

Implementing Culturally Responsive Neuroregulation: A Practical Framework for Clinical Practice

Leslie H. Sherlin*

Sherlin Consulting Group, Scottsdale, Arizona, USA
Ottawa University, Surprise, Arizona, USA
Grand Canyon University, Phoenix, Arizona, USA
Sonoran University of Health Sciences, Tempe, Arizona, USA
Fuller Theological Seminary, Phoenix, Arizona, USA
Nova Tech EEG, Inc., Mesa, Arizona, USA

Abstract

Introduction. While fundamental physiological mechanisms underlying neuroregulation demonstrate universality across populations, the implementation of these interventions occurs within diverse cultural contexts that profoundly shape treatment accessibility, acceptability, and effectiveness. **Purpose.** This article synthesizes evidence from cultural adaptation frameworks in psychotherapy research, implementation science strategies, and neuroregulation best practices (drawing from more than 40 sources spanning 5 decades, including meta-analyses, randomized controlled trials, and theoretical frameworks) to provide evidence-based practical guidance for implementing culturally responsive neuroregulation in clinical settings, bridging the gap between universal neurophysiological principles and culturally-informed service delivery. **Methods.** A comprehensive synthesis of cultural adaptation frameworks from psychotherapy research, implementation science strategies, and neuroregulation best practices was conducted to develop an integrated framework applicable across practice settings. **Results.** The resulting framework operates at three interconnected levels: (a) clinical practice, encompassing culturally-informed assessment protocols, treatment adaptations, and communication strategies; (b) organizational systems, addressing structural barriers, alternative service delivery models, and equity-focused quality monitoring; and (c) professional development, including training requirements, competency standards, and supervision models. Evidence indicates that systematic cultural adaptations enhance engagement and retention without compromising treatment fidelity or effectiveness, with meta-analyses demonstrating improvements in engagement and retention outcomes when multilevel strategies address clinical, organizational, and professional development barriers simultaneously. **Implications.** Successful implementation requires integration of cultural considerations throughout the treatment process while maintaining the integrity of core neurophysiological mechanisms. At the practitioner level, this includes immediate adaptations to assessment protocols, communication strategies, and treatment delivery. At the organizational level, this necessitates policy reforms addressing access barriers, quality monitoring systems, and workforce development. The framework provides actionable strategies spanning both individual clinical practice and systems-level organizational change committed to equitable neuroregulation services.

Keywords: cultural adaptation; implementation science; cross-cultural neuroregulation; health equity; cultural humility; implementation fidelity; treatment engagement; neuroregulation

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***Address correspondence to:** Leslie H. Sherlin, PhD, 7272 E. Indian School Rd, Ste 540, Scottsdale, AZ 85251, USA. Email: leslie@drsherlin.com

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Edited by:
Rex L. Cannon, PhD, Currents, Knoxville, Tennessee, USA

Reviewed by:
Rex L. Cannon, PhD, Currents, Knoxville, Tennessee, USA
Rogieh Nooripour, PhD, Alzahra University, Tehran, Iran

Introduction

The transition from understanding cultural influences on neuroregulation to implementing culturally responsive practices represents a critical challenge facing the field today (as documented in the companion review; Sherlin, 2026). The companion article to this work (Sherlin, 2026) established critical theoretical foundations for understanding cultural factors in neuroregulation. That comprehensive review demonstrated that while fundamental physiological mechanisms (including operant conditioning, neuroplasticity, and autonomic regulation) operate universally across human populations (Sherlin et al., 2011), multiple culturally variable factors profoundly influence treatment access, engagement, and outcomes. The review synthesized three complementary theoretical frameworks that work synergistically: cultural humility emphasizing ongoing self-reflection and power dynamic awareness (Tervalon & Murray-García, 1998), which, when layered onto health disparities research, amplifies understanding of structural inequities by foregrounding how power asymmetries manifest in both healthcare systems and therapeutic relationships (Metzl & Hansen, 2014). This integrated perspective informs understanding of the therapeutic alliance as a culturally mediated process (Constant et al., 2021), where cultural humility and disparity awareness converge to shape practitioner-client dynamics. Additionally, the systematic evidence review revealed striking gaps in cultural considerations research across all neuroregulation modalities (neurofeedback, transcranial electrical stimulation, photobiomodulation, and peripheral biofeedback). However, the limited available evidence suggested promising outcomes when cultural barriers are addressed, with diverse populations achieving comparable results to majority populations when access and engagement barriers are systematically removed (Fleischman et al., 2022), albeit from studies with methodological constraints including limited sample sizes and geographic specificity that warrant replication in larger, more diverse samples. This second article builds directly on these foundations, translating theoretical understanding into actionable implementation strategies that practitioners can immediately apply in clinical settings.

Contemporary healthcare environments increasingly demand evidence-based approaches to reducing disparities and improving outcomes for diverse populations (Betancourt et al., 2003). For neuroregulation practitioners, this mandate presents

both opportunity and responsibility. The opportunity lies in expanding access to effective interventions that have historically been limited to relatively privileged populations (Saadi et al., 2017). The responsibility involves ensuring that expansion occurs through culturally-informed, equitable practices rather than one-size-fits-all approaches that may inadvertently perpetuate disparities (Alegria et al., 2016).

Recent implementation science research provides crucial frameworks for achieving the delicate balance between treatment fidelity and cultural adaptation (Bernal et al., 2009). Meta-analyses demonstrate that culturally adapted interventions can maintain or even enhance treatment effectiveness, with a direct-comparison meta-analysis reporting an effect of $d = 0.32$, favoring culturally adapted over unadapted bona fide psychotherapy (Benish et al., 2011), and a subsequent meta-analysis of 78 studies likewise favoring adapted interventions (G. C. N. Hall et al., 2016). These findings offer a roadmap for neuroregulation practitioners seeking to serve diverse populations without compromising the scientific integrity of their interventions (Griner & Smith, 2006).

The urgency of developing culturally responsive practices cannot be overstated. Demographic shifts indicate that by 2045, no single racial or ethnic group will constitute a majority in the United States (U.S. Census Bureau, 2018). Practitioners increasingly encounter clients from diverse backgrounds who may benefit from neuroregulation but face multiple barriers to engagement. As documented in the companion review (Sherlin, 2026), these barriers operate at multiple levels, with implementation science frameworks emphasizing the importance of addressing systemic levers first as they create cascading effects (Metzl & Hansen, 2014): systemic (insurance coverage, geographic distribution of services), which compound organizational factors (clinic location, hours, policies), which in turn shape interpersonal dynamics (therapeutic alliance, communication styles), and ultimately affect individual engagement (language, health literacy, cultural beliefs). Saadi et al. (2017) found that Black patients had 30% lower odds and Hispanic patients 40% lower odds of receiving outpatient neurology care compared to White patients, even controlling for insurance, education, and income. Addressing these multilevel barriers requires more than good intentions; it demands systematic approaches grounded in

evidence and refined through practice (Betancourt et al., 2003; López et al., 2012).

An often-overlooked structural constraint contributing to these disparities is the positioning of neuroregulation services within predominantly private, clinic-based delivery models. These models are disproportionately concentrated in higher socioeconomic and predominantly White communities, reflecting multiple intersecting factors: substantial equipment and software costs, specialized training pathway expenses, insurance reimbursement limitations favoring established practices in affluent areas, and referral networks that privilege access for those already connected to specialty mental health services (Saadi et al., 2017). In the absence of grant funding, institutional partnerships, or community-embedded delivery infrastructures, individual practitioners have limited capacity to serve culturally diverse populations, regardless of intent or cultural competence. Consequently, the underrepresentation of minoritized populations in neuroregulation research and practice may reflect systemic access barriers and delivery model constraints more than lack of clinical suitability, patient interest, or practitioner commitment to equity (Metzl & Hansen, 2014).

This article synthesizes evidence-based strategies from cultural adaptation research, implementation science, and clinical best practices to create a comprehensive framework for culturally responsive neuroregulation (S. Sue et al., 2009). The framework addresses three implementation levels: clinical practice with individual clients, organizational systems and policies, and professional development and training. Throughout, the focus remains on practical, actionable strategies that practitioners can implement immediately while working toward longer-term systemic changes.

Methods

This article represents a narrative synthesis of evidence-based strategies for implementing culturally responsive neuroregulation. The synthesis integrated multiple literature streams through systematic search and thematic analysis procedures.

Literature Search Strategy

Systematic searches were conducted across PubMed, PsycINFO, Google Scholar, and the Cochrane Library databases from January 1980 through December 2024. Search terms included combinations of ("cultural adaptation" OR "cultural

competence" OR "cultural humility") AND ("neurofeedback" OR "biofeedback" OR "neuroregulation" OR "psychophysiological intervention"); ("health disparities" OR "health equity") AND ("mental health treatment" OR "implementation"); ("treatment adaptation" OR "evidence-based practice") AND ("diverse populations" OR "minority populations" OR "cross-cultural"). Additional sources were identified through manual review of reference lists from key articles and consultation of implementation science frameworks.

Inclusion Criteria

Included sources comprised: (a) peer-reviewed empirical studies examining cultural factors in neuroregulation or related psychophysiological interventions; (b) meta-analyses and systematic reviews of cultural adaptation in mental health treatment; (c) theoretical and conceptual frameworks addressing cultural competence, health disparities, or implementation science; (d) clinical practice guidelines from professional organizations; and (e) seminal works establishing foundational concepts in cultural responsiveness. Excluded were non-English language sources, unpublished dissertations, and low-quality gray literature.

Synthesis Approach

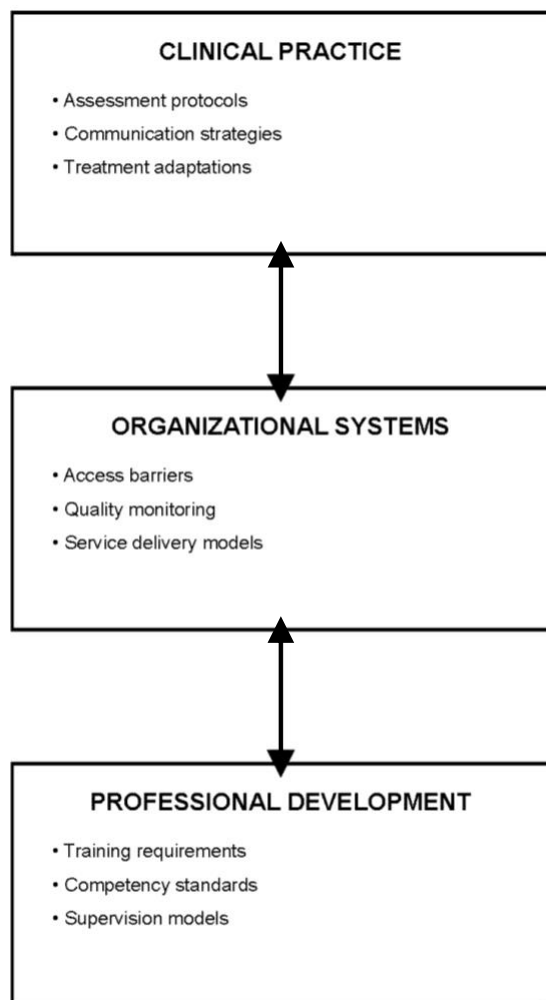
The initial search yielded over 200 sources, which were winnowed to approximately 60 based on relevance to neuroregulation implementation and methodological rigor. A thematic matrix approach was employed to map and cluster elements from cultural adaptation frameworks (e.g., Bernal et al., 2009; Griner & Smith, 2006), implementation science models (e.g., Betancourt et al., 2003), and neuroregulation-specific evidence into the three-level architecture (clinical practice, organizational systems, professional development). This integrative process involved iterative refinement to ensure both comprehensiveness and coherence.

