The Developmental Neurobiology of Moral Mindsets: Basic Needs and Childhood Experience

Mary S. Tarsha and Darcia Narvaez

Tarsha, M.S., & Narvaez, D. (2023). **The developmental neurobiology of moral mindsets: Basic needs and childhood experience**. In M. Berg & E. Chang (Eds.), *Motivation & morality: A biopsychosocial approach* (pp. 187–204). APA Books.

In this chapter, we describe the formation of neurobiological systems that are critical not only for well-being but also motivation—moral motivation in particular. We examine humanity's basic needs; the communal practices that humanity evolved to meet those needs; and the effects of need satisfaction or nonsatisfaction on the development of moral capacities, including dispositional mindsets. Basic needs, their satisfaction, and the resulting capacities are intertwined with motivation generally: We have innate motivations for basic need satisfaction to help us grow optimally; satisfaction of these needs early in life sets up capacities that contrast with impaired formation of capacities related to moral motivations that results from nonsatisfaction of these needs.

Basic Needs and Well-Being

Basic needs are built-in motivations for optimizing one's development and well-being. Several theorists have postulate multiple basic needs. Basic needs fundamental for *physical* well-being include food, shelter, sleep (Maslow, 1970), and positive touch, the latter being especially important for healthy physiological development, particularly during infancy (Field, 2002; Hertenstein, 2002; Montagu, 1986). Conversely, bodily integrity (Nussbaum, 2013) is violated not only by sexual abuse but also by corporal punishment (e.g., Gershoff & Grogan-Kaylor 2016). In addition to physical basic needs, *psychological* well-being is facilitated by a sense of safety (Maslow, 1970), trust (Erikson, 1950), belonging, and love (Maslow, 1970; Nussbaum, 2013), autonomy (Deci & Ryan, 1985), control (Fiske, 2004), competence (Deci & Ryan, 1985), and connection to the natural world (Louv, 2016), as well as self-actualization (Maslow, 1970), and play (Burghardt, 2005).

There are disagreements about which basic needs are most fundamental. For example, Erik Erikson (1950) identified trust (vs. mistrust) as a fundamental stage in the first year of life; recent empirical evidence demonstrates that positive touch from caregivers builds a healthy neurobiology (Field, 2002), which is fundamental to social trust in part through the mechanism of a well-functioning vagus nerve (Porges, 2011). When development goes well—that is, because of quality of the relational care received—the child establishes an inner state of trusting the world. However, if seeds of distrust have been planted in early life, a sense of disconnection and distrust may follow the individual throughout life, mitigated only if an intervention reshapes neurobiologically based attitudes.

In terms of basic need fulfillment, infants (before age 4 years) differ from older children because they are brain-immature, with rapid growth underway. To develop their biopsychosocial well-being, they need the simultaneous meeting of all aforementioned basic needs (as observed in our ancestral environment, small-band hunter–gatherers; Narvaez, 2013b, 2018a). Later in this chapter, we discuss how our ancestral environment provided for the basic needs of young children.

The shift to more cognitive capacities throughout childhood, adolescence, and adulthood brings to the fore additional basic needs. As development proceeds, cognitive advances yield a greater need to understand the surrounding world (Fiske, 2004), as demonstrated by children's

favored question of "Why." As they develop, growing children and adults have a need to experience a sense of purpose—Why am I here? (Staub, 2003). Answers to these questions are best grounded in safe, stable, and nurturing relationships (Garner et al., 2021) that provide the type of support needed to explore and make positive meaning of the world throughout the course of development (Benson et al., 2011; Bronfenbrenner, 1979).

Converging evidence suggests that meeting basic needs fosters the kinds of mindsets that promote prosociality and capacities for relational attunement and communal imagination that undergird compassion (Narvaez, 2014). To understand further how basic needs promote prosociality, we begin with the Evolved Developmental Niche, the system of care that evolved to meet the basic needs of developing persons.

Meeting Basic Needs: The Evolved Developmental Niche

The human genus spent 99% of its history in small-band hunter–gatherer communities, or nomadic foragers, some of which are still in existence and have been studied by anthropologists (Hewlett & Lamb, 2005). The noncivilized, nonindustrialized, "preconquest" lifestyle, worldview, and consciousness apparent in these and similar societies are quite different from those of advanced industrialized societies (e.g., Narvaez, 2013b; Narvaez & Tarsha, 2021; Sorenson, 1998).

One of the most striking commonalities found among foragers worldwide is the developmental system for raising the young (Hewlett & Lamb, 2005), what we call the evolved nest or *Evolved Developmental Niche* (EDN; Narvaez, Gleason et al., 2013). The EDN is the ecological system of care that evolved to meet basic needs and optimize early life development, when human brains are highly immature and rapidly develop in response to physical and social experience. The EDN is provisioned by a community and includes seven components: (a) soothing perinatal experiences; (b) touch, being held, or kept near others constantly; (c) caregiver prompt and appropriate responses to keep the baby optimally aroused; (d) breastfeeding on request frequently (two to three times/hour initially) and, on average, for 4 years; (e) multiple *allomothers*—frequent care by responsive individuals other than mothers (fathers and grandmothers, in particular); (f) multiage, self-directed free play in nature; and (g) high social embeddedness. Converging evidence from developmental psychology (Kim et al., 2011), neuroscience (Schore, 2003), evolutionary biology (Carter & Porges, 2013), and epigenetics (Champagne, 2018) suggests that each component of the EDN is a critical variable in shaping neurobiological processes that undergird an individual's health and well-being, as well as sociomorality (Narvaez, 2014). Although there are differences in specifics, nomadic foragers live with considerable physical stress (from our perspective) but low social stress because throughout their lives they receive generous support from other members of the community (Ingold, 2005). The ancestral context is relationally rich, providing for all basic needs in a communally oriented, mutually responsive sharing culture (Widlok, 2017)—companionship care (Narvaez, 2014), allowing each to develop in a species-normal manner.

