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### Early attachment and trauma in human and non-human primates

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**EARLY ATTACHMENT AND TRAUMA IN HUMAN AND NON-HUMAN PRIMATES**

How do our relationships impact us?

**A thesis submitted to**

**Regis College**

**The Honors Program**

**in partial fulfillment of the requirements**

**for Graduation with Honors**

**by**

**Mary Roe**

**April 2024**

**Thesis written by**

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Director, Regis College Honors Program

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## ABSTRACT

Name: Mary Roe

Major: Psychology

EARLY ATTACHMENT AND TRAUMA IN HUMAN AND NON-HUMAN PRIMATES

Advisor's Name: Dr. Amanda Miller

Reader's Name: Dr. Rona McCall

The importance of social relationships for our survival and optimal development has been emphasized repeatedly in scientific literature. Research suggests that a child's initial relationships with their caregivers establishes their attachments and eventually mediates the child's sense of security in the world. If the child is adequately cared for, they will form a secure base to experience the world from. In this thesis, I explore research on attachments and parental deprivation in non-human primates. I contribute my own data on the maternal behaviors of Costa Rican mantled howler monkeys to reinforce the non-human primate literature. I then synthesize these findings in the context of human attachment literature, shedding light on the evolutionary and survival-oriented dimensions of attachments, and demonstrating their continued relevance in the modern human context. These deterministic findings on the effects of early trauma and dysregulated attachments can be disheartening to those who were denied love and support from a caregiver during infancy and childhood. Therefore, I question the degree of power our early attachments have on our long-term development and well-being by investigating resiliency and the human capacity to prosper in the context of trauma and disrupted attachments. Throughout this thesis, I aim to contribute valuable insights into the intricate interplay between early attachments, resilience, and overall human development, and ultimately suggest that our early attachments are not entirely deterministic of our long-term development.

## CHAPTER 1: Identity

I have always been intrigued by the question of what makes someone who they are: our personality, likes, dislikes, specific interests, and mannerisms. When I was younger, I remember viewing myself as a relatively independent being. I felt as though I directed my own interests and passions – I was the way I was simply because that was me, it was my intrinsic personhood. As I have grown older, I have seen more and more of the ways my childhood, upbringing, and environment have interweaved to form the person I am today. I began to understand that I am not a solitary, self-sufficient being on this planet, but that I am a reflection and extension of my parents, my environment, and my ancestors all conspiring in the creation of this present self.

The event that really put this renewed understanding of self into perspective was transitioning into college from out of state. Because I grew up with very constant and nurturing surroundings – I lived in the same house my whole life, had many of the same friends and family members present throughout my childhood and adolescence – I only understood the leverage of my external environment on my personhood when I drastically shifted my external environment. Moving to Colorado from Texas and surrounding myself with an entirely new social group allowed me to see which qualities of myself persisted and which adapted to my new environment. I began to notice the many ways I differed from my peers in things like social expectations, emotional resilience, openness, coping strategies, and conflict management. Although I encountered turmoil and distress in the transitions I faced throughout college, I maintain within me a sense of stability and perspective that allows me to face challenges confidently. I continuously attribute this to my upbringing and the opportunities I had to form secure, stable attachments.



When I consider my upbringing, a few things stand out to me as instrumental in developing a secure and resilient sense of self. From a young age I was engaged in many diverse and healthy social groups. I was also encouraged to try things on my own and pursue my own interests. I was raised by parents who valued time outside, getting messy, and playing. Most of all, I was always surrounded by people who loved and supported me, including not just my parents and brother, but my grandparents and cousins all living within close proximity to me. I think my cousins, in particular, were essential in my development.

I have five cousins on my mother's side who were my best friends growing up. We shared big parts of growing up together: sleeping over at each other's houses on the weekends, going to dance class together every Monday and Wednesday, and enduring the 12-hour drives to Destin, Florida every summer where we spent weeks playing on the beach. My cousins and aunt and uncle issued this close system of support that extended beyond my nuclear family. Having a group of five cousins allowed me to navigate through conflict and play effectively and mirror the development of my older cousin and brother. I think having this extended support group allowed for secure attachments to develop.

When my uncle became sick with cancer and eventually died in 2018, I watched the heartbreaking reverberations of this ruptured attachment on my cousins. The loss and separation of a parent disturbed their sense of security. When a traumatic loss like this happens, you realize that you are not always protected from danger and hurt and that some things just happen. Some experiences are out of your control.

Immediately after my uncle's death, I felt this urgency to do everything in my power to help my younger cousins grow into the loving, competent, healthy individuals I know they are capable of being, despite the loss and grief they had faced. Because I placed so much importance

on familial relationships, I was terrified that this trauma would permanently damage my cousins and cause them to be incapable of living happy lives. I did not want this loss to hinder their development and capacity to become the best versions of themselves. I watched as over the years since my uncle's death, my cousins not only grew, but they also prospered. I observed the ways having other systems of support in place, in our family and close friends, allowed this grief and pain to be shared and held. I became curious about how the effects of trauma and loss could be buffered and transformed into a quality of resilience. My cousins display a sense of resilience now because not only have they faced tragedy, but they have learned how to live with it.

It wasn't until I started interning at Central Visitation Program in the fall of 2022 while living in Denver that I really began to observe these effects of parental separation and estrangement in other families and in younger children. I began interning as part of their domestic relations team, where one parent was working to regain custody over a child(ren) while the child(ren) resided in custody with the other parent or caregiver. I would supervise visits between the child or children and the parent who was hoping to regain custody by attending court-ordered visitations. It was surprisingly easier for me to observe the effects of this separation on the parent than the children. The parent was typically enduring mental health or substance abuse issues, while desperately missing their child/children. The children, on the other hand, seemed relatively unaffected by the complication and instability of their situation. I began to really question what long-term developmental effects the children would face. Many of the parents I worked with expressed a similar concern, saying things like "she needs her mother," or "they need their father."

As I transitioned into working for the child welfare department at Central Visitation Program, I started working with children who had been removed from an unsafe living situation

by Child Protective Services and placed in the temporary care of a friend/family or foster care. I began to really question when it was more harmful for children to be separated from or living with their parents. I felt as though sometimes it was far more harmful for children to be living with parents who are incapable of taking care of their children than it was for children to be separated from their parents for an extended period. I wondered how we could ensure a healthy, safe development of children who were not safe living with their parents.

Although the children I was working with had not lost parents due to death, they had lost parents to addiction, incarceration, and mental illness. These parents were in their children's lives, but they no longer served the role of caregivers to their child. Many of the children were unable to know the stable, secure presence of the parent(s). Most of the children, however, knew this sense of love and security, then had to cope with the loss of it as parents faced addiction, incarceration, or other barriers.

Upon working with the families that I was assigned to and meeting the children, I again felt this urgency to understand what we can do to support these children and ensure that they have the same opportunities to flourish as other children. I also simply felt unequipped to support parents struggling with being separated from their children.

This need for a deeper understanding of how to ensure healthy development for children regardless of their external conditions is what inspired this thesis and research topic. To begin, I think it is important to examine where our needs for family and caregivers originate, and how they influence our development from birth. I want to understand how children bond and attach to caregivers in not only humans, but also in non-human primates. I observed this bonding and forming of attachments in non-human primates (monkeys) while taking a summer course in Costa Rica. Researching bonding and attachment in primates gives us not only a more expansive

selection of literature to examine, but it also gives insight into the ecological perspective of development and family relations. This ecological perspective brings awareness to the basic, survivalist functions of attachment and bonding. Studying primates could help us understand, fundamentally, where our needs for attachments and family structures originate.

In this thesis, I will investigate what caregiver/child attachments look like in primates and humans, as well as what infringes on these attachments. I will also touch on the ways we can respond to these disrupted bonds and attachments therapeutically. I aim to demonstrate that given the right opportunities for growth and support, we can compensate for early disrupted bonds and attachments, and even provide individuals with the means to become resilient to future challenges.

## CHAPTER 2: Attachment in Non-Human Primates

To begin this investigation on attachment, I wanted to look at non-human primate literature and how researchers define attachment. Although attachment has long been recognized as a process between caregiver and child, the nature and specific mechanisms of attachment have been debated by researchers. Some consider attachment to revolve around the child learning from the mother's face and form which signal when the child can be alleviated from states such as hunger and thirst (Harlow et al., 1959). This creates a need for affection and connection between the mother and child. Others emphasize the importance of innate needs for connection, such as sucking and nursing, temperature regulation, and the infant clinging on mother for transportation (Harlow et al., 1959). Attachment was once primarily regarded as a survival mechanism, where vulnerable infants must attach to their food supply and protection (their maternal figure) in order to promote survival (Ainsworth et al., 2015). However, it is now widely recognized for its deeper and more complex role in emotional regulation, cognitive development, and ultimately establishing a "secure base" for the infant (Ainsworth et al., 2015; Bowlby, 1969; Harlow & Harlow, 1962). Harry Harlow's surrogate mother studies were one of the first to demonstrate that primates develop attachment not necessarily to the provider of food, but to the provider of comfort (Harlow et al., 1959), suggesting the complex nature of attachment.

