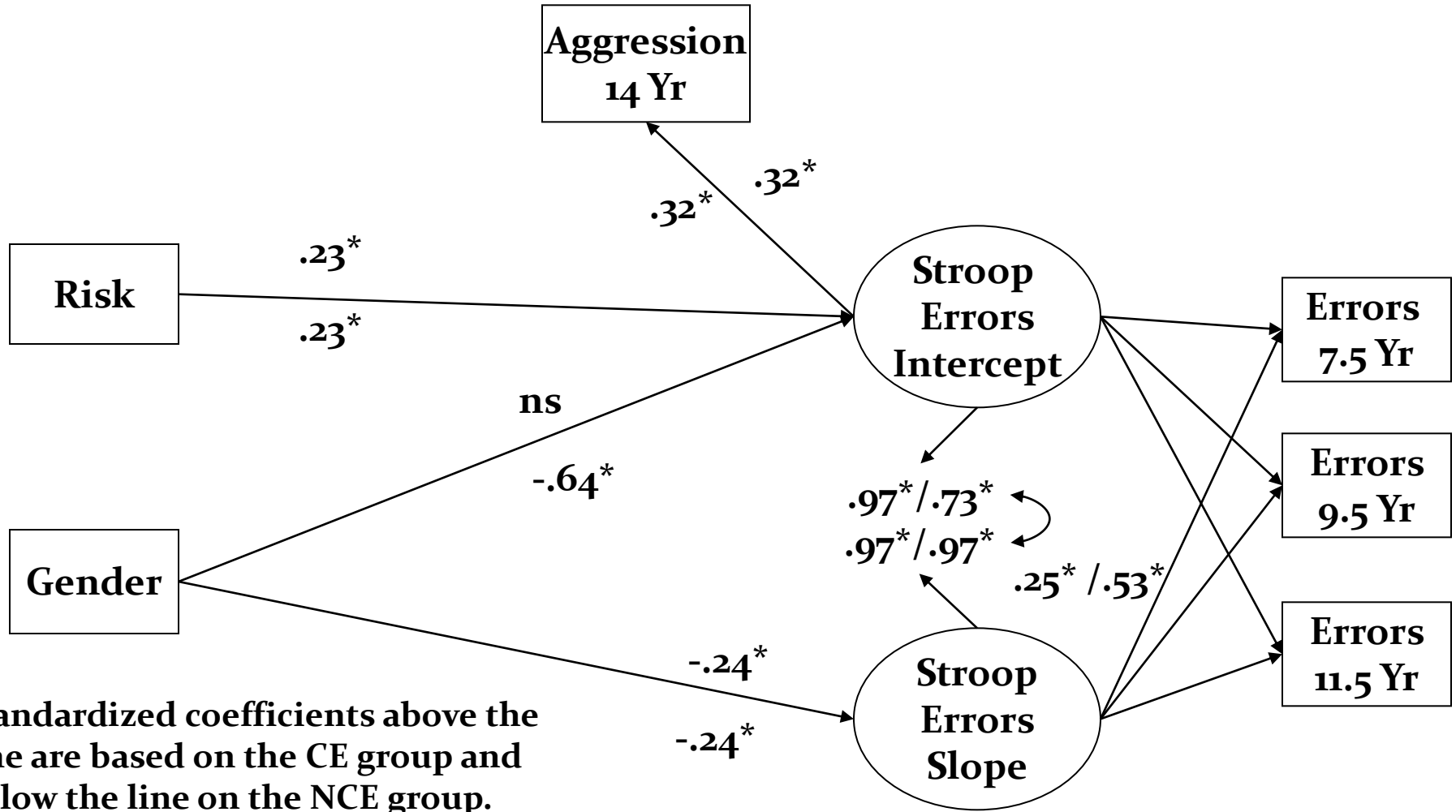
Trajectory of Stroop Errors by Gender and Prenatal Cocaine Exposure Status



