

10-1-2017

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Sonya Lorelle

Rebecca Michel

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### Recommended Citation

Lorelle, Sonya and Michel, Rebecca (2017) "Neurocounseling: Promoting Human Growth and Development Throughout the Life Span," *Adultspan Journal*: Vol. 16: Iss. 2, Article 4.  
Available at: <https://mds.marshall.edu/adsp/vol16/iss2/4>

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PRACTICE

# Neurocounseling: Promoting Human Growth and Development Throughout the Life Span

Sonya Lorelle and Rebecca Michel

*Professional counselors must understand both psychological and neurological factors that impact human development across the life span. Despite an emerging body of literature about neurocounseling, little is known about how to integrate this information into supervision or the counseling curriculum. This article provides an overview of neuroscience topics applicable to professional counselors and recommendations for learning about neurocounseling.*

*Keywords:* neurocounseling, across the life span, life span

Neuroscience is the study of the brain and nervous system. Neurocounseling is the integration of neuroscience into counseling to treat behavioral and psychological challenges. The mind–body connection has been gaining acceptance within the counseling field (Ivey & Zalaquett, 2011), making it increasingly important for professional counselors to learn about neurocounseling. For example, the 2016 Standards adopted by the Council for Accreditation of Counseling and Related Educational Programs (CACREP) require professional counselors to understand neurological factors that influence human development and mental health (CACREP, 2015). Although there has been increased emphasis on understanding the role of neuroscience within counseling, there has been less discussion about how professional counselors and graduate counseling students can increase their knowledge of these topics. This article summarizes foundational neurocounseling topics for professional counselors and provides strategies for counselor educators and supervisors to infuse information about neuroscience into supervision or a human growth and development course.

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*Sonya Lorelle, Division of Psychology and Counseling, Governors State University; Rebecca Michel, Department of Counseling and Special Education, DePaul University. Correspondence concerning this article should be addressed to Sonya Lorelle, Division of Psychology and Counseling, Governors State University, 1 University Parkway, University Park, IL 60484 (e-mail: slorelle@govst.edu).*

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## HUMAN GROWTH AND DEVELOPMENT

While information about neurocounseling can be incorporated into courses across the counseling curriculum (Busacca, Sikorski, & McHenry, 2015; Field, Jones, & Russell-Chapin, 2017), the master’s-level human growth and development course covers many stages of life-span development and is a fitting class to integrate learning about neuroscience. The topics outlined in this article would satisfy CACREP (2015) requirements for teaching about human growth and development, including the “biological, neurological, and physiological factors that affect human development, functioning, and behavior” (p. 10). Individuals can access the resources cited in this article at [www.counseloredneuroscience.com](http://www.counseloredneuroscience.com).

### Introduction to Neurobiology

Ivey and Zalaquett (2011) provided justification for counselors to be familiar with neurobiology. In this discussion, we review relevant terms for professional counselors. To those seeking to learn more about these concepts, we recommend the first chapter from *The Developing Mind: How Relationships and the Brain Interact to Shape Who We Are* (Siegel, 2012) and the first chapter in *Neurocounseling: Brain-Based Clinical Approaches* (Field et al., 2017).

*Brain structure.* A metaphor can be used to remember key parts of the brain’s anatomy relevant for counseling: the *hand model of the brain* (Siegel, 2012). Dan Siegel (2012) suggested making a fist in which the wrist represents the brain stem, the thumb represents the limbic area, and fingers curled around the thumb represent the cortex. The terms *upstairs* and *downstairs* can be used metaphorically to delineate the upper and lower regions of the brain’s functioning. The downstairs brain includes the brain stem and limbic regions. The brain stem is responsible for automatic bodily functions, arousal, and the fight, flight, and freeze responses. The limbic system includes the hippocampus and amygdala, which are central to regulating emotions and creating memories. The upstairs brain includes the cerebral cortex and is responsible for thinking, problem solving, and abstract thought. Siegel (2012) explained how these higher level functions could become ineffective when people are flooded with anger, causing them to act in destructive ways. In these situations, individuals often “flip their lid” (Siegel, 2012, p. 286). In the hand model of the brain, outstretched fingers create a visual representation of the cerebral cortex becoming unavailable during this highly emotional experience. This visual representation allows individuals to recognize how parts of the brain are connected and influence human behavior throughout the life span.

