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Perceived Neuroscience Knowledge and Counselor Self-Efficacy

Cristina Buus
University Of South Dakota

PERCEIVED NEUROSCIENCE KNOWLEDGE AND COUNSELOR SELF-EFFICACY

By

Cristina Buus

B.A., University of Sioux Falls, 2011
M.A., University of South Dakota, 2016

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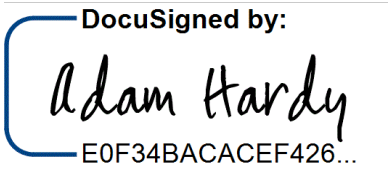

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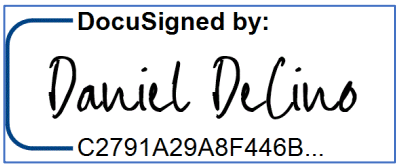

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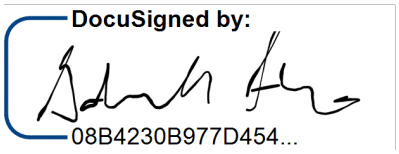

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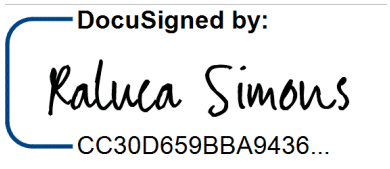

Dr. Raluca Simons

Abstract

There has been an increase in neuroscience research within the counseling field which has then been integrated into counseling practice. There is limited research, however, that investigates how this neuroscience information impacts counselors directly. This study investigated the association between counseling self-efficacy and perceived neuroscience knowledge. This study also sought to understand what factors were predictive of perceived neuroscience knowledge (gender, age, licensure tier, years of experience, CACREP-status, and perceived benefit of neuroscience knowledge). To answer the research questions, a multiple regression design was utilized to identify any factors that were predictive of perceived neuroscience knowledge. Additionally, a correlation was run to identify any association between counselor self-efficacy and perceived neuroscience knowledge. Results showed that perceived benefit of neuroscience knowledge was positively significantly associated with perceived neuroscience knowledge and there was a moderately positive correlation between counselor self-efficacy and perceived neuroscience knowledge. Implications for the counseling field, limitations and recommendations for future research were identified.

Dissertation Chair Adam Hardy, PhD

Dr. Adam Hardy

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Chapter One

Introduction

The integration of neuroscience into counseling has gained momentum in recent years (Luke et al., 2019). The growing knowledge regarding neurobiology has implications for the counseling field, including understanding affect regulation (Divino & Moore, 2010) and providing a tool for counselors to help clients make sense of their experience through a neuroscientific lens (Luke et al., 2019). This expansion of neuroscience within the field led to the requirement of professional counselors to understand neurological factors that influence human development, as stated in the 2016 Council for Accreditation of Counseling and Related Educational Programs (CACREP) standards. An expanding body of neuroscience literature increasingly informs clinical practice through validating theory, guiding assessment and conceptualization, and directing effective interventions (Miller, 2016).

Although there has been increased emphasis on understanding the role of neuroscience within the counseling process, there has been less discussion about how this effects the work of professional counselors; more specifically, how it effects their counselor self-efficacy. Neuroscience research has provided an understanding of how mental illness functions on a neurobiological perspective, improving how counselors approach client presenting concerns. This study investigated the relationship between the counselor self-efficacy of professional counselors and perceived neuroscience knowledge.

Need for the Study

There has been an increase in research, and therefore knowledge, regarding neuroscience in relation to mental health issues. This knowledge helps counselors with diagnosis and treatment planning. For example, understanding how dysregulation of the nervous system functions helps

tailor treatment to utilize a brain-body approach instead of a cognitive-behavioral approach which likely would not be sufficient (Shauss et al., 2019). Research investigating the effects that neuroscience knowledge has on counselor self-efficacy or even to what extent counselors are utilizing neuroscience in their practice, is limited. This current study investigated the relationship between counselor self-efficacy and perceived neuroscience knowledge. The following sections will discuss various areas within the counseling field and neuroscience that will emphasize the importance of the present research study.

Advances in Neuroscience in Counseling

Over the past few decades, advances in technology, such as the development of functional magnetic resonance imaging (fMRI) and positron emission tomography (PET) provided ways for investigating the brain that were previously impossible. Researchers are now able to observe responses in the brain to stimuli, such as counseling (Miller, 2016). Various forms of psychotherapy have been found to change the functioning of the nervous system by way of increased prefrontal cortex activation in clients diagnosed with mental illnesses, as evidenced by neuroimaging (Beeson & Field, 2017). Neuroscience, neuroimaging, and other neurobiological areas have found that measurable structural changes happen in client brains due to cognitive and interpersonal therapy (Ivey & Zalaquett, 2011). Findings indicating that the brain can change and even support neurogenesis as a result of therapy both promotes the efficacy of therapy and the importance of educating counselors in neuroscience. Neuroscience research provides evidence suggesting that counseling theory and practice is effective in creating positive change within clients (Ivey & Zalaquett, 2011).

Trends in Neuroscience in Counseling

Experts in the cognitive-behavior therapy (CBT) field have reconsidered conventional CBT models to incorporate findings from neuroscience. A new model of neuroscience-informed cognitive-behavior therapy (n-CBT) was introduced in 2015 by Field, et al. This new model modified Ellis' (1962) ABC model to explain why client dysfunction occurs (Field et al., 2016). The goal of n-CBT (Field et al., 2015) is to help clients raise awareness to physiological responses. Research studies have indicated that cognitive emotional regulation strategies are typically ineffective during high stress situations when hormones, including adrenaline and cortisol, are being released (Field et al., 2016). Research also underscores the importance of developmental trauma in client conceptualization as adverse childhood experiences are linked to a wide range of health and psychological conditions (Schauss et al., 2019) and can alter the trajectory of the developing brain (Navalta et al., 2018). Researchers indicate that neurofeedback is an ideal treatment methodology as it is an accessible and safe technology (Schauss et al., 2019), as well as other modalities including mindfulness interventions, Cognitive Behavioral Therapy (CBT), and motivational interviewing (Miller & Rollnick, 2012).

While there are trends that support the use of neuroscience in counseling, there are concerns that it is too reductionistic and removes the humanistic element from the counseling process. Wilkinson (2017) suggests that incorporating neuroscience in counseling "supports rather than informs our profession" (p 73) and further relays that to inform the counseling profession, new counseling theories will need to be developed. While neuroscience is gaining traction in the counseling field, the impact this has on counselors remains to be investigated, specifically in terms of counselor self-efficacy. Vocational self-efficacy will be discussed gain a better understanding of its relationship to perceived neuroscience knowledge.

Vocational Self-efficacy

Vocational identity is defined as the "the possession of a stable and clear picture of one's goals, interests and talents" and is a crucial component in career development (Russinova et al., 2018, p 197). Research investigating vocational self-efficacy has been conducted with various populations including individuals with psychiatric disabilities, Asian American college students, and adolescents (Jo et al., 2015; Kim & Choi, 2019; Lumpkin et al., 2017; Mata-Segreda, 2015; Russinova et al., 2018. Though the groups may be varied, the factor on which vocational self-efficacy is developed is the same: through a firm vocational identity. Understanding what contributes to vocational self-efficacy, for counselors, can help them identify where to put their focus in terms of training and development. In this study, perceived neuroscience knowledge was investigated to identify its association with counselor self-efficacy.

Lumpken et al., (2017) found that self-efficacy is a mediator that shapes vocational interests. Student participants felt more confident in their career choice of sports management and in their ability to be successful in the path leading up to that career after taking a sports management course; vocational identity and career decision self-efficacy were positively correlated. The authors concluded that their results provide insight into how higher education can better serve students who are specifically interested in a sports management career (Lumpken et al., 2017). In the same vein, this study identified the relationship between perceived neuroscience knowledge and counselor self-efficacy to better understand how counselors can proceed with their continued education and for counseling programs to adjust their coursework to include more neuroscience related opportunities. Students who have an interest or are curious about the subject will be more likely to obtain additional education specific to neuroscience.

Vocational self-efficacy can be raised by fostering curiosity within the career decision process. The connection between curiosity and ethnic identity in career decision self-efficacy

among Asian American first-year college students was explored by researchers in hopes to gain a better understanding of how to improve career counseling within that demographic (Kim & Choi, 2019). Their findings indicated that curiosity is directly associated with career decision self-efficacy beliefs and indirectly associated with ethnic identity, emphasizing the importance of considering cultural components within the career development process. Similarly, Jo et al., (2016) examined the mediating role of dysfunctional career thoughts in the relationship between vocational identity and career decision self-efficacy among Korean college students. The authors reported that South Korean college students tend to struggle developing stable vocational identities during adolescence which can often lead to difficulties in the career decision making process including choosing majors that are incongruent with vocational interests (Jo et al., 2016). Their study found a positive association between career decision self-efficacy and vocational identity and a negative correlation between dysfunctional career thoughts and vocational identity.

While adolescents may not face the same immediacy as college students regarding career decision making, they still are constructing their self-concept that, in part, influences the development of their vocational identity (Mata-Segreda, 2015). Results from this qualitative study suggested that during childhood, the family constituted the most important environment of learning situations that fostered the development of positive vocational self-efficacy (Mata-Segreda, 2015). In adolescence, this leads to individuals believing they are capable of successfully managing tasks.

Research pertaining to vocational self-efficacy has contributed to better understanding how to foster its development. Within the context of career decision, creating an identity that is clear and stable involves several factors, including ethnic identity, curiosity, and family environment (Kim & Choi, 2019; Lumpkin et al., 2017; Mata-Segreda: 2015). Conversely,

vocational identity can be hindered by dysfunctional career thoughts that interrupt the career decision-making process (Jo et al., 2015).

Understanding what factors contribute to the development of vocational self-efficacy can help counseling programs provide opportunity for those factors to develop. Incorporating more neuroscience specific material, for example, may spark an interest and curiosity within counselors-in-training and encourage development within that area. This in turn can bolster counselor self-efficacy.

Statement of Problem

Previous research has looked at neuroscience training and self-efficacy in master's level training programs (Wilson, 2017) and found no significant difference in levels of counselor self-efficacy between students who had taken a neuroscience course and those who did not. Results did show student interest in future neuroscience training. This current study was interested in understanding how counselor self-efficacy among practicing counselors is impacted by perceived neuroscience knowledge, as little research has been conducted with licensed professional counselors. This study aimed to extend the previous research and add to the existing body of literature related to counselor self-efficacy. Given that neuroscience has become more prominent in the field of counseling, studies are needed to explore how counselors conceptualize and respond to clients regarding their symptoms from a neuroscience perspective (Field et al., 2019). It is important to know how neuroscience impacts practicing counselors. The limited research in this area presents an opportunity to explore the extent to which neuroscience knowledge impacts counselor self-efficacy. The findings can help programs potentially create more defined standards for neuroscience training.

The Council for Accreditation of Counseling and Related Educational Programs (CACREP) is an accrediting body for counseling programs at the masters and doctoral level. CACREP programs are evaluated to ensure they meet "strict, consistent standards set by the profession" (Council for Accreditation of Counseling and Related Educational Programs, 2016) with the goal of training ethical and competent counselors. Current CACREP standards are vague and do not provide specific criteria for neuroscience. Section 5, Clinical Mental Health Counseling, lists the following for neuroscience training: 5.1.g describes that counselors will be knowledgeable about the "impact of biological and neurological mechanisms on mental health;" and 5.1.e the "potential for substance use disorders to mimic and/or co-occur with a variety of neurological medical, and psychological disorders." (CACREP, 2016). The lack of specificity of these standards leave room for programs to interpret how to incorporate them into their coursework. This study was interested in understanding whether CACREP status was predictive of perceived neuroscience knowledge.

