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NEUROSCIENCE-INFORMED COUNSELING

A Training Model for the Development of Neuroscience-Informed Counseling Competencies

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The American Mental Health Counselors Association (AMHCA) standards of practice contain the only comprehensive currently existing set of standards for neuroscience-informed counseling. While these competencies exist, titled the Biological Basis of Behavior Standards, little direction has been provided to counselor education programs or current practitioners about how counselors should best develop these competences. An AMHCA Neuroscience Taskforce was commissioned by AMHCA President-Elect Eric Beeson in 2017 to develop a pilot neuroscience training program for counselors that addressed the AMHCA Biological Basis of Behavior Standards. During the first year, the taskforce recognized that a training model was needed to outline the training content and sequence that counselors should complete before a pilot training program could be developed. In this article, taskforce members describe the training model and discuss directions for implementation of this training model by counselor education programs and continuing education providers.

For more than 10 years, the American Mental Health Counselors Association (AMHCA, 2021) has identified a set of core practice standards that all clinical mental health counselors must possess in addition to the common

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core entry-level standards identified by the Council for the Accreditation of Counseling and Related Educational Programs (CACREP). The AMHCA Professional Standards Committee, now known as the Advancement of Clinical Practice Committee, initially identified four core areas where further training was needed: the biological basis of behavior, psychological trauma, substance use, and specialized clinical assessment (AMHCA, 2021). These four areas were revised in 2016, and additional areas were subsequently added in 2020 and 2021 that included technology-supported counseling, integrated behavioral healthcare, child and adolescent counseling, aging and older adults, forensic evaluation, and gender identity counseling (AMHCA, 2021).

The AMHCA standards were the first to include a rigorous set of competencies pertaining to neuroscience. Although biological basis of behavior competencies had long existed in doctoral-level psychology training (D'Amato et al., 2021), training in this area had not at the time been required of counselors, and no set of competencies existed for counselors prior to the AMHCA document. It is worth noting that the *CACREP 2009 Standards* (CACREP, 2008) were the first to include a core knowledge competency relating to "current understandings about neurobiological behavior" (II.G.3.b., p. 10). CACREP later expanded this standard in its 2016 revision to include "biological, neurological, and physiological factors that affect human development, functioning, and behavior" (CACREP, 2015, II.F.3.e., p. 10).

Initial practice standards of AMHCA and CACREP were expanded over time in the context of the counseling profession's progressive embracing of training in neuroscience-informed counseling. Events associated with the counseling profession's formalized support of neuroscience-informed counseling are documented in the 2017 article by Beeson and Field. In summary, the allied mental health professions have recognized an emerging corpus of empirical literature regarding neurophysiological aspects of human development as well as human experience. As an example, a plethora of studies have substantiated immediate and long-lasting neurophysiological effects of traumatic stress (e.g., Akiki et al., 2017; Belleau et al., 2020). The National Institute of Mental Health in 2008 responded to this emerging body of literature by proposing a new neuroscience-informed model to reconceptualize the assessment, diagnosis, and treatment of mental health disorders, known as the research domain criteria (Insel et al., 2010). Studies have also supported neurophysiological change as an outcome of psychotherapy (e.g., Santarnecchi et al., 2019; Weingarten & Strauman, 2015). Psychotherapy theories have emerged that are grounded in neuroscientific findings, such as interpersonal neurobiology (Siegel, 2006) and neuroscience-informed cognitive-behavior therapy (Field et al., 2015). In acknowledgment of these advances, voices within the counseling profession have claimed that neuroscience is the newest force in counseling (D'Andrea, 2012) and have become "practice standards of the future" (Myers & Young, 2012, p. 21). National counseling organizations such as the American Counseling Association (ACA), the Association of Counselor Education and Supervision, and AMHCA approved formal interest networks devoted to neuroscience from 2013 to 2015. ACA and AMHCA respectively started magazine and journal sections devoted to neuroscience between 2013 to 2017. The ACA also published its first textbook devoted to neuroscience-informed counseling in 2017 (Field et al., 2017).

