Neurobiology: Unlocking the Mind to Promote Well-Being

Feature Articles - Research/Scientific

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In treating clients with addictive disorders, it is often helpful for the counselor to determine what may have precipitated this type of behavior. Learning about the client's genetics and early development, as well as environmental influences, such as traumatic events, are critical components of the client's recovery.

The interpersonal neurobiology approach to therapy incorporates several different scientific disciplines to determine how the mind changes as a result of both experience and development across the lifespan. The fundamental idea of this approach is to define the process of the mind and how it works to achieve well-being.

The mind can be defined as an embodied process that regulates the flow of energy and information. Regulation is at the heart of mental life, and helping others with this regulatory balance is central to understanding how the mind can change. The brain has self-regulatory circuits that may directly contribute to enhancing how the mind regulates the flow of its two elements, energy and information.

Energy and information can flow from within one brain, or between the brains of people. Environmental factors also impact how the mind emerges, and it is important to understand how relationships have a profound effect on the flow of energy and information between two people, as well as within one person.

Although a person's genetics play an important role in how the mind develops, experiences are also key in shaping neural connections. When neurons become active they enable the flow of an electric current down their long lengths which activate downstream neurons, linked together by thousands of synaptic connections in the brain. Mental well-being is achieved when separated areas of the brain specialize in their own functions and then link together. This process is referred to as integration. Integration promotes flexibility, adaptability, coherence, energy and stability. Individuals with mental health and/or addictive disorders are often at odds with this coherent flow (Thagard, P., 2002), and the brain is prone to entering a state of rigidity or chaos, away from a state of well-being.

Interpersonal neurobiology operates on a model approach that combines the objective domains of science and the subjective domains of human knowing. By using interpersonal neurobiology in therapy sessions, the counselor can help alleviate the client's suffering, thus moving him or her toward well-being. Therapeutic experiences that move an individual toward well-being are those that promote integration. Deviations

from this integrated flow often manifest as rigidity and/or chaos, resulting in symptomatic conditions that may be inflexible, maladaptive, incoherent, deflated and unstable. To promote integration, it is important that the counselor understands and is mindful of at least nine domains of integration throughout the stages of treatment and recovery.

Domains of integration

Integration of consciousness. There are three general mechanisms of attention: exogenous, endogenous and executive (Posner, M.I. (Ed), 2004). Exogenous is driven by external stimuli, whereas endogenous attention is self-generated, where the individual chooses to focus his or her attention on a particular stimulus. Executive attention refers to a person's ability to create a flexible response that is not determined by external factors or by a single focal point.

Integration of consciousness involves a person's ability to develop executive forms of attention that are associated with the larger capacities for self regulation, such as balancing emotion, improving stress response and enhancing social skills. Self-awareness is an important factor in therapy and in the occurrence of various psychiatric disorders (Beitman, B.D. & Nair, J., 2004). A person's capacity for receptive, flexible awareness enables that individual to focus his/her attention in a way that is helpful to oneself and others, is sometimes called "mindful awareness."

Mindfulness is defined as paying attention, in the present moment, on purpose, without grasping onto judgments. Mindful awareness can result in profound improvements in a range of physiological, mental and interpersonal domains of a person's life, including the prevention of relapse of addiction (Marlatt and Gordon, 1985). Mindful practices have been shown to improve cardiac, endocrine and immune functions, as well as empathy, compassion and interpersonal sensitivity (Kabat-Zinn, J., 2005).

The focus of attention on various domains of mental, somatic and interpersonal life can create neural firing patterns in the brain that result in new synaptic connections which can help individuals with addictive or mental health disorders. Neural plasticity, the change in neural connectivity induced by experience, may be the fundamental way in which psychotherapy alters the brain. Moreover, consciousness may play a direct role in harnessing neural plasticity by altering previously automatic modes of neural firing and enabling new patterns of neural activation to occur.

Consciousness and neural plasticity are linked in the following way: attention directs neural firing, and where neural firing occurs, new connections are made. Therefore, through therapy, a person with an open receptive mind may be able to integrate new combinations of previously isolated aspects of his or her mental reality (Siegel, D.J., 2007).