Purpose of the Study

The purpose of this study was to gain an understanding of the relationship between counselor self-efficacy and perceived neuroscience knowledge. Results of this study could inform master's level counseling programs to adjust their coursework to include more courses related to neuroscience, as well as inform professional counselors to include more neuroscience training in their professional development. Specifically, the following questions guided this study:

1. To what extent do professional counselors rate the perceived benefit of neuroscience knowledge in the counseling process?
2. What factors are predictive of perceived neuroscience knowledge among professional counselors?

3. What is the association between perceived neuroscience knowledge and counselor self-efficacy among professional counselors?

The findings from this study have implications within the mental health field. Understanding the relationship between perceived neuroscience knowledge and counselor self-efficacy could help bring more focus within this area, in terms of neuroscience training.; counselor educators can include more neuroscience material in their coursework and professional counselors can seek out neuroscience training opportunities.

Hypotheses

For research question one, I hypothesized that counselors would rate the perceived benefit of neuroscience knowledge in the counseling process highly, based on the increased amount of attention that neuroscience has in the field according to research. For research question two, out of the six predictor variables for research question two (age, gender, licensure tier, years of experience, perceived benefit, and CACREP status), I hypothesized that years of experience and perceived benefit would be most predictive of perceived neuroscience knowledge.

Regarding research question three, I hypothesized that perceived neuroscience knowledge would be positively correlated with counselor self-efficacy; the higher perceived neuroscience knowledge a professional counselor reports, the higher their counselor self-efficacy will be. Additionally, I hypothesized that professional counselors would rate their perceived level of neuroscience knowledge as low, as standards for neuroscience training within CACREP programs are vague.

Implications of This Study

Findings from this study help guide future research related to neuroscience and counselor self-efficacy as limited information is currently available regarding this topic. Counseling programs may adjust their programs of study to put more emphasis on neuroscience-related courses to promote current trends in counseling and counselor self-efficacy. Increased research related to how mental illness functions in the brain emphasizes the importance of neuroscience within the counseling field. This indicates further need to expand upon this knowledge into understanding how those findings are helping counselors in their practice. Do counselors benefit from understanding neuroscience? How does this correlate with their self-efficacy? This study adds to the growing body of literature related to neuroscience and expand the limited area of neuroscience in connection with counselor self-efficacy.

Clinical Implications

Counselors can enhance their practice through continuing education trainings related to neuroscience. Counselor self-efficacy has been found to be an important component in the counseling process. A counselor's confidence in their ability to effect change can translate into the therapeutic process and lead to better therapeutic outcomes. Therefore, it is important to understand what impacts counselor self-efficacy. The neuroscience research that is currently available supports and enhances the counseling profession, however, there is a lack of research investigating how this impacts the counselor in terms of self-efficacy. This study aimed to bridge that gap and understand how perceived neuroscience knowledge impacts counselor self-efficacy.

Definition of Terms

There are several key terms within the study that need to be defined. It is important to define each term to clearly understand what the study investigated. The following sections define

each key term, self-efficacy, counselor self-efficacy, vocational self-efficacy, professional counselor, neuroscience, and counselor competence.

Self-efficacy

According to Bandura (1977), self-efficacy is defined as a cognitive structure representing an individual's expectation of personal effectiveness. Experiences and conclusions drawn from those experiences have a direct impact on future performance. The overall self-efficacy of the individual shapes the way in which they internally rehearse future performance (Bandura, 1989). Self-efficacy is an individual's belief or confidence in their ability to successfully complete a task.

Counselor Self-efficacy

Counselor self-efficacy has been defined as a counselor's beliefs about their capabilities to effectively counsel a client (Daniels & Larson, 2001). These authors also describe how counseling self-efficacy affects other variables including counselor performance, counselor anxiety, and the supervision environment (Daniels & Larson, 2001). It has been defined as "a person's belief in their ability to perform counseling-related skills and behaviors" (Goreczny et al., 2015, p. 79).

Vocational Self-efficacy

Vocational self-efficacy or career decision self-efficacy refers to an individual's belief about their ability to complete career related tasks (Kim & Choi, 2019). Lent and Brown's (2013) social cognitive career theory identified vocational self-efficacy as a prime factor in creating positive career behaviors. Research has shown that career decision self-efficacy has a positive association with vocational identity (Jo et al., 2015). An individual's belief in their ability to perform well in their career promotes a stable vocational identity.

Professional Counselor

For this study, a professional counselor is defined as a master's-level mental health service provider trained to work with individuals, families, and groups in treating mental, behavioral, and emotional problems (American Counseling Association, [ACA], 2014). Professional counselors may be licensed or pre-licensed. A professional counselor obtains a license through their state by completing licensure requirements, typically 2,000-3,000 hours of experience as a professional counselor (ACA, 2014).

Every state has their own requirements for licensure. For example, there are two licensure tiers in South Dakota: Licensed Professional Counselor (LPC) and Licensed Professional Counselor- Mental Health (LPC-MH). LPC-MH is the higher of the two tiers. Requirements include obtaining a degree from an accredited graduate program, 2000 supervised hours of client contact for each tier and the passing of an examination for each tier (Board of Examiners for Counselors and Marriage and Family Therapists, 2020).

Neuroscience

Neuroscience is defined as the branch of the life sciences that deals with anatomy, physiology, biochemistry or molecular biology of nerves and nervous tissue especially in relation to behavior and learning (Merriam-Webster, n.d.). Generally, neuroscience is understood as the study of the brain and nervous system (Lorelle & Michel, 2017). For the purpose of this study, neuroscience will be defined using the combination of both; the study of the brain and nervous system functioning in relation to behavior.

Counselor Competence

Competence is defined as the quality or state of having sufficient knowledge, judgment, skill, or strength for a particular duty or in a particular respect (Merriam-Webster, n.d.).

Counselor competence has been outlined in the American Counseling Association (2014) code of ethics stating, "Counselors practice only within the boundaries of their competence, based on their education, training, supervised experience, state and national professional credentials, and appropriate professional experience "(ACA, 2014, C.2.a). Competence helps ensure that clients receive therapy that will not cause harm and be beneficial.

Summary

Neuroscience research in the counseling field has increased substantially over the recent years (Luke et al, 2020). Advances in technology have also led to a greater understanding of how counseling affects the brain (Miller, 2016). Incorporating neurobiological information into client conceptualization has led to the improvement of counseling theories to better serve clients (Field et al., 2016; Schauss et al., 2019). Some researchers question the efficacy of neuroscience in counseling contending that it removes the humanistic component from the counseling process (Wilkinson, 2017). This research aimed to help gain a better understanding how perceived neuroscience knowledge is impacting the counseling field in terms of counselor self-efficacy.

This research adds to the body of knowledge as there is a lack of research that relates to how neuroscience knowledge among licensed counselors impacts counselor self-efficacy. This study adds to the literature in this area to increase understanding of this topic with hopes to further improve the efficacy of counseling. Understanding to what extent perceived neuroscience knowledge impacts counselor self-efficacy can help counseling programs adjust their programs of study to incorporate more neuroscience-based courses. Further, it can help professional counselors improve their therapeutic relationship with clients through providing information to the client that can enhance client understanding of their presenting concerns.

Chapter Two

Literature Review

This chapter reviews the literature relevant to self-efficacy and neuroscience. Neuroscience, neuroscience advancement, neuroscience of mental illness, and self-efficacy research and its ties to counselor performance is discussed. This leads to an examination of research linked to counselor competence.

Neuroscience

Government funding for neuroscience research is at an all-time high (Beeson & Field, 2017; Statista, n.d.). This points to the relevancy neuroscience has in the counseling field. The past 25 years of neuroscience research have yielded results that have changed our understanding of human emotion, cognition, and behavior (Beeson & Field, 2017; Crockett, et al, 2017: Field, et al., 2016; Lang, et al, 2014), enhancing counselor's conceptualization of client presenting concerns. Even so, neuroscience literature in the counseling field is primarily conceptual in nature and attempts to generalize findings from other disciplines to the practice (Beeson & Field, 2017). Little information currently exists related to counselor training and preparedness to integrate neuroscience into practice (Russo et al., 2021).

Neuroscience is the study of the brain and nervous system (Lorelle & Michel, 2017), which constitutes many complex processes and structures. Lorelle and Michel (2017) provide an overview of various neurological topics that are applicable to professional counselors, including attachment, brain structures and function, and stages of human lifespan development concluding that neuroscience holds value in the counseling field in terms of client care. This points to how neuroscience and counseling can combine to enhance treatment for clients.

Research in animal models and neuroimaging tools have allowed researchers to see experiences of emotions and their relationship to the brain, further expanding our knowledge of the connection between neuroscience and therapy (Panksepp, 2016). Through brain imaging, researchers can see that how specific emotions are derived from different parts of the brain (Ivey & Zalaquett, 2011). Neuroscience has the potential to provide additional levels of case conceptualization, treatment planning, and a means of fostering understanding and insight (Luke et al., 2019). In other words, explaining basic concepts may help clients manage symptoms through the use of coping skills with the knowledge of how these skills work from a neuroscience perspective. Neuroscience research helps clients, counselors, and has improved the field of counseling. The current study adds to this through gaining a better understanding of how counselors' self-efficacy is impacted by neuroscience information.

History of Neuroscience Advancement

The last 50 years has brought on significant development in the understanding of brain function (Lorusso et al., 2018). Comprehending processes related to cognition and emotions gained traction in the 18th and 19th century. Franz Joseph Gall described the morphology of the brain and the main nervous structures which led to an advancement in differentiating cerebral portions and their functions (Esperidiao-Antonio et al., 2017). Pierre Paul Broca proposed the first mapping of cerebral functions through observing patients with cerebral damage and identified the limbic lobe (Esperidiao-Antonio et al., 2017). From there, researchers continued to investigate brain functions and relation to emotions.

Interest in understanding the connection between brain structures and emotion gained momentum due to the Phineas Gage case. In 1848, Phineas Gage survived a work accident that caused severe brain damage (Tobia, 2015). After an accidental explosion at his work site, Gage

was impaled by a metal bar that went through the left maxillary area reaching into his frontal lobe. Several weeks later he was noted to have significant behavioral and personality changes. Before the accident, he was an efficient worker, intelligent, and well-balanced. After the event, he was indecisive, apathetic, quick-tempered, and unable to plan for the future (Esperidiao-Antonio et al., 2017). This case study helped open the discussion to investigate how neuroanatomy is involved in emotions.

The first neuropsychological theories of emotions were proposed in the 20th century by Sigmund Freud, physiologist Sigmund Exer, and Israel Waynbaum. Their theories highlighted the work of William James and Carl Lange who emphasized that subjective emotional experience is caused by physiological manifestations (Esperidiao-Antonio et al., 2017). The electroencephalogram (EEG) measures electrical functions in the brain and has been used for almost 100 years. It is one of the oldest forms of neuroimaging used by psychologists, with the first use in the 1920s (Matsen et al, 2020) and the most relevant testing modality to evaluate seizures today (Tatum, 2014).