Early care quality influences how well the child's right brain hemisphere develops, which grows more rapidly than the left hemisphere over the first 3 years of life (Schore, 2019a). Until age 3, neuronal blood flow and activity in the brain are primarily in the right side (Chiron et al., 1997; Schore, 2011). At 6 weeks of age (postnatal)—the same time many U.S. infants are placed in day care, where allomothering is minimally provided—the subcortical and cortical circuits in the right basolateral amygdala and right anterior cingulate begin a period of critical maturation (Schore, 2019a). Both structures are part of the limbic system and are critical for emotion-processing behaviors (Schore, 2019b). Like other neurobiological components, they develop in

an experience-dependent manner and require implicit maternal sensitivity and responsivity for proper development (Schore, 2019b).

Infant studies have demonstrated that *other-consciousness sympathy* is fundamental to human nature (Trevarthen, 2002). Newborns show an innate readiness for companionship, "a need and a skill for exchange of motive states" that gives rise to "moral relating, in which the infant and his or her companion show concern for one another" (Trevarthen, 2002, p. 109). In the exchange of emotions, they sense one another, valuing one another's feelings. The human spirit and its sympathies, so well documented by infant studies, can be thwarted by unresponsive care, promoting instead alienation, humiliation, and shame.

Implicit maternal sensitivity, which supports infant right brain development, requires activation of the parent's right brain hemisphere. Kringelbach and colleagues (2008) used magnetoencephalography to investigate the neural signature of parental instinct, the part of the brain that responds visually and perceptually to their infants' changing cues. They found that the right hemisphere—specifically, the right fusiform gyrus—mediated parenting and perception. Additional studies have also affirmed the asymmetric role of the right brain in perceiving gestures, voices, faces, smells, and even pheromones (Brancucci et al., 2009). In short, responsive care depends on healthy implicit social processing precisely because responding to ongoing affective cues from the infant, in the moment, is an integral part of responsive parenting.

Apart from neuroimaging studies, mounting evidence from clinical research demonstrates the importance of quality relationships in shaping child outcomes. For example, in a large cross-cultural sample (N = 3,523 children between ages 6 and 13), Hambrick and colleagues (2019 investigated the relation among clinical ratings using the neurosequential model of therapeutics, which assesses four aspects of child development: (a) developmental adversity, (b) developmental relational health, (c) current relational health, and (d) central nervous system (CNS) functioning (capabilities across several brain-mediated developmental functions). Relational ill health in the first 2 months of life more strongly predicted negative current CNS functioning than at any other time point. In addition, *relational health* at 0 to 2 months—that is, the quality of caregiving and overall social support—was a stronger predictor of CNS functioning than was developmental adversity. Other studies have underscored the importance of this time period as relationally sensitive (Schneider-Hassloff et al., 2016; Turecki & Meaney, 2016) and its correspondence with healthy neurobiological functioning and right hemisphere functioning across development.

Responsive caregiving contributes to relational health, a broad outcome of the type of caregiver–child relationship that comprises EDN-consistent care. Although responsiveness is integral for neurobiological development, each of the other components of the EDN may also be vital (Narvaez, Panksepp, et al., 2013). We provide an extended example about the importance of positive touch, whose effects have been isolated in studies, because touch is intrinsic to the other EDN components and is fundamental in early life, with a lack of it leading to failure to thrive and numerous other adverse outcomes across the life span (Barnett, 2005).

Positive touch in infancy promotes healthy functioning in multiple systems, including healthy serotonin and dopamine levels (Field et al., 2005) and stress response (Feldman et al., 2010). Within the mother–father–infant triad, coordinated movement between physical proximity and affectionate touch coupled with synchronized social gaze increases plasma oxytocin, the social bonding hormone (Gordon et al., 2010). In addition, positive maternal touch generally supports the "social brain," the neuronal networks dedicated to interacting and processing the social world, such as practicing the capacity to be sensitive to the emotions, thoughts, and

interests of others and the ability to engage in meaningful social interactions. In a functional magnetic resonance study, maternal positive touch supported both resting brain networks and neuronal connectivity in 5-year-old children; those with mothers who provided low or minimal touch had lower brain connections in their right dorsal medial prefrontal cortex, an important part of the social brain that controls mentalizing (Brauer et al., 2016). James Prescott (1990, 1996), formerly of the National Institutes of Health, has examined data from more than 400 societies, observing that cultures that provided more physical touch (carrying) and breastfeeding in infancy had lower levels of aggression and violence in adulthood, an association that has been supported by others (e.g., Field, 1999). In contrast to positive touch, the detrimental effects of corporal punishment are well documented, with numerous cross-cultural studies, longitudinal investigations (Berlin et al., 2009; Gershoff et al., 2012), and large meta-analyses (Gershoff, 2002; Gershoff & Grogan-Kaylor, 2016) over a span of five decades that have identified the long-term consequences of harsh touch (e.g., spanking), including aggression.

In general, when the EDN is not provided, or trauma is experienced at sensitive times in development, such as unresponsive, distressing care; harsh touch; or corporal punishment, species-normal development may be thwarted. Lack of EDN provision equates to deprivation of children's needs, what we call *undercare*, shifting a child from an optimal trajectory to being at risk for dysregulation and disconnection. For example, undercare exacerbates the stress response system: the hypothalamic–pituitary–adrenocortical axis, which fosters stress reactivity (Lupien et al., 2009). The burgeoning field of stress research has shown the importance of continually meeting young children's needs for support in order to properly regulate and shape the hypothalamic–pituitary–adrenocortical axis (Gunnar & Quevedo, 2007). Thus, the social environment becomes embedded within the developing stress response system, a major component of self-regulation and sociality (Dich et al., 2015; McEwen, 2019; Schore, 2002). In this way, healthy physical and neurobiological processes, along with the basic building blocks of socioemotional intelligence, self-regulation and morality, can become impaired (Schore, 1997, 2002; Narvaez, 2014).

