

Bruce Ellis **Research Statement**

Overview

As an overarching goal of my career, I seek to leverage knowledge from both evolutionary biology and developmental science to address core issues in developmental psychopathology, especially in relation to child and adolescent health. At a macro level, this involves theory development: advancing new models of how our biobehavioral systems respond to specific features of family environments and the larger ecological context. This work employs life history theory to model how these responses regulate stress-health relations over the life course. At a more micro level, my work focuses on theory testing: examining the impact of fathers, family relationships, and socioecological conditions on children's biological stress responses, timing of puberty, risky adolescent behavior and cognition, and related health outcomes. Although my research has shown replicable effects of families and ecological stress on these developmental outcomes, the size of these effects differs across individuals. That is, some children are more impacted by their rearing experiences than are others. Another focus of my research, therefore, is on investigating differences between children in their neurobiological susceptibility to environmental influence (i.e., biological sensitivity to context). My work involves both basic research and real-world applications in the form of theoretically-based interventions.

Impact

Among faculty in the two departments in which I have an appointment, Psychology and Anthropology, my research was the second most cited on Google Scholar over the last five years; $N = 8457$ citations since 2016 (1/23/2021). In addition, among faculty in these two departments, my research has the highest Total Research Interest (TRI) score on ResearchGate; $TRI = 7252$ (1/23/2021). TRI is an index of the extent which one's research is cited, recommended, and read by other researchers.

In 2019, I received the *Distinguished Contributions to Interdisciplinary Understanding of Child Development Award* from the Society for Research in Child Development.

Research in the Hidden Talents Lab at the University of Utah

During my 5 years at the University of Utah, a major focus of my research has been on the development of "hidden talents" in adversity-exposed youth. This work, which is conducted in collaboration with Dr. Willem Frankenhuis (Utrecht University), presents an evolutionary-developmental theory of resilience focusing on specific abilities that are enhanced as a result of growing up under harsh conditions (i.e., hidden talents). Our research attempts to flip the narrative on traditional deficit-based approaches to understanding development under stress. Such approaches, we argue, are incomplete because they miss how individuals adapt to their environments by fine-tuning their cognitive abilities to solve recurrent problems faced in their local ecologies. These abilities, moreover, can be used to enhance intervention outcomes and resilience in youth from diverse backgrounds (see Ellis, Bianchi, Griskevicius, and Frankenhuis, 2017, *Perspectives on Psychological Science*; Ellis, Abrams, Masten, Sternberg, Tottenham, & Frankenhuis, 2020, *Development and Psychopathology*; Frankenhuis, Young, & Ellis, 2020,

Trends in Cognitive Science; Frankenhuus, de Vries, Bianchi, & Ellis, 2020, *Developmental Science*).

The central goal of the hidden talents research program is to advance a new theory of resilience, which focuses on leveraging hidden talents to foster success in education, jobs, and civic life. Although our model of resilience was only first published in 2017 (Ellis et al., 2017), it has become well known and cited in the field. Our recent paper updating and extending the theory (Ellis et al., 2020) has received a remarkable response from other scientists, including extensive commentary ranging from supportive to challenging (see attached documents: *Ellis--Adaptation-based approach to resilience--Uplifting comments and questions*; *Ellis--Adaptation-based approach to resilience--Challenging questions and responses*). These responses testify to the influence that the theory is having on how the field conceptualizes resilience.

My research in the Hidden Talents Lab at the University of Utah has been supported by a variety of foundations (Sorenson Legacy Foundation, James S. McDonnell Foundation, Jacobs Foundation, Consortium for Families & Health Research, and the Robert Wood Johnson Foundation). I directed the interdisciplinary Robert Wood Johnson Foundation Research Network on Cognitive Adaptations to Childhood Stress (2016-2019), which supported theory development and research on hidden talents. This led to a large, *preregistered* study of hidden talents among socioeconomically diverse middle school students in the greater Salt Lake City area. We recently completed the study (just before the pandemic!), successfully recruiting over 600 students from local Boys & Girls Clubs and public schools. The first two papers from this project are currently in preparation (including Susan Brener's Masters Thesis).

Research on Stress-Health Relations

A major focus of my research is on stress, development, and health. I co-developed the theory of Biological Sensitivity to Context (Boyce & Ellis, 2005; Ellis et al., 2005, 2011) and its recent extension the Adaptive Calibration Model (Del Giudice, Ellis, & Shirtcliff, 2011; Ellis & Del Giudice, 2014, 2019; Ellis, Del Giudice, & Shirtcliff, 2017). This work presents a novel evolutionary-developmental theory of childhood stress and biosocial development that has been influential in guiding research on stress-health relationships and resilience. Biological Sensitivity to Context theory proposes that children differ in their susceptibility to environmental influence in a “for better and for worse” manner, depending on their psychobiologic reactivity to stress. In this work, more reactive children (as indexed by heightened autonomic or HPA responses to laboratory challenges) display heightened sensitivity to both positive and negative environmental conditions. Metaphorically, we have referred to these sensitive individuals as *orchid children*, signifying their special susceptibility to both highly stressful and highly nurturing environments. In contrast, individuals scoring low on stress reactivity have been designated as *dandelion children*, reflecting their relative ability to function adequately across a wide range of species-typical conditions. Our research on biological sensitivity to context suggests that the very characteristics that are often thought of as children's frailties (e.g., high stress reactivity) can also be their strengths, given the right context (Boyce & Ellis, 2005; Ellis, Boyce et al., 2011; Ellis, Shirtcliff et al., 2011; Sijtsema et al., 2013). My current work in this area focuses on delineating “What is an orchid child?” in terms of neurobiological profiles, susceptibility to different kinds of childhood stressors (e.g., harsh vs. unpredictable family environments), and the specificity of these effects in relation to different developmental

outcomes (e.g., externalizing versus internalizing behavioral problems). More recently, we have begun investigating temperament and sensory processing sensitivity as indicators of biological sensitivity to context (Slagt, Dubas, van Aken, Ellis, & Deković, 2017, 2018; Slagt, Dubas, Ellis, van Aken, & Deković, 2018).

