

# Relationships, Environment, and the Brain: How Emerging Research is Changing What We Know about the Impact of Families on Human Development

JO ELLEN PATTERSON\*  
SUSANNA VAKILI†

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*Recent research is providing family therapists with new information about the complex interaction between an individual's biological makeup and his/her social and physical environment. Family and social relationships, particularly during sensitive periods early in life, can affect a child's biological foundation. Additionally, stress during the early years can have a lasting effect on an individual's physical and mental health and contribute to the onset of severe mental illness. Community programs have been developed to intervene early with families who have an at-risk child to prevent or minimize the onset of mental illness including providing partnerships with at-risk mothers of infants to shape attachment relationships. Programs are also developing individual and family interventions to prevent the onset of psychosis. Practicing family therapists can incorporate emerging neuroscience and early intervention research and leverage the growing base of community programs to enhance the effectiveness and sustainability of mental health outcomes for clients. Additionally, family therapy education programs should broaden student training to incorporate the growing body of information about how family relationships affect individual mental health development.*

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Recent developments in neuroscience, genetics, and the effects of environmental and social influences on the developing brain are providing family therapists with an expanding base of knowledge to use in helping clients with mental health issues. In contrast with the nature versus nurture debate that took place decades ago, we have entered an era where research is directing us to a new understanding of health that is based on the assumption that our development is affected by a complex interaction between genes and the social and physical environments we experience (Meaney, 2010; Sluzki, 2007, 2010). The effects of interactions between genes, biology, and environment on the mental health of clients challenge some of our assumptions about how interpersonal problems develop and resolve. Family therapists can incorporate these recent research findings into their systemic view of conceptualizing and treating clients (Celano, 2013; Sluzki, 2007).

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\*Marriage and Family Therapy, University of San Diego, San Diego, CA.

†Marriage and Family Therapy, University of California at San Diego, Department of Family Medicine, San Diego, CA.

Correspondence concerning this article should be addressed to Jo Ellen Patterson, Marriage and Family Therapy, University of San Diego, 5998 Alcalá Park, San Diego, CA 92110. E-mail: joellenpatterson@gmail.com.

The study of epigenetics, a term suggesting that the environment influences/acts on genetic traits and triggers their expression, suggests that family and community interactions affect not only a child's psychosocial development, but also the biological foundation of children (Sluzki, 2007). Conversely, the genetic predisposition of a family member can significantly affect family functioning and the mental health of other family members. Timing of the experience of environmental stress changes the impact of stress on developing children—the younger the child is at the time of stressful or ameliorating life experiences, the more powerful and lasting are the biological effects (National Research Council & Institute of Medicine, 2009). The environmental experience of early childhood adversity has been linked with adult immune dysfunction, insulin resistance, and brain malfunctioning, which can lead to high-risk behaviors, emotional dysregulation, and chronic mental health problems (Brent & Silverstein, 2013).

In his article discussing how neuroscience and genetic research are profoundly affecting how psychiatry views mental illness, the director of the National Institute of Mental Health advocates for mental health treatments that prevent problems before they occur or before significant symptoms appear (Insel & Wang, 2010). Insel's article evokes an image of a future where mental health professionals and neuroscientists work together to “ensure new approaches to detecting risk, validating diagnoses, and developing novel interventions that may be based on altering plasticity or retuning circuitry rather than neurotransmitter pharmacology” (p. 1971).

Research on the relationship between poverty, which can be considered a form of environmental stress, and mental health is also changing how mental health professionals understand the etiology of mental illness. Mental illness in children has been directly attributed to risk factors associated with poverty, and adults with adverse childhood experiences, such as growing up in poverty, often raise children in environments that have toxic stress, creating an intergenerational cycle of mental health disorders (Yoshikawa, Aber, & Beardslee, 2012). These disorders can include lasting struggles with memory (Shonkoff et al., 2012).