Motivated Minds

Basic needs fulfillment through EDN provision also influences the type of motivations that direct and drive a wide span of human behavior. Higgins (2011) suggested that motivation means "to have preferences that direct choices" (p. 41). He identified three types of motivations: (a) seeking to survive, (b) maximizing pleasure, and (c) being effective in life pursuits. Converging evidence suggests that each of these motivations is influenced by early life experience. For example, undercare in early life can enhance a *survival* motivation, from neurobiological shaping described earlier, one that is stress reactive, altering blood flow, attention, and perception. *Pleasure* focus is also shaped by early life experience. Human brains are set up to be addicted to people and to experience great pleasure from social relationships (Zellner et al., 2011). Thus, when the EDN is not provided, such as when an infant is routinely denied positive touch and responsive care (and instead consistently isolated in a crib or playpen for hours), the social pleasure systems can emerge underdeveloped (e.g., oxytocin system). A socially impoverished early childhood may replace social with nonsocial pleasure seeking, which is abnormal for a social mammal.

In addition to seeking survival and pleasure, Higgins (2011) found a third type of motivation by answering the question "What do people really want?" He concluded that individuals want to be *effective in life pursuits*. This requires all sorts of tacit knowledge for getting along well in the world, including well-functioning executive functions, which are seeded

in the first year of life (Schore, 2019a), are typically the last cognitive function to reach adult levels (in the third decade of life), and are the first to show decline in aging adults (Wiebe & Karbach, 2017). Life pursuits can be colored by the settings of the other two motives, even moral pursuits.

Relating Neurobiology to Moral Motivation: Ethical Mindsets

Triune ethics metatheory (Narvaez, 2008, 2014, 2016, 2018a) examines *ethogenesis*, moral ontology from an evolutionary developmental systems standpoint (Narvaez, 2018b). This metatheory integrates neuroscience, evolutionary systems theory, and developmental and clinical research, postulating multiple potential ethical mindsets that shift based on the situation. Mindsets emerge from individualized neuroception and neurobiological functions, involving social approach and avoidance in ways patterned in early life through epigenetics and plasticity (differing from ontological developmental patterns that distinguish humans from other apes; Tomasello, 2019). A mindset shapes motivation in the moment, affecting perception, affordances, and actions; when guiding behavior, it becomes an ethic (Narvaez, 2013a). Mindsets are situational but can become dispositional based on early life experience when neurobiological structures are tailored. Species-normal dispositional mindsets are shaped by the EDN and are evident among nomadic foragers. These include *social engagement*—enjoyable, flexible, relational attunement in the moment—and *communal imagination*: the use of abstraction toward benevolent, connected planning that is inclusive of the wider community. On the other hand, routine undercare (lack of the EDN) and significant trauma can lead to a self-protectionist orientation to the social life, characterized by aggression and oppositionalism, and withdrawal and subordination, based in various forms of dysregulation (Narvaez, 2014). Face-to-face self-protectionism can be helpful for acute situations but becomes antisocial when dispositional. Self-protectionist dispositions undergird corresponding abstracting mindsets such as calculating protectionism, which is built-on oppositionalism, used to manipulate or harm others; and a relationally and emotionally detached imagination, which is built on disconnected withdrawal.

Some might argue that it would be helpful to have a stress-reactive brain in a dangerous, uncertain world. A little vigilance certainly may be good for today's world, but not the sustained vigilance that is commonplace in hyperreactive individuals. Stress reactivity from early trauma can imprison and impair an individual over the long term. In this case, the individual is conditioned to react instead of freely choosing to act.

Triune ethics metatheory provides an explanation for how cooperative sociality and morality are embodied, dynamic processes (Narvaez, 2014). Both require the integration of and interplay between reasoning and emotions, between neurobiology and perception of context (Narvaez, 2010, 2016). The interplay among these systems requires extensive flexibility, not only on the inside, among neurobiological systems, but also, on the outside, via flexible responsiveness to changing contexts and situations. The neurobiological ability to shift and adapt to changing contexts is grounded in multiple systems. One system involves the vagus nerve, the tenth cranial nerve, a branch of the parasympathetic nervous system of the CNS that controls rest, digestion, social engagement and feelings of safety (Porges, 2011). The name *vagus* is Latin for "wandering," indicating the vast length and trajectory of the nerve as it begins in the brainstem and travels throughout the body to innervate the heart, lungs, liver, digestive tract, and immune system (Mazzone & Undem, 2016).

There are two types of vagal functioning: (a) *vagal tone* (baseline functioning) and (b) *vagal flexibility* (contextual functioning). The connection between vagal baseline functioning and socioemotional development makes sense when one considers that one vagal pathway is a

neuroanatomical and neurophysiological link between the regulation of the striated muscles of the face (via the brain stem), the larynx, and the regulation of the autonomic nervous system. The muscles of the face and larynx are connected to the heart by means of the vagus nerve, which lends itself to social interaction. The connections among heart, voice, emotion, and face make it possible to express emotional states on the face and in the voice, thereby conveying one's emotions to others. In this way, the vagus nerve provides the neuromechanical connections needed for social and emotional expression and perception. The vagus nerve is a critical neurobiological component needed to support physiological states and feelings of prosocial behavior such as empathy, compassion, social attachment (social bonds), feelings of safety (Porges, 2017), and emotional regulation (Bryant & Hutanamon, 2018; Carter & Porges, 2013; Flores & Porges, 2017; Movahed Abtahi & Kerns, 2017). Thus, baseline functioning or vagal tone is considered a biomarker for sociality (Carter & Porges, 2013); feelings of safety (Porges, 2017); and prosocial behaviors, such as empathy and compassion (Diamond et al., 2012).