The Adaptive Calibration Model focuses on development of biological sensitivity to context and its consequences. The main elements of the theory are an evolutionary analysis of the functions of the stress response system; a theory of adaptive matching between stress responsivity patterns and environmental conditions; and a taxonomy of prototypical responsivity patterns, including their neurobiological markers, behavioral correlates, and developmental trajectories. The significance of the Adaptive Calibration Model has been recognized by Megan Gunnar (a leading scholar in the area of childhood stress and physiological- and self-regulation), who writes: “The field has two major theories for talking about stress and health: the Allostatic Load Model, which grew out of biological and neuroscience approaches to understanding health and disease, and the Adaptive Calibration Model, which developed out of an explicitly evolutionary-developmental framework.”¹ Preliminary data have provided empirical support for some of the key predictions of the Adaptive Calibration Model (Del Giudice, Hinnant, Ellis, & El Shiekh, 2012; Ellis, Oldehinkel, & Nederhof, 2017; Shakiba, Ellis, Bush, & Boyce, 2020). A coordinated effort involving researchers from multiple disciplines is now needed to extend and refine the model’s assumptions and test its novel predictions on existing and newly collected datasets. My most recent work focuses on testing the Adaptive Calibration Model in relation to the oxytocinergic system (Ellis, Horn, Carter, van Ijzendoorn, & Bakermans-Kranenburg, 2021).

Research on Developmental Regulation of Sexual and Reproductive Strategies

Much of my theoretical and empirical work examines links between childhood experience and sexual development. This work stands on the shoulders of a landmark theory, first presented in 1991 by Jay Belsky and colleagues, linking childhood experience, interpersonal orientation, and reproductive strategy. This theory posited that levels of stress and support in extra-familial environments influence family dynamics (marital relationships, parent-child relationships), thereby shaping children’s early emotional and behavioral development and, through it, subsequent sexual development and behavior in adolescence and beyond. I have taken the lead role in a series of prospective, longitudinal investigations that have tested core propositions derived from this theory, particularly regarding relations between family environments and pubertal timing (e.g., Ellis et al., 1999, 2003, 2012; Ellis & Garber, 2000; Ellis & Essex, 2007; Tither & Ellis, 2008; Ellis, Shirtcliff et al., 2011; James, Ellis et al., 2012).

Based on my theoretical and empirical work, my colleagues and I have advanced a series of revisions and extensions of Belsky’s original theory, including a reanalysis of family environments to distinguish between harsh-conflictual and warm-supportive family dynamics and their relative effects on pubertal maturation (Ellis et al., 1999); development of a complementary theory of paternal investment that emphasizes the unique effects of fathers and other adult males in regulation of daughters’ sexual development (Ellis et al., 1999, 2003, 2012; Ellis & Garber, 2000; Ellis, 2004; Ellis & Essex, 2007; Tither & Ellis, 2008; Deardorff, Ellis et al., 2011); development of an alternative theory of the function of pubertal timing as a

¹ Hostinar, C.E. & Gunnar, M.R. (2013). The Developmental Effects of Early Life Stress: An Overview of Current Theoretical Frameworks. *Current Directions in Psychological Science*.

mechanism for calibrating the length of childhood to match the quality of family environments (Ellis, 2004; Ellis & Essex, 2007); reconceptualization of childhood stress as constituting two fundamental dimensions of variation—harshness and unpredictability—that ultimately guide reproductive development (Ellis, Figueredo, et al., 2009; Brumbach, Figueredo, & Ellis, 2009; Belsky, Schlomer, & Ellis, 2012; Cabeza De Baca, Barnett, & Ellis, 2015; Young, Frankenhuis, & Ellis, 2020); incorporation of the importance of changes in childhood conditions during sensitive age periods as a critical factor in early pubertal development (Tither & Ellis, 2008); and development of a mediational model linking socioeconomic status, psychosocial stress in families, fat deposition in middle childhood, and onset of puberty (Deardorff et al., 2011; Ellis & Essex, 2007).

Currently, the main focus of my work moving forward in this area is to further develop my research program on the effects of fathers on sexual development in daughters. I am particularly interested in (a) further testing the *causal* relationship between low paternal investment and accelerated pubertal development, risky sexual behavior, and early reproduction in daughters and (b) investigating what proximal psychological changes occur in response to paternal absence or disengagement that promote these sociosexual outcomes. To address these issues, my recent NSF grant (*Collaborative Research: Impact of Fathers on Risky Sexual Behavior and Decision-Making in Daughters*) involved a powerful natural experiment and a series of randomized experiments to examine the impact of paternal absence and disengagement on young women's sexual psychology and risky sexual behavior—to determine *whether* and *how* fathers influence daughters' sociosexual outcomes. This work implements a genetically- and environmentally-controlled sibling-comparison methodology (Tither & Ellis, 2008; Ellis, Schlomer et al., 2012; DelPriore, Schlomer, & Ellis, 2017; DelPriore, Shakiba, Schlomer, Hill, & Ellis, 2019; DelPriore, Hill, Brener, & Ellis, 2020), which examines the effects of differential exposure of sisters within families to father absence and investment while growing up, and randomized experiments that investigate the effects of paternal disengagement on women's perceptions of male mating behavior and intent (DelPriore, Proffitt Leyva, Ellis, & Hill, 2018).