American Counseling Association

ACA Practice Briefs

Published Spring 2019

Neuro-Informed Applications in Counseling

Raissa Miller, Boise State University

Eric Beeson, The Family Institute at Northwestern University

DESCRIPTION OF NEURO-INFORMED APPLICATIONS IN COUNSELING

Neuroscience is a multidisciplinary science concerned with the study of the structure and function of the nervous system (Nature, 2019). There are many subfields within neuroscience, including cognitive, behavioral, affective, developmental, social, computational, and molecular and cellular. Depending on their area of specialty, neuroscientists study ways the brain affects thoughts, feelings, and behaviors, and how individual factors (e.g., social connection, cognition, stress levels, nutrition) affect the brain (Polania, Nitsche, & Ruff, 2018). Rapid growth in technologies is allowing neuroscientists to study the brain and nervous system in increasingly novel and complex ways, resulting in tremendous amounts of basic science research available through scholarly sources.

The use of neuroscience research to inform counseling practice is increasing (Beeson & Field, 2017). From understanding the role developmental trauma plays in brain development and current functioning to including physiological measures of functioning (e.g., quantitative EEG, breathing patterns) in assessment protocols, professional counselors are more widely incorporating principles of neuroscience into their case conceptualizations and treatment plans (Crockett, Gill, Cashwell, & Myers, 2017; Field, Jones, & Russell-Chapin, 2017). Some mental health professionals are also involved in primary neuroscience research, including Lori Russell-Chapin, Tom Collura, John Demos, Penijean Gracefire, Robert Longo, and Eraina Schauss. Professional counselors interested in applying research from these various subfields must translate, or rely on others' translations of, primary neuroscience research into practical applications for clinical work. Many mental health professionals are currently leading the way in this translational venture, as can be found in the references included throughout this practice brief.

The most frequently used term to describe the movement around neuroscience-informed applications in counseling is *neurocounseling*. Beeson and Field (2017) offered an updated definition of neurocounseling in their introduction to the new *Journal of Mental Health Counseling* neurocounseling section, defining the approach as

> …the art and science of integrating neuroscience principles related to the nervous system and physiological processes underlying all human functioning into the practice of counseling for the purpose of enhancing clinical effectiveness in the screening and diagnosis of physiological functioning and mental disorders, treatment planning and delivery, evaluation of outcomes, and wellness promotion. (p. 74)

The term neurocounseling is not intended to imply a new branch or type of counseling; instead, it suggests neuroscience has relevance to all aspects of counseling and can inform various components of counselors' work (Field, Jones et al., 2017; Luke, Miller, & McAuliffe, 2019). From a neurocounseling perspective, neuroscience is used to confirm and enhance existing practices, build new models

of assessment and case conceptualization, and inform the development of novel techniques and interventions. In the remaining sections, we will provide an overview of current neuroscience-informed applications in the areas of assessment and intervention.

Resources: Neuro-counseling Central web site: https://www.neurocounseling.org

IDENTIFICATION/ASSESSMENT STRATEGIES

Neuroscience-informed assessment includes a wide range of strategies, from adding particular questions related to developmental history to an unstructured clinical interview to collecting quantitative electroencephalogram (EEG) data (Russell-Chapin, 2017). Professional counselors can incorporate some assessment approaches into their clinical work without significant additional knowledge or training, whereas other strategies require special certification or collaboration with other allied health professionals. At the most basic level, neuro-informed counselors can conduct a comprehensive bio-psycho-social assessment with the added lens of how each element impacts nervous system development and functioning. For example, professional counselors can consider how their client's drug use during adolescence might have impaired the myelination of their cortical and subcortical regions resulting in struggles with regulation. Additionally, professional counselors might ask questions about nutrition to assess whether diet might be impacting enteric nervous system functioning and be a contributing factor to the client's experience of depression or anxiety. A few specific neuroscience-informed assessment tools and approaches are described below.

Neurological Dysregulation Risk Assessment

The Neurological Dysregulation Risk Assessment is a brief questionnaire covering 15 historical and current factors that could contribute to brain dysregulation (Chapin & Russell-Chapin, 2014). Clients are asked to endorse yes or no to having had specific experiences (e.g., prenatal toxin exposure, brain injury, trauma) or current behaviors, struggles, and life circumstances (e.g., a diet high in processed foods, chronic migraines, poverty, excessive technology use). The more items individuals endorse, the higher risk they are for experiencing neurological dysregulation; however, even one item can be a source of concern. No evidence related to score reliability and validity is presently available. Professional counselors can use client's self-reported information to hypothesize about potential symptom etiology and promising directions for treatment.