One mechanism of attachment is synchrony. Feldman (2007) reviewed the concept of parent-infant synchrony and its implications in child development as well as its biological foundations. She describes synchrony as a temporal coordination of distinct behaviors that regulates further expressions between those individuals involved. Synchrony is the coordination between parent and infant that serves as a form of communication and regulation, such as the baby moving its feet to the sound of the mother's voice. Synchrony seems to be an indicator for

empathy as well as self-regulation. This implies its importance in infant development and survival.

Sullivan et al. (2011) describe the bonding and early life attachment between the infant and caregiver as a symbiotic, dynamic process comprising a caregiver nurturing an infant and the infant responding with complementary behavior that then elicits more caregiving (Sullivan et al., 2011). The researchers assert that attachment appears to have two main functions: to ensure infant survival by remaining close to the caregiver, and secondly, to organize the brain in a way that outlines the emotional and cognitive development of the infant, specifically helping to define long-term emotional regulation (Sullivan et al., 2011). This assertion suggests that early childhood attachment goes beyond physical survival needs. We seek and need deeper comfort, touch, and care from our caregivers in order to survive and thrive. This understanding of attachment and bonding highlights the importance of integrating human and animal research so that we might better care for infants.

As a means to understand the impacts of caregiver-child attachment and bonding, many researchers, especially animal researchers, studied the behaviors of those who lacked a caregiver or had experienced abusive effects from a caregiver. Researchers have been studying the effects of early stress due to mother/infant separation in non-human primates for decades. Harry Harlow was one of the first researchers to demonstrate the emotional and cognitive effects of disruptions in mother-infant bonds. Harlow outlined rhesus monkeys' reactions to maternal separation. Several pairs of rhesus macaques were raised in total isolation chambers for the first 6 months of their lives (Harlow et al., 1971). The monkeys were then tested every day over the span of several months in a playroom with other macaques who had been raised normally (Harlow et al., 1971). The infants responded to the isolation with a "protest phase" consisting of increased

activity and vocalization, and physiological reactions (Harlow et al., 1971) as well as increased hypothalamic-pituitary-adrenal (HPA) function, demonstrating a heightened physiological reaction to stressors (Bayart et al., 1990). Ecologically, this “protest phase” helps increase the probability that the infant is found by its mother; however, the infant calls can attract predators which may further exhaust the infant (Kraemer, 1992). After one to two days, the infant will begin to calm down and decrease activity and play. Shortly after, the infants begin the “despair phase” where the infant conserves as much energy as possible in order to survive as long as possible. This includes inactivity, withdrawal, and failure to eat (Sanchez et al., 2001). Once again, we can see a demonstration of the need for physical attachment between mother and infant.

Other research has demonstrated the changes in behavior and physiological response to mother/infant separation in nonhuman primates. Bayart et al. (1990) found that infant rhesus monkeys who were separated from their mothers for a period of four days showed behavioral changes. While the infants who were in complete isolation from their mothers demonstrated depressive behaviors, those who were still able to see and hear but not make physical contact with their mothers showed increased agitated behaviors (cage shaking and biting).

There is also evidence of biological and neurological effects of maternal separation and early infant stress. Coe et al. (1978) studied the pituitary-adrenal response following separation of mother and infant squirrel monkeys. They measured the plasma cortisol levels of mothers and infants at various intervals of separation and found the cortisol levels to be extremely elevated in both the mother and infant after long intervals of separation. Four mother-infant pairs and a pregnant female were living in a social group (Coe et al., 1978). The plasma cortisol levels were tested in the mothers and infants after each of the following conditions: basal levels, 30 minutes

after momentary separation and reunion, 30 minutes after the infant was removed from the group, and 30 minutes after the mother was removed from the group (Coe et al., 1978). Plasma cortisol levels were significantly heightened in both mothers and infants after the separation, and the presence of a familiar monkey did not alter the response (Coe et al., 1978). This study illustrates the presence of a physiological attachment between the squirrel monkey mothers and infants. The agitated response that occurs when this attachment is physically separated only seems to be resolved when the mother and infant are reunited (Coe et al., 1978).

So, what are the long-term effects of these physiological, behavioral, and psychological alterations resulting from infant-caregiver separation and early infant stress? Some early and not-so-ethical studies have shown some of the severe, devastating effects of chronic disruption of the mother-infant bond and social deprivation in rhesus monkeys. Studies by Harlow et al. (1965, 1971) show that rhesus monkey infants separated from their mothers, peers, and social groups at birth and reared in “partial social isolation” (with visual and auditory contact but without tactile contact) for at least 6-12 months showed “tremendous long-term behavioral alterations, including the occurrence of autistic-like behaviors (stereotyped movements, compulsive non-nutritional sucking, and self-mutilatory behavior when animals reach puberty), lack of recognition of social cues and inability to develop normal social relationships, hyper-aggressiveness, and disoriented sexual behavior” (Sanchez et al., 2001, p. 436). In “total social isolation,” monkeys displayed even more severe effects, displaying extreme fearfulness and anxiety, and freezing in reaction to aggression from other animals. Overall, nonhuman primates subjected to prolonged periods of maternal or social deprivation suffer long-term behavioral effects, including fearfulness and anxiety as well as social and sexual dysfunction. There is also evidence of long-term alterations of ingestive behaviors (polydipsia and polyphagia) without affecting body weight (Miller,



Mirinsky, Caul, & Sakata, 1969). Research has also suggested a long-term decreased preference for sucrose. This could be indicative of anhedonia which is frequently associated with depressive states. Decreased preference for sucrose together with increased preference for quinine suggests insensitivity to gustatory stimuli (Paul, English, & Halaris, 2000). Social or maternal deprivation may cause alterations of immune function (Lubach, Coe, & Ershler, 1995) as well as altered sympathetic response to stressful stimuli (Martin, Sackett, Gunderson, & Goodlin-Jones, 1988). It is obvious that these early adverse experiences, particularly involving infant-caregiver relationships, have a way of “getting under the skin” of neurological, behavioral, and physiological development of infants (Sanchez et al., 2015). Beyond short-term variations in stress hormones and inflammation, research demonstrates the potential for early adverse experiences to create alterations in the gut microbiome, causing changes in neurotransmitters and thus the mental health of an infant’s brain (Borre et al., 2014; Cryan & Dinan, 2012). These early adverse experiences like maternal separation can also be translated into modular changes in DNA, causing epigenetic changes that are passed down from one generation to another (Champagne, 2008; Roth et al., 2009; Weaver et al., 2004). Because these effects can become so profound and prolonged, it is essential to investigate which tactics can negate some of the reverberations of early adverse experiences.

### **How can nonhuman primates respond to stress? Can attachment be re-learned?**

One of the ways we see primates confront stressful situations and help eliminate a stress response is by social buffering. Social buffering refers to the presence of another individual in a stressful situation that reduces or sometimes eliminates stress- and fear-induced responses in the context of mother-infant relationships (Sanchez et al., 2015). Stress- and fear-induced responses

are mostly referred to in terms of activation of the HPA axis, but stress-responses can go beyond hormonal signaling and include alterations in gut microbiome and even epigenetic modifications (Sanchez et al., 2015). Social buffering demonstrates the protective effects of social relationships on individuals' responses to stressful stimuli. In nonhuman primates, the maternal caregiver can serve as an external regulator of the infant's HPA axis, as the presence of a nurturing mother buffers HPA axis stress responses, particularly in infant rhesus macaques (McCormack et al., 2009; Sanchez, 2006). However, in the absence or estrangement from a maternal caregiver, surrogate mothers have an equal ability to buffer this HPA axis stress response (Hill, McCormack, & Mason, 1973; Sanchez et al., 2017).

Although social buffering has been identified as a stress management strategy in primates, some researchers question its effectiveness. Coe et al. (1978) showed that a stress response was not reduced by the presence of familiar animals. Plasma cortisol levels were significantly heightened in both mothers and infants after the separation, and the presence of a familiar monkey did not alter the response. This goes against the idea of social buffering and further demonstrates the distress implicated in mother-infant separation. It is important to continue to research the concept of social buffering to better understand the level of stress that can be modulated by social buffering and the impact of mother-infant separation.