For family therapists who perform the difficult work of helping clients suffering from debilitating issues such as recurrent depressive episodes, chronic addictions, or the cyclical manic and depressive episodes associated with bipolar disorder, the ability to accomplish more lasting therapeutic interventions is of great interest. In this article, we describe how the systemic framework inherent in the work of family therapy is expanding to incorporate an ecobiodevelopmental view of mental health, focusing on prevention in the form of early life interventions and driving healing not only through individuals and families but more broadly through communities (Shonkoff et al., 2012). Two primary areas of research that emerged in recent years are providing new information for family therapists:

- Accumulating evidence regarding how the environment affects the nervous system and brain, which in turn affect mental health.
- Our deepening understanding of how relationships (couple, parent-child, family, and community) can increase or reduce/prevent mental health issues and should be applied more frequently in treatment (Lebow, 2013).

To incorporate emerging research into the practice of family therapy, practitioners can expand their ecobiodevelopmental perspective in the following ways:

- *Neuroscience*: This area of science focuses on the structure, function, and development of the nervous system and brain, and how these biological components affect behavior, emotion, and cognition. Family therapists should develop a basic understanding of

neuroscience and how it is involved in mental health issues. They can frame some of this information for clients as a way of helping clients conceptualize their issues and understand treatment (Atkinson, 2005; Fishbane, 2007, 2013).

- *Early Intervention*: Family therapists can use this basic understanding of neuroscience to shape therapeutic interventions that will help families positively affect the mental health of their young or unborn children prior to the onset of mental health issues (National Research Council and Institute of Medicine, 2009).
- *Community-based care*: Because research demonstrates multiple resources are sometimes required to affect relational change in families, family therapists should leverage the strength and presence of community resources to influence the development of healthy families.

### WHAT FAMILY THERAPISTS NEED TO KNOW ABOUT NEUROSCIENCE

Deepening their understanding of how the brain works and is shaped by relationships enables therapists to incorporate new ideas into their systemic view of helping clients.

Research that should impact therapy includes:

- The child's brain is influenced by his/her environment, and continues to evolve throughout adolescence and young adulthood (Lenroot & Giedd, 2006).
- Chronic exposure to stress in early childhood, including relational deprivation, primes a child's brain to be more responsive to subsequent stress throughout life (Favez et al., 2012; Shonkoff et al., 2012; Yoshikawa et al., 2012).
- Attunement, affect coordination, and biobehavioral synchrony (coordination of mother and infant's physiological and behavioral systems) during early sensitive periods of infant development shape the physiology of the infant's nervous system, affecting an infant's ability to regulate stress and form healthy attachments later in life (Feldman, 2012; Feldman, Magori-Cohen, Galili, Singer, & Louzoun, 2011).
- Children who are genetically predisposed toward having mental health disorders can reduce their chances of severe lifelong mental illness by managing stress during adolescence and averting the first mental health episode during this developmental period (Hlastala et al., 2000; National Research Council and Institute of Medicine, 2009).
- Therapeutic interventions may reverse early brain deficits caused by relational dysfunction (Bryck & Fisher, 2012).
- Cumulative life choices and experiences of parents may leave biological traces in their children through epigenetics. The children can pass these traces, which may become biological characteristics after one generation, on to their children (Jirtle & Skinner, 2007; Shonkoff et al., 2012; Weaver et al., 2004).

These examples of how brains change over time and are impacted by relationships and environment demonstrate that brain development is more complex than we believed 30 years ago (Fishbane, 2007). What role can family therapists play in shaping an environment for families where stress is reduced, parenting is strengthened, and relationships positively affect brain development so that clients can experience healthy emotional functioning and good mental health?

### SHAPING A CHILD'S MENTAL HEALTH THROUGH PARENT RELATIONSHIPS

One of the earliest interventions is working with couples prior to conception to understand how the couple and parent-child relationships can affect the infant's mental health. During the first weeks of life, parents and their infant develop a relationship by paying

attention to each other and actively engaging in matching affect states, both of which are critical to developing a secure attachment relationship (Feldman, 2012; Feldman et al., 2011; Schore, 1994; Siegel, 1999; Tuttle, Knudson-Martin, & Kim, 2012). Parents experiencing sustained tension in their couple relationship during and after pregnancy, living in poverty, and having mental health issues may struggle with attunement and attachment and negatively affect the development of their child for several years to come (Favez et al., 2012; Feldman, 2012). Conversely, parents with a healthy couple relationship are more likely to have children who regulate their emotions, and parents who are sensitive can reduce the effects of poverty on a child's stress physiology (Blair & Raver, 2012) and help children develop psychological self-regulation skills (DiCorcia & Tronick, 2011).