Neuroscience and Mental Illness

While more research is being conducted, there is a need for studies that are beyond descriptive and conceptual to understand how implementing neuroscience into therapy impacts the counseling field. This greater understanding can help specify training areas such as including more education around neurobiological underpinnings of mental illness. The following sections will discuss mental illnesses and neuroscience along with neuroscience training for counselors and other related fields. Anxiety, depression, and PTSD have been extensively researched in terms of how they function and what treatments work best.

According to the U.S Department of Health, mental illness affects one in five adults in the United States; one in five youth aged 13 to 18 experience a severe mental illness disorder. Children aged eight to fifteen who experience mental illness is estimated at 13% (U.S Department of Health, 2017). Many areas of an individual's life can be negatively impacted in part due to mental illness, especially for those who live with severe and chronic mental illness. Individuals with mental illness live around 20 years less than the general population due to the link to higher rates of physical illnesses such as coronary heart disease. Other areas impacted include finances and relationships (Ewart et al., 2017). Understanding the impact that mental illness can have in various areas of life emphasizes the importance of providing effective and competent treatment.

As a counselor, part of providing effective treatment includes staying up to date on current research and practices. In fact, counselors are required to do so. The ACA Code of Ethics state that counselors are required to "acquire and maintain a reasonable level of awareness of current scientific and professional information in their fields of activity." (American Counseling Association, 2014, C.2.f, p. 9). This includes remaining informed regarding best practices to maintain their competence. Counselors are ethically obligated to pursue continuing education to ensure they are providing effective treatment.

Neurocounseling is a new term that entered the counseling field in 2013 and is defined as the integration of neuroscience into counseling by teaching the physiological underpinnings mental health concerns (Russel-Chapin, 2016). An understanding of basic neurobiological functions can be helpful for clients in understanding how the brain and body are working together to create stability or if dysregulation can create physical or mental health issues. Providing explanations to clients can promote treatment adherence as well. (Luke et al., 2019).

Clients will be able to recognize why symptoms are occurring and become intentional about using coping skills. Counseling that reflects an understanding of the neurological components of many human experiences does not negate or minimize the client experience; in contrast, it can potentially increase clients taking ownership of their experiences as they pursue growth and wellness (Luke et al., 2019).

Neurobiological understanding of depression has also been shown to decrease the stigma toward individuals with depression. In their study, Han and Chen (2014) surveyed students following a 30-minute psychoeducation presentation of the neurobiology of depression to see how it affected stigma towards individuals with depression. Results indicated decreased stigma related to individuals with depression.

In the following sections, common mental health disorders are discussed to further emphasize the significance of neuroscience in mental illnesses. The neurobiological mechanisms by which depression, anxiety, and posttraumatic stress disorder (PTSD) develop are briefly touched upon. A better understanding of this can help therapists understand what coping skills might be helpful for clients in combating symptoms and help clients gain insight into their diagnosis.

Depression

Major Depressive Disorder (MDD) is one of the most common diagnoses treated by mental health professionals, with 10.6 million U.S adults seeking treatment of the 16.2 million diagnosed (Field et al., 2019). Several theories have emerged for conceptualizing MDD etiology, including the monoamine theory, neuroplasticity theory, glutamate theory as well as explanations such as medical conditions, and structural and functional abnormalities (Field et al., 2019). Brain imaging studies have provided consistent evidence that depression is associated with the

decrease in size of brain structures connected to depression, including the hippocampus. This decrease in volume of the hippocampus is associated with the length of depressive illness and inversely related to the length of treatment (Duman, 2014). Many symptoms of depression can point to brain structures that are dysregulated.

Anhedonia, one symptom of depression, can be viewed as a dysregulated pleasure system. Reward engagement is closely tied with this and serves a survival function. This reward system is comprised of the ventral striatum, ventral tegmental area, and amygdala. (Craske et al., 2016). There are three components of the reward system: anticipation of reward, consumption of reward, and learning of reward. Depressed individuals show deficits in all three areas meaning that they engage in less rewarding activities and experience activities as less rewarding (Craske et al., 2016). Understanding how depression functions from a neurobiological perspective can help counselors provide explanations to their clients about how their symptoms could be influenced by their brain.

Anxiety

Generalized Anxiety Disorder (GAD) is thought to be one of the least successfully treated psychiatric disorders in large part due to its unclear neurobiological basis (Li et al., 2020). Patients with GAD report "pervasive, sustained, uncontrollable worry" as their primary concern. (Li et al., 2020, p. 430). Through neuroimaging studies, researchers have learned some critical aspects of the function of anxiety in the brain (Moon et al., 2015). Anxiety pathologies are brain disorders that result from maladaptive plasticity in the neural circuits that determine fearful and defensive behavior (Lang et al., 2014). They are characterized by neuroendocrine, neurotransmitter, and neuroanatomical disruptions that arise from genetic and environmental factors (Martin et al., 2009), as well as cognitive impairment (Krysta et al., 2015).

Functional Magnetic Resonance Imaging (fMRI) studies have identified abnormalities in the prefrontal cortex-limbic area, citing that individuals with GAD tend to overrespond to negative emotional stimuli (Mochcovitch et al., 2014). One study found that participants with GAD showed a low level of Choline/N-acetylaspertate (Cho/NAA), a brain metabolite in the dorsolateral prefrontal cortex, compared to participants not diagnosed with GAD, which is connected to symptom severity and cognitive dysfunction (Moon et al., 2015). Further, there is evidence suggesting that GAD is associated with poor affective flexibility, or the ability to switch between emotional and non-emotional aspects of a situation (Wen at al., 2019).

Participants in this study were asked to categorize pictures based on an affective rule (positive or negative image) or non-affective rule (the number of people in the pictures). Individuals with GAD showed greater difficulty disengaging from the negative images. They were slower to switch from negative to positive images than from positive to negative images (Wen et al., 2019). Information suggesting difficulty disengaging from emotional content and its connection with GAD can help individuals who struggle with anxiety to increase awareness of this pattern and use coping strategies to help reduce this symptom.

Posttraumatic Stress Disorder

Posttraumatic stress disorder (PTSD) is an anxiety disorder that can develop following an exposure to trauma (Sussman et al., 2016) and is said to affect between 7% and 9% of the population (Walton et al., 2017). It is characterized by behavioral and emotional symptoms including difficulty with emotional processing and inability to regulate memory, nightmares, flashbacks, hypervigilance, exaggerated startle response, external and internal avoidance, and clinically significant impairment in social, occupational, or other important areas of life (Walton, et al., 2017). The brain can be affected as well. Sussman, et. al (2016) found that soldiers with

PTSD were found to have altered brain structures that included reduction in cortical thickness, decreased volumes of the caudate, and some enlargement in several areas within the cerebellum. Counselors who understand the neuroscience behind PTSD can help explain symptoms to clients in an understandable way. This can help clients feel more empowered by having an understanding about what is happening in their brain and subsequently aid in treatment planning to identify what coping skills may be helpful in more effectively managing those symptoms.

Neuroscience Training for Professional Counselors

CACREP is an accrediting body for counseling programs at the masters and doctoral level (Council for Accreditation of Counseling and Related Educational Programs, 2016). CACREP requires neuroscientific information to be included in various courses. According to the 2016 CACREP standards, these sections include addictions, human growth and development, clinical mental health counseling and clinical rehabilitation counseling (CACREP, 2016). The information listed in these standards is vague and does not delineate specific requirements in terms of what is needed for training, stating that a general foundation of neurobiological factors is necessary in each respective area (CACREP, 2016). This gives leeway to programs regarding the depth of information being taught to fulfill these requirements; programs choose the level of emphasis on the content areas.

Neuroscience Training in Related Fields

Other fields of study, including psychiatry and school psychology, have different requirements related to neuroscience training. Psychiatry residents, per requirements set by the Accreditation Council on Graduate Medical Education (ACGME), are required to have at least two full-time months of supervised clinical experience in the diagnosis and treatment of patients with neurological disorders/conditions (Benjamin, 2013). Child and adolescent psychiatrists

require training to obtain a solid grasp of imaging, molecular genetic/genomics, and other highly technical neurobiological areas (Deschamps et al., 2020). Clinical and counseling psychology, and social work programs have also been struggling over the past 20 years to figure out how to best incorporate the role of neuroscience into their coursework (Russo et al., 2021). Within the realm of mental health professionals, there is a lack of consistency of neuroscience training considering the emergence of neuroscience within the field.

Self-Efficacy

Self-efficacy, a concept developed by Albert Bandura (1977) is defined as the level of confidence an individual has in their ability to perform tasks (Yiu et al., 2012). There are four components that affect self-efficacy: performance accomplishments, vicarious experience, verbal persuasion, and emotional arousal. Of these, performance accomplishments are especially influential because accomplishments are based on personal mastery experiences, suggesting that the act of doing has the greatest impact on self-efficacy (Bandura, 1977).

Self-efficacy, once established, tends to generalize to other situations in which performance is low. Self-efficacy can determine how much effort people put forth in tasks and how long they will persist in the face of obstacles (Stagg et al., 2018). Self-efficacy has been studied in relation to various subjects including burn-out, career counseling, ethical and legal issues, academics, and school counseling, however, the relationship between counselor self-efficacy and neuroscience knowledge has been scarcely researched. Personal accomplishments, require both knowledge and skill, and belief in self to perform well (Bandura, 1993). The connection between perceived neuroscience knowledge (personal accomplishments) and counselor self-efficacy was investigated in this study.

Research investigating the relationship between counselor self-efficacy and years of experience is mixed. One study assessed the perceived preparedness levels of college mental health clinicians to counsel transgender college students. Results showed a moderate amount of preparedness overall with no significant difference based on years of counseling experience. (Couture, 2017). Another study showed a positive relationship between age and counselor self-efficacy in rehabilitation counseling (McCarthy, 2014). This current study examined years of experience in the counseling field as a predictor variable on perceived neuroscience knowledge.

Vocational Self-Efficacy

People face vocational challenges throughout all stages of life (Mata-Segreda, 2015). In particular, the stress of choosing a career path increases during the college years (Jo et al., 2015). In their 2015 study, Jo, et. al identified that career decision self-efficacy was shown to positively correlate with vocational identity whereas dysfunctional career thoughts were negatively correlated with career decision self-efficacy; the more certain an individual is in their belief about their ability to be successful in a prospective career, the stronger their vocational identity. Bandura (2006) noted multiple factors including purpose, foresight, self-regulation, and self-reflection that propel the growth of vocational self-efficacy. Level of interest in an area also affects self-efficacy (Bandura, 1977). In a study examining counselor self-efficacy and counseling older adults, higher self-efficacy predicted increased interest in working with older adults (Wagner et al., 2019). Individuals who are interested in an area will feel more successful within that area..

Counselor Self-Efficacy

Results from research related to counselor self-efficacy has shown that counselor self-efficacy is related to therapeutic outcome (Goreczny et al., 2015; McCarthy, 2014). Practitioners

who believe in their ability to effect change are more likely to do so. Counselor self-efficacy is a predictor of use of information in job performance. Counselors are more likely to utilize strategies with clients if they are confident they can effectively deliver them (Goreczny et al., 2015). Among counselors-in-training, one study found an increase in counselor self-efficacy scores during training, specifically in the use of microskills, process, and handling difficult client behaviors (Kozina et al., 2010). This is in line with the goal in training programs to improve skill development. The increase in neuroscience research and its positive impact on the counseling field (Panksepp, 2016) coupled with the relationship between counselor self-efficacy and therapeutic outcome, supports the importance of bridging the gap in the literature to understand what other factors impact counselor self-efficacy, in this case, perceived neuroscience knowledge.