Similar to other neurobiological systems, the development of vagus nerve functioning is sensitive to social environmental influences and caregiving environments. Early experiences that are rich in responsive care shape the functioning of the vagus nerve to operate in a regulated, adaptive manner (Clark et al., 2016; Musser et al., 2011; Shahrestani et al., 2014). Conversely, early experiences deprived of responsive care yield children with dysregulated vagal functioning (Skowron et al., 2014). How well the vagus nerve functions can persist across development and can influence sociomoral capacities. For example, in the first months of life, greater vagal tone (healthy functioning) predicted greater emotional regulation, attention, and self-control and decreased behavior problems at age 5 years (Feldman, 2009). At 3 years of age, children with lower resting baseline vagal tone and stronger recovery from stress demonstrated greater sympathy in subsequent years (ages 6 and 7; Taylor et al., 2015). Vagal tone functioning in infancy and early childhood predicts development of adaptive skills related to morality in middle childhood, including sympathy, emotional regulation, attention, behavior problems, and self-control (Feldman, 2009; Taylor et al., 2015). Childhood experiences have also been associated with vagal tone in adult samples. In a recent vagal tone study, women (N = 78) reported on childhood EDN history and adverse childhood experiences (Tarsha & Narvaez, 2022). EDN history moderated the negative influences of adverse childhood experiences on women's vagal regulation, suggesting that the EDN buffers adversity by supporting the physiological building blocks of health and resilience.

Vagal tone has been identified as a neural pathway to compassion (Porges, 2017; Stellar et al., 2015) and cooperative behavior (Beffara et al., 2016), including prosociality (Kogan et al., 2014). In adults, moral judgment has been linked with neuro–visceral integration, such that individuals with high vagal tone report higher deontology scores (emphasis on duty-based morality) compared with those with low vagal tone, who report higher scores of utilitarianism (Park et al., 2016).

Connecting the Evolved Developmental Niche, Basic Needs, and Sociomoral Functioning

In our work, we are beginning to delineate the connections among EDN-consistent childhoods, moral behavior, and vagal functioning. For example, in our analyses with 6-year-old children, EDN-consistent experiences supported physiological functioning, as measured via vagal functioning, and this, in turn, mediated moral behavior (Tarsha et al., 2022). Put more specifically, experience of frequency of free play in the last week, an indicator of EDN-consistent experience, predicted higher vagal functioning (more parasympathetic activation), which mediated social oppositional behavior. This suggests that play, a critical component of the

EDN, may shape physiological regulation and buffer against social oppositional behavior. However, maternal sociomoral behavior may also influence how children physiologically react. In separate analyses, maternal self-protectionist behavior was associated with children's parasympathetic regulation, in other words, lower vagal tone (Tarsha et al., 2020). In one cross-cultural study (United States: $N = 525$, China: $N = 379$), child well-being, sociality, and sociomoral temperament (protectionism or engagement) were examined (Narvaez et al., 2021). Mediation analyses demonstrated that sociomoral temperament mediated relations between well-being (happiness, thriving, depression, and anxiety) and social outcomes (empathy, concern after wrongdoing, internalized conduct, inhibitory control, and misbehavior) in both samples, with engagement slightly outperforming protectionism. The findings suggest that fostering early well-being may influence social outcomes through a child's developing sociomoral temperament. Taken together, the findings suggest that childhood experiences influence the development of moral behavior and physiological regulation in children in whose environments EDN consistency is associated with engagement and EDN inconsistency is associated with indicators of self-protectionism.

Investigations of each EDN component and its relationship to socioemotional processing is still being conducted, but several connections have emerged. For example, in a recent study (Narvaez et al., 2019) that used cross-cultural samples (United States, $N = 574$; Switzerland, $N = 96$; China, $N = 382$), parents reported on young children's EDN-consistent experience in the past week. The EDN components included experiences of positive and negative touch, indoor and outdoor free play, and family togetherness inside and outside the home. Frequency of EDN component experience in the last week predicted children's social thriving, including social engagement with others, in all three countries.

In a survey study of U.S. adults (Narvaez, Wang et al., 2016; $N = 606$), a retrospective report of an EDN-consistent childhood predicted a social engagement orientation via a pathway through secure attachment, mental health (less anxiety and depression), and perspective taking. The less healthy paths linked lower scores on EDN-consistent childhoods to low secure attachment, worse mental health (higher anxiety and depression) predicting a reactive protectionism orientation[1] via low perspective taking, or, in a second path, predicting social withdrawal orientation via personal distress. In another survey of adults (Narvaez, Thiel et al., 2016; $N = 295$), the role of an EDN-consistent childhood history was examined regarding outcomes of moral behavior, in particular communal engagement behavior and social withdrawal behavior. In mediation analyses, EDN history predicted both types of moral behavior through secure attachment: a measure of psychological and physical health. For communal engagement behavior, the path included the social capacity of perspective taking; for social withdrawal, the social capacity mediator was personal distress. Of interest is that the direct path from EDN history to adult communal engagement behavior was also significant, demonstrating that the mediators contributed to, and were shaped by, EDN history, but the strength of EDN experience in childhood maintained direct effects on adult moral behavior. EDN history scores shaped, both directly and indirectly, forms of adult moral behavior in expected directions.

However, as we mentioned earlier, the role of basic needs in childhood is also an important contributor to developing moral capacities and moral behaviors. To examine this relationship, two additional studies were conducted with U.S. adults (Kurth & Narvaez, 2018). In the first sample ($N = 350$), EDN history and basic needs fulfillment history were investigated as they related to a social engagement orientation. Basic needs fulfillment was measured according to the Basic Needs Satisfaction Scale (Noble et al., 2018) with items corresponding to Fiske's

(2004) BUCET list: belonging, understanding, control, enhancing self, and trust. Two factors resulted: Effectance and Discouragement. Using mediation analyses, EDN history predicted adult social engagement orientation positively through Effectance and negatively through Discouragement in separate models. Of interest is that only the model with Effectance reduced the direct path from EDN history to engagement, indicating the importance of fulfilled childhood basic needs when examining adult social engagement orientation. In a second study of adults (*N* = 400), childhood histories of effectance and discouragement were investigated with regard to moral personality outcomes (honesty, forgiveness, distrust), orientation (communal, protectionist) and moral behavior (social engagement, communal, reactive protectionist, social withdrawal). In regression analyses controlling for EDN history and adult attachment, basic needs fulfillment predicted, in the expected directions, honesty, forgiveness, distrust, a communal imagination orientation, reactive protectionist behavior, and withdrawal protectionist behavior. Taken together, such evidence suggests that basic needs satisfaction in childhood leads to the development of capacities oriented toward communal relationality and social engagement.

