



Systems and Cascades in Cognitive Development and Academic Achievement

Bornstein, M.H., Hahn, C.S., & Wolke, D. (2013). Systems and cascades in cognitive development and academic achievement. *Child Development*, 84, 154-162. doi: 10.1111/j.1467-8624.2012.0189.x



Civilian-
Focused
Article



552 healthy youth were assessed multiple times from 4 months to 14 years of age to assess the relationships between academic achievement at 14 years old and a variety of variables (home environment, temperament, intelligence). Many variables contributed to academic achievement in adolescence (directly, indirectly, or both), including: information processing efficiency in infancy, general mental development in toddlerhood, behavior difficulties in early childhood, intelligence in middle childhood, and maternal education.

Key Findings:

- General cognitive ability, as measured by IQ at 8 years old, was the strongest predictor of academic achievement at 14 years.
- Controlling for other variables, children who habituated more efficiently at 4 months and scored higher on a measure of development at 18 months had higher IQs at 8 years and academic achievement at 14 years.
- Behavior difficulties at 3 years of age undermined academic achievement (even after accounting for other variables).
- Maternal education directly and indirectly (through mental development and IQ at 8 years) predicted academic achievement at 14 years.

Implications for Programs:

- Programs could offer classes that help military parents manage behavior difficulties in young children.
- Programs could offer informational courses on how to stimulate cognitive development in young children.

Implications for Policies:

- Policies could recommend funding for early intervention programs to improve information processing in military children and avert behavioral difficulties.
- Policies could allocate funding to train military family workers in effective means of facilitating cognitive development in young children.

Avenues for Future Research:

- Additional research could focus on interventions that help increase cognitive functioning in young children to determine their effectiveness.
- Future studies could follow children longitudinally into adulthood to determine how these variables impact later achievement.

Background Information

Methodology:

- English infants were assessed at 4, 6, 18, and 36 months, as well as at 8 and 14 years of age.
- Assessments included: 4 months - habituation (total time looking at a stimulus), 6 months - temperament, enriched parenting and home environment, 18 months - development, 36 months - behavior, 8 and 14 years - intelligence and academic achievement.
- Structural equation modeling was used to test relations among habituation efficiency, child socioemotional functioning, enriched parenting, home environment, maternal education, child cognitive development, and adolescent achievement.

Participants:

- 552 full-term healthy, normal birth weight infants (56% boys) participated.
- Average maternal age at child's birth = 28.90 (SD=4.81) years.
- Maternal education completed: 37% secondary school, 26% completed college preparatory school, 14% completed college.
- No other relevant demographic variables were reported.

Limitations:

- The sample consisted of all English children with undisclosed race/ethnicity/socioeconomic data; it is unknown how these findings would generalize to a U.S. military population.
- No outcome variables beyond academic achievement were measured at 14 years; additional indications of adjustment may have been helpful.

Assessing Research that Works

Research Design and Sample				Quality Rating:	★★★★
	Excellent (★★★★)	Appropriate (★★★)	Limited (★★)	Questionable (★)	
The design of the study (e.g., research plan, sample, recruitment) used to address the research question was....	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Research Methods				Quality Rating:	★★★★
	Excellent (★★★★)	Appropriate (★★★)	Limited (★★)	Questionable (★)	
The research methods (e.g., measurement, analysis) used to answer the research question were...	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Limitations				Quality Rating:	★★★☆☆
	Excellent Minor Limitations (★★★★)	Appropriate Few Limitations (★★★)	Limited Several Limitations (★★)	Questionable Many/Severe Limitations (★)	
The limitations of this study are...	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Implications				Quality Rating:	★★★☆☆
	Excellent (★★★★)	Appropriate (★★★)	Limited (★★)	Questionable (★)	
The implications of this research to programs, policies and the field, stated by the authors, are...	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
				<input type="checkbox"/> Not applicable because authors do not discuss implications	
Overall Quality Rating				★★★★	