Counselor Competence

Research has been conducted in relation to multicultural counselor competence (Clark et al., 2017; Crockett & Hays, 2015; Jaladin, 2016; Swan et al.,2015) and generally found that with more training, positive supervisory relationship, and increased multicultural competency knowledge, counselors reported higher self-efficacy. However, less research was available that pertains to general counselor competence (Sommers-Flanagan, 2015) and no research could be found that discussed counselor competence and neuroscience knowledge. The available standards that outline counselor competence are multidimensional and complex. CACREP (2009) standards require that counseling programs integrate eight core knowledge-based standards and six specialty standards, which are then branched into 67 learning objectives and six specialty standards into 61 critical knowledge and skill components to measure competence (Sommers-Flanagan, 2015).

The American Counseling Association (ACA) Code of Ethics outlines standards for clinical practice that counselors must adhere to in order to promote the ethical principles of autonomy, nonmaleficence, beneficence, justice, fidelity, and veracity (ACA, 2014). Standard C.2.a., Boundaries of Competence, states, "counselors practice only within the boundaries of their competence, based on their education, training, supervised experience, state and national professional credentials, and appropriate professional experience" (ACA, 2014, p. 8). Similarly, the American Mental Health Counseling Association (AMHCA) outlines their own standards for counselor competence (American Mental Health Counseling Association, 2020) that mirror those of the ACA code of ethics. Code C.1.a states that "counselors recognize the boundaries of their competencies and the limitations of their expertise (AMHCA, 2020).

All of these standards, CACREP, AMHCA, and ACA, give general guidelines for practicing competently but leave room for interpretation related to training. For example, how much training in neuroscience is required to be competent in that area? It leaves the deciphering up to the clinician. As neuroscience remains a prominent developing area in the counseling field, more information is needed to define what competent neuroscience counseling practice means.

Predictor Variables for this study included age, years of experience, licensure tier, gender, CACREP status, and perceived benefit of neuroscience knowledge. Previous research has indicated a relationship between job knowledge and job experience (Schmidt, et al., 1986; Wolcott, et al., 2021). This study included years of experience as a predictor variable with perceived neuroscience knowledge.

Summary

Interest in neuroscience has led to increased government funding for research that has greatly improved the understanding of human emotion and behavior (Beeson and Field, 2017).

This has led to an increased understanding of mental illnesses that help counselors provide insight to clients as to how the illness functions in the brain (Sussman et al., 2016; Wen et al., 2019). Despite the growth in neuroscience research and its relevancy to counseling, counseling programs do not delineate specific requirements in terms of neuroscience training, citing that they must have a general foundational knowledge of neurobiological factors (CACREP, 2016). The gap between the helpfulness of neuroscience in counseling and training requirements is one that I am hoping to lessen through further understanding the relationship between counseling self-efficacy and neuroscience knowledge. Neuroscience training holds higher importance in other related fields of study, including psychiatry, psychology, and school psychology (Benjamin, 2013) even though its growth has been noted in the counseling field.

Self-efficacy and counselor competence have been researched within various areas, including multiculturalism, career decision-making, ethical and legal issues, and school counseling (Goreczny et al., 2015; Matthews et al., 2018; Mullen et al., 2016). There is limited research that investigates self-efficacy in the context of neuroscience training (Russo et al., 2021; Wilson, 2017). Understanding how neuroscience knowledge impacts counselor self-efficacy can aid programs to adjust their coursework accordingly and to provide counselors with information that can improve their practice.

Chapter Three

Methodology

Research Questions and Hypotheses

The increase in neuroscientific information within the counseling literature calls into question the extent to which counselors are being trained in this area and how it affects their counselor self-efficacy. Counselor self-efficacy has been concluded to predict therapeutic outcomes (Goreczny et al., 2015). It is important to understand how trends, such as neuroscience within the counseling field, impact counselor self-efficacy and counselor development. I anticipate the results from this study may encourage counseling programs to include more neuroscience training in their curriculum, allowing counselors to incorporate informed neuroscience knowledge into the counseling process. Similarly, professional counselors could seek training opportunities that are focused on neuroscience.

Research Question One

The first research question posed the following: *to what extent do professional counselors rate the perceived benefit of neuroscience knowledge?* This question was answered using a 7-point Likert scale (1= low benefit, 7= high benefit). Participants were asked "How would you rate the benefit of neuroscience knowledge while performing counseling?" I hypothesized that the benefit of neuroscience knowledge will be rated highly. Perceived benefit was then used as a predictor variable for perceived neuroscience knowledge for research question two.

Research Question Two

The second research question posed the following: *what factors are predictive of increased perceived neuroscience knowledge among professional counselors?* The predictor variables included years of experience in the counseling field, licensure tier (top tier and not top

tier), perceived benefit, gender, age, and CACREP status. The mean of responses for perceived benefit of neuroscience knowledge from research question one was utilized as the predictor variable of perceived benefit. I hypothesized that perceived benefit and years of experience would positively predict perceived neuroscience knowledge and that gender, age, licensure tier, and CACREP-status would not be predictive of perceived neuroscience knowledge.

Research Question Three

The third research question asked the following: *what is the association between perceived neuroscience knowledge and counselor self-efficacy among professional counselors?* This question was answered using the Counselor Self Estimate Inventory (COSE) (Larson & Suzuki, 1992). The COSE and Neuroscience survey results were put into a correlation. I hypothesized that there would be a positive correlation between counselor self-efficacy and perceived neuroscience knowledge among the participants. Counselor self-efficacy will be higher among participants with higher perceived neuroscience knowledge.

Methods

Population Inclusion and Exclusion Criteria

Inclusion criteria included the following requirements: participants were over the age of 18 and literate in the English language. Participants held a master's degree from a counseling program and were currently working in the counseling field as a professional counselor. A screening question was provided to ensure that participants did not take the survey more than once. Any participant who did not meet these criteria was forwarded to the end of the survey without the opportunity to respond to survey questions.

Power Analysis

The minimum number of participants of 98 was configured using G*Power software (Faul et al., 2007). The following parameters were input into G*Power: linear multiple regression, fixed model, R^2 increase statistical test, and a priori power analysis. An F-test was used with parameters of a medium effect size of 0.15; $\alpha = 0.05$, 0.8 power with seven predictor variables. A medium effect size was selected based on a prior study (Kim & Zalaquett, 2019).

Population and Sampling

Convenience sampling was used to obtain the sample of professional counselors. Following IRB approval, 3,000 prospective participants were recruited using email invitations through ACA Connect, which serves as the American Counseling Association's domain for study participant recruitment, and through counseling practices. Additionally, participants were contacted through statewide counseling associations. The survey was left open for 30 days to allow for the minimum participant number of 98 to be reached. A total of 186 responses were collected and after data cleaning, the analysis sample was 157.

Description of Participants

The mean age of participant was 43.41 years old with a range of 24 to 77 years of age (*SD* = 12.01). A majority of participants identified as female (84.7%, *n* = 133). Male participants made up 14% (*n* = 22), and the remaining participants identified as non-binary/third gender (*n* = 1; 0.6%) or preferred not to say (*n* = 1; 0.6%). On average, participants had been working as a professional counselor for 9.06 years (range 0 – 50, *SD* = 8.68). Most of the participants graduated from a CACREP accredited program (80.3%, *n* = 126). The remaining participants did not graduate from a CACREP accredited program (19.7%, *n* = 31).

Measures

Two survey instruments were used in this study. I created the invitation email and informed consent form. The first instrument was the neuroscience survey. The questions for this survey were derived from the AMHCA Biological Bases of Behavior standards. It is a subscale of a larger survey that was used in a prior study (Russo et al., 2021). The second instrument was the Counselor Self-Estimate Inventory (COSE) (Larson & Suzuki, 1992). Participants were provided a link for immediate access to the survey.

Invitation Email and Informed Consent

An invitation message to participate in the study was sent to participants. They were introduced to the purpose of the study and the reason they were selected to participate in the study. Prior to participating in the study, participants reviewed the informed consent form and indicated their intention to continue (see Appendix A). This form included general details of the study and any potential risks and benefits. Participants were entered into a drawing for a $50 Amazon gift card for their participation. The form clearly stated that participation was voluntary and that participants may refuse to answer any questions or discontinue participation at any time. My contact information was provided for any questions that were to arise. After consenting to participation, participants were given access to the research survey.

Neuroscience Survey

Demographic questions included in the survey were age, gender identity, years of experience, licensure tier, CACREP status, and if they were working in the counseling field. The first item asked participants if they had taken the survey before. This was to ensure that participants did not take the survey twice due to multiple methods of survey dissemination. See Appendix C for list of questionnaire items. An open text box was offered for participants to provide responses.

A 20-item survey was given to quantify the outcome variable of perceived neuroscience knowledge. The items relating to perceived neuroscience knowledge were derived from the AMHCA Biological Bases of Behavior (BBB) competencies. In 2018, the AMHCA launched a taskforce to create consistent language, operationalize training stages, and to create a training model to guide counselors in developing competency in combining neuroscience in counseling. The survey they created served to provide a baseline for training received regarding the BBB competencies (AMHCA, 2020; Russo et al., 2021). Russo et al. (2021) utilized these items in a previous study investigating neuroscience-informed counseling and counselor competence. The original survey was created and piloted by researchers at the University of Pennsylvania.

For the purposes of this study, a subscale was created from the larger survey. The survey items chosen were questions related to the research questions pertaining to perceived neuroscience knowledge. Examples of these questions include, “To what degree do you feel knowledgeable on how the central nervous system operates?” and “How would you rate your perceived knowledge on how drugs are metabolized, stored, and eliminated?” Questions also asked participants to rate their confidence in talking about neurophysiology and behavior with clients and discussing diagnoses from multiple perspectives. Questions were answered on a 7-point Likert scale (1= low perceived knowledge to 7= high perceived knowledge). Scores ranged from 20-140. The mean of responses was reported to account for missing values. The alpha for the 20-item instrument in this current study was $\alpha = .978$ (N= 43).

A pilot study was completed to establish content and construct validity of the neuroscience survey. The pilot study included 10 professional counselors in the field. Participants were asked to complete the survey and then answer follow-up questions about the survey. The questions that were asked included: “Do the questions align with measuring

perceived neuroscience knowledge?" "What questions on the survey, if any, are confusing?" "What other feedback do you have about the survey?" and "how long did the survey take you to complete?"

Counselor Self Estimate Inventory (COSE)

The Counselor Self Estimate Inventory (COSE) (Larson et al., 1992) has been widely used in research investigating counselor self-efficacy (Kozina et al., 2010). It was developed to assess counselor trainees' confidence in their ability to perform various counseling skills including attending, dealing with difficult client behavior, cultural competence, and being aware of their own values. The COSE is a 37-item questionnaire that requires participants to rate themselves on a six-point Likert scale ranging from "strongly disagree" to "strongly agree." Examples of questions include, "I am certain that my interpretation and confrontation responses will be concise and to the point," "I am likely to impose my values on the client during the interview," and "I feel confident that I will appear competent and earn the respect of my client." Scores range from 37-222. Higher scores indicate greater self-efficacy (Larson et al., 1992). To determine levels of counselor self-efficacy, participants were given the COSE. The scores from the COSE were input into SPSS. The mean instead of the sum of scores was reported to account for questions that participants skipped.

