Behavioral Exposures, Genetics, and Early Onset Physical Aggression

Genetic susceptibility to **aggression** interacts with parenting and **behavioral exposures** increasing risk of **early onset physical aggression**.

General Information	
Broad Focus Area	Injury
Background and Justification	Two developmental trajectories for antisocial behavior have been proposed: "life-course persistent" and "adolescence-limited" antisocial behavior. Life course persistent antisocial behavior was proposed to appear as early as preschool, and be characterized by severe persistent aggression accompanied by multiple problem behaviors including, noncompliance, lying, stealing, poor academic performance, truancy, early and excessive alcohol and drug use during adolescence.[1] Genetic susceptibility, perinatal exposures (alcohol, drugs, malnutrition, hypoxia, or maternal stress) and/or unresponsive or insensitive parenting during the neonatal period result in abnormal brain structure (limbic and cerebellar vermis), abnormal neurotransmitter levels, and difficult temperament during infancy; and lag in development of verbal and executive brain functions at age two. The latter two factors interact synergistically with concomitant and subsequent inconsistent, unresponsive, rejectful, intrusive, hostile, or harsh parenting leading to chronic physical aggression (CPA). Warm and consistently responsive parenting will moderate the effects of difficult temperament and/or deficits in verbal and executive brain functions.
Prevalence/ Incidence	Approximately 4% of children have high levels of physical aggression from infancy to late adolescence (CPA).
Economic Impact	It is estimated that 25% of the tangible costs associated with violent crime in the U.S. is attributable to juveniles.[2] Based on this assumption and a 1996 report estimating the tangible costs of violent crime in the U.S., the estimated annual cost of juvenile violence in 2003 dollars was $24.3 billion.[3]

Exposure Measures			Outcome Measures	
Primary/ Maternal			***Primary/ Maternal***	
Methods			Methods	
Life Stage			Life Stage	.
Primary/ Child	- Parenting and behavioral exposures, particularly family stress - Family history of aggression, violence, crime - Bioreactivity		***Primary/ Child***	Early onset physical aggression
Methods	Biological sampling - Salivary cortisol Interview/questionnaire/medical and school records -Parenting style: nurturance,		Methods	- Questionnaire of caretakers (measuring child characteristics: cognitive, social, and behavioral) - School and medical records examination

	nurturance, discipline techniques -Measure of depression in parents -Measure(s) of child abuse: parental discipline style, records from child protective services			- Examination by a medical professional (behavioral testing)
Life Stage	Early childhood		Life Stage	Early childhood
Secondary/ Child	Genetic susceptibility to aggression			
Methods	Brain imaging during the first year would be needed to detect abnormal limbic and cerebellar vermis structure, gamma aminobutyric acid receptors, and levels of monoamine oxidase, serotonin, and dopamine.			
Life Stage	Birth onwards			

Important Confounders/Covariates	
Psychological factors such as temperament, hyperactivity, opposition, impulsivity, cognitive development, and social information processing deficits	Neurobehavioral dose-response effects of prenatal alcohol exposure may result in adverse behavior in childhood and adolescence.[4]
Family factors such as harsh, abusive, or neglectful parenting, lack of parental supervision, family conflict, and parental criminality or substance abuse	Poor parent-child relationships, lack of supervisions, low parental involvement, as well as family conflict appear to have an impact on aggression.[5, 6]
Other environmental exposures such as obstetrical complications, head injuries, prenatal exposure to alcohol, drugs, cigarette smoke, and lead	Obstetrical complications, head injuries, prenatal exposure to alcohol, drugs, cigarette smoke, and lead could lead to increased risk of aggression.[7, 8]

Population of Interest		Estimated Effect that is Detectable
All Children; Some sub-studies could be done on high risk samples, i.e., parents with a history of behavior problems.		

Other Design Issues	
Ethical/Burden Considerations	A variety of conditions may be encountered and require intervention, including: Child abuse and neglect, unsafe parenting practices, unsafe environments, serious aggression, and other antisocial behavior by the children.
Cost/Complexity of Data Collection	Some development of measures will likely be needed. Multiple contacts during the first year of life would be essential to establish parent-child interactions.

References:

[1] Moffitt, T. (1993). Adolescence-Limited and Life-Course Persistent Antisocial Behavior: A developmental taxonomy. *Psychological Review 100*, 674-701.

[2] Miller TR, Fisher DA, and Cohen MA. 2001. Costs of Juvenile Violence: Policy Implications. Pediatrics 107(1): p. e3.

[3] Miller TR, Cohen MA, Wiersema B. 1996. Victim Costs and Consequences: A New Look. Washington, DC: Government Printing Office; National Institute of Justice Research Report NCJ 155281 and US General Printing Office 495-037/20041.

[4] Streissguth AP, Sampson PD, et al. 1989. Neurobehavioral dose-response effects of prenatal alcohol exposure in humans from infancy to childhood. Annals of New York Academy of Science. 562: 145-158.

[5] Keenan K and Shaw DS. 1994. The development of aggression in toddlers: a study of low-income families. Journal of Abnormal Child Psychology. 22: 53-77.

[6] Moffitt T. 1993. Adolescence-limited and life-course persistent antisocial behavior: a developmental taxonomy. Psychological Review. 100: 674-701.

[7] Fergusson DM, Woodward LJ, et al. 1998. Maternal smoking during pregnancy and psychiatric adjustment in late adolescence. Archives of General Psychiatry. 55: 721-727.

[8] Fergusson DM, Horwood LJ, et al. 1993. Maternal smoking before and after pregnancy: effects on behavioral outcomes in middle childhood. Pediatrics. 92: 815-822.