*Plasticity.* The ability of the brain to be shaped by experiences is called plasticity. Early in life, the brain is extremely plastic and is building connections rapidly. During the first 4 years of life, 80% of the structural development

of the brain is completed (Ludy-Dobson & Perry, 2010). A simple metaphor helps individuals conceptualize plasticity. The *sled in the snow* metaphor (Siegel & Bryson, 2013) illustrates that a sled will follow the old trail made in the snow ending at the same spot unless the sled is picked up and moved to another section, and a new trail is made in the snow. As the snow falls, the old path will become covered up and the new path will become stronger with repetition. The brain retains plasticity throughout one's life (Doidge, 2016; Siegel, 2012), which has important implications for counselors. Effective counseling involves building new neural connections (Ivey, Ivey, & Zalaquett, 2010) and ongoing plasticity demonstrates that client growth and new learning are possible at any age.

*Neurogenesis.* The brain is made up of cells called neurons. The brain is dependent upon recurring experiences to build new neural networks. Exposure to repetitive stimuli causes the brain to change and adapt (Ludy-Dobson & Perry, 2010). As Carla Shatz articulated in the phrase “neurons that fire together, wire together” (as cited in Siegel, 2012, p. 197), the more exposure to a certain experience or stimulus, the stronger the neural connection will become. An activity can personalize this concept: Individuals sign their names with their dominant hand and nondominant hand, share which approach felt more natural, and make the connection about how exposure to repetitive stimuli affected their experience.

Neurogenesis, or the brain's ability to develop new neurons, is also important for professional counselors and students to understand (Ivey & Zalaquett, 2011). While the development of new neurons drastically halts after birth, researchers have discovered neurogenesis is possible in mature brains (Perry, 2002). However, prolonged or intensely stressful experiences can be destructive for the brain's plasticity and neural development (Ratey, 2008). The counseling process, which asks clients to envision new perspectives and try new behaviors, engages the brain to build new neural networks, which become stronger with time and repetition (Ratey, 2008). This process provides justification for the important role of counseling to support client growth. Ivey et al. (2010) asserted that intentional counseling interventions can provide important learning and neural growth for clients in distress. Next, we will explore the role of attachment.

### **Attachment**

The brain plays an important role in attachment. Schore (2000) explained, “Attachment can be defined as the interactive regulation of biological synchronicity between organisms” (p. 23). Children are genetically wired to attach to caregivers (Cassidy & Shaver, 1999), and the social-emotional functions of the right brain may be primarily responsible for this attachment process (Schore, 2000). Children have genetic predispositions but need certain experiences

with caregivers to influence the expression of those genes. Parents' emotional attunement to an infant impacts the infant's brain organization and structure (Schore, 2001).

Bowlby (1969) discussed attachment of children with caregivers as necessary in order for children to develop a secure base that allows them to explore their world and create an internalized model for social-emotional relationships throughout life. Caregivers help to regulate infants' stress reactions and arousal levels by responding to the child's signals in order to promote positive states and moderate negative ones (Schore, 2001; Siegel, 2012). In this process, the caregiver and baby co-regulate. An infant's adaptive ability to cope with external stressors grows during exposure within this caring, predictable, and responsive environment (Ludy-Dobson & Perry, 2010). This type of responsive caring promotes a "social engagement system" (Chapin & Russell-Chapin, 2014, p. 69) in the brain that prepares the child to have better emotional regulation and to be resilient to the stress of life and later relationships. Absent, unresponsive, or poorly timed parent and child exchanges result in attachment problems and disorganized neural networks connected to social and emotional learning in children (Chapin & Russell-Chapin, 2014; Perry, 2002). The impact of these neurological changes associated with attachment can be seen into adulthood. In functional magnetic resonance imaging scans, adults with disorganized or unresolved attachment show differences in brain activity in areas that are associated with emotional regulation (Buchheim et al., 2006). Parents' own attachment style can affect their ability to be responsive to their children as well as influence their adult romantic relationships (Edelstein et al., 2004). By understanding the attachment processes in childhood, professional counselors can recognize the lasting consequences within adults' attachment styles.