Research has shown this instrument to have adequate validity and reliability (Larson, et al., 1992). The estimates of reliability range from an internal consistency of $\alpha = .93$ for the total score to $\alpha = .62$ for awareness of personal values. (Goreczny et al., 2015). See Appendix C for COSE inventory. The alpha for the current study is $\alpha = .923$ (N = 131). There was a missing scale item on the survey so the alpha was calculated with 36 items instead of 37.

Data Collection Procedures

Email invitations were sent out to professional counselors through ACA Connect, state counseling associations, and counseling agencies to participate in the study. Once informed consent was obtained, participants had immediate access to the survey through the survey link. The survey results were stored on Qualtrics research software. No identifying information was available to ensure confidentiality, and all data was stored on a password protected computer and will be stored for a minimum of three years. Data collection was continued for 30 days to allow for at least the minimum number of 98 participants to be reached**.**

Procedure

An online survey on Qualtrics software was disseminated to participants. The survey took 10-15 minutes to complete. Participants had the option to enter their email at the end of the survey to enter into a drawing to win a $50 Amazon gift card. The survey included demographic questions, the neuroscience survey which was derived from AMHCA Biological Bases of Behaviors competencies and the Counselor Self-Estimate Inventory (COSE). The mean of responses was reported to answer research question one (perceived benefit of neuroscience knowledge) and then utilized as a predictor variable for research question two.

Research question two asked what factors are predictive of neuroscience knowledge. The data was analyzed for assumptions for multiple regression. Using IBM SPSS (Version 29) software, the six predictor variables (perceived benefit, years of experience, licensure tier, age, gender identity, and CACREP status) were entered in to the regression model simultaneously against the outcome variable (perceived neuroscience knowledge). The adjusted R^2 value of the model was observed.

The third research question utilized a correlation design to identify the association between perceived neuroscience knowledge and counselor self-efficacy among professional

counselors. This methodology was chosen because I wanted to understand the effect sizes of the predictor variable on the outcome variable. The data was analyzed to ensure it met the assumptions for regression. Once analyzed, the correlation coefficient was inspected to determine strength and direction of relationship.

Data Handling and Preparation

Once the data was collected, the first task was to omit responses which did not provide adequate information for analyses. The following conditions prompted deletion from the data set: (a) the participant indicated that they were not currently working in the field as a counselor (n = 17), (b) the participant indicated that they had taken the survey before (n = 6), and (c) the participant did not complete past question 9 on the survey (n = 6). A total of 157 participants were utilized for analyses which satisfied the minimum participants recommended from the power analysis (N= 98). Prior to running the major analyses of the data, all variables were examined for accuracy of data entry and missing values. There were 35 missing cases, making the total number for analysis for research question one *n=122.* See Table 1 below for descriptive statistics for all variables.

Table 1
Descriptive Statistics

	Range	Mean	SD	Skewness	Kurtosis
Perceived NS Knowledge	5.80	4.19	1.19	-.309	-.360
Perceived Benefit of NS Knowledge	6	5.63	1.29	-1.12	1.02
Counselor Self-efficacy	2.56	4.9	.545	-.329	-.227

Years of Experience	50	9.06	8.68	1.76	4.15
Licensure Tier	1	1.29	.454	.953	-1.10
Age	53	43.41	12	.599	-.258
Gender	3	1.88	.398	-.387	6.23
CACREP Status	1	1.2	.399	1.53	.360

Data Analysis

Once the data was collected from the survey, it was uploaded into the Statistical Package for the Social Sciences (SPSS). The demographic data was analyzed to determine the mean of age and years practicing. I tested for normal distribution then ran descriptive statistics, including mean, range, and standard deviation for research questions 1-3.

The data collected in this study was examined through a multiple regression design. Multiple regression was used to model the relationship between predictor variables on an outcome variable. Using this type of analysis, I determined whether the predictor variables (years of experience, perceived benefit of neuroscience, age, gender, licensure tier, and CACREP status) were related to the outcome variable (perceived neuroscience knowledge). Specifically, I determined the unique variance of each statistically significant predictor variable on the outcome variable. Relationships were considered significant if $p < 0.05$ as is customary among the social sciences (Cohen, 1992). I reported on unique variance using Cohen's (1992) conventions of effect size (R^2): small (approximately 0.02 or less), medium (approximately .13), or large (approximately 0.26). Perceived neuroscience knowledge was then analyzed to determine the relationship with counselor self-efficacy.

Research Question One: Perceived Benefit of Neuroscience Knowledge

This section of the study is dedicated to the first research question: *to what extent do professional counselors rate the perceived benefits of neuroscience knowledge for professional counselors.* Participants answered one question pertaining to perceived benefit of neuroscience knowledge on a Likert scale ranging from 1-7 (1= low benefit- 7= high benefit). The mean of the responses for this question was used as a predictor variable for research question two.

Research Question Two: Factors Predictive of Perceived Neuroscience Knowledge

This section of the study is dedicated to research question two: *what factors are predictive of increased perceived neuroscience knowledge among professional counselors?* The predictor variables include years of experience in the counseling field, licensure tier (top tier and not top tier), perceived benefit (from research question one), CACREP status, age, and gender.

Regression Analysis

A multiple regression analysis was utilized to analyze the data. First, the data was entered into SPSS and tested for eight assumptions required for multiple regression. The data set was tested for normality, as well as for homoscedasticity and normality of residuals. Cook's D test was utilized to test for outliers. The variables (years of experience, license tier, age, gender, CACREP status, and perceived benefit) were then put into a regression model. A table was presented that included the model summary, coefficients, adjusted R^2, R^2 value, and standard error.

Research Question Three: Association Between Perceived Neuroscience Knowledge and Counselor Self-Efficacy

The following section will address the third research question: *what is the association between perceived neuroscience knowledge and counselor self-efficacy among professional*

counselors? This question was analyzed by running a correlation to determine strength and direction of a relationship between perceived neuroscience knowledge and counselor self-efficacy among professional counselors. The data from the neuroscience survey was analyzed and was used for the variable of perceived neuroscience knowledge. The data from the COSE was analyzed and used as the variable for counselor self-efficacy. A correlation analysis was used to determine the strength and direction of the relationship of counselor self-efficacy and perceived neuroscience knowledge among professional counselors.

Ethical Considerations

Ethical considerations for this study were as follows. There was little to no expected risk of harm to participants. Participants were asked to consider their level of self-efficacy in their abilities as a counselor. It is possible this process caused negative emotional responses. The informed consent encouraged participants to seek counseling services if distressing emotions are produced as a result of completing the survey. Participants were free to discontinue at any time, and my contact information was provided to participants for any questions or concerns. Information will be contained in a password secured file for two years, at which time it will be deleted.

Summary

This chapter addressed the methodology of the current study. Approval from the university Institutional Review Board was obtained before contacting participants. Invitations were sent out to prospective participants and informed consent was obtained from participants once they agreed to participate in the study. Participants had immediate access to the survey once consent was obtained.

The surveys included the neuroscience survey and the COSE. The neuroscience survey consisted of 20 items derived from the AMHCA Biological Bases of Behavior (BBB) competencies (Russo, 2021) and the Counselor Self-Estimate Inventory (COSE) included 37-items. A pilot study was completed for the neuroscience survey to establish content and construct validity. This pilot study consisted of 10 counselors.

Once collected, the data was analyzed using SPSS. First, descriptive statistics were analyzed to determine how participated rated the benefit of neuroscience knowledge in the counseling process. The data was analyzed to ensure they met assumptions respective to each analysis. Next, a multiple regression was run to determine was factors (years of experience, perceived benefit of neuroscience, gender, age, licensure tier, and CACREP status) were predictive of perceived neuroscience knowledge. Lastly, a correlation was completed with the variables counselor self-efficacy and perceived neuroscience knowledge to determine the strength and direction of the relationship.

Chapter Four

Data Analysis and Results

This chapter is dedicated to reviewing the outcomes of the data collection process and reporting the results of the data used to answer the research questions. I discuss the analyses utilized for each research question. Tables are presented throughout the chapter.

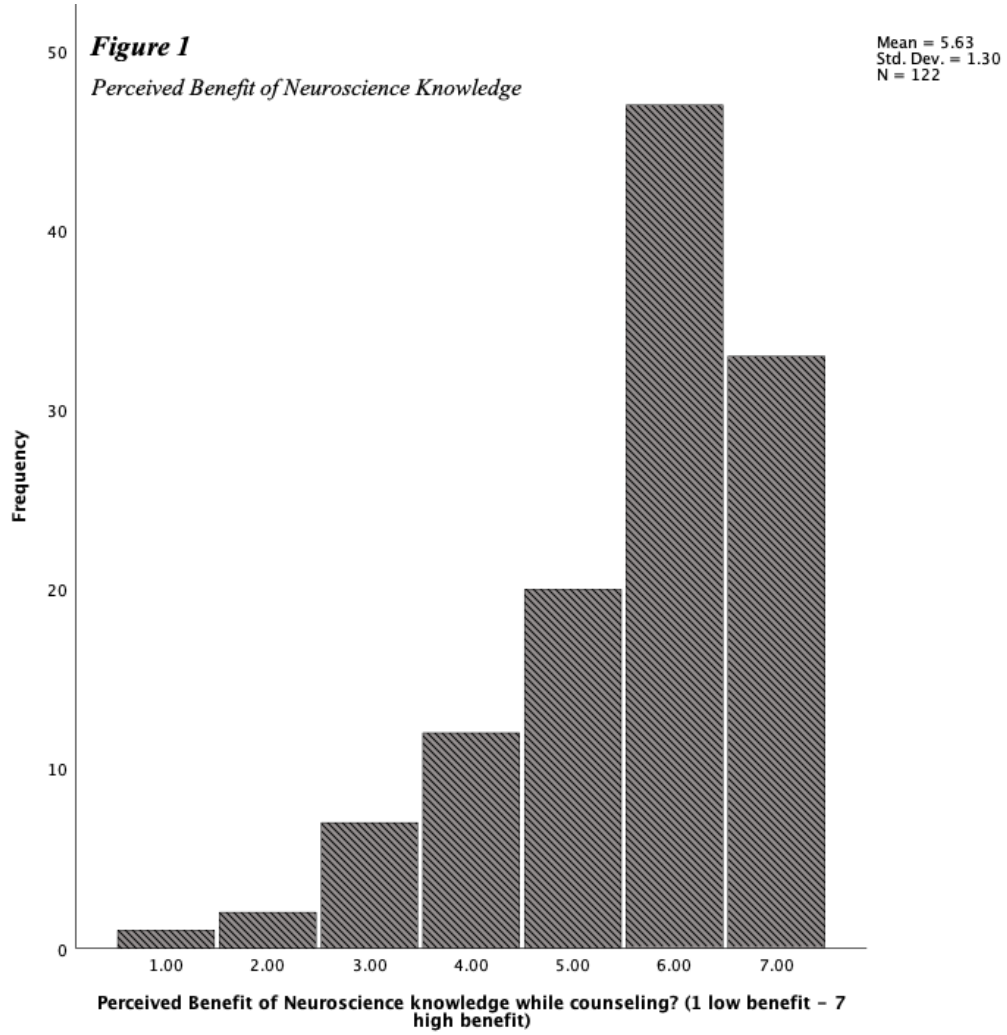
Pilot Study

The neuroscience survey was created based on subscale of a larger survey that was utilized in a prior study (Russo, 2021). As such, a pilot study was conducted to assess content and construct validity. The neuroscience survey was sent out to ten participants. Participants were ten professional counselors practicing in the field. Participants were asked to complete the survey and respond to the follow-up questions via email. Overall, feedback suggested that the neuroscience survey contained appropriate content and construct validity.