Beyond social buffering, how else is it possible for monkeys to recover from periods of isolation and stress? Is it possible for monkeys to recover fully from extended periods of parent separation? Harlow and Suomi (1971) studied the effects of social isolation on social behaviors and how to best aid in the full social recovery of isolated monkeys. They describe several attempts at rehabilitation of isolated macaque monkeys (monkeys that were born and reared in

complete social isolation). Young isolates that were exposed to equal-age normal (not isolated) peers only recovered a limited amount of simple social response (limited and delayed play and limited threat response) (Harlow & Suomi, 1971). Some mothers also eventually showed acceptable maternal behavior after being forced to accept infant contact after a period of months. The study also examined the ability of isolated infants to develop crude interactive patterns among themselves after being exposed to surrogates.

The most impactful finding of the study was that when 6-month-old social isolates were exposed to 3-month-old monkeys, the isolates achieved a complete social recovery (Harlow & Suomi, 1971). Harlow placed the 6-month-old isolates with the 3-month-old “therapist” monkeys. The therapist monkeys were female rhesus monkeys who were separated from their mothers at birth but raised in a nursery with simplified surrogate mothers. The therapist monkeys had 2 hours a day of peer interaction, leading to relatively normal social development. Each isolate interacted with its paired therapist monkey for two hours a day, three days a week, for period of a month. Over the next 20 weeks, the number of playroom sessions involving two isolates and two therapists progressively increased as the original paired sessions decreased. By the time the isolates were one year old, their behaviors were scarcely distinguishable from the therapists. The isolates’ frequency of exploratory, play, and locomotive behaviors matched the therapists’, demonstrating a reversal of the isolation syndrome. The isolates also demonstrated a decline in self-clasping and huddling, suggesting a recovery from depressed behaviors after 6 months of interaction with the therapist monkeys (Harlow & Suomi, 1971).

This study demonstrates the ability to attain social rehabilitation even after prolonged periods of isolation and gives interesting insight into the best ways to go about this rehabilitation. The use of imitative learning for isolated monkeys to learn about socialization as the younger

monkeys pass through these stages shows we can effectively rehabilitate those who have been isolated. This study also demonstrates the effects when this imitative learning is absent. When parents or caregivers are not around to show what socialization and interaction looks like, children have no place to learn. These findings remind me of the importance of my older sibling and cousin in modeling behaviors. Having a guide to what healthy development looks like was extremely helpful as I was growing up. It also points to the need for role models for children in foster care and facing custody issues. Having a consistent older peer or adult could help facilitate positive social adaptation for children without a legal guardian.

The ability of Harlow's monkeys to achieve a complete social recovery in a supportive peer environment, even when separated from their mother, highlights the crucial role of our environment in recovering from trauma, neglect, or abuse. Ungar (2013) and Suomi (2005) note this significant role of the environment, suggesting that rhesus monkeys who have been abused or neglected will not necessarily have abnormal biobehavioral development, so long as their environment is benign. Monkeys that have experienced deprivation or trauma might exhibit variations in both brain structure and function, potentially transmitting these distinctions to their offspring through non-genetic mechanisms (Ungar, 2013). However, the extent to which individual animals adapt post-separation trauma is primarily influenced by the quality of their environment (Ungar, 2013). A facilitative environment has the potential to alter developmental pathways regardless of individual differences (Ungar, 2013).

## CHAPTER 3: Costa Rica: Attachment in Mantled Howler Monkeys

### **A reflection**

When I was offered the opportunity to observe monkeys in their natural habitat at La Selva, Costa Rica, I immediately accepted, knowing that this was an opportunity that would greatly contribute to my thesis and enrich my academic and personal life. I saw the opportunity to observe these social and familial dynamics in nonhuman primates first-hand, which I knew would make for an interesting addition to my investigation on attachment and loss. This was an experience that realized some of my younger self's wildest dreams, being a passionate nature and animal lover and advocate. Not many other experiences can bring you closer to nature than living in a cabin with the rain forest in your backyard for three weeks, venturing out into the jungle every morning to sit with the monkeys and all the other animals for hours on end. I was excited to explore deeper into the dynamic, strange relationship between humans and the natural world, particularly in our primate relatives.

I entered my research on mantled howler monkeys at La Selva with very little understanding of what animals are like in the wild. I didn't go to many zoos or aquariums as a child, so the representation I had of wildlife was the garden snakes in my front yard and the occasional deer, elk, or bunny, and of course, the many nature documentaries and National Geographic magazines I indulged in. But still, I held the impression that animals and wildlife were misunderstood, empathetic creatures that are far more similar to humans than we like to admit. And most of all, I thought that these primates would exemplify where we have gone wrong as humans in our relationship to nature, and how we fundamentally ought to live: immersed in and in harmony with the natural world. Although I maintain that animals are

misunderstood and many display characteristics of emotional intelligence, I never fully understood just how *wild* wildlife is.

The spider monkeys sling through the forest with their tall, slender bodies as their fierce, white-ringed eyes fearlessly stare you down. They are not cute or cuddly, but they are their own autonomous animals, doing their best to exist in an environment where survival is the primary goal of life. I witnessed one specific series of events that made the ferocity of these animals especially apparent to me: A female howler monkey was resting near her troop with her infant latched on to her stomach when two spider monkeys swung over to her. One of the male howler monkeys picked up on the approaching threat and stepped in front of the female and her infant. It seemed to me this was an attempt to guard the female and her infant and scare away the spider monkeys. If you have observed anything from spider monkeys, you know they are not afraid of starting a little trouble, and they did not shy away from the male howler's intimidation. I stared in shock through my binoculars as the spider monkeys proceeded to yank the tail of the infant howler monkey, playing a game of tug-of-war with the tiny infant as the howler mother did her best to hold on to her infant. The spiders finally ripped the infant from its mother and tossed it back and forth like a toy. The howler mother made several attempts to steal her infant back until finally the spider monkey dropped the infant several feet. Miraculously, the infant caught itself with its prehensile tail wrapped tightly around a branch as the mother ran to rescue it before the spider monkeys got to it once again.

Watching this sequence play out before my eyes was extremely distressing, and an abrupt awakening to the chaotic, unlawful world that nearly all other animals in the world live within. This complicated the way I viewed the relationship between humans and nature. It had always made sense to me before: as humans evolved from our primate ancestors, we gained a sense of

self-importance that separated us from the rest of nature. We disrupted the harmonious relationship between nature and animals by exploiting the other animals and nature around us to benefit our own security and way of life. This resulted in the formation of a large rift between humans and all other species so that we are now left walking a strange line of simultaneously wanting to immerse ourselves wholly into nature while also feeling as though we don't quite fit into it. But after spending time in the wilderness, I began to question this. I'm not sure I want to return to a world of public defecation and baby-snatching. What if that is not the answer? I started to reevaluate the role that humans can play in the story of evolution. I wondered how we can live in harmony with the natural world without having to reintegrate fully into it--while maintaining some degree of law and civil organization. I think indigenous civilizations provide some beautiful insight on this. They demonstrate that humans are not inherently evil and a curse to all forms of nature we encounter, but that we have the ability and responsibility to protect and advocate for the animals and ecology surrounding us. In *Braiding Sweetgrass*, Robin Wall Kimmerer (2013), asserts that humans are actually capable of creating a positive impact on the natural world, and that indigenous communities have been demonstrating this relationship for centuries. Kimmerer paints a clear picture for how humans can build an optimal relationship with their environment, and that this relationship is feasible.

In contemplating this dynamic relationship between humans and nature, I observed the stark ways that wildlife diverges from human life. These animals are not a function of the human narrative here to comply to our notions of morality and worth, but autonomous beings who exist in a realm of survival. They are worthy of life in their own right—not because of how cute they are or what value they bring to human life, but simply because they exist and serve an essential role in the functioning of this ecosystem. Importantly, in observing the sea of differences

between humans and nonhuman primates, I was able to isolate the similarities. Small things began to stand out as primal behaviors that have been passed along for centuries and continue to exist behind our deep layer of human evolution. One of these things was infant care.

The infant howler monkeys stay tightly clasped on to their mother's fur for at least the first five weeks of their lives (Balcells & Baró, 2009). When an infant is startled in some way, they immediately run back to the safety of their mother. I also observed how mothers would gather and watch their infants and juveniles play together. As the infants grow to be juveniles, the mothers push their juveniles off of them, challenging them to gain independence. I observed the importance of the infants having physical reassurance and touch that creates an attachment between the mother and infant. All these observations resonated to some degree with human childcare dynamics.