*Counselor education and supervision application.* Individuals interested in learning more about these concepts can read "The Verdict Is In: The Case for Attachment Theory" (Sroufe & Siegel, 2011), which explains the connection between attachment and the brain, as well as *The Developing Mind* (Siegel, 2012), which includes a chapter on the neural wiring of attachment. Several videos also illuminate the attachment process. The *still face experiment* video, in which an infant quickly starts to cry when her mother stops responding to her, illustrates how a neurological need manifests itself behaviorally in children. Case studies can also be utilized to allow professional counselors and students to solve problems, test assumptions, and practice case conceptualization. For example, counselors and students might consider a family situation where a teen mother is experiencing difficulties with her baby and her mother. In this case study, the teen mother's father left her and her mother when the teen was young. Counselors and students would reflect on the quality of the attachment relationship between the caregiver

and child, possible factors affecting attachment, and the neurobiological considerations. They would also be asked to determine interventions to help foster a more secure attachment style.

*Neurocounseling application.* Psychoeducation can be an effective way of supporting clients. Miller (2016) proposed the term *neuroeducation* as “a didactic or experiential-based intervention that aims to reduce client distress and improve client outcome by helping clients understand the neurological processes underlying mental functioning” (p. 105). Counselors can provide information to parents and guardians about the neurological influence of attachment. This can help to reframe a child’s motivations and behaviors, create insight into how the caregivers’ own attachment style might influence their parenting, and encourage them to engage in activities and routines that facilitate connection and entering the child’s world. Bryson’s (2013) video *10 Brain-Based Strategies: Help Children Handle Their Emotions* provides several examples of how caregivers can be emotionally responsive to their children.

### **Trauma**

It is vital for professional counselors to understand how trauma affects the brain. Felitti et al. (1998) conducted the Adverse Childhood Experiences study and found that early exposure to trauma and violence can lead to significant challenges later in life. In fact, exposure to threatening, abusive, and violent experiences during critical times in the brain’s development alters the structure and function of the brain (Perry & Hambrick, 2008). Early childhood impairment can affect later developmental tasks as the lower brain development is contingent on information and feedback from the higher level brain processes (Perry, 2009). The impact of early trauma experiences on the brain can significantly influence adult development.

*Stress reactions.* When people perceive a threat, the brain stem activates and moves them along an arousal continuum of calm, arousal, alarm, fear, and terror (Perry, 2006). The reactions of the brain stem and midbrain help the person to act immediately in order to ensure safety without processing too much information from the cortex. Many children exposed to ongoing abuse, violence, and other threats develop a distorted baseline of arousal where the body is kept in a state of alarm and fear (Perry, 2006). These disruptions in the body’s ability to regulate stress can be found in adults with childhood trauma histories (Bellis & Zisk, 2014).

*Memory.* The memory systems of the brain are also affected by trauma. Memories are encoded differently during times of trauma. Siegel (2012) defines memory as an experience in the past that influences the present and shapes reactions in the future. There are two types of memory: implicit and explicit. Implicit memory involves emotions, perceptions, physical actions of the body, and bodily sensations. This type of memory is available from

birth and does not require that conscious attention be paid to an experience for it to be stored. Explicit memory consists of factual and autobiographical memory and starts developing around the age of 2 (Siegel, 2012). Attention is needed in order to store the information, which involves the hippocampus (Siegel, 2012). Stressful experiences can cause the hippocampus to become ineffective at processing and recording new information (Siegel, 2012). When a memory is not fully explicitly stored, it can still be recorded in the implicit memory, leaving people with vivid emotional and bodily sensation memories. Siegel (2012) suggested that having only these implicit memories can prevent people from processing the experience with cortical parts of their brain and therefore remain unable to resolve the traumatic experiences. These unresolved implicit memories often shape the person's ongoing perceptions of the world through intrusive recollections and nightmares.

*Counselor education and supervision application.* Counselors can learn more about trauma and the neurophysiology of traumatic stress by reading Chapter 4 in *Neurocounseling: Brain-Based Clinical Approaches* (Field et al., 2017). Another helpful resource is the discussion of how trauma impacts brain development and the importance of positive relationship interactions in “The Role of Healthy Relational Interactions in Buffering the Impact of Childhood Trauma” (Ludy-Dobson & Perry, 2010). Additionally, counselors can read “Applying Principles of Neurodevelopment to Clinical Work With Maltreated and Traumatized Children: The Neurosequential Model of Therapeutics” (Perry, 2006) for a review of the alarm activation process, arousal continuum, and clinical implications of the impact of trauma on the brain. Individuals could also watch a TED Talk on *How Childhood Trauma Affects Health Across a Lifetime* (Harris, 2014) and then personalize the information by considering and sharing examples of times when they felt the stress response as well as the types of memories they experienced during those events.