Quality Appraisal

Included sources were appraised using a modified Mixed Methods Appraisal Tool (MMAT) rubric prioritizing empirical rigor, cultural relevance, and applicability to neuroregulation contexts. Recent meta-analyses and randomized controlled trials were prioritized while acknowledging the foundational importance of seminal theoretical works (e.g., Tervalon & Murray-García, 1998) despite their temporal distance from contemporary empirics.

Clinical Practice Framework

Figure 1. Integrated Tri-Level Framework for Culturally Responsive Neuroregulation.



Note. The framework depicts bidirectional arrows between clinical practice, organizational systems, and professional development levels, illustrating dynamic interconnections and reinforcing effects across implementation domains.

Comprehensive Cultural Assessment

Culturally responsive neuroregulation begins with thorough assessment that explores cultural factors influencing treatment engagement and outcomes (S. Sue et al., 2009). Rather than treating cultural assessment as an add-on or special circumstance, it should be seamlessly integrated into standard intake procedures. This integration normalizes cultural considerations and prevents clients from feeling singled out or stereotyped based on visible characteristics or demographic categories (Kleinman & Benson, 2006).

The assessment process explores multiple domains through conversational inquiry rather than checklist interrogation (Kleinman & Benson, 2006). Medical mistrust is prevalent among racial and ethnic minority populations and may affect treatment engagement (Bazargan et al., 2021). Open-ended, narrative approaches may yield richer cultural information than structured questionnaires alone (Kleinman & Benson, 2006). Understanding the client's explanatory model provides crucial insight into how they conceptualize their difficulties and what interventions make sense within their worldview (Kirmayer & Ryder, 2016). Practitioners should ask: "How do you understand what you're experiencing?" "What do you think causes these difficulties?" "What have you tried that has been helpful?" These questions reveal cultural frameworks for understanding distress that may differ significantly from biomedical models (Kirmayer & Ryder, 2016). For example, some cultures may conceptualize symptoms as spiritual imbalance, family disharmony, or social disruption rather than individual neurological dysfunction.

It is important to recognize that while explanatory models vary culturally, the physiological dysregulation underlying conditions treated with neuroregulation remains consistent across populations (Sherlin, 2026). As established in the companion review, research demonstrates that trauma produces similar patterns of autonomic dysregulation, EEG abnormalities, and stress hormone disruption regardless of cultural background or conceptualization (van der Kolk, 2014). The assessment should therefore explore both the client's cultural understanding and provide psychoeducation about the universal physiological processes that neuroregulation addresses, creating bridges between different worldviews (Hinton & Good, 2016).

Previous healthcare experiences, particularly negative encounters or discrimination, help identify potential trust issues affecting engagement (Bazargan et al., 2021). Research indicates that medical mistrust significantly impacts treatment adherence and outcomes, particularly among racial and ethnic minorities. This exploration requires sensitivity, recognizing that clients may be reluctant to share discrimination experiences with practitioners representing the same system that harmed them (Bazargan et al., 2021). Questions should be framed gently: "Some people have had difficult experiences with healthcare providers in the past. Has anything like that happened to you?" This acknowledges the reality of discrimination without

requiring detailed disclosure and validates potential concerns (Tervalon & Murray-García, 1998).

Technology comfort and procedural concerns require explicit assessment rather than assumptions based on age or demographics (Eisenbarth et al., 2025). Recent research by Eisenbarth et al. (2025) documented significant barriers to neurofeedback participation among culturally diverse populations in New Zealand, including concerns about electrode placement, hair disturbance (particularly among those with textured hair requiring significant styling effort), religious or cultural considerations about head touching, and gender-matched practitioner preferences for procedures involving physical contact. Notably, 19.34% of participants indicated that experimenter gender would matter for procedures involving head contact, highlighting intersections of cultural, religious, and gender considerations (Eisenbarth et al., 2025). Assessment should explore technology experience and comfort levels, equipment-related concerns, cultural or religious considerations about electrode placement, concerns about head covering disruption, practitioner gender preferences for procedures involving physical contact, and beliefs about external influences on brain function or consciousness.

Language preferences extend beyond translation needs to include preferences for how concepts are explained (Flores, 2005). Some clients prefer medical or technical language conveying expertise and scientific credibility, while others find such language alienating or intimidating (Kleinman & Benson, 2006). The teach-back method, asking clients to explain their understanding of key concepts, identifies comprehension gaps without condescension and provides opportunities to adjust explanations based on individual needs and preferences (Flores, 2005).

Family involvement preferences must be explicitly discussed rather than assumed based on cultural stereotypes (E. T. Hall, 1976). While collectivistic cultures generally emphasize family involvement in healthcare decisions, individual preferences vary widely within cultural groups. Practitioners should explore who the client considers family (recognizing that family definitions vary culturally), what role they would like family members to play in treatment, how confidentiality can be maintained while respecting involvement preferences, and what cultural expectations exist about family participation in health decisions (S. Sue et al., 2009).

Assessment and Normative Database Considerations

The cultural composition of normative databases represents a critical yet often overlooked consideration in neuroregulation assessment (Chiao, 2009). As documented in the companion review (Sherlin, 2026), over 90% of human neuroimaging publications originate from Western countries. Most neurofeedback normative databases have been developed with predominantly White, Western, middle-class populations (Chiao, 2009). While fundamental EEG patterns associated with specific neurological conditions demonstrate consistency across populations (Betting et al., 2006), baseline patterns may be influenced by cultural practices such as meditation, prayer, or traditional breathing exercises that shape neural organization through neuroplasticity mechanisms (Travis & Shear, 2010).

Practitioners should exercise caution when interpreting assessment results for individuals from populations underrepresented in normative samples (Moss, 1985). Early research by Moss (1985) found differences in EEG asymmetry between Japanese and Western subjects, suggesting Western-developed normative databases may not be universally applicable. When possible, practitioners should use normative databases that include diverse populations or, at a minimum, interpret results with explicit acknowledgment of normative sample limitations (Chiao, 2009). Documentation should note when clients' demographic characteristics differ substantially from normative samples and interpretation should be appropriately tentative (G. C. N. Hall, 2001).

Cultural factors also influence performance on cognitive and psychological assessments commonly used in neuroregulation practice (S. Sue et al., 2009). Standardized assessments may contain cultural biases in content, language, or task structure that affect performance independent of the construct being measured (G. C. N. Hall, 2001). For example, timed tests may disadvantage individuals from cultures with different time orientations, and self-report measures developed in individualistic cultures may not validly assess constructs in collectivistic populations (Kirmayer & Ryder, 2016). Assessment results should always be interpreted within cultural context, considering language proficiency, educational background and test-taking familiarity, cultural values that may influence response patterns (such as collectivistic values potentially affecting self-report measures of individualistic constructs like assertiveness), and potential cultural differences in the meaning and

expression of psychological constructs being assessed (G. C. N. Hall, 2001; S. Sue et al., 2009).

The LEARN Model in Practice

Berlin and Fowkes' (1983) LEARN model, originally developed for cross-cultural medical encounters, provides a structured approach for integrating cultural assessment findings into treatment planning. Here, the model is adapted specifically for neuroregulation contexts (Berlin & Fowkes, 1983).

Listen with genuine curiosity to the client's perspective, attending not just to words but to the cultural context giving them meaning (Tervalon & Murray-García, 1998). For neurofeedback, this might mean understanding how clients conceptualize brain function, whether they view thoughts and feelings as controllable, and what role they believe technology should play in healing (Kleinman & Benson, 2006). A client from a culture emphasizing spiritual causation of illness may need time to explain how they understand their difficulties before being receptive to neurophysiological explanations (Kirmayer & Ryder, 2016).

Explain the practitioner's understanding of difficulties and how neuroregulation might help, using language and concepts that resonate with the client's worldview while providing education about universal physiological mechanisms (Berlin & Fowkes, 1983). Building on the distinction established in the companion review (Sherlin, 2026) between universal mechanisms and culturally variable factors, explanations should emphasize that the fundamental neurophysiological processes operate consistently across all human populations while acknowledging that cultural context shapes how symptoms are experienced and expressed (Sherlin et al., 2011). For example: "From what you've shared about feeling constantly on edge, your nervous system seems stuck in protection mode. This is a universal human response to threat that works the same way in all people regardless of cultural background. Biofeedback can help your body remember how to shift into calmer states, similar to how prayer or meditation might work but using technology to guide the process more directly" (Porges, 2011).

Acknowledge differences between perspectives explicitly, validating the client's viewpoint while sharing professional perspectives (Berlin & Fowkes, 1983; Tervalon & Murray-García, 1998). This acknowledgment prevents the power imbalance inherent in healthcare relationships from silencing client perspectives. For instance: "I hear that you see your difficulties as related to family stress and

disconnection from your community. From my perspective as a neurofeedback practitioner, I see signs of nervous system dysregulation that may be contributing to how hard it feels to cope. Both of these perspectives can be true at the same time" (Kleinman & Benson, 2006).

Recommend treatment options that account for both cultural preferences and clinical considerations (Berlin & Fowkes, 1983). Recommendations should include discussion of expected outcomes, time commitment, costs, and how treatments align with cultural values (S. Sue et al., 2009). For a client who values family harmony over individual symptom reduction, the practitioner might frame potential benefits in terms of improved capacity to fulfill family roles and maintain important relationships rather than focusing solely on individual symptom reduction (E. T. Hall, 1976).

Negotiate treatment plans that represent genuine collaboration rather than compliance with practitioner recommendations (Berlin & Fowkes, 1983; Tervalon & Murray-García, 1998). This negotiation addresses not just what treatment but how it's delivered in culturally responsive ways, including session structure modifications, family involvement approaches, integration with other healing practices the client may be using, and success metrics meaningful to the client rather than only standardized outcome measures (S. Sue et al., 2009). The negotiation process itself models respect for the client's cultural values and autonomy (Tervalon & Murray-García, 1998).

Communication Strategies

Effective cross-cultural communication in neuroregulation requires sophisticated attention to both verbal and nonverbal elements (E. T. Hall, 1976). When language differences exist, professional medical interpreters should be used rather than family members for clinical content, ensuring accurate communication and maintaining appropriate boundaries (Flores, 2005). Using family members as interpreters, particularly children, places inappropriate burden on family dynamics and may compromise both accuracy and confidentiality (Flores, 2005).

Interpretation for neuroregulation presents unique challenges requiring advance preparation (Flores, 2005). Many languages lack equivalent terms for technical concepts central to treatment. Working with interpreters to develop culturally meaningful explanations enhances understanding (Kleinman & Benson, 2006). Presession briefings should cover

key concepts that will be discussed, anticipated technical explanations that may need adaptation, cultural considerations relevant to the specific client, and clarification of any technical terms the interpreter may not have encountered (Flores, 2005). Postsession debriefing allows the interpreter to raise concerns or suggest communication improvements (Flores, 2005).