Analysis of Results for Research Question One

The first research question asked "To what extent do professional counselors rate the perceived benefit of neuroscience knowledge? Participants were asked to indicate how they rate the benefit of neuroscience knowledge in counseling on a Likert scale ranging from 1 -7, with 1 indicating low benefit and 7 indicating high benefit.

To analyze this question, I examined the descriptive statistics to find the mean of responses. Out of 157 participants, there were 35 missing cases for this question, making the total number for analysis $n = 122$. The mean was $M = 5.63$, indicating a moderately-high rating. The median was $Mdn = 6$ and the range was 6. The data was negatively skewed, indicating that participants most frequently rated the benefit of neuroscience in counseling highly. See Figure 1 below. The mean of the results was used as a predictor variable for research question two.



Analyses of Results for Research Question Two

The second research question asked, "What factors are predictive of perceived neuroscience knowledge?" Perceived neuroscience knowledge was measured on a scale of 1-7 and had a mean of M = 4.19 (SD = 1.19). Licensure tier was converted into two categories, 1 = top-tier and 2 = not top-tier. CACREP status had two categories and was coded 1= yes, 2= no. Gender identity had four categories and was coded 1 = male, 2 = female, 3 = non-binary/third gender, and 4 = prefer not to say. Only one participant identified as non-binary/third gender and

one participant preferred not to disclose. These two were excluded from analysis, as there were not enough participants in those categories for analysis.

A multiple regression was run to predict perceived neuroscience knowledge from gender, age, licensure tier, years of experience, and perceived benefit of neuroscience knowledge, and CACREP status. There was linearity as assessed by partial regression plots and a plot of studentized residuals against the predicted values. There was independence of residuals, as assessed by a Durbin-Watson statistic of 2.021. There was homoscedasticity, as assessed by visual inspection of a plot of studentized residuals versus unstandardized predicted values. There was no evidence of multicollinearity, as assessed by tolerance values greater than 0.1. There were no values for Cook's distance above 1. The assumption of normality was met, as assessed by a Q-Q Plot.

The multiple regression model statistically significantly predicted perceived neuroscience knowledge $F(6, 103) = 4.599$, $p < .001$, adj. $R^2 = .165$. These results show that 16.5% of the variance in perceived neuroscience knowledge can be predicted by the predictor variables. This indicates a medium effect size according to Cohen (1992). Looking at the unique individual contribution of the predictors, the results show that perceived benefit of neuroscience knowledge ($\beta = .328$, $t = 4.11$, $p < .001$) positively predicted perceived neuroscience knowledge, $p < .05$. Gender, age, licensure tier, and years of experience were not statistically significant. Regression coefficients and standard errors can be found in Table 2 below. The mean for perceived neuroscience knowledge was 4.32.

Table 2
Multiple Regression Results for Perceived Neuroscience Knowledge

	R^2	Adj. R^2	β	Std Error β	Sig
Constant	.211	.165	1.928	.924	.039
Age			.007	.012	.585
Years of experience			.024	.015	.106
Perceived Benefit of NS Knowledge			.328	.080	<.001
Licensure Tier			.049	.212	.818
Gender			-.011	.242	.963
CACREP Status			-.073	.245	.766

n = 110

Analyses of Results for Research Question Three

Research question three asked, "what is the association between perceived neuroscience knowledge and counselor self-efficacy?" Counselor self-efficacy was measured on a scale of 1-6 with a mean of $M = 4.9$ ($SD = .54$). A Pearson product-moment correlation coefficient was computed to assess the relationship between perceived neuroscience knowledge and counselor self-efficacy. Preliminary analyses showed the relationship of the variables to be linear with no outliers, and both variables appeared normally distributed based on visual inspection of the histogram and scatterplot. Results showed a statistically significant moderate positive correlation between counselor self-efficacy and perceived neuroscience knowledge, $r = .33$, $N = 135$, $p < .001$. See Table 3 below for correlations for each variable.

Table 3

Bivariate correlations for variables

		Perceived NS Knowledge	Counselor Self-Efficacy	Age	Years of Experience	Perceived Benefit of NS Knowledge	Licensure Tier	Gender	CACREP Status
Perceived NS Knowledge	Pearson Correlation	1	.338**	.228**	.200*	.389**	.095	-.127	-.004
	Sig (2-tailed)		<.001	.006	.016	<.001	.255	.126	.966
Counselor Self-Efficacy	Pearson Correlation	.338**	1	.257**	.210*	.217*	-.014	-.046	-.048
	Sig (2-tailed)	<.001	.	.003	.015	.026	.871	.596	.578
Age	Pearson Correlation	.228**	.257**	1	.667**	.033	.036	-.128	.123
	Sig (2-tailed)	.006	.003	.	<.001	.716	.654	.111	.124
Years of Experience	Pearson Correlation	.200*	.210	.667**	1	.034	-.075	-.109	.040
	Sig (2-tailed)	.016	.015	<.001	.	.708	.351	.174	.624
Perceived Benefit of NS Knowledge	Pearson Correlation	.389**	.217*	.033	.034	1	.036	-.251**	-.002
	Sig (2-tailed)	<.001	.026	.716	.708	.	.695	.005	.980
Licensure Tier	Pearson Correlation	.095	-.014	.036	-.075	.036	1	.051	.075
	Sig (2-tailed)	.255	.871	.654	.351	.695	.	.523	.352
Gender	Pearson Correlation	-.127	-.046	-.128	-.109	-.251**	.051	1	-.091
	Sig (2-tailed)	.126	.596	.111	.174	.005	.523	.	.259
CACREP Status	Pearson Correlation	-.004	-.048	.123	.040	-.002	.075	-.091	1
	Sig (2-tailed)	.966	.578	.124	.624	.980	.352	.259	.

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

Summary

This study included 157 professional counselors. The first research question indicated that the perceived benefits of incorporating neuroscience information in the counseling process was rated moderately high (M= 5.63). The overall multiple regression model was found to be statistically significant F (6, 103) = 4.599, $p < .001$, adj. $R^2 = .165$. The inclusion of the predictor variables accounted for 16.5% of the variability of perceived neuroscience knowledge. Of the five predictor variables (age, gender, licensure tier, years of experience, perceived benefit, and CACREP status), perceived benefit was the only variable that was statistically significant in predicting perceived neuroscience knowledge ($p < .001$). Using a correlation analysis, a moderate, positive correlation between counselor self-efficacy and perceived neuroscience knowledge ($r = .33$) was found.

Chapter Five

Discussion

This research study sought to better understand the relationship between perceived neuroscience knowledge and counselor self-efficacy. There were three research questions that guided the study:

1. To what extent do professional counselors rate the perceived benefit of neuroscience knowledge?
2. What factors are predictive of increased perceived neuroscience knowledge among professional counselors?
3. What is the relationship between counselor self-efficacy and perceived neuroscience knowledge?

I used a multiple regression to identify factors that are predictive of perceived neuroscience knowledge and a correlation to identify the relationship between perceived neuroscience knowledge and counselor self-efficacy. This chapter discusses the findings of the results, how it contributes to the counseling field, limitations of the study, and recommendations for future research.

Research Question One

For research question one, I hypothesized that participants would rate the perceived benefit of neuroscience in the counseling process highly. Perceived benefit of neuroscience knowledge was rated moderately high (M= 5.63) indicating that it was perceived to be helpful in the counseling process. This aligns with research discussing the benefits of neuroscience within the counseling field. Neurobiological understanding of depression has been shown to decrease

the stigma toward individuals with depression (Han & Chen, 2014). Neuroscientific information helps clients feel more empowered through understanding symptoms from a neurobiological level. This subsequently helps with better treatment planning by developing coping strategies that may be helpful in decreasing symptoms.

Research Question Two

I hypothesized for research question two that perceived benefit and years of experience would be predictive of perceived neuroscience knowledge. Perceived benefit, from research question one, was put into the analysis as one of the six predictor variables for research question two. The six predictor variables under investigation were age, gender, years of experience, perceived benefit, licensure tier, and CACREP status.

Interestingly, perceived benefit was the only variable shown to be statistically significant. This indicated that increased perceived benefit was most predictive of increased perceived neuroscience knowledge. Those who believe neuroscience knowledge to be useful in the therapeutic process assessed their own knowledge related to neuroscience highly. Gender, age, years of experience, CACREP status and licensure tier were not statistically significant. The mean for perceived neuroscience knowledge was $M=4.23$ indicating that participants rated their own knowledge of neuroscience to be moderate. This could be reflective of the current lack of standards related to neuroscience training. Perhaps with more specified standards in place, the result for this question would be higher.

Non-significant Findings

Gender, age, licensure tier, years of experience, and CACREP status were not found to be significant predictors of perceived neuroscience knowledge. I hypothesized that years of experience would be predictive of perceived neuroscience knowledge. It is interesting to

consider potential explanations why this was not the case. Participants in this study had been working in the field for an average of 9.06 years. With more experience, there would presumably be more opportunity for development in the area of neuroscience knowledge, however it could be that counselors who have been working in the field for many years may be complacent in their practice and choose not to expand to include other areas. For counselors who are newer in the field, it could be that they may be focusing their efforts on other areas including administrative tasks, skill development, and theory-based knowledge. CACREP status was not significant perhaps due to lack of specific standards related to neuroscience. It would be interesting see if this result would change if the standards were more definitive.

Research Question Three

I hypothesized that there would be a positive association between perceived neuroscience knowledge and counselor self-efficacy. The relationship between perceived neuroscience knowledge and counselor self-efficacy was found to be moderately positive. Thus, counselors with higher scores on the neuroscience survey scored higher on the COSE. Individuals who perceived themselves to be knowledgeable in neuroscience showed a greater confidence in their ability to effectively provide counseling. This is an important contribution to the limited area of neuroscience training among counselors, creating a starting point to further understand how incorporating neuroscience training can enhance counselor performance.

Self-Efficacy

The findings of this current study align with components of self-efficacy theory. Participants who scored higher on the neuroscience survey had higher scores on the COSE. Self-efficacy theory suggests that performance accomplishments, or mastery experiences, are especially influential in the development of self-efficacy (Bandura, 1977). Participants who

utilized neuroscience knowledge in their practice indicated higher confidence in their work with clients.

Interest in neuroscience translated into their confidence of utilizing this information for their client's benefit. Bandura (1977) discussed how interest influences behavior. Having more interest in an area leads to seeking out opportunities for engagement in that area (Wagner, et al., 2018), in the case of this current study, seeking out neuroscience knowledge. Further, self-efficacy theory suggests that higher self-efficacy can generalize into other areas, which aligns with the findings of this current study. While the relationship does not determine causality, (perceived neuroscience knowledge does not cause higher counselor self-efficacy or vice versa) it is interesting to consider that perceived neuroscience knowledge has an influence on generalizing into counselor self-efficacy.