New neuroscience-informed approaches to working with couples have been developed that are designed to help couples change how they relate and respond to others (Atkinson, 2005; Fishbane, 2013). Habitual responses developed early in life and wired into the brain often prevent individuals from changing how they regulate their emotions in spite of the strength of their intention to change. Therapists can make couples aware of how their responses have been shaped by early experiences and help them develop new ways of responding that may activate new neural pathways in their brains, facilitating improved response states to their partners and children (Atkinson, 2005).

Attunement and attachment to parents are critical to the physical and emotional well-being of children (Schore, 1994, 2001; Siegel, 1999). Infant rats experiencing high levels of licking and grooming by their mothers have different levels of DNA methylation, resulting in altered gene expression and improved stress response systems in the licked and groomed infant compared with infant rats experiencing low levels of licking and grooming (Weaver et al., 2004). These epigenetic changes persist into adulthood, passing on to subsequent offspring. Interestingly, when neglected infant rats are removed from their mothers and placed with adult female rats that provide increased levels of licking and grooming, gene changes are reversed. The human version of licking and grooming—attachment and attunement—affects not only a child's psychosocial development but also the developing brain and ultimately gene expression.

Relationship quality in the early years may also affect a child's cognitive capabilities. Nobel Prize winner James Heckman's research on environmental factors that affect children's ability to learn indicates that children who receive frequent emotional nurturing have improved cognitive skills and are more capable learners compared with children raised in emotionally neutral or depriving environments (Heckman, 2007). While maternal nurturing can affect brain and psychosocial development, factors such as social interactions, family dynamics, nutrition, and physical environment can alter gene expression. Depending on the timing and duration of exposure to negative environmental factors, epigenetic changes can result in lifelong mental and physical health issues in individuals and their offspring (Jirtle & Skinner, 2007; Shonkoff et al., 2012). Increased research on human sensitivity to negative environmental factors during various developmental stages will facilitate development of interventions that may prevent lifelong health issues (Shonkoff et al., 2012).

Family therapists can use research findings to educate clients about the impact of stress and parental mental health on a baby's developing brain and the importance of attunement and attachment. Therapists can help parents learn to consistently and warmly respond to a young child's needs, promoting adaptive regulation of the parent's stress management systems and influencing the child's ability to regulate his/her own stress systems (Blair & Raver, 2012; DiCorcia & Tronick, 2011). Family therapists can also more broadly impact mental health by facilitating community groups where this type of information is shared, shaping communities to support young families in raising healthy children.

## EARLY INTERVENTION

### Parental Depression, Anxiety, and their Effects on Children

In addition to helping parents have healthy family relationships, family therapists may be able to shape a child's future mental health by intervening early to help parents struggling with depression and anxiety. Maternal depression, which occurs in more than 10% of pregnant women, may affect the developing fetus in the areas of growth, neurobehavior, and childhood behavior (Soubry et al., 2011). While the biological bases for these adverse changes are unknown, mood disorders such as maternal depression may be involved in altering gene expression in children. Interventions that prevent or delay the onset of maternal depression perinatally and during a child's preschool years may prevent maternal depression's sequelae in children, resulting in long-term developmental effects on a child (Munoz, Beardslee, & Leykin, 2012).

Parents with social anxiety disorder, the most prevalent anxiety disorder, typically express high levels of criticism and doubt and low levels of warmth and affection toward their children. This type of relationship can result in children developing their own anxiety disorders (Budinger, Drazdowski, & Ginsburg, 2013). Family therapists may be able to prevent anxiety disorders in these children by working with parents in the preconception stage to reduce anxiety symptoms, foster healthy coping mechanisms, and teach ways of relating that minimize anxiety and distress (Siegel & Hartzell, 2003).