Conclusions

Moral mindsets emerge from early experiences that shape neurobiological functioning for a lifetime, barring intervention. When basic needs are met and the EDN is provided in early childhood, a well-functioning interpersonal neurobiology facilitates the development of flexible sociality, as found in social engagement and communal orientations. In contrast, undercare from a degraded EDN and unmet basic needs impairs neurobiological development, enhancing innate survival systems. Consequently, the individual is more easily triggered, exhibiting protectionist mindsets and corresponding behaviors. In this case, motivation systems can be flavored by protectionism in situations of perceived threat, whether the motivation is surviving, maximizing pleasure, or being effective in life pursuits.

Because of their mutual influence, childhood experiences and interpersonal neurobiological development can be seen as pillars of adult well-being and moral functioning. Childhood experiences of support (basic needs met and EDN provided) lead to neurobiological structures that are apparent in physiological well-being and social well-being. For example, relational attunement relies on a regulated stress response system, and compassion relies on a well-functioning vagus nerve. On the other hand, dysregulated systems can impair health and sociality, boosting self-protective social orientations.

Considering the converging evidence regarding the connections among basic needs, EDN provision, well-being, and moral motivation, it seems appropriate that both researchers and practitioners examine these constructs together. Separating them can—and often does—lead to a skewed understanding of sociomoral development. For example, examining reactive or calculating protectionism without also investigating childhood experiences might lead to the conclusion that self-protectionist (self-centered) behavior is species normal rather than emergent from particular life histories.

In a world currently overwhelmed with self-protectionist attitudes and behaviors likely rooted in part in early undercare, restoring our species' EDN may be imperative. Self-calming capacities, as well-functioning stress response and vagus nerve allow, ground the flexible social intelligence sorely needed to address the numerous crises we face.

References

Barnett, L. (2005). Keep in touch: The importance of touch in infant development. *Infant Observation*, *8*(2), 115–123. https://doi.org/10.1080/13698030500171530

Beffara, B., Bret, A. G., Vermeulen, N., & Mermillod, M. (2016). Resting high frequency heart rate variability selectively predicts cooperative behavior. *Physiology & Behavior*, *164*(Pt. A), 417–428. https://doi.org/10.1016/j.physbeh.2016.06.011

Benson, P. L., Scales, P. C., & Syvertsen, A. K. (2011). The contribution of the developmental assets framework to positive youth development theory and practice. *Advances in Child Development and Behavior*, *41*, 197–230. https://doi.org/10.1016/B978-0-12-386492-5.00008-7

Berlin, L. J., Ispa, J. M., Fine, M. A., Malone, P. S., Brooks-Gunn, J., Brady-Smith, C., Ayoub, C., & Bai, Y. (2009). Correlates and consequences of spanking and verbal punishment for low-income White, African American, and Mexican American toddlers. *Child Development*, *80*(5), 1403–1420. https://doi.org/10.1111/j.1467-8624.2009.01341.x

Brancucci, A., Lucci, G., Mazzatenta, A., & Tommasi, L. (2009). Asymmetries of the human social brain in the visual, auditory and chemical modalities. *Philosophical Transactions of the Royal Society of London: Series B, Biological Sciences*, *364*(1519), 895–914. https://doi.org/10.1098/rstb.2008.0279

Brauer, J., Xiao, Y., Poulain, T., Friederici, A. D., & Schirmer, A. (2016). Frequency of maternal touch predicts resting activity and connectivity of the developing social brain. *Cerebral Cortex*, *26*(8), 3544–3552. https://doi.org/10.1093/cercor/bhw137

Bronfenbrenner, U. (1979). *The ecology of human development*. Harvard University Press.

Bryant, R. A., & Hutanamon, T. (2018). Activating attachments enhances heart rate variability. *PLoS One*, *13*(2), e0151747. https://doi.org/10.1371/journal.pone.0151747

Burghardt, G. M. (2005). *The genesis of animal play: Testing the limits*. MIT Press.

Carter, C. S., & Porges, S. W. (2013). Neurobiology and the evolution of mammalian social behavior. In D. Narvaez, J. Panksepp, A. N. Schore, & T. Gleason (Eds.), *Evolution, early experience and human development* (pp. 132–151). Oxford University Press.

Champagne, F. A. (2018). Beyond the maternal epigenetic legacy. *Nature Neuroscience*, *21*(6), 773–774. https://doi.org/10.1038/s41593-018-0157-6

Chiron, C., Jambaque, I., Nabbout, R., Lounes, R., Syrota, A., & Dulac, O. (1997). The right brain hemisphere is dominant in human infants. *Brain: A Journal of Neurology*, *120*(6), 1057–1065. https://doi.org/10.1093/brain/120.6.1057

Clark, C. A., Skowron, E. A., Giuliano, R. J., & Fisher, P. A. (2016). Intersections between cardiac physiology, emotion regulation and interpersonal warmth in preschoolers: Implications for drug abuse prevention from translational neuroscience. *Drug and Alcohol Dependence*, *163*(Suppl. 1), S60–S69. https://doi.org/10.1016/j.drugalcdep.2016.01.033

Deci, E., & Ryan, R. (1985). *Intrinsic motivation and self-determination in human behavior*. Academic Press. https://doi.org/10.1007/978-1-4899-2271-7

Diamond, L. M., Fagundes, C. P., & Butterworth, M. R. (2012). Attachment style, vagal tone, and empathy during mother–adolescent interactions. *Journal of Research on Adolescence*, *22*(1), 165–184. https://doi.org/10.1111/j.1532-7795.2011.00762.x

Dich, N., Hansen, Å. M., Avlund, K., Lund, R., Mortensen, E. L., Bruunsgaard, H., & Rod, N. H. (2015). Early life adversity potentiates the effects of later life stress on cumulative physiological dysregulation. *Anxiety, Stress, and Coping*, *28*(4), 372–390.

