SPECIFICITY OF MEMORY DEFICITS IN CHILDREN AND ADOLESCENTS WITH PRENATAL ALCOHOL EXPOSURE

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BACKGROUND

- Individuals with heavy prenatal alcohol exposure (AE) demonstrate a variety of cognitive deficits, including impairments across memory domains.
- Previous research supports an overlap in symptoms and behaviors in individuals with AE and those with other neurodevelopmental disorders.
- Unlike other neurodevelopmental disorders, there is evidence that memory deficits in children with AE persist with age.
- To test the specificity of memory deficits and their persistence with age, we compared the performance of children with histories of heavy prenatal alcohol exposure to that of typically-developing controls and non-exposed individuals with other behavioral concerns or conditions.

METHOD

Subjects belonged to one of three groups: those with histories of heavy prenatal alcohol exposure (AE, *n* = 148), those with other behavioral or clinical concerns (B-CON, *n* = 110), and typically developing controls (T-CON, *n* = 172). Subjects were also split into Child (age 5-7y) and Adolescent (10-16y) age groups.

NEPSY-II

- Memory for Designs (MD): Children briefly study patterns in a grid display and are asked to place the correct pattern in the correct location on the grid.
- Narrative Memory (NM): Children are read a short passage and are asked to recount the details they remember.
- Memory for Faces (MF): Children are briefly presented with children's faces and are asked to choose which faces they have seen before.
- Memory for Names (MN): Children are presented with the names and drawings of children. The stimuli are shown again and the child is asked to recall the name.

Statistical Analyses

Differences in demographic data were evaluated using ANOVA and chi square. Memory ability was evaluated using a repeated measures MANCOVA [Memory x Group (AE, B-CON, T-CON) x Age Group (Child, Adolescent)] with sex and ethnicity as covariates.

Table 1. Demographic Information by Group

Variable	AE	B-CON	T-CON
Sex [*n* (%) Female]	74 (50.0)	41 (37.3)	88 (51.2)
Race [*n* (%) White]	74 (50.0)	54 (49.1)	96 (55.8)
Ethnicity [*n* (%) Hispanic]	22 (14.9)	22 (20.0)	28 (16.3)
Handedness [*n* (%) Right]	126 (85.1)	92 (83.6)	155 (90.1)
Age Group			
Children [*n* (%)]	52 (35.1)	39 (35.5)	61 (35.5)
Age [M (SD)]	6.9 (0.88)	6.8 (0.86)	6.44(0.88)
Adolescents [*n* (%)]	96 (64.9)	71 (64.5)	111 (64.5)
Age [M (SD)]	13.0 (2.04)	13.5 (1.98)	13.9 (2.04)
Site			
Atlanta [*n* (%)]	41 (27.7)	38 (34.5)	47 (27.3)
Los Angeles [*n* (%)]	13 (8.8)	0 (0.0)	14 (8.1)
Minnesota [*n* (%)]	52 (35.1)	32 (29.1)	57 (33.1)
San Diego [*n* (%)]	42 (28.4)	40 (36.4)	54 (31.4)
IQ* [M (SD)]	88.2 (11.96)	96.6 (15.11)	103.1 (15.34)
FAS Diagnosis [*n* (%) FAS)]	18 (12.2)	0 (0.0)	0 (0.0)

* DAS-II General Conceptual Ability Standard Score

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RESULTS

Demographics

Groups did not differ significantly on sex, race, ethnicity, handedness, or distribution across age group (*p*s ≥ .052). As expected, there were significant group differences for IQ (*p*s < .001; AE < B-CON < T-CON). There were also differences in the distribution of subjects across site (*p* = .048). This difference is likely due to the fact that one site (Los Angeles) did not recruit subjects in the B-CON group. **See Table 1.**

Interactions

Group × Memory Type × Age Group interaction was significant (*p* = .046; **See Figure 1**)

Child Age Group: Group x Memory Type interaction was significant. Follow-up pairwise tests indicated that on NM, MF, and MN, the T-CON group had significantly higher scores than the AE and B-CON groups, which did not differ from each other. On MD, the AE group had significantly lower scores than the B-CON and T-CON groups, which did not differ significantly.

Adolescent Age Group: Group x Memory Type interaction was not significant.

Age Group × Memory interaction was significant (*p* = .018)
The adolescent group had significantly higher scores than the child group on MF and MN, but did not differ on MD or NM.