Resource: For more information on this assessment, contact Lori Russell-Chapin, Co-Director for the Center for Collaborative Brain Research (CCBR) at lar@bradley.edu

Neurosequential Model of Therapeutics

The neurosequential model of therapeutics (NMT) is an approach to clinical assessment and decision-making grounded in principles of neurodevelopment and traumatology (Perry, 2009). The approach is intended to complement existing assessment tools, providing a neurodevelopmental lens to initial interviews and treatment planning efforts (Child Trauma Academy, 2015). The first step of NMT assessment includes collecting a thorough developmental history with an emphasis on noting the timing of environmental or relational challenges and positive relationships and supports. Perry shared the example of individuals' exposure to toxins while in the womb (e.g., prenatal alcohol or drug use by mother), noting that toxins can "alter the norepinephrine, serotonin, and dopamine systems of the brainstem and diencephalon that are rapidly organizing during these times in life" (p. 249) resulting in regulatory struggles in childhood and beyond. Such occurrences are calculated, scored, and represented as an estimate of developmental "load." The second phase of the NMT assessment includes creating a functional brain map that represents an individual's current functioning, linking clinical symptoms to specific brain structures and systems. This brain map is a visual representation of an individual's

functional capabilities, not an actual fMRI or specific neuropsychological evaluation. The final component of NMT assessment includes a recommendation of a sequence of interventions that support healing the brain from the bottom-up. For example, early trauma might result in brain stem dysregulation that requires rhythmic, body-based approaches, whereas relational trauma in early to middle childhood might result in more limbic system dysfunction that could be best addressed through child-centered play therapy or attachment-based approaches. Use of the NMT assessment approach requires formal training provided through the Child Trauma Academy. Although the NMT is not a standardized assessment, "NMT metrics have been shown to be valid (both face valid and cross-validity have been examined) and reliable . . . there is a network wide inter-rater reliability process and ongoing 'ratings meeting' to allow ongoing correction and supervision" (Child Trauma Academy, 2015, p. 9).

Resource: Child Trauma Academy: www.childtrauma.org

Quantitative Electroencephalography (QEEG)

Quantitative electroencephalography (QEEG), also known as brain mapping, is an assessment method that provides professional counselors with a glimpse of potential brain functioning that is filtered through the lens of client's self-report (Chapin & Russell-Chapin, 2014). Specifically, QEEG is the method of analyzing EEG signals that are collected by placing electrodes on the participant's scalp. The EEG signal then travels through an amplifier and into a computer program that uses quantitative statistical methods to calculate metrics (e.g., amplitudes, z-scores) related to types of brain-waves (e.g., delta, theta, gamma) at various locations, including their connectivity and communication with one another. These metrics are then compared to a normative database to identify potential areas of brain functioning that could be related to the client's self-reported symptoms. Although not a direct measure of brain activity, QEEG data serves as an indirect measure of electrical activity that is correlated to specific brain areas, regions, structures, and networks. Whether completed by the professional counselor or someone to whom the professional counselor refers, brain map data that can confirm, illuminate, or expand the first-person narrative of the client and guide future interventions. Currently, QEEG analysis is an unregulated area of practice. Individuals can complete specialized training through organizations that train biofeedback and neurofeedback clinicians (e.g., Biofeedback Certification International Alliance) or seek voluntary certification through the International QEEG Certification Board.

Resources: International QEEG Certification Board: https://qeegcertificationboard.org/
Several vendors of QEEG hardware and software include https://www.stens-biofeedback.com/what-is-qeeg https://www.newmindmaps.com/demo/demo.htm; https://www.brainmaster.com/software-updates/braindx-report-generator/; http://anineuroguide.com/

INTERVENTION STRATEGIES

Neuroscience research offers support for the tenets of many existing counseling approaches (Clark & Beck, 2010; Lux, 2010; Miller & Dillman-Taylor, 2016; Ross et al., 2017). There are also some established and emerging intervention strategies that explicitly emphasize neuroscience concepts or prioritize the brain (e.g., brain wave training) and the body (e.g., heart rate variability) more directly in fostering therapeutic change. Interventions addressed here include neuroeducation, Neuroscience-Informed Cognitive-Behavior Therapy, interpersonal neurobiology, and neurofeedback.

Neuroeducation

Neuroeducation is a specific type of psychoeducation that focuses on sharing brain-based information with clients through didactic or experiential means (Miller, 2016). The contemporary idea of mental health professionals talking with individuals about brain structures and functions for therapeutic benefit largely emerged from the translational neuroscience work of Siegel (2010), Cozolino (2010),

and Badenoch (2008). Groups of professionals have also developed comprehensive neuroeducation programs focusing on pain (Louw, Puentedura, Schmidt, & Zimney, 2018) and addiction treatment (Ekhtiari, Rezapour, Aupperle, & Paulus, 2017). Neuroeducation can be used to help clients develop greater compassion and empathy for themselves or others. Connecting behaviors or experiences of emotional dysregulation to nervous system development or adaptive physiological responding can have a destigmatizing effect, reducing shame and blame and beginning the process of shifting negative self-narratives.