https://doi.org/10.1080/10615806.2014.969720
Erikson, E. H. (1950). *Childhood and society*. W. W. Norton.
Feldman, R. (2009). The development of regulatory functions from birth to 5 years: Insights from premature infants. *Child Development, 80*(2), 544–561. https://doi.org/10.1111/j.1467-8624.2009.01278.x
Feldman, R., Singer, M., & Zagoory, O. (2010). Touch attenuates infants' physiological reactivity to stress. *Developmental Science, 13*(2), 271–278. https://doi.org/10.1111/j.1467-7687.2009.00890.x
Field, T. (1999). American adolescents touch each other less and are more aggressive toward their peers as compared with French adolescents. *Adolescence*, *34*(136), 753–758.
Field, T. (2002). Infants' need for touch. *Human Development*, *45*(2), 100–103. https://doi.org/10.1159/000048156
Field, T., Hernandez-Reif, M., Diego, M., Schanberg, S., & Kuhn, C. (2005). Cortisol decreases and serotonin and dopamine increase following massage therapy. *The International Journal of Neuroscience*, *115*(10), 1397–1413. https://doi.org/10.1080/00207450590956459
Fiske, S.T. (2004). *Social beings: A core motives approach to social psychology*. New York, NY: Wiley.
Garner, A., Yogman, M., & The Committee on Psychosocial Aspects of Child and Family Health, Section on Developmental and Behavioral Pediatrics, Council on Early Childhood. (2021). Preventing childhood toxic stress: Partnering with families and communities to promote relational health. *Pediatrics*, *148*(2), e2021052582. https://doi.org/10.1542/peds.2021-052582
Gershoff, E. T. (2002). Corporal punishment by parents and associated child behaviors and experiences: A meta-analytic and theoretical review. *Psychological Bulletin*, *128*(4), 539–579. https://doi.org/10.1037/0033-2909.128.4.539
Gershoff, E. T., & Grogan-Kaylor, A. (2016). Spanking and child outcomes: Old controversies and new meta-analyses. *Journal of Family Psychology*, *30*(4), 453–469. https://doi.org/10.1037/fam0000191
Gershoff, E. T., Lansford, J. E., Sexton, H. R., Davis-Kean, P., & Sameroff, A. J. (2012). Longitudinal links between spanking and children's externalizing behaviors in a national sample of White, Black, Hispanic, and Asian American families. *Child Development*, *83*(3), 838–843. https://doi.org/10.1111/j.1467-8624.2011.01732.x
Gordon, I., Zagoory-Sharon, O., Leckman, J. F., & Feldman, R. (2010). Oxytocin, cortisol, and triadic family interactions. *Physiology & Behavior*, *101*(5), 679–684. https://doi.org/10.1016/j.physbeh.2010.08.008
Gunnar, M. R., & Quevedo, K. M. (2007). Early care experiences and HPA axis regulation in children: A mechanism for later trauma vulnerability. *Progress in Brain Research, 167*, 137–149. https://doi.org/10.1016/S0079-6123(07)67010-1
Hambrick, E. P., Brawner, T. W., Perry, B. D., Brandt, K., Hofmeister, C., & Collins, J. O. (2019). Beyond the ACE score: Examining relationships between timing of developmental adversity, relational health and developmental outcomes in children. *Archives of Psychiatric Nursing*, *33*(3), 238–247. https://doi.org/10.1016/j.apnu.2018.11.001
Hertenstein, M. J. (2002). Touch: Its communicative functions in infancy. *Human Development*, *45*(2), 70–94. https://doi.org/10.1159/000048154

Hewlett, B. S., & Lamb, M. E. (2005). *Hunter–gatherer childhoods: evolutionary, developmental and cultural perspectives*. Aldine.

Higgins, E. T. (2011). *Beyond pleasure and pain*. Oxford University Press.

Ingold, T. (2005). On the social relations of the hunter–gatherer band. In R. B. Lee & R. Daly (Eds.), *The Cambridge encyclopedia of hunters and gatherers* (pp. 399–410). Cambridge University Press.

Kim, P., Feldman, R., Mayes, L. C., Eicher, V., Thompson, N., Leckman, J. F., & Swain, J. E. (2011). Breastfeeding, brain activation to own infant cry, and maternal sensitivity. *The Journal of Child Psychology and Psychiatry*, *52*(8), 907–915. https://doi.org/10.1111/j.1469-7610.2011.02406.x

Kogan, A., Oveis, C., Carr, E. W., Gruber, J., Mauss, I. B., Shallcross, A., Impett, E. A., van der Lowe, I., Hui, B., Cheng, C., & Keltner, D. (2014). Vagal activity is quadratically related to prosocial traits, prosocial emotions, and observer perceptions of prosociality. *Journal of Personality and Social Psychology*, *107*(6), 1051–1063. https://doi.org/10.1037/a0037509

Kringelbach, M. L., Lehtonen, A., Squire, S., Harvey, A. G., Craske, M. G., Holliday, I. E., Green, A. L., Aziz, T. Z., Hansen, P. C., Cornelissen, P. L., & Stein, A. (2008). A specific and rapid neural signature for parental instinct. *PLoS One*, *3*(2), e1664. https://doi.org/10.1371/journal.pone.0001664

Kurth, A., & Narvaez, D. (2018). Basic needs satisfaction and its relation to socio-morality capacities and behavior. In D. Narvaez (Ed.), *Basic needs, wellbeing and morality: Fulfilling human potential* (pp. 91-133). New York: Palgrave-MacMillan.

Louv, R. (2005). *Last child in the woods: Saving our children from nature deficit disorder*. Workman.

Lupien, S. J., McEwen, B. S., Gunnar, M. R., & Heim, C. (2009). Effects of stress throughout the lifespan on the brain, behaviour and cognition. *Nature Reviews Neuroscience*, *10*(6), 434–445. https://doi.org/10.1038/nrn2639

Maslow, A. (1970). *Motivation and personality* (2nd ed.). Harper & Row.