I am curious if there is something we can learn from non-human primate infant care. In instances like the spider monkey attack, I observed how animals react and cope with stressful situations. In Peter A. Levine and Ann Fredreick's *Walking the Tiger*, the authors raise the question of how animals routinely face severe threats, and yet are rarely traumatized. Using wild animals to observe trauma is extremely useful. When we experience a life-threatening event, the nervous system responds in one of three ways: fight, flight, or freeze (Levine, 2023). These are primal, physiological responses that the body has adapted as a means to survive in the face of threat. Animals existing in the wild face threats to their survival every day, so these nervous system responses serve an essential purpose. In modern life for humans, however, even when we are faced with threatening or scary situations, our life is not routinely in danger. Because of this, many people struggle with overactive nervous systems and improper methods for moving through and releasing the energy caused by traumatic situations.



Levine and Frederick (2023) argue that without using primal, physiological methods of resolving trauma, we will remain in a state of fight, flight, or freeze. Utilizing things like the “felt sense” and shaking are ways to connect with the physical experience and move through the trauma biologically, rather than intellectually. When we observe an animal experience a threatening event, say a deer being chased by a coyote, the deer will shake its body immediately after the coyote is gone as a way to release the stressful experience from the physical body. Levine and Frederick point out that a main reason for humans’ inability to recover from traumatic experiences as easily and quickly as other animals is because of our pre-frontal cortex and tendency to intellectualize events.

After the infant howler monkey returned to its mother and the spider monkeys swung away, I watched as the mother held her infant close and chirped to it. The mother shook her head and tail, and a few minutes later, things returned to usual. The infant began playing again and the mother began feeding. I felt that there was no way that the infant would recover from such a scary encounter, but life for the howler monkeys seemed to be perfectly normal and fine. I wondered how we could respond to stressful events more like howler monkeys. I questioned the importance of having a mother for the infant to return to as a safe base. I also questioned the importance of physical touch following a life-threatening event. I decided to examine these questions by conducting my own observational research.

## **Behavior in female mantled howler monkeys (*Alouatta palliata*) with and without dependent offspring**

### **1. Introduction**

Mantled howler monkeys (*Alouatta palliata*) are group-living, large-bodied platyrrhines known for their long calls (Altmann, 1959; Di Fiore et al., 2011). Howler monkeys are social, bisexually dispersing monkeys. Infants/juveniles require up to three years of dependency on their mother. During the first few weeks of the infant's life, all locomotion is dependent on the mother, as the mother will carry the infant everywhere (Lyall, 1996). The infant will continue to suckle for up to 22 months (Balcells & Baró, 2009). Infant care is a lengthy and energetically demanding phase for howler mothers; however, it is essential to ensure the infant's survival. To cope with the responsibilities of motherhood, mantled howler monkeys, like most other mammals, will occasionally partake in allomaternal care, or alloparenting (Calegaro-Marques & Bicca-Marques, 1993). Alloparenting occurs when individuals other than the mother spend time caring for the infant (Calegaro-Marques & Bicca-Marques, 1993).

At La Selva Biological Research Station in northeastern Costa Rica, I observed the effects of infant care on adult females. My previous investigations on attachment demonstrated the biological need for an early attachment and "safe base" (Feldman, 2007). I wanted to see if I could observe these attachments in the wild, as well as extended family systems and how or if the responsibility of infant care is shared between other monkeys in the social system. This alloparenting could be evident of some degree of social buffering that can help the infant monkey to disperse stress response during a stressful event. At La Selva's large, protected forest fragment, I examined the ways in which activity patterns (resting, feeding, locomoting) and nearest neighbors (other adult females, adult males, or other juveniles/infants) varied between

adult females with dependents versus without. I also examined how the mother's activity changed when her dependent was and was not physically attached to her.

To maximize the benefits of alloparenting, I predicted that adult females with dependents will spend a greater proportion of scans with other adult females than adult males or other juveniles. I also predicted that adult females with dependents will spend a greater proportion of scans resting and feeding compared to locomoting so they might supply more food to their offspring. Finally, I predicted that infants/juveniles will physically attach to their mother more when she is locomoting and/or feeding compared to resting. This is to be closest to the food being foraged and not get lost. I predict that dependents will physically detach from their mothers more when the mothers are resting because the dependents will be more comfortable to play and explore when they know where their mothers are.

## **2. Methods**

### *Study species:*

Mantled howler monkeys (*Alouatta palliata*) are a type of New World monkey from Central and South America. They are frugivore-folivores, meaning their diet consists of mostly leaves, although they eat fruit when it is available (Dias & Rangel-Negrín, 2015). Because leaves are difficult for howler monkeys to digest and do not provide substantial nutrition, mantled howler monkeys tend to spend a lot of time sleeping and resting (Dias & Rangel-Negrín, 2015). The males are known for their howls, which are long, loud calls they make due to an enlarged hyoid bone. Both males and females will disperse from their groups of up to 40 individuals when they are ready to mate and join a new group. Each group usually contains an alpha male who gets preferences on resting location, food, and mates (Wang & Milton, 2003). Howler monkeys are essential to rainforest ecology by helping disperse seeds (Glander, 1975).

*Study site:*

Research took place at La Selva Biological Research Station, Costa Rica. The Organization for Tropical Studies (OTS) manages La Selva, which is 15.4 km<sup>2</sup> of tropical wet forest with pastures, primary and secondary forests, and research station infrastructure (e.g., cabins, labs) (Matlock & Hartshorn, 1999). La Selva extends into Braulio Carrillo National Park which consists of ~440 km<sup>2</sup> of cloud and tropical rainforest (Bell & Donnelly, 2006). La Selva's forests are extremely biodiverse and contain three species of platyrrhines: mantled howler monkeys, white face capuchins, and Central American spider monkeys. There are 23-28 groups of howler monkeys at La Selva (Johnson et al., 2023; Schreier et al., 2023) with a mean group size of 14.3 individuals and population density of 23.4 individuals/km<sup>2</sup> (Schreier et al., 2023). Females typically outnumber males in the groups, and there were a substantial number of females with dependent offspring populating each group.

*Data collection:*

I collected data using instantaneous focal sampling to collect scans on female nearest neighbor, activity, and dependent position (Altmann, 1974). I used 30-minute samples with 2-minute intervals. At each 2-minute interval I recorded activity, nearest neighbor age-sex class, and infant positioning if relevant. I recorded data in May-June 2023 for a total of 20 hours of data collection.

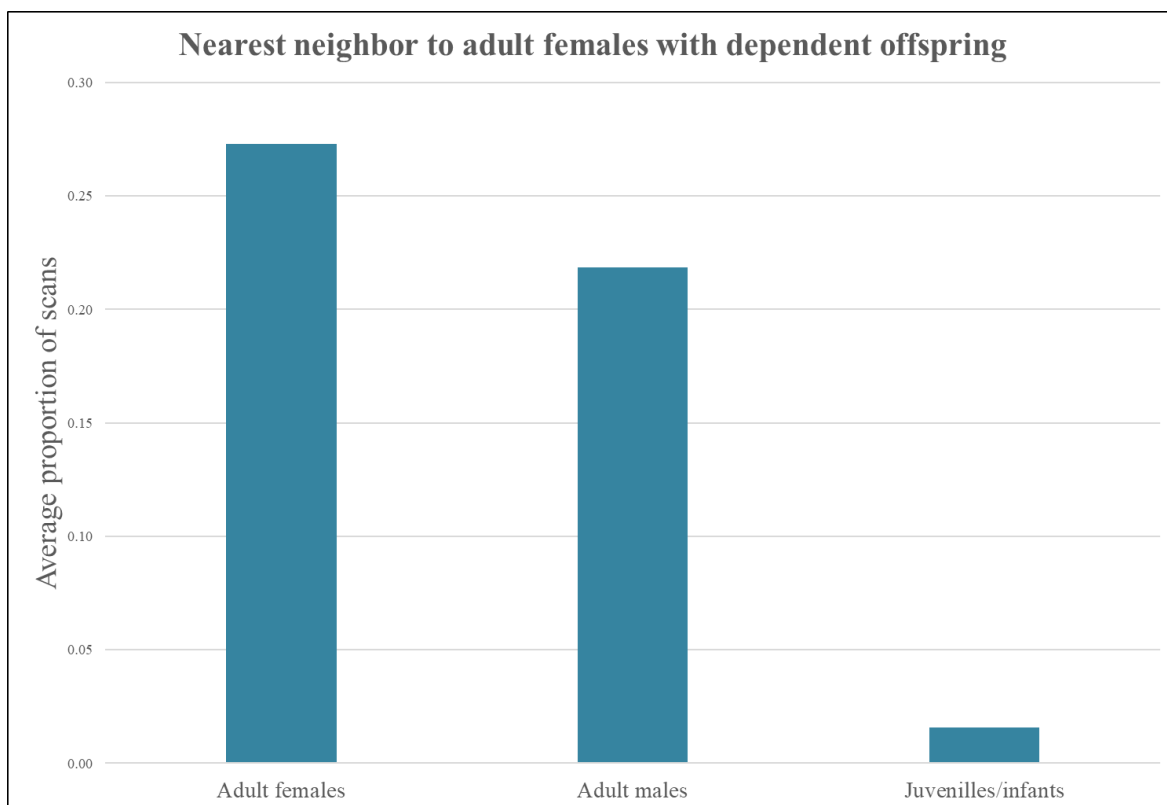
*Data analysis:*

I used Excel to calculate means and create bar graphs in order to compare adult female with dependents nearest neighbor, activity, and infant positioning, as well as adult female without dependents activity. I used Jamovi to conduct One-way ANOVAs and calculate P-values and F-values.

