The role of maternal interactive style in preterm infants development of attentional networks

Eva van de Weijer-Bergsma, MSc[1], Lex Wijnroks, PhD[1], and Marian J. Jongmans, PhD[1,2]
[1] *Department of General and Special Education, Utrecht University, Utrecht, The Netherlands*
[2] *Wilhelmina Children's Hospital, University Medical Centre Utrecht, The Netherlands*

Universiteit Utrecht

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Abstract
The aim of this study is to investigate the influence of infant risk status at birth and maternal interactive styles during mother-infant interaction on the development of executive attention.
Preliminary results suggest that infants who were born premature possibly benefit from interacting with a more directive and less sensitive responsive mother.

Introduction
Former very and extremely low birth weight children are at an increased risk for developmental problems in various domains such as cognitive functioning. Major disabilities are often detected early in infancy. Low severity dysfunctions, however, are detected relatively late (i.e. at school age). Moreover, their incidence among these children has increased. Currently, there are no good predictors of these more subtle cognitive problems. Attention development is considered an important prerequisite for cognitive functioning. Three interconnected attentional networks in the brain have been proposed: 1) the orienting system or posterior attention network, 2) the alerting or arousal network, and 3) the executive control system or anterior attention network (Posner & Petersen, 1990). In the results presented here, we focus on the development of the executive control network, which is considered to be partly dependent on the caregiving environment (Rothbart & Posner, in press). The aim of this study is to investigate the influence of infant risk status at birth and maternal interactive styles during mother-infant interaction on the development of executive attention.

Research questions
1) Is infant risk status at birth (e.g. birth weight, gestational age, severity of medical complications) predictive of executive attention functioning?
2) Are maternal interactive styles (e.g. sensitive responsiveness and non-directiveness) predictive of executive attention development?

Method

Study in progress
Presented here are the preliminary results of a longitudinal study (N=90) using repeated measures (at 7-10-14 months) of sustained attention, executive attention, infant self-regulation, maternal parenting attitudes and maternal interactive styles.

Participants
Twenty-five singleton infants (N=25), born with a gestational age of <36 weeks, birth weight <2500 grams, admitted to the Neonatal Intensive care Unit (NICU) or Medium Care Unit (MC) of the Wilhelmina Children's Hospital in Utrecht, The Netherlands, were visited at home at the corrected age of 7 months ± 1 week (Corrected age in days: mean 209.52, sd 3.97; Chronological age in days: mean 270.96, sd 15.50).

Measurements
Neonatal medical risk score was based on the presence and severity of medical complications during the neonatal period (e.g. IRDS,BPD, PVL, IVH, PHVD, neonatal asphyxia, NEC, and sepsis).

Executive attention was assessed using age-appropriate looking and reaching versions of the A-not-B task (Diamond & Goldman-Rakic, 1989; Bell & Adams, 1999) (see photo).

Maternal sensitive responsiveness and non-directiveness were observed during a 5-minute mother-infant free-play session using the ELO-scales (Wijnroks, 1994, 1997, 1998).

Results
Correlations and partial correlations were calculated between the A-not-B task, infant variables and maternal interactive behaviors, controlling for chronological age and infant medical risk.

Table 1. Correlations between the A-not-B task, infant variables and maternal behaviors (*N*=25).

	A-not-B looking	A-not-B reaching	
	r	*r*	Partial *r*
Infant variables			
Birthweight	-.332	-.194	
Gestational age	-.364 †	-.349 †	
Infant medical risk	.161	.363 †	
Chronological age	.154	.441*	
Maternal behaviors			
Sensitive responsiveness	-.116	-.348*	-.385 †
Non-directiveness	-.201	-.272 †	-.358

* significant at $\alpha = 0.05$, † significant at $\alpha = 0.10$
Partial correlations are controlled for the effect of chronological age and infant medical risk.

Executive attention. Analyses showed no significant relationship between scores on the looking and reaching versions of the A-not-B task.
Birth weight was not associated with either scores on the looking or the reaching version of the A-not-B task. Infants with a shorter gestational age, however, showed a better performance on both versions of the A-not-B task ($p < .10$). Better performance on the reaching version, but not the looking version, of the A-not-B task was associated with higher medical risk ($p < .10$), and higher chronological age ($p < .05$).

Maternal interactive style. Correlations show that low maternal sensitive responsiveness is associated with better performance on the reaching version of the A-not-B task ($p < .05$), as is higher directiveness ($p < .10$). Using a multiple regression analysis, controlling for chronological age and medical risk at birth, the association between sensitive responsiveness, non-directiveness and A-not-B reaching task increased.

Conclusions
Executive attention performance at 7 months corrected age in preterm infants seems to be dependent on the amount of experience outside the womb, as is shown by the significant association between chronological age and A-not-B performance. These results are in agreement with those of Matthews, Ellis & Nelson (1996), showing that age-corrected premature infants outperform full-term infants on the A-not-B task. When controlled for chronological age, sensitive responsiveness and non-directiveness were not significantly associated with executive attention performance. Despite a small sample, however, these preliminary results suggest that infants who are born prematurely possibly benefit from interacting with a more directive and less sensitive responsive mother.

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Correspondence should be addressed to first author at: E.vandeWeijer@fss.uu.nl
AV-services, Dept. of Chemistry 2005