Vertical integration. This involves linking the basic somatic regulatory functions of the brainstem with the limbic system generation of affective states, emotional drives,

attachment. Unlike the brainstem, the cortex is underdeveloped at birth and is shaped by genetics and environmental factors, such as life experiences. The posterior regions of the cortex are responsible for perception of the physical world (the first five senses), whereas the frontal lobe of the cortex enables motor functions, attention and emotion regulation, and more complex thinking such as planning and reflection.

Specifically, the prefrontal cortex is a major component in vertical integration, in that it links the body, brainstem, limbic circuits and cortex. This is the process by which fibers physically connect the input of somatic and vertically distributed neural structures. The middle prefrontal areas of the brain are crucial for generating specific aspects of mental functions (See Figure 1).

Although some people may be able to naturally achieve vertical integration simply by focusing their awareness on their bodies, most people who come to therapy need some encouragement by the counselor to intentionally pay attention to these signals to transform a disconnected way of living into a richer, more integrated way of living.

Bilateral integration. The right and left cortices of the brain perceive and create reality in distinctively different ways. The right hemisphere of the brain, which is the first to develop after birth, is very active during the first three years of life (Chiron, C., Jambaque, I., Nabbot, R. Lounes, R. Syrota, A., & Dulac, O., 1997).

The right side processes things in a holistic, non-verbal fashion and is visuospatial (picture-oriented). The right brain is responsible for a wide range of functions, including the stress response, autobiographical memory, non-verbal empathy and spontaneous emotion. The right side is sometimes referred to as “analogic” because it perceives a wide spectrum of meaning, and does not have a problem with ambiguity.
The left side of the brain becomes more active after the initial first few years of a person’s life. The left processes things in a more linear, logical fashion and tends to be more literal, taking things very seriously. The left is known for having more of an on-off, yes-no, right-wrong perspective.

Integration of memory. Memory can be defined as the way in which past events alter the probability of how the mind functions in the future. Memories shape how a person experiences the present and how he or she anticipates the future. Integration of two aspects of memory — implicit and explicit — can promote well-being, whereas segregation of these two can result in mental anguish and suffering.

Implicit memory is the first layer of processing, and is the first and only form of memory available to a growing infant (Bauer, P.J., 1996). Implicit memories are created throughout a person’s life, but are often selectively integrated into the next layer of processing, known as explicit or declarative memory. There are two unique aspects of implicit memory: encoding these type of memories does not require conscious attention; and retrieving elements of these memories does not elicit an internal sensation that something is being accessed from a past memory.

Explicit memory involves both factual (semantic) and episodic memories. Episodic memory is one that is drawn from a past experience and has a sense of self and time. Unlike implicit memory, both semantic and episodic memories require some focal attention for their encoding, and there is a conscious sense that a past memory is being accessed when retrieved. The hippocampus is thought to serve an important role in memory integration, as it is able to take implicit memories and assemble them into semantic and episodic forms of explicit memory (Siegel, 1999).

However, traumatic episodes may block the integrative function of the hippocampus (Solomon, M. & Siegel, D.J., (Eds), 2003). This occurs because the hippocampus may be temporarily shut down as a result of a massive secretion of stress hormone and discharge from the amygdale in response to an overwhelming event (Sopolsky, R.J., Romero, R.M., & Munck, A.U., 2000). In some instances people are able to effectively block the hippocampus as a coping mechanism, attempting to block the traumatic episode from entering their explicit memory. However, the implicit memory is still encoded and may be activated later, in response to environmental or internal triggers that resemble the original traumatic episode. This “implicit-only” form of memory serves as a possible explanation for flashbacks and post-traumatic stress disorder.

The key to memory integration is the neural reality that focal attention allows the puzzle pieces of implicit memory to enter the spotlight of attention and then be assembled into the framed pictures of semantic and self-memories. With such reflective focus, what was once a memory configuration capable of intrusion on a person’s life can move into a form of knowing that involves both deep sensations of the reality of the past.