While practice standards now exist for the integration of neuroscience into counseling practice, no guidance has been published that directs counselor training programs and currently practicing counselors on how best to develop these competencies. Authors have commonly remarked that innovations such as new training standards often have insufficient information about training and implementation, resulting in low rates of adoption (e.g., McHugh & Barlow, 2010; Rogers, 2003). Furthermore, a recent study revealed that counselors have substantial gaps in neuroscience training, including foundational content (Russo et al., 2021). To address this gap, Beeson, the president-elect of AMHCA, commissioned a Neuroscience Taskforce in 2017 to develop information and resources regarding how counselors can develop the AMHCA biological basis of behavior competencies (AMHCA, 2021). Beeson selected Thom Field to be the chair of the Neuroscience Taskforce, because of Field's previous leadership roles and experience related to neuroscience-informed counseling as (a) chair of the AMHCA neuroscience interest network; (b) prior committee member of the AMHCA Advancement of Clinical Practice committee, a group that edits the AMHCA practice standards, including the Biological Basis of Behavior Standards (AMHCA, 2021); (c) associate editor of the Neurocounseling section of the *Journal of Mental Health Counseling*; (d) coeditor of the Neurocounseling: Bridging Brain and Behavior column of *Counseling Today*, the monthly magazine of the ACA; and (e) research and scholarship in the neuroscience-informed counseling literature.

Taskforce members were identified using a modified Delphi process to select a panel of experts (Okoli & Pawlowski, 2004). In the Delphi method, 10–18 people are required for an expert panel (Okoli & Pawlowski, 2004). Beeson and Field developed a knowledge resource nomination worksheet to identify members who had expertise in at least one of three categories: (a) neuroscience-informed counseling scholarship, including journal article publications and editorial positions; (b) neuroscience-informed counseling practice, including biofeedback and neurofeedback certification; (c) professional counseling research and practice, with no involvement in neuroscience-informed counseling scholarship or practice. Beeson and Field determined the latter category was important for establishing both emic and etic positioning on the taskforce to enhance credibility and trustworthiness (Merriam & Tisdell, 2015). A total of 20 people were initially invited to the taskforce, and each panel invitee was asked to nominate others to the list following Delphi procedures (Okoli & Pawlowski, 2004). Because the size of the neuroscience-informed community is small, the total number of experts invited to the taskforce after the nomination process was complete was 33. This was smaller than the desired number of approximately 100 experts invited to Delphi panels (Okoli & Pawlowski, 2004). Invitees were informed of the 2-year duration of the taskforce and the time commitment involved. All invitations were sent via email. A total of 14 people accepted (42.4% response rate). Of those who did not accept the invitation, invitees either declined for time commitment reasons or did not respond to the invitation. The final taskforce roster was composed of the many significant names in the neuroscience-informed counseling community, organized by alphabetical order: Eric Beeson, Jamie Crockett, Thom Field (chair), Michelle Ghoston, Penijean Gracefire, Gary Gintner, Laura Jones, Chad Luke, Yoon Suh Moh, Morgan Riechel, Lori Russell-Chapin, G. Michael Russo, Eraina Schauss, and Carlos Zalaquett.

The initial goals of the taskforce included creating a comprehensive taskforce report about unifying terminology, a synthesis of the literature base for the Biological Basis of Behavior Standards, and eventually a comprehensive series of training modules for counselors to develop the knowledge and skill competencies outlined in the Biological Basis of Behavior Standards. In the first year of the taskforce, it became clear that a training model and guide was needed for how counselors should develop knowledge and skills before a comprehensive series of training modules could be developed.

The taskforce worked together in teams to identify aspects of a training model that would organize how best to help counselors develop the biological basis of behavior competencies. The taskforce met regularly through virtual meetings using the Zoom platform. By the end of the second year of the taskforce (i.e., 2019), a training model had been developed via consensus. In this article, we describe the training model and provide a rationale for included and excluded components of the model.