Trajectory of Stroop Errors by Risk and Prenatal Cocaine Exposure Status



Final LGM of Stroop Errors with Gender, Cumulative Risk, and Aggressive Behavior



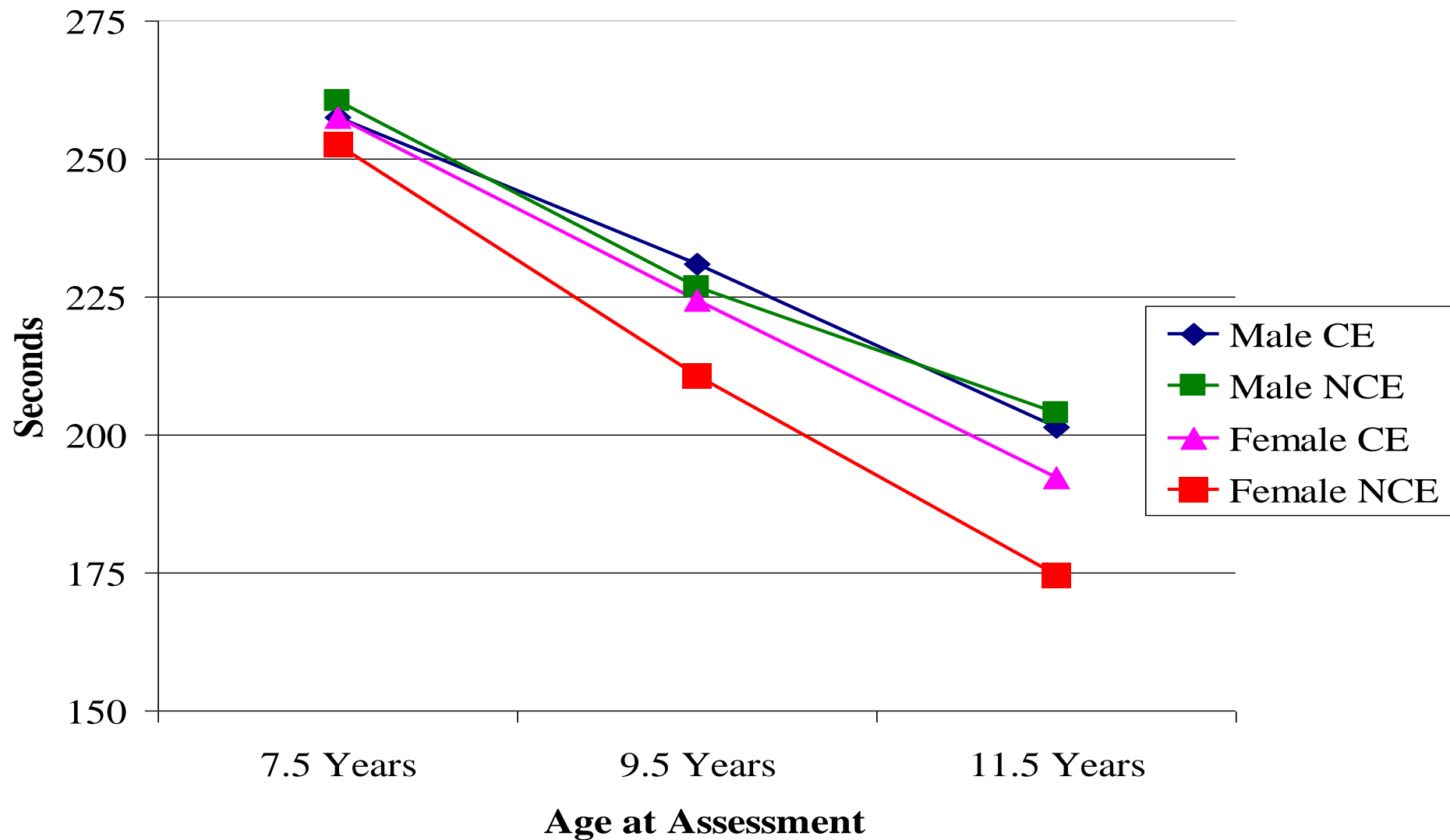
Standardized coefficients above the line are based on the CE group and below the line on the NCE group. Pathways not pictured were ns.