*Neurocounseling application.* Professional counselors and students must consider the most effective therapeutic approaches when working with clients who have experienced early trauma. When the brain stem is dysregulated, therapeutic and social–emotional learning are stunted (Perry, 2006); thus, use of common counseling interventions, such as helping clients develop insight about a situation or challenging their cognitions, would not be sufficient. A comprehensive trauma intervention should include providing the client psychoeducation about the common biological trauma responses and tools for arousal reduction and affect regulation (Cohen, Mannarino, & Deblinger, 2006). Clients also need strategies for ensuring safety and should be encouraged to give attention to social and relational engagement. Finally, counselors can assist clients in challenging their beliefs about the sense of self that resulted from the trauma, working through the difficult



experiences, and encouraging a sense of mastery and a sense of control (Malchiodi, 2008). Interventions that work to regulate the brain stem, such as music, movement, eye-movement desensitization and reprocessing (EMDR), and drumming, should also be considered (Perry, 2006). Van der Kolk (2016) suggested that counselors helping clients to heal from the impact of trauma should encourage them to engage their body through yoga and other movement as a way for the body to learn how to regulate emotions and physiological change. There is also research to support the effectiveness of neurofeedback to address psychological and behavioral issues, including attention, emotional regulation, and managing arousal symptoms (Chapin & Russell-Chapin, 2014). Next, we will discuss neurobiology within adolescence and emerging adulthood.

### **Adolescence and Emerging Adulthood**

Professional counselors should be aware of important changes that occur in the brain throughout the life span. The neurological changes are vast in the brain during adolescence (between the ages of 10 and 18) and emerging adulthood (between the ages of 18 and 29), and several need to be considered, including myelination, pruning, reconstruction within the prefrontal cortex and parietal cortex, and a decrease in the level of dopamine. Collectively, these changes significantly affect young adults' emotional and behavioral responses (Codrington, 2010). Siegel (2013) stated that brain changes in adolescence create four qualities: novelty seeking, social engagement, increased emotional intensity, and creative exploration.

Myelination is the process of the neuron's axons being wrapped in myelin, which is an insulation sheath that makes the neural connections faster, more efficient, and enables more complicated functions to take place (Perry, 2002). This process begins at birth, and during the first years of life, myelination contributes to the original structuring of the brain. There is another surge in this process during adolescence. During the myelination process, individuals learn new ways to think, behave, and interact with their world. While this is a normal developmental process, the new thoughts and behaviors may be unsettling or shocking for parents, educators, and other adults interacting with these individuals.

Adults often regard adolescents' and emerging adults' thoughts and behaviors as disorganized or unformulated, especially when under stress. This may be due to changes within the prefrontal cortex as the brain begins to restructure and the prefrontal cortex specializes (Codrington, 2010). This specialization occurs because of the elimination of excess and unused synaptic connections (Blakemore & Choudhury, 2006). Perry (2002) noted these changes are primarily impacted by the environment and experiences, rather than genetics. Given the reconstruction during this stage, an adolescent's ability to monitor



and organize behavior and thoughts is less developed than in later adulthood (Blakemore & Choudhury, 2006). Thus, adults may view the adolescent’s decisions as irrational and selfish.

The ability to take another person’s perspective is not fully formed until adulthood (Blakemore & Choudhury, 2006; Siegel, 2013). Siegel (2013) noted the limbic area, responsible for emotions, might have more impact on behavior during adolescence because of changes in connections between the prefrontal cortex and the emotional system of the brain (Codrington, 2010). The sensitivity to react to the messages from the limbic area may look to adults like moodiness. During adolescence, the base level of dopamine drops and there is increased sensitivity when it is released (Blakemore & Robbins, 2012; Siegel, 2013). This change makes individuals more likely to seek new experiences to get positive feelings from the dopamine release. This sensitivity in the reward regions of the brain also may tend to skew decision making in emotional contexts (such as environments around their friends), making them evaluate decisions based on how they feel about the potential benefit rather than the potential negative consequences, which may lead to more risk-taking behaviors (Blakemore & Robbins, 2012).