Group × Memory interaction was marginally significant (*p* = .052; **See Figure 2**)
The T-CON group had significantly higher scores than the AE group on all memory subtests, significantly higher scores than the B-CON group on NM, MF, and MN, and marginally higher scores than the B-CON group on MD (*p* = .075). The B-CON group had significantly higher scores than AE only on MD.

Group × Age Group interaction was not significant (*p* = .519)

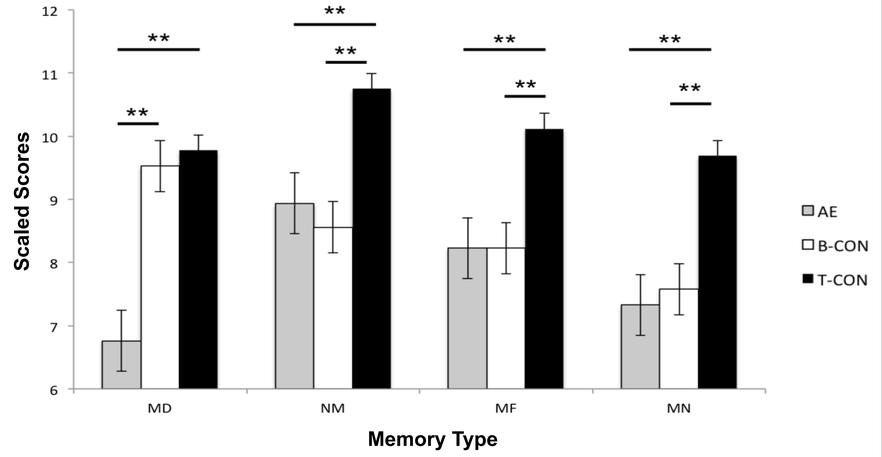
Main Effects

Main effect of Group was significant (*p* < .001)
The T-CON group had significantly higher scores than both the AE group and the B-CON group, which also differed significantly (T-CON > B-CON > AE).

Main effect of Age Group was significant (*p* = .022)
The adolescent group had significantly higher scores than the child group.

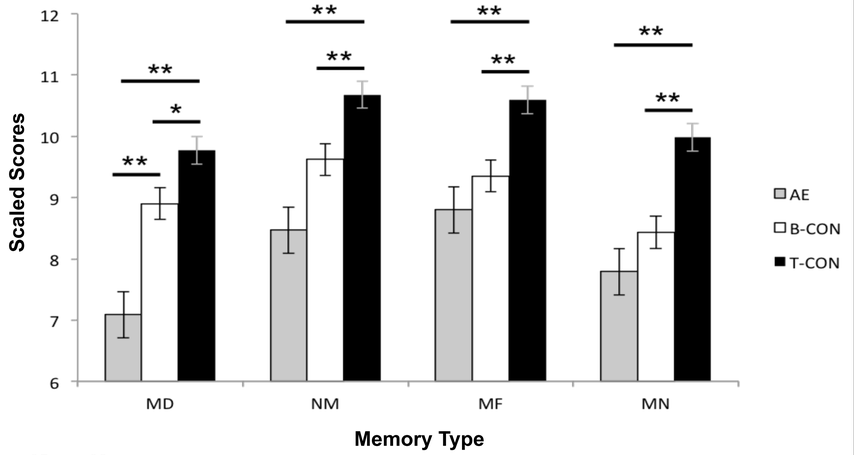
Main effect of Memory was significant (*p* < .001)
Scores on NM and MF were significantly higher than scores on MD and MN. Scores did not differ between MD and MN or NM and MF.

Figure 1. Mean Memory Scores for Children (Age 5-7)



**p<.05, *p<.08
MD, Memory for Designs; NM, Narrative Memory; MF, Memory for Faces; MN, Memory for Names

Figure 2. Mean Memory Scores by Group



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MD, Memory for Designs; NM, Narrative Memory; MF, Memory for Faces; MN, Memory for Names

DISCUSSION

- Compared to typically developing controls, individuals with AE demonstrated deficits across all memory domains.
- Compared to subjects with behavior concerns or conditions, the AE group demonstrated significant deficits on visuospatial tasks, indicating the AE group may have specific weakness in that area compared to other clinical populations.
- These results are clinically significant because they indicate that visuospatial memory ability can discriminate between AE and other clinical populations. In addition, they also suggest that individuals with AE may have a distinct developmental trajectory.