ORGANIZATION OF THE BIOLOGICAL BASIS OF BEHAVIOR COMPETENCIES

The taskforce first sought to identify the sequence by which counselors should be trained in the AMHCA Biological Basis of Behavior Standards (AMHCA, 2021). As written, the AMHCA Biological Basis of Behavior

Standards had only been organized into two main categories, Knowledge and Skills. As such, the taskforce felt that greater clarity was needed regarding which of the knowledge and skills were introductory versus more advanced. The taskforce discussed that providing guidance with sequencing was likely to be helpful both to counselor graduate training programs and to professional counselors. The taskforce noted that graduate training programs would likely struggle to assist counseling students to develop all of the competencies by the time of graduation. Clarifying the sequential nature of competency development would therefore be useful to graduate training programs, which may need to decide which standards should be covered as part of the curriculum and which standards are beyond the scope of the curriculum and need to be addressed postgraduation. The taskforce also believed that many practicing counselors who had already graduated would be seeking to gain these competencies as well and might want some guidance regarding which training content they should first pursue before progressing to more complex content.

The taskforce identified a 4-point system for identifying introductory, intermediate, advanced, and specialized training competencies. A rating of 1 was assigned to a foundational/introductory competency; a rating of 2 was assigned to an intermediate competency; a rating of 3 was assigned to an advanced competency; and a rating of 4 was assigned to an advanced competency requiring specialized training, such as neurofeedback. The taskforce agreed upon this rating system via consensus (List, 2001).

Four members of the taskforce reviewed the AMHCA Biological Basis of Behavior Standards (AMHCA, 2021) and assigned a rating for each standard. The taskforce selected these four members for their diverse professional backgrounds and expertise, which the taskforce believed would enhance credibility and reduce bias. The first rater had written numerous articles on neuroscience and held an editorial role for a neuroscience-informed section of the *Journal of Mental Health Counseling*. The second rater had experience with writing AMHCA practice standards and had contributed to editing the Biological Basis of Behavior Standards. The third rater had experience training graduate students in neurofeedback and was a certified neurofeedback practitioner with a current private practice specializing in neurofeedback. The fourth rater had written national standards for the practice of neurofeedback. All four raters held graduate degrees in counseling and were licensed for independent practice as counselors.

During a subsequent taskforce meeting, final ratings were determined using consensus to resolve discrepancies in ratings. Several standards had consistency across raters, such as "structure and function of the CNS [central nervous system] and PNS [peripheral nervous system]" (AMHCA, 2021, 1.a.). Other standards had more inconsistency, such as "evaluating CNS/PNS function, EEG [electroencephalogram], MRI [magnetic resonance imaging], GSR [galvanic skin response]" (AMHCA, 2021, 1.f.). The taskforce resolved all inconsistencies across raters via consensus. The final consensus competency ratings are depicted in Table 1.

Some standards seemed to have resonance across competency levels, and thus multiple ratings were assigned to the same standard. For example, the standard "identify limits of neuro expertise and knowledge" (AMHCA, 2021, 2.a.ii.) appeared relevant across competency levels and thus was given a 1, 2, and 3 rating. During the same taskforce meeting, the larger taskforce also voted to approve three cross-cutting themes that the four raters had identified across each of the training levels: (1) critically evaluating literature at each of the training levels, (2) neuroeducation pertaining to each training level, and (3) neuroscience-informed counseling theory and practice relevant to content at each training level. The four raters believed that these cross-cutting themes seemed important at each training level and would have specific relevance to the content at each level. For example, the literature content that needed to be critically evaluated at the Foundational level (e.g., neuroanatomy) would differ from literature content that would need to be critically evaluated at the Clinical Presentations level (e.g., neurological basis of mental disorders). The taskforce noted that while counselors would receive in-depth training in applying neuroscience-informed counseling theory in the third level (Applications), some training in neuro-informed counseling theory should be integrated throughout the training sequence.

Following this rating of the standards, the taskforce created a table to group the standards with the same rating. Once grouped, the taskforce met to discuss themes at each of the training levels. From these themes, the taskforce used consensus to identify names for each training level, and a model emerged from this review of the rated competencies. The four titles of the training levels were as follows: (1) Foundations, (2) Clinical Presentations, (3) Applications, and (4) Specializations.