Mazzone, S. B., & Undem, B. J. (2016). Vagal afferent innervation of the airways in health and disease. *Physiological Reviews*, *96*(3), 975–1024. https://doi.org/10.1152/physrev.00039.2015

McEwen, B. S. (2019). Prenatal programming of neuropsychiatric disorders: An epigenetic perspective across the lifespan. *Biological Psychiatry*, *85*(2), 91–93. https://doi.org/10.1016/j.biopsych.2018.10.005

Montagu, A. (1986). *Touching: The human significance of the skin*. Harper & Row.

Movahed Abtahi, M., & Kerns, K. A. (2017). Attachment and emotion regulation in middle childhood: Changes in affect and vagal tone during a social stress task. *Attachment & Human Development*, *19*(3), 221–242.

Musser, E. D., Backs, R. W., Schmitt, C. F., Ablow, J. C., Measelle, J. R., & Nigg, J. T. (2011). Emotion regulation via the autonomic nervous system in children with attention-deficit/hyperactivity disorder (ADHD). *Journal of Abnormal Child Psychology*, *39*(6), 841–852. https://doi.org/10.1007/s10802-011-9499-1

Narvaez, D. (2008). Triune ethics: The neurobiological roots of our multiple moralities. *New Ideas in Psychology*, *26*(1), 95–119. https://doi.org/10.1016/j.newideapsych.2007.07.008

Narvaez, D. (2010). Moral complexity: The fatal attraction of truthiness and the importance of mature moral functioning. *Perspectives on Psychological Science, 5*(2), 163-181.

https://doi.org/10.1177/1745691610362351

Narvaez, D. (2013a). Neurobiology and moral mindsets. In K. Heinrichs & F. Oser (Eds.), *Moral and Immoral Behavior: Theoretical and Empirical Perspectives on Moral Motivation* (pp. 289-307). Rotterdam: Sense Publishers.

Narvaez, D. (2013b). The 99%—Development and socialization within an evolutionary context: Growing up to become "A good and useful human being." In D. Fry (Ed.), *War, peace and human nature: The convergence of evolutionary and cultural views* (pp. 643–672). Oxford University Press.

Narvaez, D. (2014). *Neurobiology and the development of human morality: Evolution, culture and wisdom*. W. W. Norton.

Narvaez, D. (2016). *Embodied morality: Protectionism, engagement and imagination*. Palgrave-MacMillan. https://doi.org/10.1057/978-1-137-55399-7

Narvaez, D. (Ed.). (2018a). *Basic needs, wellbeing and morality: Fulfilling human potential*. Palgrave-MacMillan. https://doi.org/10.1007/978-3-319-97734-8

Narvaez, D. (2018b). Ethogenesis: Evolution, early experience and moral becoming. In J. Graham & K. Gray (Eds.), *The atlas of moral psychology* (pp. 451–464). Guilford Press.

Narvaez, D., Gleason, T., Tarsha, M., Woodbury, R., Cheng, Y., & Wang, L. (2021). Sociomoral temperament: A mediator between wellbeing and social outcomes in young children. *Frontiers in Psychology*, *12*, 742199. https://doi.org/10.3389/fpsyg.2021.742199

Narvaez, D., Gleason, T., Wang, L., Brooks, J., Lefever, J., Cheng, A., & The Centers for the Prevention of Child Neglect. (2013). The evolved development niche: Longitudinal effects of caregiving practices on early childhood psychosocial development. *Early Childhood Research Quarterly*, *28*(4), 759–773. https://doi.org/10.1016/j.ecresq.2013.07.003

Narvaez, D., Panksepp, J., Schore, A., & Gleason, T. (Eds.). (2013). *Evolution, early experience and human development: From research to practice and policy*. Oxford University Press.

Narvaez, D., & Tarsha, M. (2021). The missing mind: Contrasting civilization with non-civilization development and functioning. In T. Henley & M. Rossano (Eds.), *Psychology and cognitive archaeology: An Interdisciplinary approach to the study of the human mind* (pp. 55–69). Routledge.

Narvaez, D., Thiel, A., Kurth, A., & Renfus, K. (2016). Past moral action and ethical orientation. In D. Narvaez, *Embodied morality: Protectionism, engagement and imagination* (pp. 99-118). New York, NY: Palgrave-Macmillan.

Narvaez, D., Wang, L., & Cheng, A. (2016). Evolved developmental niche history: Relation to adult psychopathology and morality. *Applied Developmental Science*, *20*(4), 294–309. https://doi.org/10.1080/10888691.2015.1128835

Narvaez, D., Woodbury, R., Gleason, T., Kurth, A., Cheng, A., Wang, L., Deng, L., Gutzwiller-Helfenfinger, E., Christen, M., & Näpflin, C. (2019). Evolved development niche provision: Moral socialization, social maladaptation and social thriving in three countries. *SAGE Open*, *9*(2). https://doi.org/10.1177/2158244019840123

Noble, R., Kurth, A., & Narvaez, D. (2018). Measuring basic needs satisfaction and its relation to health and wellbeing. In D. Narvaez (Ed.), *Basic needs, wellbeing and morality: Fulfilling human potential* (pp. 17-49). New York: Palgrave-MacMillan.

Nussbaum, M. (2013). *Political emotions: Why love matters for justice*. Belknap.

Panksepp, J. (2004). *Affective neuroscience: The foundations of human and animal emotions*. Oxford University Press.

Park, G., Kappes, A., Rho, Y., & Van Bavel, J. J. (2016). At the heart of morality lies neuro–visceral integration: Lower cardiac vagal tone predicts utilitarian moral judgment. *Social Cognitive and Affective Neuroscience*, *11*(10), 1588–1596. https://doi.org/10.1093/scan/nsw077

Porges, S. (2011). *Polyvagal theory*. W. W. Norton.

Porges, S. W. (2017). *The pocket guide to the polyvagal theory: The transformative power of feeling safe*. W. W. Norton.