### 3. Results

I compared the average proportion of scans that adult females with dependents spent with other adult females, adult males, and other juveniles/infants (figure 1). There was a significant difference in the proportion of scans females with dependents spent with these different categories of monkeys,  $F(2, 60) = 5.83, p = .005$  (figure 1). Using post-hoc comparisons, I found that adult females with dependents spent a significantly greater proportion of scans with adult females,  $M = .27, SD = .30$ , than they did with non-dependent juveniles/infants,  $M = .02, SD = .04, p = .005$  (figure 1).

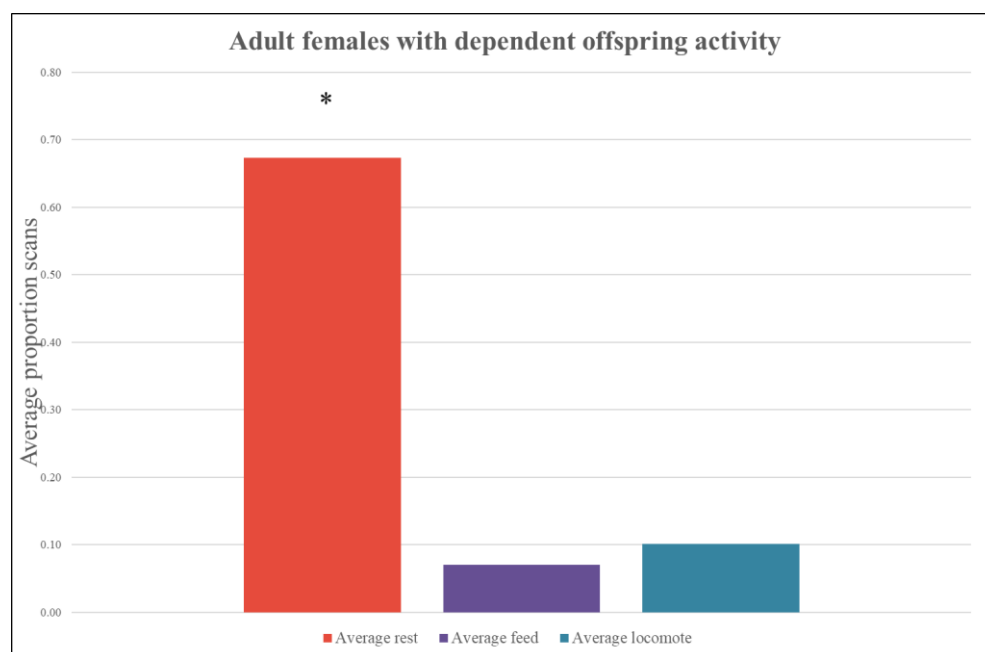
Using post-hoc comparisons, I found that adult females with dependents spent a significantly greater proportion of scans with adult males,  $M = .22, SD = .33$ , than they did with non-dependent juveniles/infants,  $p = .04$ . There was no significant difference in proportion of scans between adult females and adult males,  $p = .77$ .



*Figure 1. Females with dependents spent a significantly greater proportion of scans with adult females than they did with juveniles/infants ( $p = .005$ ).*

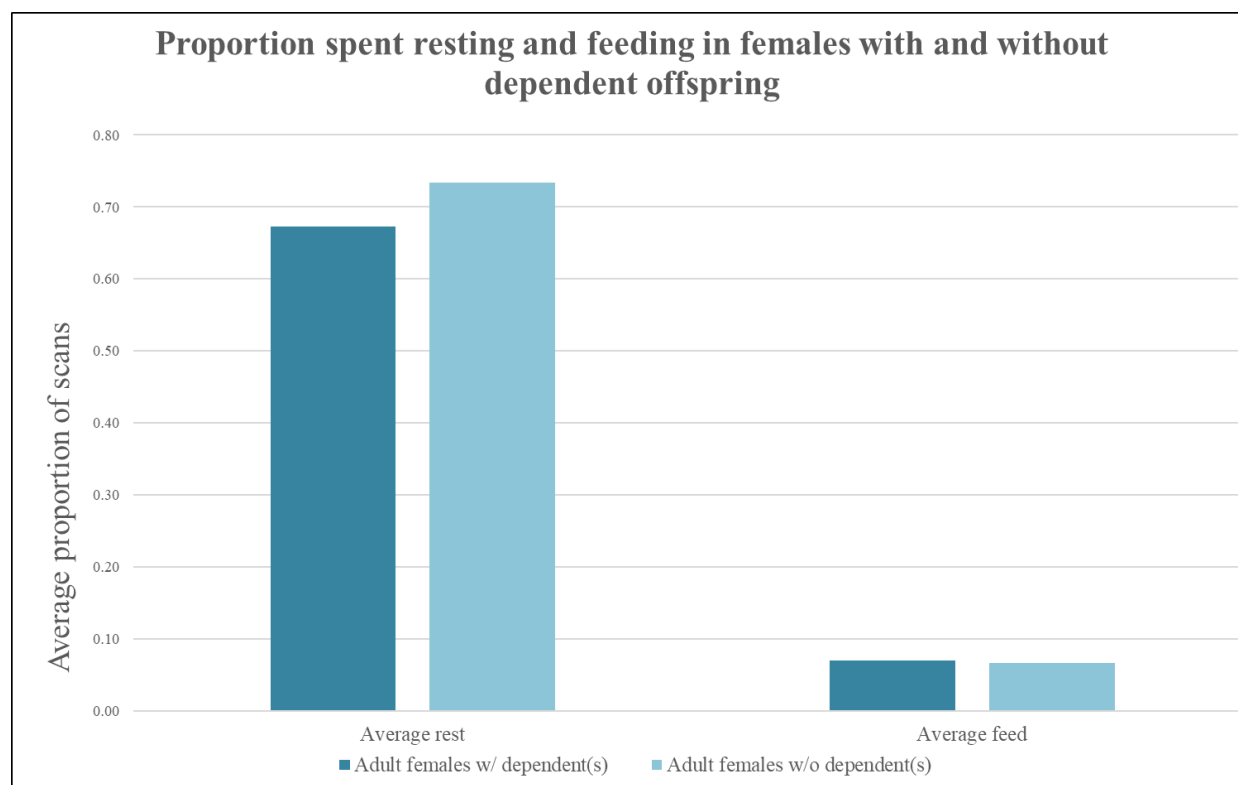
I used a one-way ANOVA to compare the average proportion of scans that females with dependents spent resting, locomoting, and feeding (figure 2). There was a significant difference in the proportion of scans spent engaged in these activities,  $F(2, 60) = 54.53$ ,  $p = <.001$  (figure 2). Using post-hoc comparisons, I found that adult females with dependents spent a significantly greater proportion of scans resting,  $M = .67$ ,  $SD = .32$ , than they did feeding,  $M = .07$ ,  $SD = .12$ ,  $p = <.001$  (figure 2).

Using post-hoc comparisons, I found that adult females with dependents spent a significantly greater proportion of scans resting,  $M = .67$ ,  $SD = .32$ , than they did locomoting,  $M = .10$ ,  $SD = .13$ ,  $p = <.001$  (figure 2). There was no significant difference in proportion of scans between feeding and locomoting,  $p = .88$  (figure 2). Females with dependents spent significantly more time resting,  $M = .67$ ,  $SD = .32$ , than locomoting or feeding  $p = <.001$  (figure 2).