*Counselor education and supervision application.* Professional counselors and students seeking to gain additional knowledge about adolescents and emerging adults are invited to read “A Family Therapist’s Look Into Interpersonal Neurobiology and the Adolescent Brain: An Interview With Dr. Daniel Siegel” (Codrington, 2010), which provides an overview of adolescent and young adult brain development. There are several applicable audio and video resources, including a TED Talk by Sarah-Jayne Blakemore, *The Mysterious Workings of the Adolescent Brain* (Blakemore, 2012), and a National Public Radio interview with Frances Jensen on *Why Teens Are Impulsive, Addiction-Prone, and Should Protect Their Brains* (Gross, 2015). During supervision or graduate study, professional counselors and counseling students could examine a case study in which an emerging adult is experiencing various challenges (e.g., difficulty staying focused on school, emphasis placed on peer relationships at the expense of family ties, minor legal trouble, disagreements with parents). The counselors and students would discuss the case using their knowledge of the neurobiological changes that occur during this period to explain potential reasons behind the emerging adult’s behavior, suggest possible counseling interventions, and provide a prognosis. Armed with knowledge about the brain, counselors and students often experience a perspective shift and leave with a more realistic conceptualization of the emerging adult’s behaviors and prognosis.

*Neurocounseling application.* It can be helpful for professional counselors to educate adolescents, emerging adults, and their caregivers about typical brain changes during this phase of life. This knowledge can help to reframe negative

stereotypes into common behaviors within particular stages of development. Counselors can provide psychoeducation about the malleability of the brain to help clients understand how their experiences in adolescence can shape their brains into adulthood. Similarly, counselors can advocate for emerging adults to access opportunities to challenge their brains with activities that include higher order thinking and problem solving (Roaten & Roaten, 2012). Counselors should also consider using multisensory interventions such as art or sand tray as a way to stimulate the brain to learn and change in counseling (Martin, 2003). Next, we will explore neurobiology among older adults.

### **Older Adulthood**

Neuroscience applications can be considered over the course of the life span, including into older adulthood. Many changes occur in the brain as adults age. Some common brain alterations among older adults include the decrease of brain weight, enlargement of the ventricles, broadening of the grooves on the brain's surface, and the buildup of plaques outside of neurons (Lillrank, 2007). Researchers believe these changes impact brain functioning (Cabeza, 2002). For example, older adults typically display reduced processing speeds, less ability to focus attention, and a degeneration of memory (Wright & Diaz, 2014). Declines in memory are theorized to be connected to a reduction in neurons, myelination, blood flow, and certain neurotransmitters (McDaniel, Jacoby, & Einstein, 2008). Dolcos, Rice, and Cabeza (2002) proposed evidence of a decline in the right hemisphere functioning, which influences visual/spatial and emotional processing tasks in older adults. Other researchers postulated memory deficits might be linked to impairments in sensory perception (McDaniel et al., 2008).

However, it is important to note that not all abilities in older populations are certain to decline. Researchers have found less frequent age differences in memory performance in cultures where there are no negative stereotypes about aging (McDaniel et al., 2008). Additionally, vocabulary and emotional regulation tend not to degenerate with age (Wright & Diaz, 2014). Additionally, interventions such as exercise affect neurological changes that positively influence cognitive abilities in older adults (McDaniel et al., 2008).

*Dementia.* Beyond common neurological changes, there is also an increased risk for dementia among older adults. In 2016, over 5.4 million people were living with Alzheimer's disease (AD), a type of dementia (Alzheimer's Association, 2016). AD is a degenerative neurocognitive disorder, and symptoms include loss of cognitive function in memory, confusion, and difficulty completing routine tasks (Alzheimer's Association, 2016). The accumulation of plaques and tangles of neurons and the growth of irregular proteins hinder effective communication between neurons, which leads to progressive cognitive impairment (Granello & Fleming, 2008). These changes in the brain can occur decades before symptoms appear. Normal aging does not involve such drastic cognitive decline.