Further, by describing concepts such as neuroplasticity or implicit memory, professional counselors can help illuminate mechanisms of change and normalize the challenges of therapeutic work. The use of neuroeducation can also support regulation, as labeling what is going on internally often diminishes the intensity of thoughts and feelings (Torre & Lieberman, 2018). Professional counselors can use their creativity and contextualized knowledge of their clients when developing or selecting neuroeducation interventions. Ideas can range from the use of well-known frameworks, such as Siegel's hand model of the brain, to the development of novel metaphors, sand-tray exercises, guided imagery, or interactive games (Miller & Beeson, in press). For example, Siegel's (2010) hand model of the brain uses a person's hand to describe broad structures and functions of the brain. Individuals are instructed to hold up their hand, fold in their thumb, and then wrap their four remaining fingers over their thumbs. The wrists area is labeled the brainstem, the folded thumb the limbic system, and the folded over finger tips the prefrontal cortex. Corresponding functions related to each part of the brain and specific experiences such as "flipping your lid" are then shared based on the client's experiences and interests (Miller, 2016). Neuroeducation is most effective when it is used in conjunction with a grounded philosophical approach to counseling and implemented with attention to essential micro skills and common factors of change (Lebowitz, Ahn, & Oltman, 2015). Without such focus, sharing neuroscience information (e.g., offering genetic or biological explanations for mental health and addiction related concerns) may lead to genetic or biological essentialism and serve to decrease personal agency and clinical outcomes (Lebowitz & Appelbaum, 2017).

Resources: Miller, R., & Beeson, E. T. (in press). *The neuroeducation toolbox: Collaborative approaches to infusing neuroscience principles in counseling and psychotherapy.* San Diego, CA: Cognella.

Miller, R. (2016). Neuroeducation: Integrating brain-based psychoeducation into clinical practice. *Journal of Mental Health Counseling, 38,* 103-115. https://doi.org/10.17744/mehc.38.2.02

Neuroscience-Informed Cognitive-Behavior Therapy (nCBT)

Neuroscience-informed cognitive-behavior therapy (nCBT) is a "semi-structured, multiphasic, and progressive approach to neurocounseling that is grounded in a novel conceptualization process known as the Waves of the ABCs" (Beeson, Field, Jones, & Miller, 2017, p. 30). The *Waves* extend Albert Ellis' traditional ABCDE analysis to include emerging science related to information processing and adaptive neurophysiological functioning. *Wave1* reflects bottom-up processing that is mostly automatic, reactive, and outside of conscious awareness. *Wave2* describes top-down processing in which individuals become more conscious of their experiences and begin to engage in cognitive appraisal and more intentional responding. The process of nCBT emphasizes recognizing and attending to *Wave1* experiences before focusing on and modifying *Wave2* experiences. Examples of *Wave1* interventions include affective modeling, anchoring, biofeedback, metaphor, and systematic desensitization. Examples of *Wave2* interventions include connecting behaviors and emotions to physiological states, sensory-based exploration and imagery, reappraisal, and making new meaning out of new physiological experiences, which disputes previously held beliefs. The nCBT approach is currently in the first stage of model development according to the National Institutes of Health (NIH) model of intervention development and thus efficacy research is limited (Onken, Carroll, Shoham, Cuthbert, & Riddle, 2014). Preliminary results, however, have demonstrated high levels of counselor and client belief in the credibility and effectiveness of the model and have identified the role certain factors play (e.g., counselors' ability to communicate positive expectancy) in overall client outcome (Field, Beeson, & Jones, 2016; Field, Beeson, Jones, & Miller, 2017).

Resources: Neuroscience-informed cognitive-behavior therapy (nCBT) website: https://www.n-cbt.com/

Beeson, E. T., Field, T. A., Jones, L. K., & Miller, R. (2017). *nCBT: A semi-structured treatment manual.* Boise, ID: Boise State University.