*Figure 2. Females with dependents spent significantly more time resting than locomoting or feeding ( $p = <.001$ )*

Females with and without dependents spent a similar average proportion of scans resting and feeding (figure 3).



*Figure 3. Females with and without dependents spent a similar average proportion of scans resting and feeding.*

I ran a 2x3 ANOVA examining the main effects of position (infant attached or detached from mother) and activity (feed, rest, locomote) (figure 4). There was a main effect of position such that when feeding, adult females with infants spent a significantly greater proportion of scans with their infant/juveniles physically detached (off) than attached (on)  $F(1, 74) = 5.85, p = .018$  (figure 4). There was no main effect of activity type,  $F(2, 74) = 0.00, p = 1.00$  (figure 4). There was a significant interaction between position and activity such that when feeding or

resting, the infant spent a greater proportion of scans detached (off) the mother, and when locomoting the infant was more often attached (on) the mother  $F(2, 74) = 5.14, p = .01$  (figure 4).

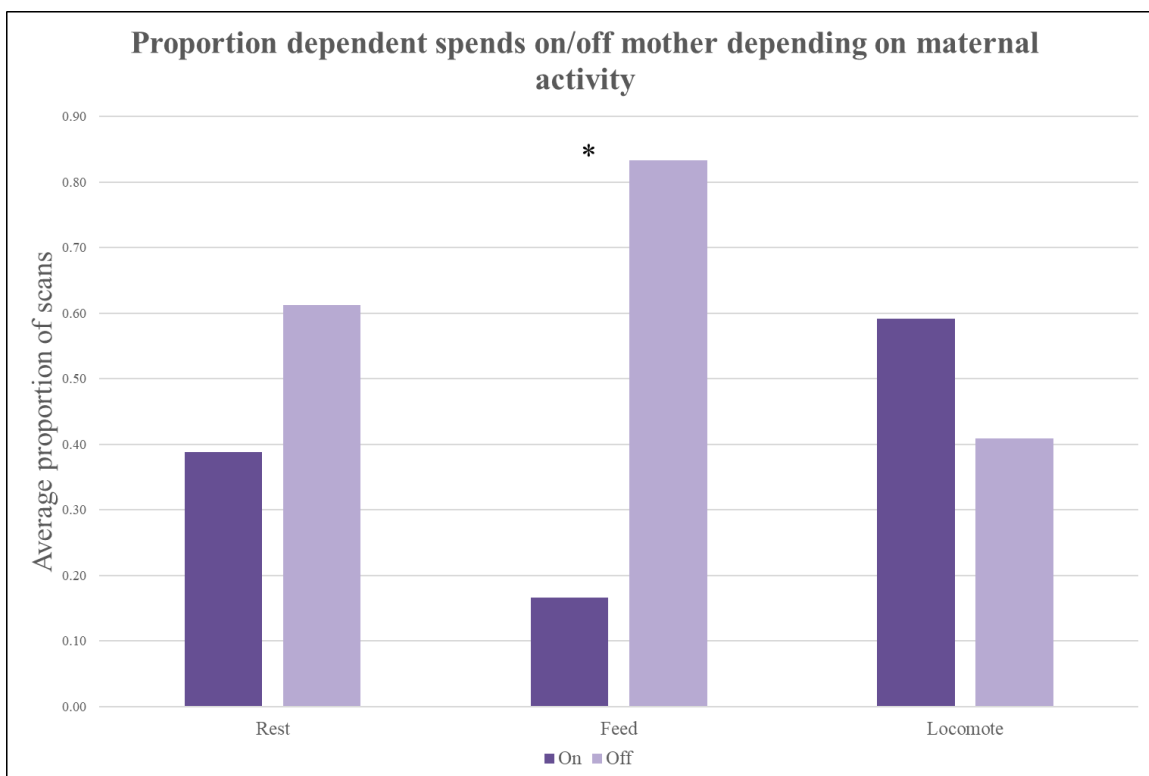


Figure 4. When feeding, adult females with infants spent a significantly greater proportion of scans with their infant/juveniles physically detached (off) than attached (on) ( $p = .018$ ).

#### 4. Conclusion

My results suggest that female howler monkeys with dependent offspring spend a significant proportion of scans resting, but not significantly greater than females without dependent offspring. The results also suggest that there is not a significant difference in whether females with dependents spend a greater proportion of scans with female or male nearest neighbors, but females with dependents do spend a significantly greater proportion of scans with male nearest neighbors than with juvenile/infant nearest neighbors. Females with dependents



could spend a greater proportion of scans with adult males than with other juvenile/infant monkeys in order to establish closer bonds with the males to prevent infanticides. However, the females with dependents spend the majority of scans with other adult females, suggesting that they might benefit from allomaternal care. My results also suggest that females with dependents spend a significantly greater proportion of scans feeding with the dependent off (physically detached) than feeding with the dependent on (physically attached). This could be indicative of the need for the adult females to feed while the juveniles/infants can spend less time feeding and more time playing.

Although it is unclear why females with dependent offspring spend the majority of their time with other females, it could simply be because females made up the majority of the groups I was observing. There is also not a significant difference in the proportion of scans females with dependents spent with males versus females. Therefore, I am hesitant to conclude that females with dependents have a preference for the sex of neighboring monkeys. In order to better measure how females with infants build their social systems as well as the role of alloparenting and caregiving from non-related monkeys, future research should devise a systematic way to measure allomaternal care. A construct could be made involving non-related monkey's proximity to the infant, frequency of interaction, and frequency of care-taking behaviors like grooming with the infant. This construct could then be measured to better understand the degree of allomaternal care in a certain monkey group.

As for the activity patterns of female howler monkeys with dependent offspring, we know that they spend most of their time resting. This was predicted as infant-care is energetically demanding. However, this proportion of scans spent resting was not significant in comparison to females without dependent offspring. This could suggest a ceiling effect, such that because all

howler monkeys spend a significant majority of their time resting in comparison to other activities, it is difficult to detect small differences between the amount of rest females with and without dependents engage in. Since the howler monkeys take a long time to digest the leaves that comprise the majority of their diet, there is not much flexibility in how much of the day they spend resting. Future research could better address the question of whether females with dependent offspring need more rest than those without dependents by only measuring instances of rest between the two groups of female howler monkeys.

My data on infant positioning resulted in an interesting finding demonstrating that mothers typically fed with their infant detached from their body. This result could be due to the mother's greater need for caloric intake. Generally, the mothers are going to need to feed more often than the infants, while the infants are going to need to play more than the mothers. Therefore, when the mother gets up to feed, the infant may take this opportunity to detach and play. Future research could further investigate this finding to see if it was mirrored across various groups and locations. Previous research has also suggested a correlation between the developmental stages of infancy and attachments of infants to their mothers during certain activities (Balcells & Baró, 2009). For instance, very young infants are more likely to be attached to their mother while she rests and locomotes, and as the infants get older, they begin to detach more often (Balcells & Baró, 2009). Because my infants were grouped into a single category consisting of any infant or juvenile who still demonstrated dependency on their mother, my data likely did not pick up on these chronological adjustments in physical attachment.

Overall, there is still significant research needed in order to adequately examine how mantled howler monkeys attach to and care for their infants, as well as the energetic costs of this care. Observing how these monkeys care for their infants can teach us about our own

evolutionary needs for early attachments and how we can utilize these attachments to cope with stressful stimuli.

## CHAPTER 4: Humans

### **Attachment and Loss**

In addition to the literature on non-human primates, researchers have examined the developmental, emotional, and cognitive effects of early life attachments among humans. The long-term consequences of early parental deprivation have continually intrigued developmental psychologists (Bowlby, 1951; Rutter, 1972). Given that the social histories of children adopted internally from orphanages often involve neglect and frequent caregiver turnover during what may be sensitive times for the development of social bonds, these children offer a unique opportunity to study these effects (Smyke et al., 2002). They also have the opportunity to recover from these experiences as they move into highly supportive families.

Hostinar et al. (2015) examined the effects of early parental deprivation among adopted and institutionalized children, specifically, the effectiveness of parent support in alleviating HPA-axis stress responses. They compared a sample of 8–11-year-old children who had been internationally adopted with a gender and age-matched sample of non-adopted children (born and raised by their birth families in urban Midwestern area). All the participants were randomly assigned to receive support from a parent or from a stranger following a modified Trier Social Stress Test (TSST). Results demonstrated that parent support significantly dampened the cortisol-stress response in non-adopted children compared with support from a stranger; however, the cortisol response of children who had been adopted did not change between the parent- and stranger-support conditions. Cortisol reactivity was also generally lower for children who had been adopted in both conditions than that of non-adopted children in the stranger-support condition (Hostinar et al., 2015).