### Toxic Stress, Poverty, and the Developing Brain

Through a process known as allostasis, our brains and bodies are designed to handle normal amounts of stress (McEwen & Seeman, 1999). When we experience stress, our brains attempt to maintain homeostasis by telling our bodies to produce stress chemicals that help us cope with stress and then return us to a normal state when the stress has subsided. If stress is chronic we can experience allostatic overload, which wears down our bodies and can result in physical and mental health issues (McEwen, 2005; McEwen & Seeman, 1999). In children, significant experience of childhood stress and low socioeconomic status (SES) are risk factors for chronic diseases during adulthood, and childhood abuse and trauma can alter the brain in ways that render individuals more prone to mental health issues including addiction, mood disorders, PTSD, and personality disorders (Teicher, Andersen, Polcari, Anderson, & Navalta, 2002). In terms of cognitive skills and affective functioning, prenatal and postnatal exposure to stress and growing up without adequate resources may cause issues with memory, executive functioning, linguistic skills, cognitive skills, and social-emotional skills (Hackman, Farah, & Meaney, 2010; Shonkoff et al., 2012). Adults who endure chronic levels of childhood stress exhibit poor mental and physical health indicators such as smoking, substance abuse, obesity, promiscuity, poor academic performance, and pathological gambling, and stress causes physiological changes that alter immune system functioning and increase the occurrence of diseases involving the heart, liver, and pulmonary system (Shonkoff et al., 2012). Adults with adverse childhood experiences are often unemployed, poor, homeless, and prone to committing violent crimes. An intergenerational cycle is often established where these adults are unable to provide relationships for their children that mitigate the effects of stress, resulting in children growing up in homes exposed to toxic stress (Shonkoff et al., 2012).

Three categories define how a particular type of stress experienced during childhood impacts a child's response to stress in their adult life (National Scientific Council on the Developing Child, 2011):

1. *Positive stress*—A child enters a physiological state that is mild to moderate in severity and returns to a baseline state by accessing a responsive adult who provides coping assistance.
2. *Tolerable stress*—More threatening than positive stress, tolerable stress involves greater levels of physiological response. If a child can access strong protective adult relationships, the extent of the physiological response can be reduced and the child can more rapidly return to a baseline state.
3. *Toxic Stress*—Because this stress is chronic and not mediated by a child's access to a sustained secure attachment relationship, brain and body development is altered in ways that impair later life functioning, including the ability to manage stress, acquire new skills, and deal with adversity. Functioning of the amygdala, orbitofrontal cortex, hippocampus, and medial prefrontal cortex are affected, and the number of neurons and neuronal architecture are altered (Shonkoff et al., 2012).

Given what we have learned about how the combination of chronic stress, low SES, and a poor attachment relationship with an adult can severely impair a child's mental health, family therapists working with distressed families should develop interventions that reduce stress and target mediators of the effects of low SES (Hackman et al., 2010). Family therapists can apply techniques to improve parental mental health during pregnancy and early childhood, provide psychoeducation regarding healthy parenting techniques, refer community resources to help reduce stress and increase parent coping tools, and use therapy to facilitate the building of stronger attachment relationships between children and parents so the effects of chronic stress are minimized.

### **Kindling Theory—Preventing or Delaying the First Episode of Mental Illness**

In 1992, Robert Post applied the model he developed for conceptualizing the onset and recurrence of epileptic seizures, known as kindling theory, to the study of recurrent affective disorders (Post, 1992). Post hypothesized that significant psychosocial stressors precede the initial episode of some affective disorders, but that subsequent episodes are less likely to be precipitated by stressors of similar significance. Kindling describes how the neurochemistry of a brain that has experienced the initial episode of an affective illness is altered and primed to more readily react to subsequent stressors, rendering an individual more susceptible to recurrent episodes. Kindling theory postulates that the brain becomes sensitized to a stressor and that this encoding may affect gene expression. It becomes more difficult to cure an affective disorder after onset of the first episode, perhaps because the brain has become more sensitized, enabling affective episodes to occur without any preceding stimulus.

