FOR WHOM THE BELL TOLLS:
Which children are affected by their childcare experience?

Jay Belsky
University of California, Davis
Two Distinct Questions Regarding Development:
HOW?
WHY?
QUESTION:
WHY WOULD NATURAL SELECTION CRAFT AN ORGANISM WHOSE FUTURE FUNCTIONING IS INFLUENCED BY ITS EARLIER EXPERIENCES?
CONSIDERATION 1:

The future is uncertain.
CONSIDERATION 2:

Plasticity is “expensive”
What these two considerations suggest to me is that there should be VARIATION IN DEVELOPMENTAL PLASTICITY: Developmental experiences and environmental exposures should affect some more than others.
In some respects this is NOT a new idea:
We have long appreciated, or at least presumed, that some are more affected by—and thus VULNERABLE to—the negative effects of adversity
In fact, the traditional and classic model of how environmental factors, including those experienced early in development, shapes human development is the dual-risk or the diathesis-stress model of environmental action.
Diathesis-Stress

Positive child outcome

Negative child outcome

→ environment

Bakermans-Kranenburg & Van IJzendoorn, 2006
But why would nature craft a developmental system for generating disturbances in development?
HOW DIFFERENTIAL SUSCEPTIBILITY DIFFERS FROM DIATHESIS STRESS
Diathesis-Stress vs. Differential Susceptibility

Positive child outcome

6

4

2

0

-2

-4

-6

Negative child outcome

environment

→

Bakermans-Kranenburg & Van IJzendoorn, 2006
Evidence of Differential Susceptibility:

--Temperament
--Physiological Reactivity
--Candidate Genes
NEGATIVE EMOTIONALITY
AS A
SUSCEPTIBILITY MARKER
Maternal Empathy and Externalizing Problems Moderated by Early Difficult Temperament

Marital Conflict and Change in Behavior Problems From Age 2-3 Moderated by Temperamental Irritability

Low conflict: constructive approaches to dealing with disagreements.
High conflict: physical violence.

Grade 1 Teacher-Child Conflict and Symptom Severity Change from Grade 1-7 Moderated by Reactive-Inhibited Temperament

BEYOND TEMPERAMENT: Endophenotypes as Moderators of Environmental Effects (Boyce & Ellis, 2005)
Attachment (17 mos) and Problem Behavior (17 mos.)
Moderated by
Baseline Respiratory Sinus Arrhythmia (5 mos.)

Daily Hassles, Physical Health & Depression
(Blood Volume Pulse Amplitude and Heart Rate Reactivity)

Marital Conflict and Externalizing Problems in Kindergarteners
Moderated by Physiological Reactivity

BEYOND TEMPERAMENT AND PHYSIOLOGY:
Genes as Moderators of Environmental Effects (GXE)
The 5-HTTPLPR Gene

The serotonin-transporter gene (5-HTP) is a good gene to consider because there is some evidence that infants carrying the short (vs. long) allele are more negatively emotional as newborns (Auerbach et al., 2005). Short alleles have also been linked to depression in females and vulnerability to the depression fostering effects of negative life events in adulthood (Caspi et al., 2003).
Positive Parenting and 8-12 Year Old Positive Affect Moderated by 5-HTTLPR

Hankin, B. et al. (2011). Differential susceptibility in youth: evidence that 5HTTLPR x positive parenting is associated with positive affect ‘for better and worse’. Translational Psychiatry, 1, e44.
Perceived Racial Discrimination and Conduct Problems Moderated by 5-HTTLPR

Figure 2. Results of the analysis for male youths only. Slopes of conduct problems for levels of perceived discrimination, ranging from -3 to +3 standard deviations from the sample mean, plotted separately for male youths with the ll genotype and male youths with the ss or sl genotype.

GXE: The DRD4 Gene

The DRD4 gene codes for a type of dopamine receptor, with the dopaminergic system involved in attentional, motivational, and reward mechanisms in the brain. One variant of this gene, the 7-repeat DRD4 allele, has been linked to lower dopamine reception efficiency, and thus to ADHD and externalizing problems in children, as well as behavioral difficulties, including substance abuse and aggression, in adulthood.
Prenatal Smoking & ADHD

Mother’s Unexplained Punishment and Preschooler’s Observed Prosocial Behavior Moderated by DRD4

Brain Derived Neurotrophic Factor (BDNF) has also been implicated in the etiology of depression, with evidence linking the Methionine (Met) allele of BDNF Val66Met polymorphism to anxiety in humans and mice.
Parental Depression and Negative Emotionality in 3-Year Olds: Moderated by BDNF

Hayden, E. P. et al. (in press). The role of brain-derived neurotrophic factor genotype, parental depression, and relationship discord in predicting early-emerging negative emotionality. Psychological Science. 2010;0956797610385357
Early Deprivation/Institutionalization Effects on Attention Problems at age 10-12 Years Moderated by BDNF

BEYOND CORRELATIONAL EVIDENCE:
GENETIC MODERATION OF INTERVENTION EFFICACY
--negative emotionality
--physiological reactivity
--DRD4
--5HTTLPR

Intervention for Children with Conduct Disorder
(Emotionally Dysregulated: loses temper, angry, touchy; Headstrong: Argues, defiant annoys, blames)

Intervention for Children with Disruptive Behavior Disorder
(Cortisol Stress Reactivity: HS=Highly Reactive)

Pre- and posttreatment comparison of Parent Daily Report (PDR) Overt Aggression scores and Oppositional Behavior scores in high cortisol stress responsivity (HS) and low cortisol stress responsivity (LS) in disruptive behavior disorder subgroups

Effect of High-Quality Foster Care/Adoption of Institutionalized Children and Externalizing Problems Moderated by 5-HTTLPR

Development of Externalizing Behavior for Intervention and Control Groups By DRD47-Repeat Allele

Bakermans-Kranenburg et al. (2008). Experimental evidence for differential susceptibility: Dopamine D4 receptor polymorphism (DRD4 VNTR) moderates intervention effects on toddlers' externalizing behavior in a randomized controlled trial. Developmental Psychology, 44, 293-300.
Effects of Meditation on Perceived Stress Moderated by BDNF

WHAT ABOUT CHILD CARE?
Childcare Quantity (7-36 mos.) and Executive Functioning (48 mos.) Moderated by Basal Cortisol (7 mos.)

Observed Quality of Child Care and Teacher-Rated Behavior Problems in Kindergarten


Institute for the Study of Children, Families and Social Issues
CONCLUSIONS

--Language for “upside plasticity”?  
--Domain specific or domain general?  
--Susceptibility: born and made--“born to be made”?  
--Implications for Intervention: Efficacy vs. Equity?