Plain language explanations remain essential regardless of language concordance (Kleinman & Benson, 2006). The complexity of neuroscience concepts requires careful translation into accessible terms without sacrificing accuracy (S. Sue et al., 2009). Visual aids, demonstrations, and hands-on experiences can transcend language barriers while respecting cultural learning styles (Resnicow et al., 1999). For example, showing a client what the neurofeedback display looks like and having them practice controlling it during the initial session provides experiential learning that may be more effective than lengthy verbal explanations (Griner & Smith, 2006). Practitioners should develop multiple ways of explaining core concepts, adjusting based on client feedback and comprehension checks (Flores, 2005).

Communication styles vary significantly across cultures with profound implications for information exchange, rapport building, and treatment planning (E. T. Hall, 1976). E. T. Hall's (1976) distinction between high-context and low-context communication remains highly relevant for neuroregulation practice. High-context communication, common in many Asian, African, and Latin American cultures, relies heavily on nonverbal cues, implicit understanding, and indirect expression (E. T. Hall, 1976). Low-context communication, typical of Northern European and Anglo-American cultures, emphasizes explicit verbal expression and direct communication (E. T. Hall, 1976). These differences manifest in multiple ways during treatment. Clients from high-context cultures may not directly express disagreement or discomfort with procedures, showing reluctance through nonverbal behavior or missed appointments rather than verbal refusal (E. T. Hall, 1976). They may find direct symptom questions uncomfortable, preferring to communicate distress through somatic complaints or metaphorical language (Kirmayer & Ryder, 2016). Practitioners accustomed to low-context communication may misinterpret indirect communication as resistance, poor motivation, or limited insight (E. T. Hall, 1976; Kleinman & Benson, 2006).

Nonverbal communication carries particular importance in cross-cultural interactions, with significant cultural variation in interpretation of gestures, facial expressions, and body language (E. T. Hall, 1976). Eye contact norms vary significantly across cultures; what signals engagement and honesty in one culture may indicate disrespect or inappropriate intimacy in another (E. T. Hall, 1976). Physical proximity preferences differ, affecting comfort with the close contact required for electrode placement (Eisenbarth et al., 2025). Touch boundaries during electrode placement require explicit discussion, particularly for procedures involving head or facial electrode placement (Eisenbarth et al., 2025). The meaning of silence varies culturally, with some cultures viewing silence as comfortable contemplation while others interpret it as awkward or hostile (E. T. Hall, 1976).

Written materials require comprehensive adaptation beyond simple translation (Resnicow et al., 1999). Effective cross-cultural health communication involves cultural adaptation of content, images, examples, and conceptual frameworks. Materials should reflect diverse populations in imagery, avoiding the common practice of only showing White, middle-class individuals using neurofeedback equipment (Resnicow et al., 1999). Examples and metaphors should be culturally relevant; for instance, comparing neurofeedback training to mastering a sport may resonate in some cultures while musical instrument mastery or traditional craft skill development may be more meaningful analogies in others (Bernal et al., 2009). Reading levels should be adjusted for varied health literacy (Flores, 2005). Cultural values should be considered in framing benefits and outcomes; individualistic cultures may respond to frames emphasizing personal achievement and self-improvement, while collectivistic cultures may find frames emphasizing family benefit and social harmony more compelling (E. T. Hall, 1976; S. Sue et al., 2009).

Treatment Adaptation Strategies

Cultural treatment adaptations in neuroregulation must balance fidelity to core mechanisms with responsiveness to cultural needs (Bernal et al., 2009). Meta-analyses consistently demonstrate that systematic, theory-driven adaptations produce superior outcomes compared to surface-level modifications or no adaptation (Griner & Smith, 2006; G. C. N. Hall et al., 2016). The key principle, established in the companion review (Sherlin, 2026), is that fundamental physiological mechanisms underlying neuroregulation remain constant across populations while implementation can and should be

adapted for cultural responsiveness (Sherlin et al., 2011).

The ecological validity model (Bernal et al., 2009) provides a comprehensive framework for adaptation across eight dimensions: language, persons, metaphors, content, concepts, goals, methods, and context. For neuroregulation specifically, this translates into protocol modifications that align procedures with cultural values while maintaining therapeutic integrity (Bernal et al., 2009). Core neuroregulation mechanisms (operant conditioning [Sherlin et al., 2011], neuroplasticity, autonomic regulation [Porges, 2011]) remain constant; what varies is how clients engage with these mechanisms (Griner & Smith, 2006). Adaptations might include feedback display selection considering cultural aesthetics and meanings, reward system modifications matching cultural values and motivational frameworks, and session structure flexibility accommodating cultural practices and time orientations (Bernal et al., 2009).

Colors carry different significance across cultures; red might signal danger or error in Western contexts but represents luck and prosperity in Chinese culture (Resnicow et al., 1999). Practitioners should assess color preferences and associations, avoiding assumptions based on their own cultural background (Bernal et al., 2009). Abstract displays may be preferable to potentially culturally-loaded imagery (S. Sue et al., 2009). Some clients may prefer geometric patterns while others respond better to nature scenes. The key is ensuring the feedback is reinforcing rather than aversive or confusing based on cultural interpretations (Griner & Smith, 2006).

Individual achievement emphasis might not motivate clients from collectivistic cultures as effectively as feedback emphasizing balance, harmony, or contribution to family wellbeing (E. T. Hall, 1976). For example, rather than framing successful training as “you achieved the goal,” reframing as “you’re developing skills that will help you be there for your family” may be more motivating (S. Sue et al., 2009). Points systems or competitive elements work well for some cultures but may be uncomfortable for others who prefer cooperative or noncompetitive structures (Bernal et al., 2009).

Session structure flexibility might include prayer time accommodation for religious clients before beginning technical procedures, brief social connection time for clients from relationship-oriented cultures who may find immediate task focus uncomfortable or disrespectful, modified session length

accommodating different time orientations (some cultures operate on more flexible time schedules and may find rigid 50-min sessions constraining), or flexible pacing that allows for family phone calls or other culturally important obligations that may arise during longer training sessions (E. T. Hall, 1976; S. Sue et al., 2009).

Peripheral Biofeedback Cultural Adaptations

Peripheral biofeedback, particularly heart rate variability (HRV) training, offers unique opportunities for cultural adaptation given its alignment with traditional mind-body practices in many cultures (Feldman et al., 2016). Feldman et al. (2016) demonstrated the effectiveness of culturally adapted cognitive-behavioral psychophysiological therapy (CBPT) with HRV biofeedback for Latino adults with comorbid asthma and panic disorder. Their systematic cultural adaptations included Spanish language sessions with bilingual therapists, active family involvement in treatment when desired by clients, culturally relevant examples and metaphors drawn from Latino cultural contexts, addressing cultural asthma beliefs such as *susto* (fright illness) and *nervios* (nerves), and incorporating culturally resonant stress concepts that made sense within participants’ explanatory frameworks (Feldman et al., 2016). Both adapted CBPT and music relaxation showed improvements, with CBPT demonstrating additional advantages for medication adherence (Feldman et al., 2016). Critically, Nelson et al. (2020) found that HRV and end-tidal CO₂ changes partially mediated treatment effects, indicating that the targeted physiological mechanisms operated similarly across cultural groups despite requiring culturally adapted engagement pathways to achieve optimal participation and outcomes.

Beltrán-Velasco et al. (2020) documented cultural differences in psychophysiological stress responses that have implications for biofeedback protocol development. Comparing Spanish and Colombian students revealed significant differences in both subjective and objective stress response patterns (Beltrán-Velasco et al., 2020). While fundamental stress mechanisms involving hypothalamic-pituitary-adrenal axis activation and autonomic nervous system responses are universal (McEwen, 2017), chronic cultural and environmental factors shape baseline patterns and reactivity, influencing optimal training parameters (Beltrán-Velasco et al., 2020). Practitioners should assess baseline stress response patterns carefully and consider whether cultural factors such as chronic discrimination stress or migration-related trauma may affect optimal training thresholds and reinforcement schedules

(Geronimus et al., 2006). Allostatic load from chronic stress exposure may result in blunted stress reactivity or chronically elevated sympathetic tone that requires adjusted training parameters (Geronimus et al., 2006; McEwen, 2017).

The mind-body focus of peripheral biofeedback may be particularly acceptable to populations familiar with traditional practices such as yoga, qigong, meditation, or contemplative prayer, providing natural bridges between cultural worldviews and biofeedback technology (Travis & Shear, 2010). For example, HRV biofeedback can be framed as using technology to enhance practices the client may already value, such as: "The breathing practice we'll do in biofeedback is similar to pranayama breathing you may have experienced in yoga, but we're using sensors to help you see exactly how your breath affects your heart rhythm and nervous system balance" (Feldman et al., 2016). This framing honors traditional knowledge while introducing technological enhancement, avoiding the implicit message that Western technology is superior to traditional practices (Hinton & Good, 2016).

These adaptations operationalize clinical-level responsiveness through protocol modifications and communication strategies, while simultaneously informing organizational-level decisions about telehealth infrastructure, interpreter services, and community partnership models. At the professional development level, successful peripheral biofeedback adaptations provide training exemplars for practitioners learning to balance treatment fidelity with cultural responsiveness.

Integration With Traditional Healing Practices

Integration with traditional healing practices requires careful navigation between respect for cultural traditions and professional boundary maintenance (Hinton & Good, 2016). Many clients, particularly from immigrant, Indigenous, or minority communities, may simultaneously engage multiple healing systems including traditional healers, religious healing, and biomedical care (Kirmayer & Ryder, 2016). Rather than viewing this as problematic "noncompliance," culturally responsive practitioners recognize parallel help-seeking as rational and culturally appropriate (Hinton & Good, 2016). Integration strategies include timing coordination with traditional healing ceremonies or practices, recognizing that clients may engage multiple healing systems simultaneously (La Roche & Christopher, 2009).

For example, a client may wish to schedule neurofeedback sessions around religious fasting periods, traditional healing ceremonies, or significant cultural events (S. Sue et al., 2009). Flexibility in scheduling demonstrates respect for the client's whole healing process rather than demanding that biomedical treatment take priority over cultural practices (Tervalon & Murray-García, 1998). Conceptual integration helps clients understand how neuroregulation relates to their existing healing framework (Hinton & Good, 2016). For example, HRV biofeedback might be explained as strengthening the same capacities developed through traditional breathing practices or prayer: "What we're doing with biofeedback is similar to what your traditional practices accomplish, but using technology to provide more immediate feedback about how your body is responding" (Feldman et al., 2016). This framing positions neuroregulation as complementary to rather than replacing traditional practices (La Roche & Christopher, 2009). For clients using traditional medicine or healing, discussion should focus on complementarity rather than contradiction (Kirmayer & Ryder, 2016).