Kindling theory has been applied to studying bipolar disorder, addiction, and depression, influencing researchers and clinicians to identify susceptibility to these disorders before they occur so lifelong mental illness may be prevented or minimized (Hlastala et al., 2000; Post, Rubinow, & Ballenger, 1986). Chronic exposure to stress, for example loss and negative events in the early lives of individuals with bipolar disorder and schizophrenia, may predispose the individual to experiencing the first episode of severe mental illness. After the experience of an initial episode early in life, the individual may experience subsequent episodes more readily and frequently (Horesh, Apter, & Zalsman, 2011). Children who have experienced the stress of abuse may be more likely to experience addiction (Shipman & Taussig, 2009), and children who experience poor early maternal care are more responsive to stressors (Pruessner, Champagne, Meaney, & Dagher, 2004; Weaver et al., 2004). Women with a history of depression can experience depressive symptoms in the absence of stressful life events, perhaps indicating that after the initial onset

of depression, their brains have become sensitized or “kindled” to become depressed more readily and in the absence of a stressor (You & Conner, 2009).

Given these findings, scientists look for ways to identify people who are predisposed to recurrent affective disorders and develop interventions to prevent illness onset or reduce the risk for illness progression (Macneil et al., 2012). Clinical staging, a medical approach used to treat progressive diseases, involves identifying characteristics and risk factors associated with phases of a disease to prevent disease progression. Psychiatry recently developed staging models for various mental health disorders and has applied the concept of neurosensitization described in kindling theory to develop treatment approaches that can prevent disorder progression (Macneil et al., 2012).

### **Early Intervention—Psychotic and Bipolar Disorders**

By applying kindling theory and shifting focus toward early detection and prevention of recurrent affective disorders, family therapists can impact the mental health of susceptible clients by conceptualizing and implementing interventions in the psychosocial environment of families that minimize significant stress in vulnerable time periods or reduce the impact of stress. The C.A.R.E. and Kickstart programs use this approach. Through the University of California at San Diego, a program has been implemented (C.A.R.E.—Cognitive Assessment and Risk Evaluation) that identifies and assesses adolescents and young adults experiencing changes in their thoughts, behavior, or emotions that may be associated with developing serious and/or disabling mental problems. Program participants identified as being at risk for developing schizophrenia or psychosis are referred to treatment programs that could enable them to avoid developing the mental illness. Kickstart, a prevention and early intervention program, provides education and early intervention services to youth who exhibit early warning signs of psychosis and to their families using the family psychoeducation treatment model (Lucksted, McFarlane, Downing, Dixon, & Adams, 2012).

### **Early Intervention—ADHD**

At UCLA’s Mindfulness Awareness Research Center (MARC), research and treatment for clients with ADHD focuses on minimizing the impact of a couple’s ADHD symptoms on their children who have ADHD (Smalley, Loo, Hale, Srestha, & McGough, 2009; Zylowska et al., 2008). Emotion dysregulation is a core component of ADHD, and children with ADHD who grow up with poorly regulated parents have difficulty functioning in school and social settings. MARC uses mindfulness interventions to improve parent emotion regulation, which has resulted in improved functioning in the children. A family therapist working with this type of couple before they have children can have a lasting impact on the lives of the couple’s future children by teaching them how to incorporate mindfulness practices in their daily lives and conducting psychoeducation regarding the benefits of these practices.

## **WORKING WITH COMMUNITIES TO AFFECT MENTAL HEALTH**

Family therapy has historically occurred in offices through 1-hour sessions with individuals, dyads, and larger family groups. While this modality of work will continue to be important, research on how early environment plays a strong role in mental health creates a compelling case for family therapists to expand their impact beyond therapy rooms. For example, in addition to family therapy the Bright Beginnings program at the Ackerman Institute for Family, under the direction of Dr. Martha Edwards, facilitates family groups and provides in-home support to at-risk families who are expecting a child or parenting

young children. The program helps parents strengthen the social and emotional development of their children and assesses the developmental needs of children with the hope of intervening early to address issues.