Narrative Integration. The first five years of life are a critical time in a person’s life as autobiographical recollection is integrated into narrative memory, thus creating thematic elements in life. The brain has a narrative function that allows a person to draw heavily on the prefrontal area to integrate neural maps that form episodic and autobiographical memories. Narrative reflection allows a person to consciously choose and, possibly, change old maladaptive patterns to move toward well-being.

Furthermore, these coherent narratives (stories that make sense of our lives) are thought to play an integral role in how children form attachments to their parents. It is thought that the parents’ neural integration and coherent narratives determine how receptive they are to their child’s mind and signals, thereby playing a central role in the development of the child’s well-being. Those with an incoherent narrative can achieve coherence and well-being through a process of making sense of their lives and resolving trauma and grief (Siegel and Hartzell, 2003).

State Integration. During the activation of the brain, firing patterns combine and form clusters of activation known as a “state of mind.” These states of activation in the brain create in a person his or her personality and patterns of perception, as well as emotional and behavioral responses that define them as individuals. State integration is the way in which a person embraces and nurtures these states of mind in order to satisfy different needs, such as comfort, love, challenge and exploration. State

integration is particularly important during times of conflict, such as during adolescence. Resolving these issues and finding balance in the integration of states may determine whether a person will achieve well-being or experience mental turmoil.

Temporal Integration. This reflective capacity to link past, present and future enables a person to achieve a self-knowing awareness and consider profound questions about his or her purpose in life and confront the reality of transience and death.

Interpersonal Integration and the Mirror Neuron System. The mirror neuron system reveals how the brain is capable of integrating perceptual learning with motor action to create internal representations of intentional states in others. This system is thought to be an essential aspect of the neural basis for empathy (Gallese, V., 2006; Iacoboni, M. & Siegel, D.J., 2004). The human brain is able to perceive the expressions of another individual and create an internal state that resonates with the other person.

This idea of resonance and attuned communication helps therapists to understand the inherently social nature of the brain, and to use their own bodily shifts to achieve empathetic insights to understand and help their clients. Being open to your own bodily states, as therapists, is crucial to establishing the interpersonal attunement and understanding that is at the heart of interpersonal integration (Siegel, 2007). The term countertransference is used to describe how therapists' own non-verbal shifts in brain state may offer them direct glimpses into the world of their clients.

The mirror neuron system clarifies the profoundly social nature of the human brain, and offers new pathways for understanding how psychotherapy leads to the process of change. Persons with impaired mirror neuron system functioning may be unable to share in the social interactions and neural connections that dictate social behavior and non-verbal understanding of others. This type of impairment has been proposed to be a characteristic of certain forms of psychopathology, including schizophrenia (Gallese, V., 2006); or even autism spectrum disorder (Dapretto, M., Davies, M.S., Pfeiffer, J.H., Scott, A.A., Sigman, M., Bookheimer, S.Y. & Iacoboni, M., 2006).

Transpirational Integration. Transpiration represents the emergence of new states of being as clients progress to new levels across the other domains of integration. Many people, who previously felt isolated from others, explain this as feeling more connected to other people and the world as a whole. As individuals move toward more integrated states across each of these domains of integration, they "breathe life across" the totality of their experience and may come to feel a sense of belonging to something larger than their bodily defined "self" that previously dominated their perspective.

With each of these domains of integration, an individual moves toward a state of being in which the FACES flow of the mind — flexible, adaptive, coherent, energized, and stable — is available to them, one day, one moment, at a time. With this enhanced capacity for meeting life's large and small challenges, a new form of resilience is created. For those with a history of using drugs of abuse to alter their neurochemistry as a means of feeling in balance and adapting to life's stresses, this approach of neural

integration can offer a helpful path in order to achieve a sense of balance in life. From mindful awareness within an integration of consciousness to the sense of a larger self of transpirational integration, this view of resilience and well-being offers an approach that fits well with understanding how those with addiction and other challenges to mental health can be helped on the road to recovery and healing. C

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