Implications of Findings

An expanding body of neuroscience literature has informed clinical practice through validating theory, guiding conceptualization, and providing direction for effective interventions (Miller, 2016). This emphasis on neuroscience indicates that it is beneficial in the counseling field. The integration of neuroscience in the counseling process has aided counselors in areas including understanding emotional regulation (Divino & Moor, 2010) and helping clients understand their experiences through a neuroscientific lens (Luke et al., 2019).

Even with the knowledge that neuroscience supports and informs the counseling process, there is limited information investigating how it impacts counselors, specifically counselor self-efficacy. This study aimed to understand how perceived neuroscience knowledge impacts counselor self-efficacy. Counselor self-efficacy is shown to be an important piece of the counseling process and has been shown to be a predictive factor of treatment outcome (Goreczny

et al, 2015). The following sections will discuss the implications this study has for counselors, counselor educators, counselor supervisors, and counseling clients.

Implications for Counselors

The findings from this current study have implications for counselors. Results from research question one showed that counselors rated the benefit of neuroscience in the counseling process moderately high. Research question three showed a moderate positive correlation between counselor self-efficacy and perceived neuroscience knowledge, indicating that counselors who rated their own neuroscience knowledge highly generally had higher counselor self-efficacy. Additionally, perceived benefit of neuroscience knowledge was found to be predictive of perceived neuroscience knowledge. This ties into previous research suggesting that counselors are more likely to utilize strategies if they are confident in their ability deliver them (Goreczny et al., 2015). Self-efficacy grows with mastery experiences (Bandura, 1977).

Counselors can seek out more training opportunities through continuing education in this area. There are numerous trainings and continuing education opportunities that are centered around neuroscience, suggesting its importance and benefit in the field. For example, neurofeedback has been shown to be a powerful tool in treating a variety of clinical issues (Myers & Young, 2011). The finding that participants rated the perceived benefit of neuroscience knowledge in counseling moderately high aligns with this. It is interesting to consider, however, the possibility it is rated highly because it is a popular area in research, so it is assumed the benefits of additional knowledge would be beneficial.

Implications for Counselor Educators

Perceived benefit was found to be predictive of perceived neuroscience knowledge and perceived neuroscience knowledge moderately positively correlated with counselor self-efficacy.

Promoting self-efficacy among counselors-in-training is an important goal for counselor educators. Understanding what factors can promote counselor self-efficacy can aid counselor educators in creating coursework that supports this goal.

Counselor educators can incorporate more neuroscience-related material in their coursework. This could include integrating research concerning neurobiological underpinnings of mental illness throughout a diagnosis, theories, and practicum course. Counselor educators can utilize neuroscience theories to aid in understanding of course material as well (Beijan et al., 2021). Adding to the neuroscience component of coursework within counseling programs can help improve the consistency of neuroscience training across disciplines (Benjamin, 2013; Deschaamps, et al., 2020; Russo, et al., 2021).

Implications for Counselor Supervisors

Additionally, these findings have implications to the supervision process. As a supervisor, it is important to understand what factors enhance counselor self-efficacy, as goals of supervision are to promote competency, ethical decision making, and self-efficacy. Having discussions surrounding neuroscience may be helpful in the development of those areas through helping counselors with case conceptualization and treatment planning. Understanding the mechanisms by which interventions function from a neurobiological perspective can help supervisees build confidence in the use of them with clients.

An activity that can be incorporated into the supervisory process includes having supervisees seek out neuroscience related research articles pertaining to client presenting concerns. Supervisees can then bring the article into supervision to discuss how it informs their work with their client. Having a discussion about this can help the supervisor assess their supervisee's understanding of how they are interpreting and applying literature to their practice.

Implications for Counseling Clients

Lastly, these findings have implications for clients. Counselors who perceived themselves to have high neuroscience knowledge generally had a higher confidence in their ability to effectively counsel clients. This confidence, or self-efficacy, can translate into the therapeutic process and lead to better treatment outcomes. This can happen through creating a strong therapeutic alliance by way of skill usage, clear conceptualization and utilizing effective interventions (McCarthy, 2014). Clients benefit from this as they are receiving treatment specific to their concerns. Clients can inquire about their symptoms to have a better understanding of what they are experiencing. This can lead to clients increasing ownership of experience and treatment adherence (Luke et al., 2019).

Limitations of the Study

There are limitations within this current study. Correlational designs, while helpful in looking for relationship between variables, do not indicate causality. Participants in this study potentially had an interest in neuroscience, affecting generalization of results. Additionally, the surveys relied on self-report measures which could be prone to bias, such as over or underreporting. Although this method of data collection has this limitation it is common among the social sciences (Creswell, 2013). Self-report measures were utilized in this study because participants were asked to assess their own knowledge and subjective experience of the benefits of neuroscience; this study did not assess true knowledge. In future research, a different neuroscience survey could be utilized. The one used in this current study was a subscale of a larger piloted survey. Finding a more commonly used neuroscience knowledge survey could yield more accurate findings.

The survey question asking about licensure tier could be stated differently to get more accurate information. The question read "What license(s) do you hold to practice counseling?" and could be asked "Do you have the top tier license to practice counseling in your state?" This would create more clarity around what tier the participant had. I needed to cross-reference the licensures with each state to see whether they were top-tier or not, leaving room for error. Lastly, Race/ethnicity was not reported.

Recommendations for Future Research

This current study investigated *perceived* neuroscience knowledge, not *true* neuroscience knowledge. Future research could assess professional counselors' actual neuroscience knowledge. This may yield more accuracy in results of the relationship between neuroscience knowledge and counselor self-efficacy.

The results of this study are encouraging in continuing the research related to this topic, laying foundation to expand upon. This could include implementing a pre/post experimental design where participants take a neuroscience training and compare counselor self-efficacy scores before and after the training. Additionally, future research could include continuing education related to neuroscience as a variable to get a better understanding of the amount of neuroscience training professional counselors engage in and compare that to counselor self-efficacy. Another area that could be added includes understanding exposure counselors had to neuroscience during their counseling programs. It would be interesting to see if there would be a difference between CACREP and non-CACREP programs.

Professional counselors were sampled for this study. Future research could include surveying clients or utilizing a qualitative methodology to understand how neuroscience impacts

their experience of therapy. This could further the understanding of how neuroscience supports the counseling process and treatment outcome.

References

American Counseling Association. (2014). *ACA code of ethics.* Retrieved from www.counseling.org/resources/aca-code-of-ethics.pdf

American Mental Health Counselors Association. (2020). *Code of ethics.* Retrieved from www.amhca.org/events/publications/ethics

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review, 84*(2), 191-215. https://doi.org/10.1037/0033-295X.84.2.191

Bandura, A. (1989). Perceived self-efficacy in the exercise of personal agency. *The Psychologist: Bulletin of the British Psychological Society* (2), 411-424.

Bandura, A. (1993). Perceived self-efficacy in cognitive development and functioning. *Educational Psychologist, 28*(2), 117-148. https://doi.org/10.1207/s15326985ep2802_3

Bandura, A. (2006). *Self-efficacy beliefs of adolescents. Guide for constructing self-efficacy scales.* Charlotte, NC: Information Age Publishing.

Beeson, T. E. & Field, T. A. (2017). Neurocounseling: A new section of the journal of mental health counseling. *Journal of Mental Health Counseling, 39*(1), 71-83. https://doi.org/10.17744/mehc.39.1.06

Beijan, L. L., Prosek, E. A. Jones, L.D., Jackson, D., Legacy, B. (2022). A consensual qualitative analysis of counselor educators' incorporating neuroscience. *Counselor Education & Supervision* 61(3), 247-261. https:// doi: 10.1002/ceas.12234

Benjamin, S. (2013). Educating psychiatry residents in neuropsychiatry and neuroscience. *International Review of Psychiatry, 25*(3), 265-275. https://doi.org/10.3109/09540261.2013.786689

Board of Examiners for Counselors & Marriage and Family Therapists. Counselors and Marriage and Family Therapist Examiners. (2020). https://dss.sd.gov/licensingboards/counselors/counselors.aspx

Council of the Accreditation of Counseling and Related Educational Programs (CACREP) (2016). www.CACREP.org

Clark, M., Moe, J., & Hays, G. D. (2017). The relationship between counselors' multicultural counseling competence and poverty beliefs. *The American Counseling Association, 56*(4), 259-273. https://doi.org/10.1002/ceas.12084

Cohen, J. (1992). A power primer. *Psychological bulletin*, *112*(1), 155. https://doi.org/10.1037/0033-2909.112.1.155

Couture, V. (2017). Counseling transgender college students: perceptions of college mental health clinicians preparedness. *College Student Journal, 51*(4), 463-472.

Craske, G. M., Meuret, E. A., Ritz, T., Treanor, M., & Dour, J.H. (2016). Treatment for anhedonia: A neuroscience driven approach. *Depression and Anxiety 33*(10)*,* 927-938. https://doi.org/10.1002/da.22490

Creswell, J. (2013) 3rd Ed. *Qualitative inquiry & research resign: Choosing among five approaches*. Thousand Oaks, CA: Sage.

Crockett. S. & Hays, G. D. (2015). The influence of supervisor multicultural competence on the supervisory working alliance, supervisee counseling self-efficacy, and supervisee satisfaction with supervision: A mediation model. *Counselor Education and Supervision. 54,* 258-273. https://doi.org/10.1002/ceas.12025

Crockett, E. J., Gill, L, D., Cashwell, H. T., & Myers E. J. (2017). Integrating non-technological and technological peripheral biofeedback in counseling. *Journal of Mental Health Counseling, 39*(2), 163-179. https://doi.org/10.17744/mehc.39.2.06

Daniels, A. J., & Larson, M. L. (2001). The impact of performance feedback on counseling self-efficacy and counselor anxiety. *Counselor Education & Supervision, 41,* 120-130. https://doi.org/10.1002/j.1556-6978.2001.tb01276.x

Deschamps, P., Hebebrand, J., Jacobs, B., Roberston, P., Anagnostopoulos, Banaschewski, t., birkle, M. S., Dubicka, B., Falissard, B., Giannopoulou, I., Hoekstra, J. P., Kaess, M., Kapornai, K., Klauser, P., Revet, A., Schroder, C., Seitz, J., Seker, A., & Signorini, G. (2020). Training for child and adolescent psychiatry in the twenty first century. *European Child & Adolescent Psychiatry. 29,* 3-9. https://doi.org/10.1007/s00787-019-01467-6

Divino, C. L. & Moore, S. M. (2010). Integrating neurobiological findings into psychodynamic psychotherapy training and practice. *Psychoanalytic Dialogues, 20,* 337-355. https://doi.org/10.1080/10481885.2010.481613

Duman, S. R. (2014). Neurobiology of stress, depression, and rapid acting antidepressants: Remodeling synaptic connections. *Depression and Anxiety, 31, 291-296.* https://doi.org/10.1002/da.22227

Ellis, A. (1962). *Reason and emotion in psychotherapy.* New York NY- Stuart

Esperidiao-Antonio, V., Majeski-Colombo, M., Toledo-Monteverde, D., Moraes-Martins, M., Fernandes, J., Bauchiglioni de Assis, M., Montenegro, S., & Siqueira-Batista, R. (2017). Neurobiology of emotions: An update. *International Review of Psychiatry, 29*(3), 293-307. https://doi.org/10.1080/10481885.2010.481613

Ewart, S., Happel, B., Bocking, J., Platania-Phung, C., Stanton, R., & Scholz, B. (2017). Social and material aspects of life and their impact on the physical health of people diagnosed with mental illness. *Health Expectations, 20,* 984-991. https://doi.org/10.1111/hex.12539