Other professions are implementing community-based approaches with some success. The Nurse-Family Partnership supports pregnant mothers who are at risk of having poor parenting skills (Olds et al., 2010). Nurses develop an ongoing partnership with these mothers during the first 2 years of the child's life to shape healthy parenting practices. Through home visits and ongoing relationship and modeling in the early years with the mothers they have been able to achieve successful program outcomes. To promote more nurturing family environments and reduce lifelong mental health issues for children, the Positive Parenting Program (Triple-P) was developed. The Triple-P helps parents develop nurturing attachment-oriented skills and is implemented through community education forums and individuals who work with young families (Sanders, Cann, & Markie-Dadds, 2003). Family therapists have an opportunity to broaden their impact on mental health by considering how to use existing and emerging community resources such as these in the service of clients' needs and by becoming involved in activities that help shape communities that will provide positive, nurturing environments for families.

## **THE ROLE FOR FAMILY THERAPISTS IN SHAPING THE FUTURE OF MENTAL HEALTH**

How can family therapists apply neuroscience and early intervention research to achieve more effective and sustainable mental health outcomes for clients? Family therapists are positioned to incorporate these findings because they often are called upon to help families in crisis and play a key role in helping these families become healthier. Historically therapists have used various traditional and evidence-based practices to accomplish their work. These practices can now be expanded to include an understanding about how work with relationships may affect the brain, how sensitive periods of brain development can influence a client's response to and recovery from difficulty, and how broader environmental factors such as community influences, biology, and genetics should be factored into deciding how to intervene with clients.

One existing model of family therapy treatment that can be expanded to incorporate recent neuroscience research findings is the family psychoeducational model. The model was developed to improve family functioning where severe mental illness such as schizophrenia is present, and has been expanded for use with families who are experiencing other mental health issues (Lucksted et al., 2012). The basic premise of the model is that families can be taught about how expressed emotion in a family can negatively impact the course of mental illness. The model advocates providing family members with specific information about the illness, training them so that they have skills to improve their ability to cope with the illness, referring them to support groups, and engaging them in therapy (Lucksted et al., 2012). The model could be adapted for use with families who are planning to or are raising young children. Family scholars could develop clinical programs and education materials for use in family therapy sessions to help parents optimize the social and emotional development of their children (Biglan, Flay, Embry, & Sandler, 2012). These resources should be created so that the family therapist can tailor the literature and tools to the unique situation of the family.

In addition to applying an expanded psychoeducational model that incorporates neuroscience research findings, therapists can focus on the larger context in which their clients live. This focus can include advocating for early intervention and preventative therapy through the Patient Centered Medical Homes (PCMH). The concept of PCMHs was developed by the designers of the Affordable Care Act as a way to deliver cost effective health

care to populations, and several are currently in operation throughout the country (Edwards, Patterson, Scherger, & Vakili, in press). Two key tenets of the PCMH are that prevention and early detection must be performed to avoid years of treatment and lowered lifetime health quality for patients, and that patient care will improve if care is integrated and if health care professionals share information. With the expectation that PCMHs will be established in every region and will become the standard form of healthcare delivery for many families, family therapists should consider participating in these systems and using their position to advocate for families.

Finally, to expand the practice of family therapy to apply the growing body of information about how biology and family interaction affect mental health, training programs should broaden the base of information used to train students (Celano, 2013). A training curriculum should incorporate an ecobiodevelopmental perspective of therapy and should include:

- Basic education about neuroscience and how brain development is involved in mental health.
- Review of research that explains how sensitive developmental periods, particularly early in life, are affected by environmental factors.
- Education about how relational interventions may be able to shape the brain to promote healing.

For the practicing therapist, the findings discussed in this article have yet to yield many specific treatment techniques with the exception of mindfulness training and psychoeducation. However, with the growing recognition of epigenetic influences on stress regulation, learning, and other basic human processes, focused family and community-based interventions will emerge in the coming years. In the meantime, the growing body of research suggests that the work of family therapists should focus on prevention and early intervention, be shaped by our emerging understanding of the critical role of parents on children's developing brains, and incorporate a deepening understanding of the powerful healing effects of healthy relationships for our clients.

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