Collaboration with traditional healers when appropriate and desired by clients, with proper consent and clear role delineation, can enhance treatment outcomes (Hinton & Good, 2016). Some clients may benefit from explicit communication between their neurofeedback practitioner and traditional healer, particularly when both are actively working with the client (La Roche & Christopher, 2009). Such collaboration requires cultural humility, respect for the traditional healer's expertise and role in the community, clear boundaries about respective scopes of practice, and client-centered focus ensuring that collaboration serves the client's goals rather than professional curiosity or research interests (Tervalon & Murray-García, 1998).

Managing Cultural Conflicts

Cultural conflicts in neuroregulation practice arise from differences in worldviews, values, communication styles, and treatment expectations (La Roche & Christopher, 2009). Rather than viewing these as obstacles, skilled practitioners recognize them as opportunities for deeper understanding and improved therapeutic alliance (Tervalon & Murray-García, 1998). When conflicts emerge, practitioners should first engage in critical self-reflection examining their own cultural assumptions contributing to the discord (La Roche & Christopher, 2009). What appears as "resistance" often reflects cultural misunderstanding rather than treatment rejection (Kleinman & Benson, 2006). For

example, clients missing appointments might reflect different time orientations, competing cultural obligations such as caring for extended family, or indirect communication of discomfort rather than low motivation or lack of commitment to treatment (E. T. Hall, 1976; S. Sue et al., 2009).

Direct but respectful discussion of cultural differences can resolve many conflicts (La Roche & Christopher, 2009). Practitioners might say: “I notice we might have different perspectives on family involvement in treatment. Can you help me understand what would work best for you within your cultural context?” This approach validates cultural differences while maintaining professional boundaries and opens dialogue rather than imposing solutions (Tervalon & Murray-García, 1998). When addressing potential cultural misunderstandings, practitioners should use curious, nonjudgmental language that invites explanation rather than defensive language that may sound accusatory or dismissive (Kleinman & Benson, 2006).

When irreconcilable conflicts arise, ethical practice may require referral to culturally matched providers or alternative treatment modalities that better fit the client’s cultural framework (G. C. N. Hall, 2001; S. Sue et al., 2009). This should be done transparently and respectfully: “I want to ensure you receive the most helpful treatment possible. Would you prefer working with a provider who shares your cultural background or speaks your language? I can help you find someone who might be a better fit” (Tervalon & Murray-García, 1998). This demonstrates commitment to the client’s well-being over practitioner ego or financial interest and models appropriate recognition of cultural competence limitations (S. Sue et al., 2009).

Organizational Implementation

Addressing Access Barriers

Structural and Economic Barriers to Equitable Access. Before addressing specific implementation strategies, it is essential to acknowledge the structural and economic constraints that fundamentally shape neuroregulation service delivery. The field operates predominantly through private practice and clinic-based models that require substantial capital investment and ongoing operational costs. Establishing neurofeedback services requires acquisition of amplifier and signal acquisition hardware, feedback software, and assessment instrumentation, along with recurring expenditures for electrodes, conductive media, and software licensing (Schwartz & Andrasik, 2017).

Systematic documentation of start-up and operating costs for neuroregulation services is not available in the peer-reviewed literature, which itself represents a gap in the field’s capacity to evaluate access barriers, but the categories of required investment place clinic establishment beyond the reach of many practitioners and community-based organizations without external capital. These equipment costs create significant barriers to entry, particularly for practitioners serving low-income communities or working in under-resourced settings where client fees must remain affordable to ensure access.

Training pathways compound these financial barriers. Board certification in neurofeedback requires 36 hours of didactic education; a course in neuroanatomy, neurophysiology, or physiological psychology; 25 contact hours of mentored practical training encompassing 100 patient sessions and 10 case study presentations; and a three-hour certification examination, in addition to \$450 in application and examination fees (Biofeedback Certification International Alliance, n.d.). Because didactic and mentoring costs are set independently by accredited training providers rather than by the certifying body, total expenditure varies considerably, and the cumulative time and tuition commitment represents a meaningful barrier for practitioners in lower-resourced settings. For practitioners from underrepresented backgrounds or those serving underserved communities, these training costs may be prohibitive without scholarship support or institutional funding. The resulting practitioner workforce concentrates in affluent areas where private pay rates can offset training investments and equipment costs, creating a service distribution pattern that mirrors and perpetuates existing healthcare disparities (Saadi et al., 2017).

Insurance reimbursement structures further entrench geographic and socioeconomic disparities. Limited coverage for neurofeedback services (as discussed in the companion review; Sherlin, 2026) means practitioners must either maintain unsustainably low fees or serve primarily private-pay clients. Medicare and Medicaid reimbursement rates, where coverage exists at all, typically fail to cover equipment costs and specialized training investments, making it economically unfeasible for practitioners to serve primarily publicly insured populations. This reimbursement landscape effectively restricts services to those who can afford out-of-pocket payment, concentrating practices in higher-income, predominantly White communities where sufficient private-pay client volumes can sustain operations (Betancourt et al., 2003).

These structural constraints have profound implications for both clinical practice and research. Individual practitioners and small-scale researchers at under-resourced institutions have limited capacity to recruit culturally diverse samples, regardless of cultural competence or commitment to equity. The underrepresentation of minoritized populations in neuroregulation research reflects these systemic access barriers more than methodological choices or population differences in treatment suitability. Calls for increased cultural representation in neuroregulation research must therefore be accompanied by parallel investments in delivery infrastructure, grant funding explicitly supporting community-based service delivery, and reimbursement reform. Without such systemic changes, expectations placed on individual clinicians and researchers risk being aspirational rather than actionable (López et al., 2012; Metzl & Hansen, 2014).

Recognizing these structural realities, the following sections address both immediate strategies individual practitioners and organizations can implement within current constraints, and longer-term systemic reforms necessary for genuinely equitable access. While individual-level cultural adaptations remain important, they are insufficient without concurrent attention to the economic and structural factors that determine who can access services at all.

Financial barriers represent the most significant obstacle to neuroregulation access for diverse populations, with treatment protocols typically requiring multiple sessions over an extended course (Fleischman et al., 2022). As documented in the companion review (Sherlin, 2026), insurance coverage limitations create a two-tiered system where neuroregulation is available primarily to those who can afford substantial out-of-pocket payments (Saadi et al., 2017). Organizations can implement various strategies to address these disparities (Betancourt et al., 2003).

Sliding scale fee structures based on income can make services accessible while maintaining organizational sustainability (Alegria et al., 2016). Effective sliding scales require transparent policies communicated clearly in multiple languages, simplified documentation avoiding bureaucratic barriers that may deter potential clients, regular review ensuring both accessibility and organizational viability, and designated slots protecting both full-fee and reduced-fee client availability (López et al., 2012). Some organizations reserve a defined

proportion of appointments for sliding scale clients, with full-fee services subsidizing reduced-fee care (Betancourt et al., 2003). Clear policies about sliding scale eligibility, required documentation, and fee determination prevent both real and perceived inequities (Alegria et al., 2016).

Grant funding specifically targeting health equity can support services for underserved populations (Fleischman et al., 2022). The Neurofeedback Advocacy Project model documented by Fleischman et al. (2022) demonstrates successful systematic expansion through equipment loans and training support to organizations serving Medicaid populations. Their work with over 300 clients across 20+ community agency sites showed that when access barriers are addressed, diverse clients with complex presentations achieve substantial improvements (Fleischman et al., 2022). The reported no-show rate of 2% suggests high engagement when services are accessible and responsive to community needs (Fleischman et al., 2022).

Geographic barriers disproportionately affect rural and low-income urban communities lacking specialty mental health services (Saadi et al., 2017). Creative service delivery approaches can extend reach through mobile services using equipped vans or portable equipment that can serve multiple community sites, satellite clinics in community locations such as schools, community centers, or religious institutions reducing transportation barriers, telehealth options overcoming distance limitations while requiring attention to digital access issues, and partnerships with existing community services providing space and infrastructure, leveraging trusted community organizations to reduce barriers and increase acceptability (Betancourt et al., 2003; López et al., 2012).

Temporal barriers affect working-class populations with inflexible schedules and multiple jobs (Alegria et al., 2016). Many low-wage workers cannot take time off during standard business hours without losing income or jeopardizing employment (López et al., 2012). Solutions include extended hours accommodating work schedules, such as early morning or evening appointments; weekend availability despite practitioner inconvenience, recognizing that families working multiple jobs may only have weekend time for healthcare; intensive treatment models condensing protocols into fewer but longer sessions when appropriate for specific protocols; and flexible cancellation policies recognizing life complexities of poverty such as

transportation unreliability, child care disruptions, or crisis situations that may prevent attendance without necessarily indicating low motivation (Alegría et al., 2016; Betancourt et al., 2003).

Alternative Service Delivery Models

Traditional clinic-based delivery may be inaccessible or culturally unacceptable to many populations (Betancourt et al., 2003). Alternative models can reduce barriers and increase engagement without compromising treatment quality, as the fundamental neurophysiological mechanisms remain constant regardless of service delivery location (Sherlin, 2026; Sherlin et al., 2011).

Community-based service delivery brings neuroregulation to familiar, trusted settings (Fleischman et al., 2022). Successful implementations include school-based programs providing neurofeedback for students with ADHD and learning difficulties, integrating treatment into the school day and eliminating transportation barriers for families (Gruzelier, 2014). Community centers offer nonstigmatizing locations particularly important for populations experiencing mental health stigma (López et al., 2012). Services provided in community centers may be perceived as "skill-building" or "wellness programs" rather than mental health treatment, reducing shame or reluctance to participate (Resnicow et al., 1999). Religious institutions provide trusted spaces for communities with medical system mistrust, though requiring careful navigation of professional boundaries and clear distinction between religious and clinical services (Betancourt et al., 2003).

Each setting requires systematic attention to privacy protection in shared spaces, ensuring confidential conversations cannot be overheard and that equipment setup maintains client privacy (Betancourt et al., 2003). Equipment security and maintenance in community settings may require different approaches than clinic-based care, including portable equipment that can be secured when not in use (Fleischman et al., 2022). Professional boundary maintenance in community settings where practitioners may encounter clients in other roles requires clear policies and ongoing supervision (S. Sue et al., 2009). Infection control and safety protocols must meet regulatory requirements regardless of setting, requiring systematic procedures and documentation (Betancourt et al., 2003). Documentation must meet regulatory requirements while being adaptable to various settings, potentially using secure electronic

health records accessible from multiple locations (Alegría et al., 2016).

Telehealth and Remote Monitoring

Telehealth and remote monitoring offer unprecedented access potential while presenting unique cultural challenges that require thoughtful navigation. Home-based neurofeedback systems can provide frequent training without transportation barriers, particularly benefiting rural communities and those with limited mobility. Feasibility evidence is emerging: an open-label study of a home-based SMR tele-neurofeedback device found significant pre–post improvement in self-reported sleep among 37 adults, with participants who demonstrated successful SMR learning showing greater gains than nonlearners (Krepel et al., 2022), and a follow-up analysis of the same sample reported improvements on several cognitive measures for learners relative to nonlearners (Kolken et al., 2023). These studies were uncontrolled and did not compare remote to clinic-based delivery, so equivalence between the two has not yet been established and remains an open empirical question.