Field, T. A., Beeson, E. T., & Jones, L. K. (2015). The new ABCs: A practitioner's guide to neuroscience-informed cognitive behavior therapy. *Journal of Mental Health Counseling, 37,* 206-220. https://doi.org/10.17744/1040-2861-37.3.206

Interpersonal Neurobiology (IPNB)

Siegel (2012) coined the term interpersonal neurobiology (IPNB) in the 1990s after years of meeting with scholars from various disciplines to discuss the mind. An interpersonal neurobiology approach to counseling draws on a body of consilient work, emphasizing the way relationships, the embodied nervous system, and the mind interact to influence mental life. Mental wellbeing is conceptualized in terms of neural integration, and specific clinical interventions are aimed at supporting the nine domains of integration: (1) integration of consciousness, (2) vertical integration, (3) bilateral integration, (4) integration of memory, (5) narrative integration, (6) state integration, (7) temporal integration, (8) interpersonal integration, and (9) transpirational integration (Siegel, 2006). Applications of IPNB in clinical practice will vary depending on the setting and clinicians' training and theoretical background; however, consistent features typically include an intentional focus on creating a safe therapeutic relationship, recognition of child and adult attachment styles and their impact on affect regulation, attention to counselors' and clients' mindfulness capabilities, consideration of core principles of brain development and functioning, and integration of behavioral changes that foster brain health (e.g., Healthy Mind Platter; Rock, Siegel, Poelmans, & Payne, 2012). Techniques consistent with IPNB principles include mindsight skills training, memory reconsolidation, somatic sensorimotor exercises, and traditional humanistic practices that emphasize the therapeutic relationship as the primary agent of change. Because IPNB is not a single intervention or manualized model of treatment, efficacy research is limited. Research on the various components of IPNB (e.g., attachment theory, mindfulness, brain-based wellness) is well researched and cited in Siegel (2012).

Resources: Mindsight Institute: https://www.mindsightinstitute.com/
Global Association for Interpersonal Neurobiology Studies: https://mindgains.org/

Neurofeedback

Neurofeedback is a technological intervention grounded in principles of classical and operant conditioning. Also referred to as EEG or brain-wave biofeedback, NFB involves collecting electrophysiological data on the human scalp, analyzing the data, and providing feedback to the client (Chapin & Russell-Chapin, 2014). The electrophysiological data from the scalp is amplified and sent to a computer program for interpretation based on pre-set training protocols. The computer program then provides feedback to the client based on how that electrophysiological data compares to the set training protocol. For example, when the electrophysiological data is within the training parameters, then the client gets a visual and auditory reward whereas when it is outside of the training parameters, the feedback is withheld.

Counseling leaders have long advocated for a greater focus on NFB in the counseling field (Myers & Young, 2012) and have even suggested that the unique interpersonal and humanistic training of professional counselors makes us tremendous NFB practitioners (Chapin, 2016). Professional counselors interested in providing neurofeedback, should seek certification through the Biofeedback Certification International Alliance (BCIA). With this additional training and certification, NFB is well within the professional counselors' scope of practice. Professional counselors who do not wish to be neurofeedback practitioners can still gain a basic understanding of the approach in order to make appropriate referrals and collaborate with neurofeedback practitioners. Because there are so many types of neurofeedback

(e.g., 1-19 channels, amplitude, Z-score, asymmetry, phase, sLORETA) and the process is highly individualized to each client, evaluating the research evidence can be difficult. The majority of empirical research within the mental health field relates to the effectiveness of neurofeedback in treating attention -deficit/hyperactivity disorder (Van Doren et al., 2019) and mood, anxiety, and trauma-related disorders (Canadian Agency for Drugs and Technologies in Health, 2014). Additionally, the International Society for Neurofeedback and Research maintains a comprehensive bibliography of neurofeedback-related research that can be found at https://www.isnr.org/isnr-comprehensive-bibliography.

Resources: Biofeedback Certification International Alliance: https://www.bcia.org/

The International Society for Neurofeedback and Research: http://www.isnr.org/

ADDITIONAL NEUROCOUNSELING-BASED RESOURCES

Brainstorm: This online community is hosted by Dr. Eric Beeson through The Family Institute at Northwestern. The group holds free monthly meetings featuring leaders in neuroscience and counseling related research and practice. Beginning in 2019, counselors can also earn continuing education credits for attending monthly events. https://sites.google.com/view/brainstormlive

Neurocounseling Section in the *Journal of Mental Health Counseling*: Since January of 2017, one to two neuroscience-related publications are included in each issue of the quarterly JMHC as part of the special neurocounseling section. Through the journal, counselors can access conceptual and empirical neuroscience related content directly relevant to professional counseling practice, https://amhcajournal.org/loi/mehc

Neurocounseling Central: This website offers counselors information about the various neuroscience-related interest networks associated with counseling professional organizations (e.g., ACA, AMHCA, ACES), as well as links to text and media resources, https://www.neurocounseling.org/neuro-networks/

The Thoughtful Counselor: This podcast produces a neuroscience-related episode series hosted by Dr. Raissa Miller covering a wide-range of translational neuroscience topics, from developmental trauma and addiction to nutrition and brain health, https://thethoughtfulcounselor.com/

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