*Counselor education and supervision application.* To expand their knowledge about older adulthood, professional counselors and students can read “Neuroscience Research on Aging and Implications for Counseling Psychology” (Wright & Díaz, 2014), which outlines the neuroscience research on aging and implications for counseling. Neurophysiological development across the life span is discussed in Chapter 2 of *Neurocounseling: Brain-Based Clinical Approaches* (Field et al., 2017). Counselors and students might also conduct an experiential role play where one individual takes on the role of an older adult client who experienced early childhood trauma and another individual serves as the professional counselor. This approach allows professional counselors and students to practice using intentional interventions with older adults.

*Neurocounseling application.* Professional counselors can use information about the aging brain to improve older adult client treatment outcomes. It is important for professional counselors to be aware of ageist attitudes about older adults and use a wellness approach to conceptualize this phase of life as a time of growth rather than decline (Fullen, 2016). Professional counselors can help older adults to expand their coping skills and encourage making meaning of their lives (Sherman, Michel, Rybak, Randall, & Davidson, 2011). These interventions support the construction of additional neural pathways.

Professional counselors can also provide education and support to individuals with AD as well as to their caregivers (Granello & Fleming, 2008). Stress management and other wellness interventions may prevent some influences of AD (Douthit, 2007). Fox (2012) recommended professional counselors include a person the client trusts in the process of counseling individuals with dementia or memory difficulties. This caregiver or family member may be able to help with the practicalities of getting the client to counseling and can provide valuable information during the assessment and counseling process.

## IMPLICATIONS

Given that neurobiological changes continue throughout the life span, professional counselors should consider brain changes when designing interventions and providing psychoeducation to clients about their mental health and wellness. The concepts of neuroplasticity provide hope and encouragement for professional counselors and clients that the brain has the ability to heal and repair after damage (Miller, 2016; Uhernik, 2016). Professional counselors can inform clients about the types of experiences that shape the brain while under stress (Miller, 2016) and choose effective counseling interventions to support a successful change process (e.g., neurofeedback, EMDR, sand tray, yoga).

Although we proposed suggestions for integrating this information into supervision or a graduate life-span development class, these concepts can be integrated throughout the counseling curriculum in classes such as counseling children and adolescents, theories, and beginning counseling skills (Field et al., 2017). Counselor educators and supervisors can also reinforce these concepts in practicum and internship when students are conceptualizing client issues through a neurobiological lens (Russell-Chapin, Sherman, & Ivey, 2016). This reinforces the developmental perspective that professional counselors take when conceptualizing clients (Ivey & Zalaquett, 2011). Using neurocounseling interventions can reframe symptoms away from problems of the personality to typical biological functioning. By providing psychoeducation to clients about the physiological aspects of their experiences, counselors can normalize their experiences, reduce shame, and provide a framework for integrating coping tools such as mindfulness (Miller, 2016; Siegel, 2012).

We recommend that professional counselors and counselor educators who are less familiar with these topics immerse themselves in the growing body of literature about neuroscience in counseling (Montes, 2013). For example, individuals seeking to develop skills and gain additional education and training might join the American Counseling Association (ACA) Neurocounseling Interest Network ([www.neurocounselinginterestnetwork.com](http://www.neurocounselinginterestnetwork.com)), read articles within the “Neurocounseling” section of the *Journal of Mental Health Counseling* (Beeson & Field, 2017), access the “Neurocounseling: Bridging Brain and Behavior” column in ACA’s monthly magazine *Counseling Today*, or watch educational videos such as *Neurocounseling: Shattering the Myths of the Brain and Counseling* (Russell-Chapin & Dermer, 2014). Other resources for gaining knowledge about the brain and neurocounseling applications include education sessions at the annual ACA Conference & Expo, webinars on the ACA website ([www.counseling.org/continuing-education/webinars](http://www.counseling.org/continuing-education/webinars)), the readings suggested in this article, and videos available at [www.counseloredneuroscience.com](http://www.counseloredneuroscience.com).

## CONCLUSION

Professional counselors must understand the brain and its relationship to mental health and development. In this article, we have (a) provided an overview of neuroscience topics applicable to professional counselors and (b) proposed resources and activities for counselor educators and supervisors to integrate neuroscience into their curriculum and supervision sessions. With this knowledge, professional counselors can be better prepared to use neurocounseling to support human growth and development through the life span.

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