However, telehealth requires careful consideration of multiple cultural and practical factors (Betancourt et al., 2003). Digital literacy varies significantly across populations, with older adults, recent immigrants, and low-income individuals potentially experiencing technology barriers (Alegría et al., 2016). While younger generations may be comfortable with smartphones and video calls, the specific technology platforms used for telehealth and the integration with neurofeedback equipment may present unfamiliar challenges. Assessment should explore not just technology access but comfort and skill level, with additional training provided as needed (Flores, 2005). Some clients may benefit from initial in-person sessions to establish rapport and learn the technology before transitioning to remote sessions (S. Sue et al., 2009).

Internet access reliability remains uneven, with rural areas and low-income communities disproportionately affected by limited broadband access (Saadi et al., 2017). Practitioners should not assume reliable high-speed internet availability and should have contingency plans for connection disruptions that don't penalize clients for infrastructure limitations beyond their control (Betancourt et al., 2003). Mobile data plans may have insufficient bandwidth or monthly data limits that make regular video sessions prohibitively expensive for low-income clients (López et al., 2012).

Privacy concerns may be heightened in multigenerational households or shared living spaces common in many collectivistic cultures (E. T. Hall, 1976). Clients may not have private space for telehealth sessions, raising concerns about confidentiality and about family members seeing or hearing clinical content (S. Sue et al., 2009). Discussion should address where clients will participate in sessions, what privacy level is possible, whether headphones would help maintain privacy, and how to handle interruptions or family members entering the space during sessions (Betancourt et al., 2003). For some clients, clinic-based or community-based settings may offer more privacy than their home environment (Alegría et al., 2016).

Language barriers may be compounded in telehealth settings where technical troubleshooting requires English proficiency beyond what's needed for clinical content (Flores, 2005). Instructions for connecting to platforms, adjusting settings, or addressing technical problems often assume English fluency. Organizations should provide technical support in clients' primary languages and should use technology platforms with multilingual interfaces when possible (Flores, 2005). Written instructions with screenshots can help but should be available in multiple languages and at appropriate literacy levels (Resnicow et al., 1999).

Cultural acceptability of telehealth is likely to vary, with some populations viewing technology-mediated care as inferior or impersonal and others appreciating reduced stigma and increased convenience. This variation has not been systematically studied in neuroregulation and warrants investigation. Older adults from cultures that highly value face-to-face interaction may find telehealth unsatisfying or disrespectful, missing the relational aspects of in-person care (E. T. Hall, 1976). Practitioners should explicitly discuss telehealth preferences and concerns during initial assessment, offer hybrid models combining in-person and remote sessions when feasible to build relationship while maintaining access, provide culturally appropriate technical support ideally in the client's primary language, and establish clear protocols for managing technical difficulties and emergency situations in ways that maintain therapeutic alliance and client safety (S. Sue et al., 2009). The loss of in-person nonverbal communication may be particularly challenging for high-context communicators who rely heavily on implicit understanding and relational cues that are diminished in video interactions (E. T. Hall, 1976).

Culturally Responsive Informed Consent

Informed consent represents both ethical imperative and legal requirement, yet standard consent processes may not ensure genuine understanding across diverse populations (Flores, 2005). Effective cross-cultural consent requires moving beyond signature collection to ensure authentic comprehension and voluntary agreement (Kleinman & Benson, 2006). Consent materials written above a client's reading level create comprehension barriers for many clients regardless of intelligence or capability.

Language considerations extend beyond translation to include ensuring materials are written at appropriate literacy levels (typically sixth to eighth grade), using common words and short sentences that enhance clarity without condescension (Flores, 2005; Resnicow et al., 1999). Providing verbal explanation opportunities allows practitioners to gauge understanding and adjust explanations based on client questions and responses (Kleinman & Benson, 2006). Using teach-back methods to verify understanding by asking clients to explain key information in their own words identifies comprehension gaps without sounding like a test (Flores, 2005). Offering time for questions without pressure, explicitly stating that questions are welcome and expected, normalizes question-asking for clients from cultures where questioning authority figures may be uncomfortable (E. T. Hall, 1976; S. Sue et al., 2009).

Professional interpreters should be used for consent discussions when language barriers exist (Flores, 2005). Family members should not serve as interpreters for consent discussions as they may have conflicts of interest, may not understand technical concepts well enough to interpret accurately, and may inadvertently influence the client's decision based on family preferences rather than individual autonomy (Flores, 2005). Practitioners must remember that using family as interpreters may compromise confidentiality by revealing information the client might not want shared with family members (Betancourt et al., 2003).

Cultural variations in decision-making styles significantly affect consent processes (E. T. Hall, 1976). Individualistic cultures emphasize autonomous decision-making with the individual patient as the primary decision-maker who may consult others but ultimately decides independently (E. T. Hall, 1976). Collectivistic cultures may prioritize family or community input, with health

decisions viewed as affecting and involving the whole family system rather than just the individual (S. Sue et al., 2009). Some cultures have specific family members (such as eldest male, family matriarch, or spouse) who are expected to make or at least approve healthcare decisions (Kleinman & Benson, 2006).

Practitioners should respect diverse decision-making preferences while ensuring the identified client provides informed consent (Tervalon & Murray-García, 1998). Some clients may wish to include family members in consent discussions or may need time to consult with family before committing to treatment (S. Sue et al., 2009). These preferences should be accommodated while maintaining clarity about who is the client and ensuring their autonomous consent, even within collective decision-making frameworks (Kleinman & Benson, 2006). Questions might include: "Would you like to have family members present for this discussion?" "Are there people whose input is important to you in making this decision?" "After hearing their thoughts, how will you make your final decision?" (E. T. Hall, 1976; S. Sue et al., 2009).

Power dynamics inherent in healthcare relationships may be amplified across cultural differences, particularly for populations with medical mistrust or immigration concerns (Bazargan et al., 2021). Creating genuine voluntariness requires multiple strategies. Building trust over time rather than rushing consent in initial encounters allows relationship development that supports truly voluntary consent (Tervalon & Murray-García, 1998). Providing multiple opportunities to ask questions throughout treatment, not just at initial consent, recognizes that understanding evolves over time and questions may emerge after initial sessions (Kleinman & Benson, 2006). Explicitly stating that declining treatment will not affect other services addresses concerns that refusal may result in negative consequences, particularly important for clients in community health centers where multiple services may be provided (Betancourt et al., 2003). Recognizing that some populations may be reluctant to refuse or question authority figures suggests using extra diligence to ensure understanding and voluntary agreement rather than passive compliance (Bazargan et al., 2021; E. T. Hall, 1976).

Consent should be conceptualized as ongoing process rather than a one-time event (Tervalon & Murray-García, 1998). Before beginning neurofeedback, clients may not fully understand what the experience will be like. Regular

opportunities to reassess understanding and willingness to continue treatment honor ongoing autonomy and allow clients to ask questions as their understanding deepens (S. Sue et al., 2009). Check-ins might include: "Now that you've experienced a few sessions, do you have any questions about what we're doing?" "Does this still feel like the right approach for you?" "Is there anything about the process you'd like to discuss or change?" (Kleinman & Benson, 2006; Tervalon & Murray-García, 1998).

Quality Monitoring and Improvement

Systematic quality monitoring with explicit attention to equity is essential for identifying and addressing disparities in neuroregulation services (López et al., 2012). Organizations must move beyond aggregate outcome reporting to disaggregated analysis revealing differential patterns across demographic groups (Betancourt et al., 2003). Without disaggregated analysis, disparities remain invisible in averaged data that may show overall positive outcomes while masking poorer outcomes for specific populations (López et al., 2012).

Engagement metrics should be tracked by race, ethnicity, language, socioeconomic status, and other relevant factors (Betancourt et al., 2003). Key indicators include referral sources and pathways revealing which communities have access to referrals and which remain unaware of services, initial appointment attendance rates indicating whether services feel accessible and acceptable to diverse populations, session attendance patterns and no-show rates that may reveal practical barriers like transportation or scheduling conflicts, treatment completion rates and average doses received across demographic groups, and reasons for premature termination that may highlight cultural barriers or conflicts requiring attention (Alegría et al., 2016; López et al., 2012).

Disparities in these metrics signal barriers requiring targeted intervention (López et al., 2012). For example, if initial appointment attendance is significantly lower for Spanish-speaking clients, this might indicate need for bilingual outreach materials, Spanish-speaking front desk staff, or explicit communication about interpreter availability (Flores, 2005). If African American clients have higher no-show rates, this might reflect mistrust requiring additional rapport-building time, practical barriers like transportation, or scheduling conflicts with inflexible work schedules (Bazargan et al., 2021; Betancourt et al., 2003).

Clinical outcomes must be analyzed for equity, not just effectiveness (López et al., 2012). While physiological mechanisms operate universally, as established in the companion review (Sherlin, 2026), outcomes may vary based on engagement quality, therapeutic alliance strength, and treatment adaptation adequacy (Griner & Smith, 2006). Organizations should examine whether all demographic groups achieve comparable outcomes, identify factors associated with differential outcomes such as number of sessions attended, language concordance, practitioner cultural competence, and implement targeted improvements addressing identified disparities (Betancourt et al., 2003; López et al., 2012). If outcomes for specific populations lag behind majority population outcomes despite similar attendance, this suggests need for enhanced cultural adaptation or practitioner training rather than assuming differential treatment response (Feldman et al., 2016; Fleischman et al., 2022).

Client satisfaction assessment requires culturally appropriate methods capturing diverse populations' experiences (Resnicow et al., 1999). Standard satisfaction surveys may miss important cultural factors affecting treatment experience (S. Sue et al., 2009). Survey questions developed for majority populations may not capture the concerns or values of minority clients (Kleinman & Benson, 2006). For example, questions about individual symptom reduction may miss relational outcomes more valued in collectivistic cultures (E. T. Hall, 1976). Culturally responsive assessment includes focus groups conducted in clients' primary languages allowing for discussion and elaboration beyond survey responses, community advisory boards providing ongoing feedback about services from community perspective, specific questions about cultural responsiveness such as "Did providers respect your cultural beliefs?" or "Was interpreter assistance satisfactory?", and anonymous feedback mechanisms recognizing that clients from hierarchical cultures may be reluctant to provide critical feedback directly to providers (Betancourt et al., 2003; E. T. Hall, 1976; S. Sue et al., 2009).

Continuous quality improvement must prioritize equity alongside efficiency and effectiveness (López et al., 2012). When disparities are identified, organizations should implement targeted interventions such as additional staff training in cultural competence focusing on identified gaps, partnership development with community organizations serving underrepresented populations, policy modifications removing identified barriers like inflexible scheduling or burdensome paperwork, and

resource reallocation to underserved populations potentially including dedicated slots or funding for clients facing financial barriers (Alegría et al., 2016; Betancourt et al., 2003). Improvement cycles should be continuous with regular review of equity metrics and adjustment of interventions based on effectiveness (López et al., 2012).

Professional Development and Training

Individual Practitioner Development

Developing cultural competence in neuroregulation requires lifelong commitment to learning and growth (Tervalon & Murray-García, 1998). Based on the cultural humility framework detailed in the companion article (Sherlin, 2026), practitioners must recognize that cultural learning is never complete and requires ongoing self-reflection and development. Individual practitioners should begin with comprehensive self-assessment examining their own cultural identity and its influence on practice including values, beliefs, and assumptions they bring to clinical work, implicit biases affecting clinical judgment and decision-making that may operate outside conscious awareness, current competence levels and knowledge gaps about specific cultural groups, and motivation for cultural competence development, recognizing that genuine cultural desire sustains ongoing efforts (Campinha-Bacote, 2002; Tervalon & Murray-García, 1998).