Members of the taskforce were organized into four subgroups based on professional expertise and interest, with one subgroup for each training level. Each subgroup then identified specific content that would need to be addressed for their assigned training level, using the aligned AMHCA Biological Basis of Behavior Standards (AMHCA, 2021) to inform content identification. As an example, as depicted in Table 2, the subgroup for the first level (i.e., Foundations) identified knowledge and skills related to the central and peripheral nervous system that counselors would need to learn to demonstrate proficiency of the aligned AMHCA Biological Basis of Behavior

Table 1 *Identified Training Levels for the American Mental Health Counselors Association (AMHCA) Biological Basis of Behavior Standards*

AMHCA Biological Basis of Behavior Standard	Level
Knowledge	
1a. Structure and function of CNS and PNS	1
1b. CNS/PNS interaction with other systems	1
1c. Neural development across life span, epigenetics	1
1d. Structural and functional neuroanatomy	1
1e. Neurotransmission	1
1f. Evaluating CNS/PNS function (EEG, MRI, GSR)	1, 4
1g. Neurocognition (learning, memory)	1
1h. Neuroscience of mental disorders	2
1i. Neurological conditions (autoimmune, epilepsy, stroke, obesity, TBI)	2
1j. Current research on biofeedback and neurofeedback	3
1k. Pharmacokinetics (absorption, distribution, metabolism, elimination)	2
1l. Pharmacokinetics/dynamics in MH and neurocognitive treatment	2
1m. Psychotropic meds and behavior change, side effects, contraindications	2
1n. Biological components of therapeutic relationship	1
Skills—Integrating Research Into Practice	
2a.i. Integrate science into practice, enhance integrated care collaboration	3
2a.ii. Identify limits of neuro expertise and knowledge	1, 2, 3
2a.iii. Locate and assimilate research from allied fields, e.g., psychiatry	2
2a.iv. Critically evaluate literature, avoiding overgeneralization of findings	1, 2, 3
2a.v. Discuss biology of reproduction and prenatal development with colleagues	3
2a.vi. Describe aging brain	1
2a.vii. Describe mechanisms and features of neurocognitive disorders and treatment strategies	2
2a.viii. Describe physiological, psychological, social interactions (e.g., epigenetics)	1
2a.ix. Articulate basic principles of psychopharmacology	2
2a.x. Appraise reliability and validity of neurophysiological assessments (e.g., mobile devices)	3
Skills—Clinical Intervention	
2b.i. Counsel clients from biologically based life span approach, integrated with theory	3
2b.ii. Appraise strengths and limitations of psychotropic medications	2
2b.iii. Counsel clients about how to talk with prescribers of psychotropic medications	3
2b.iv. Effectively translate information into plain language, without jargon, in context of therapeutic alliance	1, 2, 3
2b.v. Render suitable diagnoses based on multiple sources of information, including neurophysiology	2
2b.vi. Produce detailed clinical reports that integrate information about neurophysiological assessment	3
2b.vii. Implement formative and summative assessments for progress/outcomes (neuro relevance unclear)	3
2b.viii. Effectively communicate and collaborate with medical professionals	3
2b.ix. Use biopsychosocial assessment to explore quality of therapeutic relationship	3
Skills—Professional Advocacy	
2c.i. Consult with clients, public, etc. regarding neurophysiological underpinnings of trauma, addictions, etc.	2
2c.ii. Remain up to date on developments within neuroscience, e.g., RDoC	3
2c.iii. Critically analyze developments in social policy pertinent to access and advocacy issues for clients	3
2c.iv. Partner with organizations to offer information that can help shape public policy	3

Note. Levels are as follows: 1 = Foundations; 2 = Clinical Presentations; 3 = Applications; 4 = Specializations. CNS = central nervous system; PNS = peripheral nervous system; EEG = electroencephalogram; MRI = magnetic resonance imaging; GSR = galvanic skin response; TBI = traumatic brain injury; MH = mental health; RDoC = research domain criteria.