This study gives a unique example of the potential for caregiver support to buffer the effects of early adverse experiences by comparing children who have lived their whole lives with their biological parents to those who have been internationally adopted. This comparison helps examine when and to what extent the presence of a caregiver can dampen stress response. Children who spent the first few years of their life in orphanages did not show significantly different cortisol responses to a controlled laboratory stressor when receiving support from parents versus strangers (Hostinar et al., 2015). This lack of a selective response to parents versus strangers in adopted children brings into question the formation of an attachment between adopted child and parent. Because the adopted child spent years of their essential, developmental period without a stable attachment relationship with a caregiver, they might not experience social buffering from their parental figure in the same way nonadopted children do (Hostinar et al., 2015). Although there is a lack of selective responses in adopted children, their general cortisol levels were lower than non-adopted children in the stranger-support condition (Hostinar et al., 2015).

This probes me to question the neurobiological shifts and potential methods of coping that occur when there is instability and lack of a stable attachment in early childhood. Because early-life adversity both exposes children to more stress and deprives them of a guide to coping and soothing through social interactions, it is important to understand the neurobiological mechanisms of early life adversity and how it creates differences in the social regulation of stress response in children (Hostinar et al., 2015). Identifying these mechanisms can help promote resiliency and stress-reducing interventions.

Kertes et al. (2008) examined if early child deprivation impaired the regulation of the HPA axis in adopted children. The researchers examined basal cortisol levels in 164

internationally adopted children who had experienced varying degrees of pre-adoption deprivation. Pre-adoption deprivation consisted of multiple measures, including duration of institutional care, age at adoption, and parent-pre-adoption neglect and abuse. Height and weight at the time of adoption were also examined in order to measure growth delay as another reflection of deprivation. The researchers collected cortisol levels in the morning and before bedtime of children 3.3-11.6 years post-adoption. The researchers found that children who experienced more deprived care prior to adoption showed greater physical growth delays after adoption. Deprived care prior to adoption was not significantly associated with basal cortisol levels measured after adoption, so early neglect had no long-term, direct impact on basal cortisol levels. However, the study did show that deprived care significantly predicted growth delay assessed at the time of adoption, and greater growth delay at adoption predicted higher early a.m. cortisol levels and, consequently, a larger diurnal decrease in cortisol levels over the day. The authors conclude that prolonged periods of early neglect or deprivation will not directly affect children's basal cortisol levels several years after being removed from deprived living conditions (Kertes et al., 2008). This suggests that suppressed diurnal cortisol rhythm is transitory for institutionalized children, and that upon adoption, the diurnal rhythm can be observed again (Kertes et al., 2008).

Here we see another example of physiological effects of early childhood adversity. Although physiological effects are observed for institutionalized children, the evidence this study presents is hopeful in demonstrating that some of the effects of early childhood adversity are transitory, alluding to an ability for the body to equilibrate after extreme stress (Kertes et al., 2008). Although some children with more deprived care demonstrated greater growth delays upon adoption, in middle childhood these children had largely caught up in physical growth. This

is evidence of the influence of nurturance and the presence of caregivers even after early deprivation. It would be interesting to compare this study with other psychological constructs (e.g., baby's engagement, interaction, later childhood psychological states), to see if the same pattern could be reflected.

Early child/caregiver separation is classified as an adverse childhood experience (ACE). ACEs can include other adverse experiences like parental divorce, mental illness, drug addiction, and abuse (Brown et al., 2009; Dube et al., 2001; Felitti et al., 1998; Kalmakis, 2015). Research is continuing to reveal the long-term health implications of ACEs, which include increased risk of obesity, alcoholism, ischemic heart disease, cancer, chronic lung disease, and several other health risks (Brown et al., 2009; Dube et al., 2001; Felitti et al., 1998; Kalmakis, 2015). We also see ACEs posing a risk for later psychopathology (Felitti et al., 1998; Sánchez et al., 2001; Sheridan & McLaughlin, 2020).

Bessel Van der Kolk (2014) addresses both the psychopathological and physical health implications of early adverse childhood experiences and trauma in his book *The Body Keeps the Score: Mind, Brain and Body in the Transformation of Trauma*. In his book, Van der Kolk addresses the ways that trauma not only affects our psychology, but also our brain, nervous system, and overall bodily functions. He asserts that trauma also exists physically, and that our mind and body are connected in deeper ways than we might assume. His findings are key when understanding the recovery process from trauma and early adverse experiences. Van der Kolk emphasizes the importance of understanding the body's role in processing and recovering from trauma, and he explores various therapeutic approaches that can help individuals build resilience and overcome the effects of traumatic experiences. Although the notion that trauma affects our physical body as well as our mental state might make the path to recovery and resilience seem

even more complex, Van der Kolk asserts that understanding the effects of trauma on the body is an essential part of the recovery process. By better understanding these effects and utilizing therapeutic techniques that integrate the body, we could potentially expedite healing and more holistically approach trauma recovery and resilience.

## **Resilience**

There is a large body of existing research that points to the ways that early childhood trauma creates detrimental, long-lasting effects on the human psyche and body. However, countering research, like the Kauai Longitudinal Study (1971), has begun to investigate the concept of resilience, a dynamic process that even within the context of adversity, leads to positive adaptation. E.E. Werner, the study's author, defines resilience as "an end product of buffering process that do not eliminate risk and stress but allow the individual to deal with them effectively" (Werner, 2000, p. 116). In the Kauai Longitudinal Study, researchers aimed to investigate the development and life outcomes of a cohort of individuals born in 1955 on the island of Kauai. Half of the selected cohort lived in chronic poverty. The researchers followed the cohort from infancy into adulthood. The researchers collected data on the children and their families at birth, in the postpartum period, and at ages 1, 2, 10, 18, 32, and 40 years (Werner, 2000). Researchers then examined the effects of ACEs like childhood abuse and neglect on development. Finally, resiliency was observed through Werner's investigation of possible protective factors at play in the subjects' lives. Protective factors could include a stable and supportive environment which may aid in coping and adapting to adverse experiences. As the cohort was followed into adulthood, various outcomes like mental health, physical health, educational attainment, employment, and overall well-being were measured. Protective factors



like sociability, engaging temperament (affectionate, cuddly), internal locus of control, and intelligence all helped promote resilience in the face of certain risk factors like child abuse/neglect and poverty (Werner, 2000).

In short, the Kauai Longitudinal Study, as well as other studies focused on resilience, challenged the idea that our external circumstances determine our long-term well-being. In contrast to biological and environmental determinism, the perspective of resilience emphasizes the complexity of human interaction and the active role of the individual in their development (Uriarte, 2005). In many ways, this interactive perspective of the individual and their environment is empowering and revolutionary in the way we approach healing and psychotherapy. However, some research points to the limitations in the concept of resilience.

Ungar (2013) does not simply define resilience as the individual's ability to succeed under stressful conditions, but rather as the capacity of both the individual and their environment to interact in ways that optimize the developmental process. Ungar suggests that in order for resilience to occur after a stressful or traumatic event, there must be a context of optimal environmental conditions, like a positive social ecology. He argues that resilience is not as much of an individual construct as it is a quality of the external environment and its ability to facilitate development. Nurture, in this case, trumps nature (Ungar, 2013). I think this consideration is important to recognize in the context of psychotherapy. It may not be reasonable to expect resilience from all those who have experienced trauma and/or adverse experiences, and we should not blame the individual for an incapacity to display resilience following an adverse life experience.

The way we define resilience (individual construct versus quality of environment) is extremely important when considering the healing and recovery of broken attachments and traumas. External systemic factors like social, economic, and political structures play a big role in an individual's ability to become resilient. Without recognizing these external structures, a potential for victim blaming can develop. Resilience may not be an essential part of healing, and we should not have to heal and adapt positively, because sometimes the mere act of surviving trauma is sufficient (Bergström et al., 2015; Schwarz, 2018). It is not important how an individual responds to stressful circumstances; what matters is addressing the circumstances creating the stress (Bergström et al., 2015; Moser et al., 2019; Schwarz, 2018). Overemphasizing the individual construct of resiliency suggests that no matter the degree of absurdity and maltreatment present in one's circumstances and socio-political systems, the individual is responsible for tolerating and adapting to these conditions (Moser et al., 2019; Schwarz, 2018). An individual who has survived adverse experiences in their childhood or at any point in their life should not have to embrace a positive perspective of the maltreatment they have endured. In fact, I would argue that a big step in healing is recognizing and "sitting with" the reality and pain that you have experienced, without trying to solve it or find a positive light. In a culture that worships "happy endings" it makes sense that a concept like resilience would appeal to so many people. However, this might end up causing more harm than good, as it may push individuals to deny or disconnect from the reality of their experiences.