Flores, P. J., & Porges, S. W. (2017). Group psychotherapy as a neural exercise: Bridging polyvagal theory and attachment theory. *International Journal of Group Psychotherapy*, *67*(2), 202-222.

Prescott, J. W. (1990). Affectional bonding for the prevention of violent behaviors: Neurobiological, psychological and religious/spiritual determinants. In L. J. Hertzberg, G. F. Astrum et al. (Eds), *Violent behavior: Vol. 1: Assessment and intervention* (pp. 125–150). PMA Publishing. https://www.ojp.gov/ncjrs/virtual-library/abstracts/social-and-economic-context-violent-behavior-violent-behavior

Prescott J. W. (1996). The origins of human love and violence. *Pre- and Perinatal Psychology Journal*, *10*(3), 143–188.

Schneider-Hassloff, H., Straube, B., Jansen, A., Nuscheler, B., Wemken, G., Witt, S. H., Rietschel, M., & Kircher, T. (2016). Oxytocin receptor polymorphism and childhood social experiences shape adult personality, brain structure and neural correlates of mentalizing. *NeuroImage*, *134*, 671–684. https://doi.org/10.1016/j.neuroimage.2016.04.009

Schore, A. N. (1997). Early organization of the nonlinear right brain and development of a predisposition to psychiatric disorders. *Development and Psychopathology*, *9*(4), 595–631. https://doi.org/10.1017/S0954579497001363

Schore, A. N. (2002). Dysregulation of the right brain: A fundamental mechanism of traumatic attachment and the psychopathogenesis of posttraumatic stress disorder. *The Australian and New Zealand Journal of Psychiatry*, *36*(1), 9–30. https://doi.org/10.1046/j.1440-1614.2002.00996.x

Schore, A. N. (2003). Early relational trauma, disorganized attachment, and the development of a predisposition to violence. In D. Siegel & M. Solomon (Eds.), *Healing trauma: Attachment, mind, body, and brain* (pp. 101–167). W. W. Norton.

Schore, A. N. (2011). The right brain implicit self lies at the core of psychoanalysis. *Psychoanalytic Dialogues*, *21*(1), 75–100. https://doi.org/10.1080/10481885.2011.545329

Schore, A. N. (2019a). *The development of the unconscious mind*. W. W. Norton.

Schore, A. N. (2019b). *Right brain psychotherapy*. W. W. Norton.

Shahrestani, S., Stewart, E. M., Quintana, D. S., Hickie, I. B., & Guastella, A. J. (2014). Heart rate variability during social interactions in children with and without psychopathology: A meta-analysis. *The Journal of Child Psychology and Psychiatry*, *55*(9), 981–989. https://doi.org/10.1111/jcpp.12226

Skowron, E. A., Cipriano-Essel, E., Gatzke-Kopp, L. M., Teti, D. M., & Ammerman, R. T. (2014). Early adversity, RSA, and inhibitory control: Evidence of children's neurobiological sensitivity to social context. *Developmental Psychobiology*, *56*(5), 964–978. https://doi.org/10.1002/dev.21175

Sorenson, E. R. (1998). Preconquest consciousness. In H. Wautischer (Ed.), *Tribal epistemologies*

(pp. 79–115). Ashgate.
Staub, E. (2003). *The psychology of good and evil: Why children, adults, and groups help and harm others*. Cambridge University Press. https://doi.org/10.1017/CBO9780511615795
Stellar, J. E., Cohen, A., Oveis, C., & Keltner, D. (2015). Affective and physiological responses to the suffering of others: Compassion and vagal activity. *Journal of Personality and Social Psychology, 108*(4), 572–585. https://doi.org/10.1037/pspi0000010
Tarsha, M. S., Gleason, T., Cheng, Y., Wang, L., & Narvaez, D. (April, 2022). *Play predicts sociomoral learning mediated by respiratory sinus arrhythmia.* Learning through Play and Imagination: Expanding Perspectives (Society for Research in Child Development Special Topics Meeting).
Tarsha, M. S., Kurth, A., Gleason, T., Cheng, A., & Narvaez, D. (2020). Maternal antisocial behavior and age 6 child vagal tone across three conditions. *International Society for Developmental Psychobiology 53rd Annual Meeting Abstracts*.
Tarsha, M. S., & Narvaez, D. (2022). Effects of adverse childhood experience on physiological regulation are moderated by evolved developmental niche history. *Anxiety, Stress, and Coping, 35*(4), 488–500. https://doi.org/10.1080/10615806.2021.1989419
Taylor, Z. E., Eisenberg, N., & Spinrad, T. L. (2015). Respiratory sinus arrhythmia, effortful control, and parenting as predictors of children's sympathy across early childhood. *Developmental Psychology, 51*(1), 17–25. https://doi.org/10.1037/a0038189
Tomasello, M. (2019). *Becoming human: A theory of ontogeny*. Harvard University Press.
Trevarthen, C. (2002). Proof of sympathy: Scientific evidence on the co-operative personality of the infant, and evaluation of John MacMurray's "Mother and Child." In D. Fergusson & N. Dower (Eds.), *John MacMurray: Critical perspectives* (pp. 77–117). Peter Lang.
Turecki, G., & Meaney, M. J. (2016). Effects of the social environment and stress on glucocorticoid receptor gene methylation: A systematic review. *Biological Psychiatry, 79*(2), 87–96.
Widlok, T. (2017). *Anthropology and the economy of sharing*. Routledge.
Wiebe, S. A., & Karbach, J. (Eds.). (2017). *Executive function: Development across the life span*. Routledge. https://doi.org/10.4324/9781315160719
Zellner, M. R., Watt, D. F., Solms, M., & Panksepp, J. (2011). Affective neuroscientific and neuropsychoanalytic approaches to two intractable psychiatric problems: Why depression feels so bad and what addicts really want. *Neuroscience and Biobehavioral Reviews, 35*(9), 2000–2008. https://doi.org/10.1016/j.neubiorev.2011.01.003

[1]In Narvaez et al.'s (2016) article the term *social opposition* was used. The term used now is *reactive protectionism*.