Table 2 *Content and Aligned Standards for Four Levels of Neuroscience-Informed Counseling Competence*

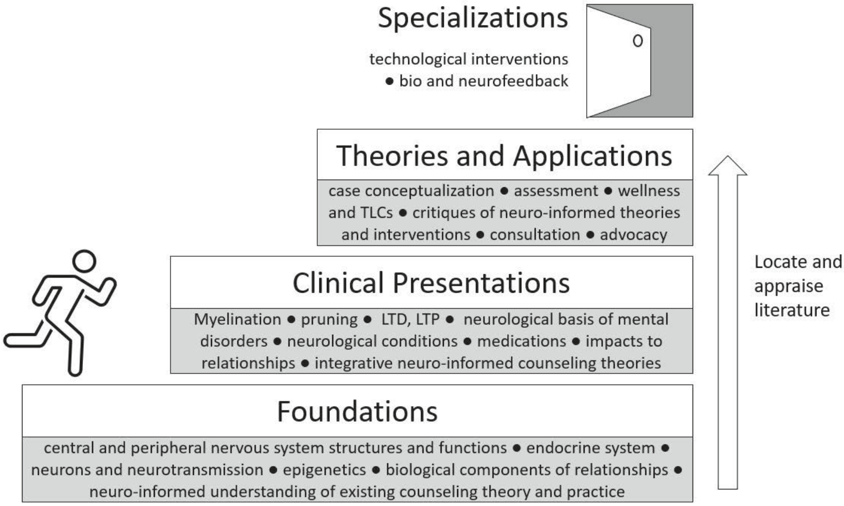
Level	Content	Biological Basis of Behavior Standards
1. Foundations	Central and peripheral nervous system structures and functions; endocrine system and HPA, SAM, HPG axes; enteric nervous system; neurons and neurotransmission; epigenetics; biological components of relationships; locate and appraise literature for CNS/PNS; CNS/PNS neuroeducation; neuro-informed understanding of existing counseling theory and practice	1.a, 1.b, 1.c, 1.d, 1.e, 1.f, 1.g, 1.n, 2.a.ii, 2.a.iv, 2.a.vi, 2.a.viii, 2.b.iv
2. Clinical Presentations	Neural development including myelination, pruning, apoptosis; LTP, LTD; amyloid plaques and tau; learning; neurological basis of mental disorders, including trauma and substance use; neurological conditions, including TBI, stroke, seizures; medications; impacts to relationships; locate and appraise literature for neural development and clinical presentations; neuroeducation of neural development and clinical presentations; neuro-informed theories (e.g., IPNB)	1.d, 1.h, 1.i, 1.k, 1.l, 1.m, 2.a.ii, 2.a.iii, 2.a.iv, 2.a.vii, 2.a.ix, 2.b.ii, 2.b.iii, 2.b.iv, 2.b.v, 2.b.viii, 2.c.i
3. Applications	Neuro-informed assessment and case conceptualization; neuro-informed wellness and TLCs; developing a neuro-informed theoretical orientation; neuro-informed consultation; neuro-informed advocacy; locate and appraise literature for neuro-informed assessment, theory, interventions; neuroeducation for neuro-informed theory/interventions	1.f, 1.j, 2.a.i, 2.a.ii, 2.a.iv, 2.a.v, 2.a.x, 2.b.i, 2.b.iv, 2.b.vi, 2.b.vii, 2.b.ix, 2.c.ii, 2.c.iii, 2.c.iv
4. Specializations	Advanced assessments and interventions; biofeedback and neurofeedback	—

Note. HPA = hypothalamic-pituitary-adrenal axis; SAM = sympathetic–adrenal–medullary axis; HPG = hypothalamatic–pituitary–gonadal axis; CNS = central nervous system; PNS = peripheral nervous system; LTP = long-term potentiation; LTD = long-term depression; TBI = traumatic brain injury; IPNB = interpersonal neurobiology; TLC = therapeutic lifestyle change.