+ = $p < .10$

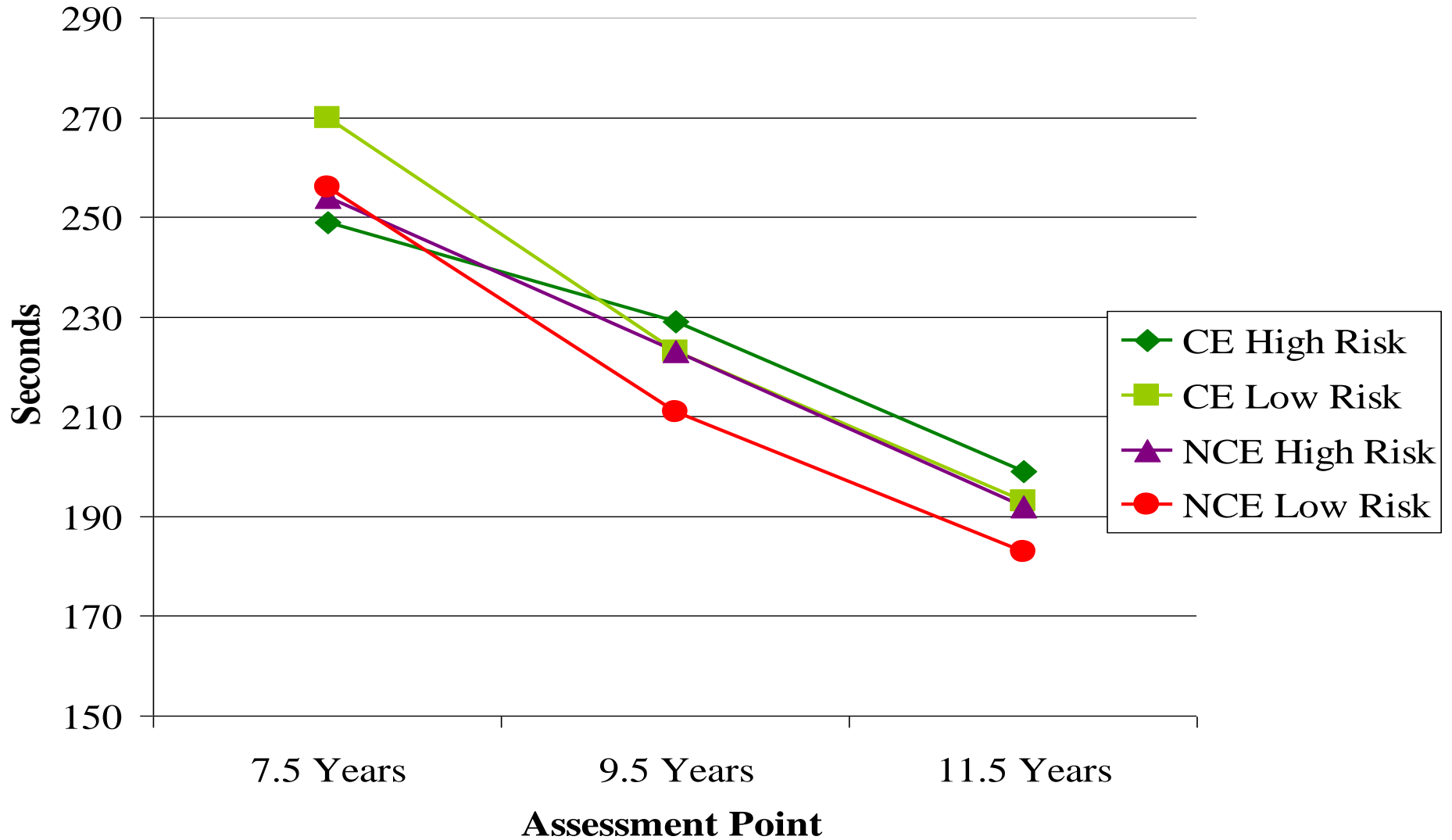
* = $p < .05$

$\chi^2 (23) = 21.19, p > .05; CFI = 1.00;$
 $GFI = .95; AIC = -24.80; RMSEA = 0.00$