Formal cultural competency training should be viewed as essential rather than optional continuing education (S. Sue et al., 2009). No established cultural competence training standards currently exist specifically for neuroregulation, and the field would benefit from developing them. Training should address both general cultural competence applicable across clinical settings and neuroregulation-specific considerations including how culture influences technology perception and acceptance, strategies for explaining neuroscience concepts across educational and cultural contexts without condescension or excessive jargon, protocol adaptation guidelines maintaining therapeutic integrity while enhancing cultural responsiveness, therapeutic alliance building across cultural differences, and recognition of one's own cultural competence limitations requiring consultation or referral (Betancourt et al., 2003; S. Sue et al., 2009).

Experiential learning through supervised practice with diverse populations accelerates competence development beyond didactic training alone (G. C. N. Hall, 2001; D. W. Sue et al., 1992). Meaningful cross-cultural clinical experiences, accompanied by

reflection and supervision, may accelerate competence development beyond didactic training alone. Practitioners should actively seek opportunities working with diverse clients, recognizing that competence requires direct experience (G. C. N. Hall, 2001). Participation in community outreach and education introduces practitioners to community contexts and builds relationships that facilitate future clinical work (Betancourt et al., 2003). Engagement with cultural communities through attendance at cultural events, reading, or relationship-building helps practitioners learn about diverse health and healing perspectives outside clinical contexts (S. Sue et al., 2009). Pursuit of supervision or consultation with culturally experienced colleagues provides guidance when working with unfamiliar populations or addressing cultural challenges (Tervalon & Murray-García, 1998).

Cultural humility practices sustain long-term development and prevent competence stagnation (Tervalon & Murray-García, 1998). This involves acknowledging mistakes as learning opportunities rather than defensively denying or minimizing cultural errors, actively seeking client feedback about cultural responsiveness through direct questions and receptiveness to indirect feedback, remaining open to having assumptions challenged and recognizing that clients are experts on their own cultural experiences, and recognizing cultural learning as ongoing rather than achievable endpoint, maintaining curiosity and humility across career span (Tervalon & Murray-García, 1998; S. Sue et al., 2009).

Organizational Training Strategies

Organizations committed to cultural responsiveness must implement comprehensive training approaches addressing all staff levels and functions (Betancourt et al., 2003). Leadership commitment demonstrated through resource allocation, policy support, and personal participation sets organizational tone for cultural competence importance (López et al., 2012). When leadership treats cultural competence as optional or delegates it entirely without participating, staff receive the message that it is not truly a priority despite rhetoric to the contrary (Betancourt et al., 2003).

Comprehensive staff training recognizes that all organizational members influence client experience, not just clinical providers (Betancourt et al., 2003). Front desk staff require training in culturally responsive customer service, appropriate interpreter utilization, and recognition of language barriers or

cultural confusion requiring assistance (Flores, 2005). Their interactions are often clients' first organizational contact and set the tone for whether the environment feels welcoming and responsive to diversity (Resnicow et al., 1999). Technical staff conducting assessments need skills for culturally appropriate interaction during procedures like electrode placement that may involve cultural or religious sensitivities (Eisenbarth et al., 2025). Clinicians require depth training in assessment, formulation, and treatment adaptation as described throughout this article (S. Sue et al., 2009). Administrators need understanding of structural barriers and equity-focused policy development to ensure organizational practices support rather than hinder cultural responsiveness (López et al., 2012; Metzl & Hansen, 2014).

Training modalities should be diverse, sustained, and progressively challenging (Betancourt et al., 2003). One-time workshops are unlikely to produce lasting change compared to sustained, multimodal approaches (Betancourt et al., 2003). Effective organizational training includes initial intensive training establishing foundation knowledge through workshops, webinars, or courses; monthly ongoing education integrated into staff meetings and clinical supervision rather than relegated to separate diversity training; case consultation incorporating cultural perspectives routinely rather than only when "cultural issues" are identified; mentorship programs supporting skill development through pairing less experienced practitioners with more culturally competent colleagues; and immersion experiences in community settings such as participation in cultural events, partnerships with community organizations, or community advisory board meetings (Betancourt et al., 2003; S. Sue et al., 2009).

Simulation and standardized patient encounters allow skill development in controlled settings before client application (S. Sue et al., 2009). Scenarios should reflect common cultural challenges such as working effectively with professional interpreters, managing family involvement expectations that differ from practitioner's assumptions, adapting protocols for religious considerations such as scheduling around prayer times or Ramadan fasting, and responding therapeutically to clients' discrimination experiences in healthcare without becoming defensive (Bazargan et al., 2021; Betancourt et al., 2003). Debriefing after simulations helps practitioners identify areas for improvement and reinforces effective strategies (S. Sue et al., 2009).

Supervision and Mentorship

Supervision plays a crucial role in developing cultural competence, requiring supervisors skilled in both neuroregulation techniques and cultural responsiveness (Tervalon & Murray-García, 1998). Effective supervision creates safe spaces for exploring cultural dynamics including countertransference reactions, mistakes and uncertainties, and developmental growth edges (S. Sue et al., 2009). Supervisors must create environments where supervisees can acknowledge cultural limitations, errors, or confusion without fear of judgment or negative evaluation (Tervalon & Murray-García, 1998).

Supervisory discussions should routinely integrate cultural considerations rather than treating culture as special topic addressed only when obvious cultural differences exist (S. Sue et al., 2009). Questions guiding cultural exploration include: “What cultural factors might influence engagement or outcomes?” “How might the client’s worldview affect symptom understanding or treatment preferences?” “What cultural strengths or resources can be leveraged?” “Are there unaddressed cultural barriers or misunderstandings?” “How might my own cultural background be affecting this clinical relationship?” (Kleinman & Benson, 2006; Tervalon & Murray-García, 1998).

Direct observation with cultural focus provides invaluable feedback unavailable through self-report alone (S. Sue et al., 2009). Supervisors observing sessions should attend specifically to verbal and nonverbal communication patterns including pace, directness, language complexity, and nonverbal communication appropriateness; power dynamics and their management, including how the practitioner navigates authority relationships and decision-making; missed cultural cues or opportunities such as moments when cultural factors might have been explored or addressed; and successful cultural adaptations worth reinforcing and potentially sharing with other supervisees (E. T. Hall, 1976; Tervalon & Murray-García, 1998). Feedback should be specific, balanced with recognition of effective cultural responses alongside areas for growth, and growth-oriented focusing on development rather than criticism (S. Sue et al., 2009).

Mentorship programs accelerate development particularly for practitioners from underrepresented backgrounds navigating predominantly White professional spaces (G. C. N. Hall, 2001). Effective mentorship addresses not just clinical skills but also

professional navigation including understanding unwritten rules and norms, network development including introductions to key colleagues and organizations, and identity integration supporting practitioners in maintaining cultural identity while succeeding professionally (G. C. N. Hall, 2001; D. W. Sue et al., 1992). Organizations should actively develop mentorship programs pairing senior practitioners with those entering the field, with attention to both cross-cultural and culturally matched mentoring relationships (S. Sue et al., 2009).

Integration of Professional Standards

The neuroregulation field must systematically integrate cultural competence into professional standards, certification requirements, and ethical guidelines (S. Sue et al., 2009). Currently, major certification bodies including BCIA (Biofeedback Certification International Alliance) lack explicit cultural competence requirements, representing a significant gap requiring immediate attention (Betancourt et al., 2003). Certification standards should include demonstrated cultural competence through required training hours in cultural factors including both general cultural competence and neuroregulation-specific applications; examination questions assessing cultural knowledge including recognition of cultural factors affecting assessment, treatment planning, and outcomes; practical demonstration via case presentation or simulation showing application of cultural competence in clinical scenarios; and continuing education requirements for credential maintenance recognizing that cultural competence requires ongoing development rather than one-time achievement (Betancourt et al., 2003; S. Sue et al., 2009).

Accreditation standards for training programs should mandate cultural competence integration throughout curricula rather than segregated diversity courses (G. C. N. Hall, 2001). This includes diverse case examples and research throughout training rather than only in designated cultural sections, faculty modeling cultural competence in their teaching and supervision, supervised practice with diverse populations as graduation requirement, and explicit skill assessment ensuring graduates meet competency standards before entering independent practice (Betancourt et al., 2003; S. Sue et al., 2009).

Ethical guidelines must explicitly address cultural responsiveness as ethical imperative rather than optional enhancement (Tervalon & Murray-García, 1998). This includes recognizing cultural

incompetence as potential harm source when practitioners work beyond their competence level with specific populations, establishing interpreter use standards requiring professional interpreters when language barriers exist, addressing informed consent across linguistic and cultural differences to ensure genuine understanding and voluntary participation, and guiding appropriate referral when cultural competence limits are reached (Flores, 2005; S. Sue et al., 2009). The International Society for Neuroregulation & Research (ISNR) and other professional organizations should develop specific ethical guidance for cultural responsiveness in neuroregulation practice (Betancourt et al., 2003).

Implementation Challenges and Solutions

Common Implementation Barriers

Organizations implementing culturally responsive neuroregulation face predictable challenges requiring proactive planning and creative problem-solving (Betancourt et al., 2003). Leadership commitment is widely regarded as central to successful implementation, demonstrated through resource allocation, personal participation in training, and integration of cultural competence into performance evaluation systems. Anticipating these challenges and securing leadership buy-in allows organizations to develop strategies rather than being deterred when difficulties arise.

Resource limitations consistently emerge as a primary implementation barrier (Alegría et al., 2016). Providing comprehensive cultural adaptations requires financial investment in interpreter services, extended appointments to accommodate language barriers and trust-building, staff training including release time and program costs, community engagement and outreach requiring dedicated staff time, and translated materials and culturally appropriate resources (Betancourt et al., 2003; Flores, 2005). Small practices or community organizations serving low-income populations face particular challenges funding these essential services (López et al., 2012). Solutions include graduated implementation prioritizing highest-impact changes rather than attempting comprehensive implementation simultaneously (Betancourt et al., 2003). Begin with core changes like professional interpreter access and basic staff training before pursuing more resource-intensive adaptations (Alegría et al., 2016). Strategic resource allocation including grant seeking specifically for health equity initiatives, with increasing funding available for disparity reduction (López et al., 2012). Creative partnerships sharing costs with community

organizations, academic institutions, or other providers serving similar populations (Betancourt et al., 2003). Documentation of return on investment through improved retention and outcomes helps justify initial resource allocation by demonstrating long-term organizational benefit (Fleischman et al., 2022).

Staff resistance emerges from various sources requiring different responses (Betancourt et al., 2003). Fear of making cultural mistakes creates anxiety that may manifest as avoidance rather than engagement (Tervalon & Murray-García, 1998). Practitioners worry about offending clients or being accused of bias. Response includes creating psychological safety where mistakes are learning opportunities, providing education about cultural humility approach that acknowledges mistakes as inevitable, and offering support rather than punishment when cultural missteps occur (S. Sue et al., 2009; Tervalon & Murray-García, 1998).