Standards for the Foundations level (i.e., 1.a., 1.b., 1.c., 1.d.,1.e., 1.f.,1.g., 1.n., 2.a.ii., 2.a.iv., 2.a.vi., 2.a.viii., 2.b.iv.; AMHCA, 2021): the central and peripheral nervous system structures and functions; the endocrine system and hypothalamic–pituitary–adrenal axis, sympathetic–adrenal–medullary axis, and hypothalamic–pituitary–adrenal axis; the enteric nervous system; neurons and neurotransmission; epigenetics; biological components of relationships; locating and appraising literature for the central and peripheral nervous system; neuroeducation about the central and peripheral nervous system; and developing a neuro-informed understanding of existing counseling theory and practice.

The content and aligned AMHCA Biological Basis of Behavior Standards for each training level are depicted in Table 2. A visual representation is featured in Figure 1.

Figure 1 *Training Model for Development of Neuroscience-Informed Counseling Competencies*



Note. TLC = therapeutic lifestyle change; LTD = long-term depression; LTP = long-term potentiation.

FOUR LEVELS OF TRAINING

The first level of training was titled Foundations. The Foundations level included information about neuroanatomy and physiology. The taskforce intentionally decided that information about neuroanatomy and physiology should be foundational, as other content would build upon this knowledge. Content in the Foundations training level included central and peripheral nervous system structures and functions, the endocrine system and hypothalamic–pituitary–adrenal axis, the sympathetic–adrenal–medullary axis, the hypothalamic–pituitary–gonadal axis, the enteric nervous system, neurons, glial cells, neurotransmission, and epigenetics. The Foundational level also included biological components of relationships, which the taskforce deemed essential to effective neuroscience-informed practice. The cross-cutting themes in alignment with the Foundational content included (a) locating and appraising literature for CNS/PNS, (b) neuroeducation about the CNS/PNS, and (c) developing a neuro-informed understanding of existing counseling theory and practice.

The second level was titled Clinical Presentations. This level featured neuroscience information that built upon basic knowledge of neuroanatomy and physiology. The content in this training level included information about neural development (e.g., myelination, pruning, apoptosis) and neuroplasticity processes such as long-term potentiation (LTP) and long-term depression (LTD) of neurogenesis and synaptogenesis. It also included content about amyloid plaques and tau; the neuroscience of learning; the neurological basis of mental disorders such as trauma and substance use; neurological conditions including traumatic brain injury (TBI), stroke, and seizures; psychotropic medications; and the impacts to relationships of clinical presentations and mental health conditions. With regard to cross-cutting themes, the second level also included (a) locating and appraising literature pertinent to neural development and clinical presentations, (b) neuroeducation regarding neural development and clinical presentations, and (c) neuro-informed theories such as interpersonal neurobiology (IPNB) and neuroscience-informed cognitive behavior therapy. The taskforce commented that counselors would likely develop a more nuanced and deeper understanding of popular applied theories such as IPNB after learning basics of neuroanatomy and physiology in the first level of training. The taskforce also agreed through consensus that knowledge about clinical presentations should precede knowledge about treatment approaches and applied theoretical models of neuroscience-informed counseling. This information about treatment approaches was thus assigned to the third level of training, following knowledge about clinical presentations.

Applications was the third level of training. As noted above, the taskforce believed that training in neural development and clinical presentations should precede training in treatment approaches. Content in this area included neuro-informed assessment and case conceptualization, neuro-informed approaches to wellness and therapeutic lifestyle changes (TLCs; Ivey et al., 2014), development of a neuro-informed theoretical orientation, neuro-informed consultation, and neuro-informed advocacy. Cross-cutting themes for the third level included (a) location and appraisal of literature for neuro-informed assessment, theory, and interventions, and (b) neuroeducation for neuro-informed counseling theory and interventions. The taskforce hoped that earlier training in neuro-informed counseling theory and interventions at each of the training levels would position counselors to develop more refined knowledge in treatment approaches and to use neuroscience to inform their existing theoretical orientation (e.g., neuroscience-informed gestalt therapy) rather developing an entirely new theoretical orientation (e.g., interpersonal neurobiology).