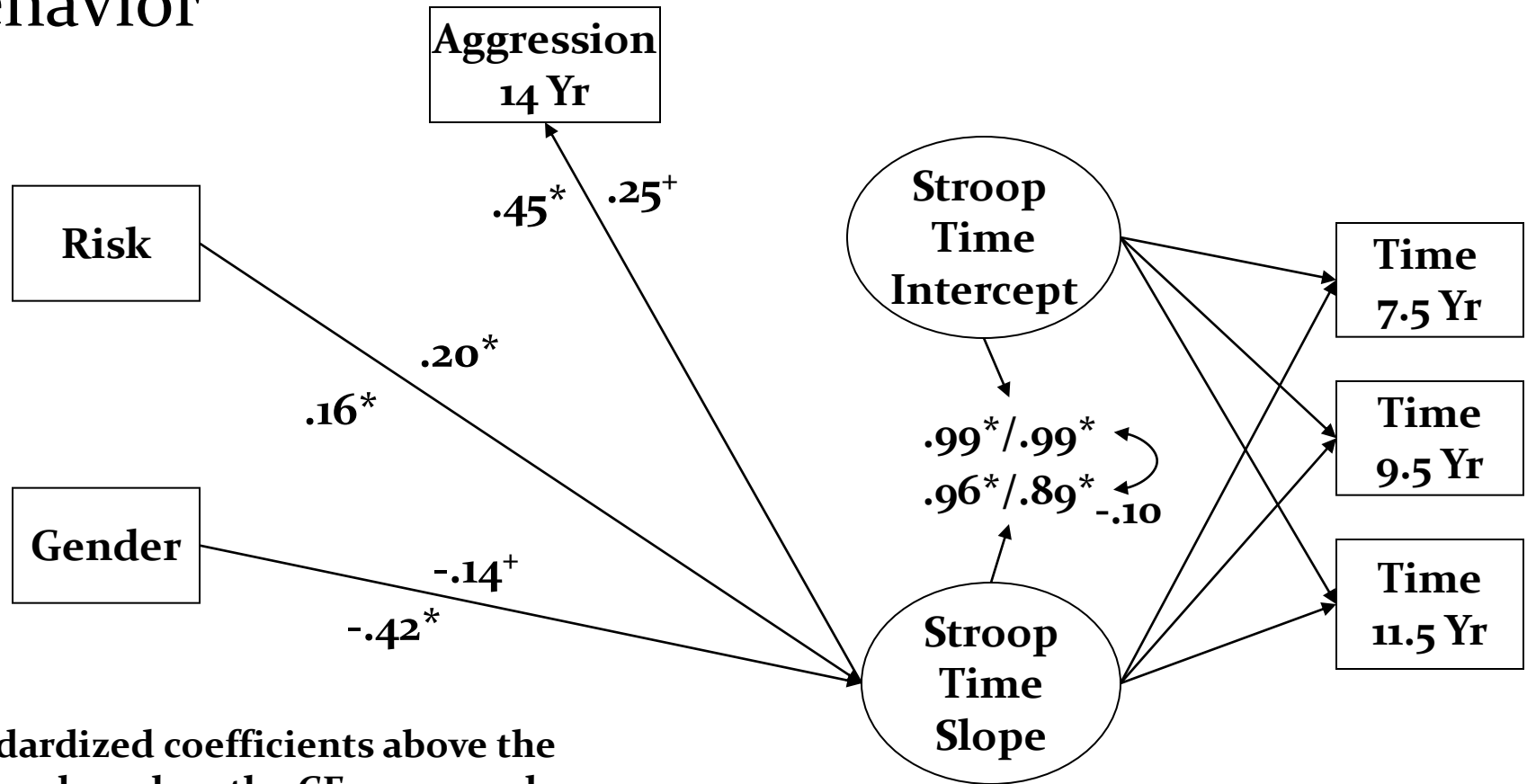
Trajectory of Stroop Completion Time by Gender and Prenatal Cocaine Exposure Status



Trajectory of Stroop Completion Time by Risk and Prenatal Cocaine Exposure Status



Final LGM of Stroop Completion Time with Gender, Cumulative Risk, and Aggressive Behavior



Standardized coefficients above the line are based on the CE group and below the line on the NCE group. Pathways not pictured were ns.

$+ = p < .10$
 $* = p < .05$

$\chi^2(20) = 11.96, p > .05; CFI = 1.00;$
 $GFI = .98; AIC = -28.03; RMSEA = 0.00$

Discussion

- The influence of cocaine exposure on the development of IC between 7.5 and 11.5 years of age is moderated by gender and influenced by demographic and early postnatal medical risk
- Higher cumulative risk, prenatal cocaine exposure, and gender places individuals, typically boys, at greater risk for externalizing problems
- IC may be a critical mechanism linking earlier risks to later behavioral problems

Acknowledgements

- “Thank you” to the many families that diligently participated over the course of the study.
- “Thank you” to the numerous research staff who devoted their time to working with the families
- Work was supported by the following NIDA grants to Linda Mayes: RO1-DA-06025 and DA-017863, and a KO5
- Please visit the NIU Emotion Regulation and Temperament Laboratory’s website to download a copy of this presentation:
- <http://www.niu.edu/emotionreg>
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