When I look back on the death of my uncle, one of the hardest things for my cousins – and myself – to do, was to accept reality. When the pain is so pungent and present it becomes very difficult to face, and it is much easier to obscure the truth. Saying things like "he's getting better" or "it's really not that bad" or "everything is okay" or "everything happens for a reason"

helps cope with the weight of the moment, but it doesn't help heal in the long-term. However, what built the most resilience and strength following my uncle's death was the ability to name it, to talk about it, and to embrace the whole experience of grief. The shift towards acceptance creates space for pain and hurt to exist. Once we can allow this pain to have space, we can feel compassion for ourselves and the scale of our emotions. Like Levine (2023) suggests in *Waking the Tiger*, we must tap into our "felt sense" in order to heal from a stressful event. We must engage the body and the physical sensations of our experience before jumping to conclusions or resolutions. This, in my opinion, is what truly creates resilience: not forcing meaning or positive perspectives on to our suffering but accepting and embracing it simply as our current state of being.

## CHAPTER 5: Navigating Healing

Although many of the factors responsible for child/caregiver estrangement and early childhood trauma are rooted in existing economic and social systems, I want to focus this portion of the thesis on how we can individually and therapeutically heal those who have experienced these early forms of trauma. Although I recognize that this seems to be a band-aid approach on a larger issue, I think it is essential for those who have suffered or been victims of early parental neglect or estrangement or trauma to have ways of accessing more opportune methods for their own healing.

While volunteering at Judi's House, a grief and bereavement center in Denver, I had the opportunity to interview a grief counselor. Through this interview, I discovered some of the therapeutic tools available to children who had experienced the death of a parent. She expressed the difficulty children faced forming new attachments when they lost a parent or loved one. She notices that it becomes harder for children to trust, and they might fear that other people they depend on will leave or die. This might lead to various maladaptive coping strategies like withdrawal, emotional outbursts, isolation, a desire to conform and hide grief, increased anxiety, and somatic symptoms like stomachaches and headaches.

When I questioned what ways we can prevent these maladaptive coping strategies, she pointed out some of the protective factors that help children grieve and cope effectively. She emphasized the importance of our external social support systems. Having open communication and a strong sense of family, as well as a supportive school system, serves as "safe bases" for the child to return to. She also discussed the importance of access to general mental health support. Especially in young children, death and loss are very difficult to comprehend and professional help is often needed if only to help the child rationalize the drastic changes occurring in their life.

Grief therapy uses many different techniques to help children grieve effectively. One technique the counselor discussed was play therapy. In play therapy, toddlers and young children can utilize this imaginative time of their life to reenact the death (Boyd, 2011; Landreth, 2012). This can help the child gain a more concrete understanding of what death is, so that they can begin to accept it and heal from it (Boyd, 2011; Landreth, 2012). Group therapy is also very helpful in the grieving process (Hughes, 2013). The counselor notes that the root of death loss is a lonely feeling, and that group therapy helps to increase the feeling of connection as well as normalize the experience of death and grief.

We have seen that when animals experience things like death and trauma, they are able to move through the experience relatively quickly and utilize things like shaking to help expel immediate stress (Levine, 2023). However, it is also apparent that humans' cognitive complexity makes this processing of stressful events more difficult. An example of this complex processing is reactive attachment disorder (RAD). If children do not receive sufficient care and emotional support during early childhood, the child can develop RAD (Ellis et al., 2019). RAD consists of a persistent pattern of emotionally withdrawn or inhibited behavior, a reluctance to form close attachments with caregivers, and a lack of responsiveness to social interactions (Ellis et al., 2019). These symptoms are usually observed in children who have experienced neglect, repeated changes in caregivers, or severe disruptions in their early relationships (Ellis et al., 2019). While a single event like the death of a parent might not directly cause RAD, the emotional impact can contribute to other challenges that may require supportive interventions and counseling. These complex manifestations of trauma and disrupted attachments compelled scientists to adapt various kinds of therapy like play therapy, group therapy, and even mindfulness-based therapy

and art therapy. These different approaches help target different parts of the human psyche that are affected by a traumatic experience.

Some researchers point to alternative methods of therapy like mindfulness to aid in the healing process of early childhood trauma (Amundsen et al., 2020). In a study from 2020, researchers evaluated the enduring effects on well-being and emotion regulation following a six-week mindfulness program (Living Mindfully Programme, UK) for a cohort of 9 to 10-year-old school children (Amundsen et al., 2020). The program, integrated into the regular curriculum, was facilitated by class teachers. A total of 108 children participated across three schools in Northeast England, categorized into a treatment group ( $n=64$ ), active control ( $n=19$ ), and waitlist control ( $n=25$ ) (Amundsen et al., 2020). Self-report assessments of well-being, mindfulness, and emotion regulation were gathered before and after the training, as well as at a 3-month follow-up. During the follow-up period, children who underwent mindfulness training exhibited noteworthy enhancements compared to the waitlist control. Significant improvements were observed in mindfulness ( $d = .76$  and  $.77$ ), Positive Outlook ( $d = .55$  and  $.64$ ), and Life Satisfaction ( $d = .65$  and  $0.72$ ) (Amundsen et al., 2020). Elevated mindfulness increases awareness and enhances the capacity to observe and accept internal experiences without avoidance or judgment (Amundsen et al., 2020). This may make it easier to cope with stressful experiences and may also help individuals become more aware of how they should navigate their healing.

Implementing access to arts could also be another treatment approach for children who have experienced ACEs (Brown & Sax, 2013). Research has shown the ways access to arts programs allows for the improvement of emotional regulation and functioning in children. A study from 2013 examined observed emotion expression and teacher-rated emotion regulation

for low-income children attending Settlement Music School's Kaleidoscope Preschool Arts Enrichment Program, an arts-integrated preschool (Brown & Sax, 2013). Over the span of a school year, children showed greater observed positive emotions such as interest, happiness, and pride, in music, dance, and visual arts classes, as compared to traditional classes (Brown & Sax, 2013). The children at Kaleidoscope also showed greater observed positive emotions than peers attending a comparison preschool that did not include full integration of the arts (Brown & Sax, 2013). These children also showed greater growth in teacher-rated levels of positive and negative emotion regulation (Brown & Sax, 2013). Increasing access to arts not only increases children's positive emotions, but also increases their ability to regulate their emotions. This is an essential skill for children who are facing stressors like poverty and trauma.

Services like mindfulness-based therapy, art therapy, and Judi's House demonstrate the advancement of services available to facilitate healing after trauma or loss. Although treatment of the effects of trauma or loss does not eliminate the cause, these treatment services help create flexibility and adaptation in response to these events. We see clearly here, and throughout this thesis, that having a supportive social environment following a traumatic event is essential to forming a healthy, adaptive development and sense of security.

Throughout this thesis, we have examined what builds a secure and healthy development, and what disrupts it. By examining our evolutionary needs for attachment and relationship in not only ourselves, but also in our primate relatives, we can begin to observe what establishes our basic sense of security. Then, by discerning the causes and effects of a disrupted sense of security in human and non-human primates, we can begin to uncover the potential routes to healing and reestablishing a sense of security and resiliency.

An important message to reaffirm after conducting this investigation into childhood attachments and trauma is that our early childhood experiences do not have to determine our life projection. Although we have seen evidence of the lasting effects of early adverse experiences and how our social and emotional development can possibly be altered in detrimental ways, we have also seen substantial evidence for humans' capacity to adapt to these conditions. It is part of human nature to continue to adapt and change to our environment, and by promoting effective social and therapeutic services, we can work to combat stressful circumstances and establish a sense of resiliency. I also want to recognize the importance of the way we discuss our individual role in our environment when discussing mental health. Promoting a sense of control and personal autonomy is essential in aiding the healing process, but in doing this, we cannot pressure positive outcomes and must simultaneously recognize and accept the gravity of the experiences we have been subject to. Like most things in life, there is a balance necessary in defining the roles of nature and nurture.

Death, loss, trauma, and abuse are difficult but oftentimes inevitable aspects of life. I hold the belief that as part of our human responsibility, we should not shy away from these uncomfortable realities. Instead, we should engage in a profound investigation and seek to learn from them, recognizing the inherent difficulty they pose. By investigating the causes and effects of these realities, I hope that we can not only learn how to better equip ourselves and heal from trauma, but also how we can better structure our culture and mental health systems such that we invoke a resilient society.



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