The fourth and final level was Specializations. The taskforce determined that this was an optional level that would not need to be completed for counselors to develop sufficient competence for clinical practice. Instead, counselors would only need to complete the first three levels to develop a baseline competence to use neuroscience information to guide their practice. The taskforce also discussed that no Biological Basis of Behavior Standards were aligned with the Specializations training level, because this level was considered beyond the scope of typical counselor preparation and training and would require more advanced training outside of typical counseling graduate programs and continuing education courses. The fourth level was marked by advanced assessments and interventions such as training in biofeedback and neurofeedback that typically requires extensive training in the use of specific technology and supervised practice hours. In addition, there are separate certification systems for competent practice of biofeedback and neurofeedback, including examination requirements. The taskforce wanted to differentiate these specialized areas of training from the first three levels, because they believed that counselors did not need to complete biofeedback or neurofeedback training in order to develop competence in neuroscience-informed counseling. However, the taskforce also remarked that some biofeedback and neurofeedback training programs do address some of the training content at each of the three earlier levels. Counselors who already possessed biofeedback or neurofeedback certification thus likely already possessed competence in at least some of the earlier content in the first three training levels.

DISCUSSION

The AMHCA Neuroscience Taskforce identified a training model consisting of three main levels of training, with a fourth level optional for those seeking more advanced specialized training. This model could be useful to counselor education program faculty who are attempting to design graduate coursework that would assist students to develop neuroscience-informed counseling competencies. It may also be useful to current practitioners who are seeking guidance for how to pursue post-graduate training in neuroscience-informed counseling. The following examples demonstrate how this information could be useful to both counselor educators and to professional counselors.

Counselor Education Programs

Counselor education programs are unlikely to be able to fully address training content for all three levels of the model. Counselor education programs could aim to provide training in the Foundations area and ideally the Clinical Presentations area as well. To do so, counseling faculty may need to consider how to adjust and modify course content to integrate neuroscience information into the core curriculum.

There appear to be two main vehicles for neuroscience training in master's-level counseling programs. The program can seek to integrate neuroscience content across coursework. The program could also create a stand-alone course to specifically address neuroscience content. A third approach is to do both: integrate neuroscience content across the curriculum and also have a stand-alone course. This third option perhaps reaps the benefits of each approach, though it has the drawback of requiring the most organizational demand regarding sequencing. For example, if the counseling program has a stand-alone neuroscience course, they must decide whether to schedule that course early or later in the program and to what extent other coursework should contain neuroscience content before and/or after that course is offered.

In regard to integration across the curriculum, there appear to be some courses where the neuroscience training model aligns with CACREP accreditation standards. At the master's level, students are required by CACREP and state licensing boards to complete core coursework in eight areas: professional orientation and ethical practice, social and cultural diversity, human growth and development, career development, helping relationships and counseling theories, group work, assessment, and research methods (e.g., CACREP, 2015). Some of these content areas seem to align more clearly with the training model, while others have a less clear connection. For example, the first and second levels (i.e., Foundations and Clinical Presentations) include content such as the structure and function of the nervous system, neural development, and the neurological aspects of mental and substance use disorders. These content areas appear to align with standards within CACREP's (2015) human growth and development core area. This area includes the broad standard of "biological, neurological, and physiological factors that affect human development, functioning, and behavior" (II.F.3.e., p. 10) and other standards such as "theories of normal and abnormal personality development" (II.F.3.c., p. 10) and "theories and etiology of addictions and addictive behaviors" (II.F.3.d., p. 10). While the human growth and development course appears to be one of the most obvious points of potential integration, counseling faculty may be reluctant to use the human growth and development course to fully address the Foundations area, as the human growth and development content area is vast and also includes other content such as developmental models and crisis, disaster, and trauma. Counseling faculty may thus feel that they can only devote a small amount of coverage to neuroscience-related content.

Other CACREP core content areas do not appear to have as clear linkage to neuroscience content and concepts, such as career development and group work. Such areas may make integration in every counseling course quite difficult. Instead, integration in courses that have clearer neuroscience linkages may make the most sense. Further specialization coursework may also be a place of potential integration, such as courses in trauma, substance use, wellness, psychopathology, and psychopharmacology.