Belief in "colorblind" approaches reflects misunderstanding of equity versus equality (López et al., 2012). Some staff believe that treating everyone the same represents fairness and that attention to cultural differences is itself discriminatory (Betancourt et al., 2003). Response includes education distinguishing equity (providing what each person needs) from equality (providing the same thing to everyone), presentation of disparity data showing that current approaches don't work equally well for all populations, and framing cultural responsiveness as clinical excellence rather than political correctness (López et al., 2012; Metzl & Hansen, 2014).

Resentment about additional requirements may emerge particularly when staff feel overburdened by existing demands (Betancourt et al., 2003). Response includes acknowledging legitimate workload concerns rather than dismissing them, demonstrating leadership commitment through resource allocation rather than only adding expectations, and showing how cultural responsiveness improves clinical effectiveness rather than only creating additional work (S. Sue et al., 2009). Focusing on systemic rather than individual change emphasizes that cultural responsiveness requires organizational support, not just individual practitioner effort (López et al., 2012).

Time constraints challenge implementation given that comprehensive cultural assessment, interpreter use, and trust-building require additional time (Flores, 2005). Typical 50-min sessions may be

insufficient for culturally responsive care, particularly initial sessions establishing rapport across cultural differences or ongoing sessions requiring interpretation (Betancourt et al., 2003). Solutions focus on integration rather than addition by weaving cultural considerations throughout existing processes rather than adding separate procedures (S. Sue et al., 2009). Efficiency improvements through staff training that increases competence and confidence, streamlining documentation, and systematic processes reduce time wasted on inefficient approaches (Betancourt et al., 2003). Recognition of long-term benefits including better engagement and retention ultimately saves time compared to repeatedly starting over with clients who drop out due to cultural barriers (Fleischman et al., 2022). Extended initial sessions allowing adequate time for culturally responsive assessment and rapport-building may prevent later problems requiring more time to address (Alegría et al., 2016; Tervalon & Murray-García, 1998).

Sustaining Cultural Responsiveness

Initial implementation enthusiasm often wanes without systematic sustainment strategies (Betancourt et al., 2003). Long-term success requires embedding cultural responsiveness into organizational DNA rather than depending on individual champions who may leave or experience burnout (López et al., 2012).

Policy integration ensures cultural responsiveness survives staff transitions and leadership changes (Betancourt et al., 2003). Written policies should address interpreter service standards including when interpreters must be used and quality expectations, cultural assessment requirements specifying minimum assessment components for all clients, accommodation procedures for religious or cultural needs, training expectations for all staff levels with specific requirements, and equity monitoring processes with defined metrics and review frequency (Betancourt et al., 2003; Flores, 2005). Policies should be reviewed and updated regularly, include staff input from diverse perspectives, be accessible to all staff in writing and training, and guide rather than replace clinical judgment (S. Sue et al., 2009).

Budget allocation demonstrates genuine organizational commitment beyond rhetoric (López et al., 2012). Cultural responsiveness requires dedicated budget lines rather than depending on surplus funds that may disappear during financial challenges (Alegría et al., 2016). Budget should include interpreter services as standard operating

cost, cultural competence training for all staff, community engagement and partnership development, translated materials and resources, equity analyst or quality improvement staff time, and contingency funding for unanticipated cultural needs (Betancourt et al., 2003). When cultural responsiveness has dedicated funding, it signals organizational priority and ensures sustainability (López et al., 2012).

Accountability mechanisms maintain focus through ongoing monitoring and feedback (Betancourt et al., 2003). Regular equity report cards presented to leadership and staff show progress and identify areas needing attention (López et al., 2012). Performance evaluations incorporating cultural competence for all staff, not just clinicians, hold individuals accountable (S. Sue et al., 2009). Community advisory board oversight provides external perspective and accountability to communities served (Betancourt et al., 2003). These mechanisms prevent cultural responsiveness from becoming merely aspirational without genuine implementation (López et al., 2012).

Continuous learning prevents stagnation through ongoing education maintaining skill development beyond initial training, community engagement through sustained partnerships and participation in cultural events, exploration of emerging population needs as communities evolve and new populations arrive, and incorporation of new research findings into practice as evidence base develops (S. Sue et al., 2009; Betancourt et al., 2003). Organizations should create learning cultures where cultural competence is everyone's ongoing responsibility rather than one-time training requirement (Tervalon & Murray-García, 1998).

Reorganized Future Directions and System Change Needs

Research Priorities for the Field

The paucity of research examining cultural factors in neuroregulation represents a critical knowledge gap requiring immediate attention, as documented in the companion review (Sherlin, 2026). Most urgently, the field needs development and validation of culturally adapted protocols through rigorous controlled trials, with findings disseminated via open-source protocol repositories ensuring practitioner scalability and adaptation for local contexts (Griner & Smith, 2006). While we have extensive evidence for standard neurofeedback protocols, we lack systematic research examining how these protocols might be optimally adapted for different cultural

populations while maintaining therapeutic efficacy (G. C. N. Hall et al., 2016). This research should investigate not only surface-level modifications like feedback displays and reward systems, but also deeper structural adaptations that might enhance engagement and outcomes for specific cultural groups (Bernal et al., 2009).

Equally important is investigation of optimal training parameters across diverse populations, with training curricula and assessment instruments made freely available through professional development consortia to facilitate immediate practitioner application (Feldman et al., 2016). Current protocols have been developed and tested primarily with Western, educated populations, yet optimal session frequency, duration, and total treatment length may vary based on cultural factors affecting engagement, practice patterns, and generalization of skills (Beltrán-Velasco et al., 2020). For instance, collectivistic cultures might benefit from different reinforcement schedules or session structures that accommodate family involvement (E. T. Hall, 1976).

Implementation research examining service delivery models in diverse community settings will provide crucial guidance for real-world application (Fleischman et al., 2022). Research should investigate effectiveness and sustainability of school-based programs in diverse schools, community-based models in cultural centers or religious institutions, hybrid telehealth models addressing access barriers, and group-based protocols with culturally homogeneous populations (Gruzelier, 2014). This research should examine not just clinical outcomes but also engagement, retention, cost-effectiveness, and community acceptability (Betancourt et al., 2003).

Economic analyses demonstrating cost-effectiveness for underserved communities are essential for advocacy and policy change, coupled with decision-support tools and implementation toolkits made freely available through professional organization websites and continuing education platforms (López et al., 2012). Without clear documentation of return on investment and societal benefits, it remains difficult to secure funding for programs serving populations that most need access to neuroregulation services (Alegria et al., 2016). Research should document cost per successful treatment outcome, comparison to alternative treatments for similar conditions, societal cost savings from reduced healthcare utilization and improved functioning, and impact on health disparity reduction (Fleischman et al., 2022). Additionally, the

development of culturally diverse normative databases represents a fundamental infrastructure need (Chiao, 2009). Current databases predominantly reflect White, educated populations, potentially leading to misinterpretation when applied to diverse groups (Moss et al., 1985). Creating representative normative data will ensure appropriate assessment and treatment planning across all populations (Betting et al., 2006; Travis & Shear, 2010).

Critically, research priorities must include infrastructure development studies examining cost-effective delivery models for underserved communities. This includes comparative effectiveness research on community-embedded delivery models versus traditional clinic-based approaches, cost-benefit analyses accounting for broader social determinants of health and community-level outcomes rather than only individual clinical metrics, and implementation studies documenting successful partnerships between academic institutions and community organizations that enable service delivery in under-resourced settings. Without evidence documenting financially sustainable models for serving diverse populations, calls for cultural responsiveness remain disconnected from the economic realities constraining practice and research (Betancourt et al., 2003; Fleischman et al., 2022).

System and Policy Change Requirements

Individual and organizational efforts, while necessary, prove insufficient without broader systemic change addressing structural barriers to equitable neuroregulation access, as emphasized in the health disparities framework detailed in the companion article (Metzl & Hansen, 2014; Sherlin, 2026). Insurance coverage expansion requires coordinated advocacy efforts at federal and state levels (López et al., 2012). Professional organizations including ISNR, Association for Applied Psychophysiology and Biofeedback (AAPB), and BCIA must work together bringing together practitioners, researchers, and affected communities to document effectiveness with diverse populations, demonstrate cost-effectiveness compared to traditional treatments, advocate for Medicaid and Medicare coverage expansion, and develop billing codes and documentation standards facilitating reimbursement (Betancourt et al., 2003). Current coverage limitations disproportionately affect communities of color and low-income populations who cannot afford out-of-pocket costs, perpetuating disparities in access to these effective interventions (López et al., 2012; Saadi et al., 2017).

Equally critical is reform of service delivery models themselves. The current reliance on private practice, clinic-based delivery concentrates services in affluent areas and creates insurmountable barriers for practitioners committed to serving diverse communities. Policy initiatives must incentivize alternative delivery structures including equipment loan programs modeled on the Neurofeedback Advocacy Project approach (Fleischman et al., 2022), which successfully expanded access through strategic equipment placement and training support; community health center integration providing neurofeedback within federally qualified health centers that already serve predominantly minority and low-income populations; school-based service delivery eliminating transportation and financial barriers while normalizing mental health interventions; and mobile neurofeedback units bringing services directly to underserved communities. Public funding streams (including Substance Abuse and Mental Health Services Administration [SAMHSA] grants, foundation support, and state mental health appropriations) should explicitly prioritize infrastructure development for community-embedded delivery models rather than only supporting individual practitioner training (López et al., 2012).

Workforce diversification through pipeline programs represents another critical system-level intervention (D. W. Sue et al., 1992). The current lack of diversity in the neuroregulation workforce limits both cultural competence and community trust, creating additional barriers for diverse clients seeking services (G. C. N. Hall, 2001). Strategies should include pipeline programs introducing neuroregulation careers to underrepresented students through school presentations, mentorship opportunities, and exposure to the field; scholarship support reducing financial barriers to training for students from underrepresented backgrounds; mentorship programs supporting professional development and retention of practitioners from diverse backgrounds; and recruitment of bilingual and bicultural practitioners addressing language barriers and cultural understanding simultaneously (D. W. Sue et al., 1992; Flores, 2005).

Research funding priorities must explicitly include diversity and cultural factors as review criteria for federal and foundation grants (G. C. N. Hall, 2001). Without such requirements, research will continue to predominantly reflect majority populations, limiting generalizability and perpetuating evidence gaps (Chiao, 2009). Funding agencies should require meaningful inclusion plans for diverse populations,

cultural factor analysis in research design and interpretation, community engagement strategies ensuring research serves community needs, and translation of findings into accessible formats for practitioners and communities (Betancourt et al., 2003). Grant review criteria should specifically evaluate cultural considerations, and study sections should include members with cultural research expertise (G. C. N. Hall, 2001).

Finally, integration with public health initiatives positions neuroregulation as a population health tool rather than a boutique intervention available only to privileged populations (Betancourt et al., 2003). Opportunities for integration include school-based mental health programs addressing ADHD and learning difficulties in collaboration with special education services, community trauma response initiatives providing accessible treatment following collective trauma such as natural disasters or community violence, substance abuse prevention and treatment programs incorporating neurofeedback as an adjunctive intervention, and chronic disease management programs addressing the neurological components of conditions like diabetes and hypertension (Gruzelier, 2014; Fleischman et al., 2022). Such integration would dramatically expand access while normalizing neuroregulation as a standard component of comprehensive healthcare rather than a specialized service known only to those with resources to seek it out (López et al., 2012).

Practice Guidelines Development Needs

Professional organizations must take leadership in developing comprehensive practice guidelines for culturally responsive neuroregulation based on available evidence and expert consensus where evidence is lacking (S. Sue et al., 2009). These guidelines need to address multiple domains of practice, beginning with assessment procedures that incorporate validated cultural assessment tools appropriate for neuroregulation contexts (Kleinman & Benson, 2006). Current assessment practices often overlook cultural factors that may significantly influence treatment engagement and outcomes, leaving practitioners without clear guidance on how to systematically evaluate and address these considerations (Betancourt et al., 2003). Guidelines should specify minimum cultural assessment components, appropriate interpreter use protocols, normative database selection and interpretation with diverse populations, and documentation of cultural factors in clinical records (Chiao, 2009; Flores, 2005).

Treatment adaptation guidelines must clarify which elements of neuroregulation protocols can be modified to enhance cultural responsiveness versus which elements must be preserved to maintain therapeutic integrity (Bernal et al., 2009). Drawing on the distinction between universal mechanisms and culturally variable factors established in the companion review (Sherlin, 2026), guidelines should specify core protocol components requiring fidelity, acceptable adaptation dimensions including feedback displays, reward systems, and session structure, contraindicated modifications that would compromise treatment effectiveness, and documentation of adaptations and clinical reasoning (Griner & Smith, 2006; G. C. N. Hall et al., 2016). Practitioners currently navigate these decisions without clear frameworks, potentially leading to either ineffective over-adaptation that compromises core mechanisms or rigid adherence that alienates diverse clients (La Roche & Christopher, 2009). Clear guidelines would help practitioners confidently make adaptation decisions while maintaining treatment effectiveness (Bernal et al., 2009).

Training requirements establishing minimum competency standards for culturally responsive practice need to be integrated into certification and continuing education requirements (S. Sue et al., 2009). The current absence of such standards means practitioners may enter the field with minimal preparation for serving diverse populations, perpetuating disparities through well-intentioned but inadequate service provision (G. C. N. Hall, 2001). Certification bodies should specify required training hours in cultural competence as prerequisite for certification, continuing education requirements for certification maintenance, competency demonstration through examination or practical assessment, and supervision requirements including cultural competence focus (Betancourt et al., 2003; S. Sue et al., 2009).

Quality indicators defining metrics for evaluating cultural responsiveness at both individual practitioner and organizational levels would enable systematic monitoring and improvement of equity in service delivery (López et al., 2012). These metrics should encompass process measures such as interpreter utilization rates, cultural assessment completion rates, and staff training participation; outcome measures examining disparity reduction in engagement and clinical outcomes across demographic groups; and balancing measures ensuring that quality is maintained while access is expanded (Betancourt et al., 2003). Professional organizations should develop standardized equity

dashboards that organizations can adapt to their specific contexts (López et al., 2012).

Conclusion

Implementing culturally responsive neuroregulation represents both ethical imperative and clinical necessity for effectively serving increasingly diverse populations (Betancourt et al., 2003; S. Sue et al., 2009). This article has detailed a comprehensive three-level implementation framework. The synthesis reveals emergent synergies where clinical practice adaptations, when coupled with systematic organizational quality monitoring, create reinforcing effects that enhance both engagement and retention outcomes (López et al., 2012), and where professional development initiatives enhance both individual practitioner competence and organizational capacity for sustained change. The framework provides concrete strategies for immediate implementation while working toward systemic changes ensuring equitable access to these powerful interventions.

At the clinical practice level, culturally responsive care requires thorough cultural assessment exploring explanatory models, technology comfort, language preferences, and family involvement expectations (Eisenbarth et al., 2025; Kleinman & Benson, 2006). The LEARN model provides a structured approach for integrating assessment findings into collaborative treatment planning (Berlin & Fowkes, 1983). Communication strategies must address both verbal and nonverbal elements, with particular attention to high-context versus low-context communication styles and appropriate interpreter utilization (Flores, 2005; E. T. Hall, 1976). Treatment adaptations should balance fidelity to core neurophysiological mechanisms with responsiveness to cultural needs, modifying feedback displays, reward systems, and session structures while maintaining therapeutic integrity (Bernal et al., 2009; Griner & Smith, 2006).

At the organizational level, addressing access barriers requires creative solutions to financial, geographic, and temporal obstacles through sliding scale fees, alternative service delivery models, and community-based programs (Betancourt et al., 2003; Fleischman et al., 2022). Quality monitoring with explicit attention to equity enables identification and remediation of disparities in engagement and outcomes (López et al., 2012). Telehealth offers substantial access potential but requires careful attention to digital literacy, internet reliability, privacy in shared spaces, and cultural acceptability.

At the professional development level, individual practitioners must commit to lifelong learning through formal training, experiential learning with diverse populations, and cultural humility practices (Tervalon & Murray-García, 1998; S. Sue et al., 2009). Organizations must implement comprehensive training addressing all staff levels, utilize diverse modalities including simulation and mentorship, and create supervision structures supporting cultural competence development (Betancourt et al., 2003). Professional organizations must integrate cultural competence into certification standards, accreditation requirements, and ethical guidelines (S. Sue et al., 2009).

The distinction between universal physiological mechanisms and culturally variable implementation factors, established in the companion review (Sherlin, 2026), provides essential clarity for practitioners navigating adaptation decisions. Confidence in mechanism universality allows focus on addressing engagement barriers without compromising treatment integrity (Sherlin et al., 2011). Core processes including operant conditioning, neuroplasticity, and autonomic regulation operate identically across human populations (Porges, 2011). What varies culturally is how individuals access, understand, and integrate these mechanisms into their lives (Kirmayer & Ryder, 2016; Hinton & Good, 2016).

Evidence demonstrates that when cultural barriers are systematically addressed, diverse populations can achieve outcomes comparable to majority populations (Feldman et al., 2016; Fleischman et al., 2022), though important caveats exist. Not all cultural adaptation studies show positive effects, and methodological limitations in existing research (including small sample sizes, limited geographic diversity, and short follow-up periods) necessitate cautious interpretation. Most supportive evidence derives from North American contexts, warranting replication in diverse international settings before claiming universal generalizability. This finding indicates that observed disparities stem primarily from implementation failures rather than differential treatment response, offering hope that systematic implementation of culturally responsive practices can significantly reduce health inequities (López et al., 2012). The reported no-show rate of 2% in a community-based program serving diverse populations illustrates the engagement possible under culturally responsive implementation (Fleischman et al., 2022).

Achieving these goals requires honest acknowledgment of structural and economic realities that constrain implementation. The concentration of neuroregulation services in private practices serving affluent, predominantly White communities reflects systemic factors including equipment costs, training expenses, reimbursement limitations, and referral patterns rather than individual practitioner choices alone. Individual practitioners working in under-resourced settings or small-scale researchers at universities with limited funding face genuine constraints in serving culturally diverse populations, regardless of cultural competence or commitment to equity. Progress therefore demands parallel action at multiple levels: individual practitioners developing cultural competence within their sphere of influence, organizations innovating delivery models that overcome economic barriers, and policy makers investing in infrastructure that makes equitable access financially feasible rather than requiring practitioners to choose between economic sustainability and equity commitments (López et al., 2012; Metzl & Hansen, 2014).

Implementation challenges, while real, prove surmountable with commitment, creativity, and collaboration (Betancourt et al., 2003). Resource limitations can be addressed through graduated implementation, strategic allocation, and creative partnerships (Alegría et al., 2016). Staff resistance decreases with education, skill-building, and creation of psychologically safe learning environments (S. Sue et al., 2009; Tervalon & Murray-García, 1998). Time constraints diminish as integration replaces addition and efficiency improves with competence (Flores, 2005). Each challenge overcome strengthens organizational capacity for serving diverse populations (López et al., 2012).

Future progress demands coordinated action across multiple stakeholders with phased implementation. In the near term (suggested 6–12 months), practitioners might begin with cultural humility self-assessment and integration of core assessment adaptations into clinical practice (Tervalon & Murray-García, 1998). Organizations could focus on implementing quality monitoring systems with equity metrics and initiating community partnership development (suggested 12–24 months; López et al., 2012). Professional associations might work toward establishing cultural competence standards and convening stakeholders for guideline development (suggested 18–36 months; S. Sue et al., 2009). Over the longer term (3–5 years), researchers must address knowledge gaps through inclusive studies with diverse populations, cultural

factor analysis, and community-engaged research (G. C. N. Hall, 2001), while policy makers could pursue systemic reforms through legislative change, research funding priorities explicitly including diversity requirements, and integration of neuroregulation into public health initiatives (Metzl & Hansen, 2014; Saadi et al., 2017). These timelines represent conceptual implementation phases rather than prescriptive mandates, recognizing that local contexts will influence feasible pacing.

The journey toward culturally responsive neuroregulation is ongoing rather than achievable endpoint (Tervalon & Murray-García, 1998). It requires humility acknowledging current limitations and mistakes, courage confronting uncomfortable disparities, creativity developing innovative solutions to complex structural barriers, and persistence continuing despite challenges. Critically, this journey is grounded in the universality of neurophysiological mechanisms (operant conditioning, neuroplasticity, autonomic regulation) that operate identically across all human populations (Porges, 2011; Sherlin et al., 2011), ensuring that cultural adaptations enhance rather than erode treatment efficacy. Most importantly, it requires genuine commitment to ensuring that neuroregulation's benefits reach all who might benefit regardless of cultural background, language, race, ethnicity, or socioeconomic status (Betancourt et al., 2003).

Through systematic implementation of culturally responsive practices at clinical, organizational, and professional levels, the neuroregulation field can fulfill its potential to provide effective interventions for all members of our diverse human family (S. Sue et al., 2009). This is not merely matter of social justice but of scientific excellence, as truly effective practice must be culturally responsive practice (Betancourt et al., 2003; López et al., 2012). The framework and strategies presented provide roadmap for this essential journey. The universal neurophysiological mechanisms underlying neuroregulation offer foundation for inclusivity (Sherlin et al., 2011; Porges, 2011), while attention to cultural factors ensures these mechanisms are accessible and beneficial for all populations (G. C. N. Hall et al., 2016). Our challenge is not to prove that neuroregulation can work across diverse populations (the fundamental science assures us it can) but rather to ensure we implement these interventions in ways that are accessible, acceptable, and effective for everyone (Feldman et al., 2016; Fleischman et al., 2022).

Author Declaration

At the time of submission, the author served as President of the International Society for Neuroregulation & Research (ISNR), Chair of the Board of the Biofeedback Certification International Alliance (BCIA), and an Advisory Board member of the International QEEG Certification Board (IQCB). These roles are disclosed in the interest of transparency, as the manuscript addresses certification standards, professional guidelines, and organizational practices relevant to these bodies. The author reports no financial interests or grant support relevant to this submission.

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