Another potential avenue for training is to create a required stand-alone course that addresses neuroscience more formally, in addition to integration in other required coursework. The benefits to having a stand-alone course are the depth and breadth of content that can be covered. In addition, if sequenced thoughtfully, the course can provide foundational information that students will build upon later. The first author developed and taught such a stand-alone course at their former institution. The course, titled Neuroscience for Mental Health Professionals, was offered in the first year of the program. The course provided students with content that addressed the first level of the model (i.e., Foundations). The course also included introductory information about neuroscience-informed counseling theory and neuroeducation about the CNS/PNS. Students either concurrently or subsequently took coursework that built on foundational knowledge, such as Psychological Trauma, Addictions, Human Growth and Development, and Psychopharmacology. These courses addressed competencies identified in the second level, Clinical Presentations. By the conclusion of graduate training, students often felt competent to conceptualize client presentations using neuroscience knowledge but still felt they needed more tangible tools to provide neuroscience-informed counseling interventions and techniques in clinical practice. In other words, the students still needed additional post-graduate training in the third level of the model (i.e., Applications) by the conclusion of the program. Such information about further training needs could be discussed with students at the conclusion of their program of studies.

Professional Counselors

Professional counselors who seek neuroscience-related training must attempt to discern which training they need from the wealth of options available. For example, the following trainings can be found from a quick Web scan of online continuing education course offerings for mental health providers using the keyword *neuro*: anxiety and stress, biofeedback, child development, epigenetics, gerontology, interpersonal neurobiology, mindfulness, neurofeedback, psychopharmacology, substance use, and traumatic stress, to name a few. The lack of clear training models has meant that counselors may pursue training in the absence of a formalized structure with which to evaluate their current competencies, gaps in knowledge and skill, and next training to pursue. As such, practicing counselors who complete continuing education in neuroscience outside of formal credentialing programs such as neurofeedback certification may feel their training has been scattershot and, at times, confusing. Because of the terminology and potentially challenging nature of the content, counselors may attend some trainings where they feel they are lacking the prerequisite knowledge or skills to benefit fully. They may also attend other trainings that seem rudimentary and below their current skill level. Continuing education providers can use models such as the one outlined in this article to structure their offerings, so that counselors are trained in a comprehensive and sequential fashion. Ideally, it would be beneficial for continuing education providers to also delineate whether their course covers foundational material about neuroanatomy and physiology or requires preexisting knowledge of neuroanatomy and physiology.

It is worth noting that many continuing education courses focus on appealing modern approaches to psychotherapy such as interpersonal neurobiology that assume basic foundational knowledge of neuroanatomy and physiology. There are relatively few continuing education programs in counseling that address introductory neuroanatomy and physiology. A need therefore exists for more continuing education offerings that focus on introductory material about neuroanatomy and physiology, so that counselors feel prepared for more applied models that are grounded in preexisting knowledge about neuroanatomy and physiology. Without this, counselors may lack the requisite knowledge to be able to appraise these models before adopting them and may only develop superficial knowledge into their use. As an example, suppose a client asks a counselor why a concept such as Dan Siegel's (2010) hand model of the brain will be useful to them. To answer this question, the counselor must possess requisite knowledge of structures in the brain, the hypothalamic–pituitary–adrenal axis, and the influence of stress hormones on human behavior. This knowledge may not be taught directly in an interpersonal neurobiology workshop, and counselors without this knowledge may feel unprepared to answer client questions about their use of such models.

CONCLUSION

The counseling profession is continuing to evolve in its formalization of competencies and training approaches for integrating neuroscience into counseling practice. In this article, a new training model was presented for assisting counselors to gain competence in the most comprehensive list of standards and competencies pertaining to the use of neuroscience to guide counseling practice, the AMHCA Biological Basis of Behavior Standards. The taskforce is now working on developing a pilot comprehensive training program that is hoped to be available to counselors in the near future. The taskforce anticipates that other comprehensive trainings will become available that address each of the three levels and also hopes that foundational training in neuroanatomy and physiology will become more accessible to counselors both during and after graduate education. The training model was developed to aid counseling programs and current practitioners to guide the sequencing of training to ensure that counselors have comprehensive and rigorous training in the use of neuroscience to guide clinical practice.

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