Faul, F., Erdfelder, E., Lang, A.-G., & Buchner, A. (2007). G*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods*, *39*, 175-191. https://doi.org/10.3758/bf03193146

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

Field, T. A., Beeson, E.T., & Jones, L. K. (2016). Neuroscience-informed cognitive behavior therapy in Clinical practice: A preliminary study. *Journal of Mental Health Counseling, 38*(2), 139-154. https://doi.org/10.17744/mehc.38.2.05

Field, T. A., Beeson, E.T., & Luke, C., Ghoston, M., & Golubovic, N. (2019). Counselors' neuroscience conceptualizations of depression. *Journal of Mental Health Counseling, 4*(3), 260-279. doi.org/l0.l7744/mehc.4l.3.05. https://doi.org/10.17744/mehc.41.3.05

Goreczny, J. A., Hamilton, D., Lubinski, L., & Pasquinelli, M. (2015). Exploration of counselor self-efficacy across academic training. *The Clinical Supervisor, 34*, *78-97.* https://doi.org/10.1080/07325223.2015.1012916

Han, D. & Chen S. (2014). Reducing the stigma of depression through neurobiology-based psychoeducation: A randomized controlled trial. *Psychiatry and Clinical Neurosciences, 68,* 666-673. https://doi.org/10.1111/pcn.12174

Ivey, E. A. & Zalaquett P. C. (2011). Neuroscience and counseling: Central issue for social justice leaders. *Journal for Social Action in Counseling and Psychology, 3*(1). https://doi.org/10.33043/jsacp.3.1.103-116

Jaladin, M., A., R. (2016). Perceived multicultural counseling competence of malaysian counselors: An exploratory study. *Multicultural Counseling and Development, 45,* 127-148. https://doi.org/10.1002/jmcd.12069

Jo, H., Ra, Y., Lee, J., & Kim H. W. (2015). Impact of dysfunctional career thoughts on career decision self-efficacy and vocational identity. *The Career Development Quarterly, 12*(64), 333-344. https://doi.org/10.1002/cdq.12069

Kim, H. Y. & Choi, N. (2019). Career decision self-efficacy of Asian American students: The role of curiosity and ethnic identity. *The Career Development Quarterly, 67,*32-46. https://doi.org/10.1002/cdq.12161

Kim, R. S. & Zalaquett, C. (2019). An exploratory study of prevalence and predictors of neuromyths among potential mental health counselors. *Journal of Mental Health Counseling, 41*(2), 173-187. https://doi.org/10.17744/mehc.41.2.06

Kozina, K., Grabovari, N., De Stefano, J., & Drapeau, M. (2010). Measuring changes in counselor self-efficacy: Further validation and implications for training and supervision. *The Clinical Supervisor, 29.* 117-127. https://doi.org/10.1080/07325223.2010.517483

Krysta, K., Krzystanek, M., Janas-Kozik, M., Klasik, A., & Krupka-Matuszczyk, I. (2015). Impact of pharmacological and psychological treatment methods of depressive and anxiety disorders on cognitive functioning. *Journal of Neural Transmission, 122,* 101-110. https://doi.org/10.1007/s00702-014-1282-3

Lang, J. P., McTeague. M. L., & Bradley, M. M. (2014). Pathological anxiety and function/dysfunction in the brain's fear/defense circuitry. *Restorative Neurology and Neuroscience, 32,* 63-77. https://doi.org/10.3233/rnn-139012

Larson, L. M., & Suzuki, L. A. (1992). Development and Validation of the Counseling Self-Estimate Inventory. Journal of Counseling Psychology; Washington, 39(1), 105–105. https://doi.org/10.1037/0022-0167.39.1.105

Lent, R. W., & Brown, S. D. (2013). Social cognitive model of career self-management: Toward a unifying view of adaptive career behavior across the life span. *Journal of Counseling Psychology, 60,* 557–568. https://doi.org/10.1037/a0033446

Li, J., Zhong, Y., Ma., Z., Wu, Y., Pang, M., Wang, C., Liu, N., Wang, C., & Zhang, N. (2020). Emotion reactivity-related brain network analysis in generalized anxiety disorder: A task fmri study. *BMC Psychiatry, 20,* 429-442. https://doi.org/10.1186/s12888-020-02831-6.

Lorelle, S. & Michel, R. (2017). Neurocounseling: Promoting human growth and development throughout the life span. *Adultspan, 16*(2), 106-119. https://doi.org/10.1002/adsp.12039

Lorusso, L., Piccolino, M., Motta, S., Gasparello, A., Barbara, J., Bossi-Regnier, L., Shepherd, G., Swanson, L., Magistretti, P., Everitt, B., Molnar, Z., & brown, R. (2018). Neuroscience without borders: Preserving the history of neuroscience. *European Journal of Neuroscience, 48*(5), 2099-2109. https://doi.org/10.1111/ejn.14101

Luke, C., Beeson, E. T., Miller, R., Field, A. T., & Jones, K. L. (2019). Counselors' perceptions of ethical considerations for integrating neuroscience with counseling. *The Professional Counselor, 10*(2), 204-219. https://doi.org/10.15241/cl.10.2.204

Lumpkin, A., Franco, D., Multon, D., & Achen, R. (2017). Sports management career decision-making self-efficacy. *College Student Journal, 51*(4), 539-549.

Martin, E., Ressler, J. K., Binder, E., & Nemeroff, B. C. (2009). The neurobiology of anxiety disorders: Brain imaging, genetics, and psychoneuroendocrinology. *Psychiatric Clinics of North America, 32*(3), 549-575. https://doi.org/10.1016/j.psc.2009.05.004

Mata-Segreda, A. (2015). The promotion of vocational self-efficacy in adolescents. *Policy and Practice. 81*(4), 25-31

Matsen, J., Perrone-McGovern K., & Marmarosh C. (2020). Using event-related potentials to explore processes of change in counseling psychology. *Journal of Counseling Psychology, 67*(4), 500-508. https://doi.org/10.1037/cou0000410

Matthews, J. J., Barden, S. M., Sherrell, S. R. (2018). Examining the relationships between multicultural counseling competence, multicultural self-efficacy, and ethnic identity development of practicing counselors. *Journal of Mental Health Counseling, 40*(2), 129-141. https://doi.org/10.1037/cou0000410

McCarthy, K. A. (2014). Relationship between rehabilitation counselor efficacy for counseling skills and client outcomes. *Journal of Rehabilitation, 80*(2), 3-11.

Merriam-Webster. (n.d.). Competence. In *Merriam-Webster.com dictionary.* Retrieved from https://www.merriam-webster.com/dictionary

Merriam-Webster. (n.d.). Neuroscience. In *Merriam-Webster.com dictionary.* Retrieved from https://www.merriam-webster.com/dictionary

Miller, R. (2016). Neuroeducation: Integrating brain-based psychoeducation into clinical practice. *Journal of Mental Health Counseling, 38*(2), 103-115. https://doi.org/10.17744/mehc.38.2.02

Miller, W. R. & Rollnick, S. (2012). *Motivational interviewing: Preparing people for change* (3rd ed.). New York, NY: Guilford Press.

Mochcovitch M.D., da Rocha Freire R.C., Garcia, Nardi A.E. (2014). A systematic review of fMRI studies in generalized anxiety disorder: evaluating its neural and cognitive basis. *Journal of Affect Disorders*, 336–342. https://doi.org/10.1016/j.jad.2014.06.041

Moon, C., Kang, H., & Jeong. G. (2015). Metabolic change in the right dorsolateral prefrontal cortex and its correlation with symptom severity in patients with generalized anxiety disorder: Proton magnetic resonance spectroscopy. *Psychiatry and LCinical Neurosciences, 69,* 422-430. https://doi.org/10.1111/pcn.12279

Mullen, R. P., Lambie, W. G., Griffith, C., & Sherrell, R. (2016). School counselors' general self-efficacy, ethical and legal self-efficacy, and ethical and legal knowledge. *Ethics and Behavior, 26*(5), 415-430. https://doi.org/10.1080/10508422.2015.1033627

Myers, E. J.. & Young, S. J. (2012). Brain wave biofeedback: Benefits of integrating neurofeedback in counseling. *Journal of Counseling & Development, 90*(1), 20-29. https://doi:10.1111/j.1556-6676.2012.00003.x

Navalta, C. P., McGee, L., & Underwood, J. (2018). Adverse childhood experiences, brain development and mental health: A call for neurocounseling. *Journal of Mental Health Counseling, 40*(3), 266-278. https://doi.org/10.17744/mehc.40.3.07

Panksepp, J. (2016). The cross-mammalian neurophenomenology of primal emotional affects: From animal feelings to human therapeutics. *Journal of Comparative Neurology, 584*(8), 1624-1635. https://doi.org/10.1002/cne.23969

Russel-Chapin, A. L. (2016). Integrating Neurocounseling into the counseling profession: An introduction. *Journal of Mental Health Counseling, 28*(2), 93-102. https://doi.org/10.17744/mehc.38.2.01

Russinova, Z., Gidugu, V., Bloch, P., Rogers, S., Restrepo-Toro, M. (2018). Empowering Individuals with psychiatric disabilities to work, *Psychiatric Rehabilitation Journal, 41*(3), 196-208. http://dx.doi.org/10.1037/prj0000303.

Russo, G. M. Schauss, E., Naik, S., Banerjee, M. G., Jones, L., Zalaquett, P. C., Beeson, T. E., & Field, A. T. (2021). Extent of counselor training in neuroscience-informed counseling competencies. *Journal of Mental Health Counseling, 43*(1), 75-93.

Schauss, E., Horn, G., Ellmo, F., Reeves, T., Zettler, H., Bartelli, D., Cogdal, P., West, S. (2019). Fostering intrinsic resilience: A neuroscience-informed model of conceptualizing and treating adverse childhood experiences. *Journal of Mental Health Counseling, 4*(3), 242-259. https://doi.org/10.17744/mehc.41.3.04

Schmidt, F. L., Hunter, J. E., & Outerbridge, A. N. (1986). Impact of job experience and ability on job knowledge, work sample performance, and supervisory ratings of job performance. *Journal of Applied Psychology, 71*(3), 432–439. https://doi.org/10.1037/0021-9010.71.3.432

Sommers-Flanagan (2015). Evidence-based relationship practice: Enhancing counselor competence. *Journal of Mental Health Counseling, 37*(2), 95-108. https://doi.org/10.17744/mehc.37.2.g13472044600588r

Stagg, S. D., Eaton, E., & Sjoblom, M. A. (2018). Self-efficacy in undergraduate student with dyslexia: A mixed methods investigation. *British Journal of Special Education, 45*(1), 26-42. https://doi.org/10.1111/1467-8578.12200

Statista. (n.d.). *Total neuroscience funding by the National Institutes for Health (NIH) from FY 2013 to FY 2023.* https://www.statista.com/statistics/712866/total-neuroscience-funding-by-the-national-institutes-for-health

Sussman, D., Pang, W. E., Jetly, R., Dunkley, T. B., & Taylor, J. M. (2016). Neuroanatomical features in soldiers with post-traumatic stress disorder. *BMC Neuroscience 17,* 1-11. https://doi.org/10.1186/s12868-016-0247-x

Swan, L. K., Schottelkorb, A.A., & Lancaster, S., (2015). Relationship conditions and multicultural competence for counselors of children and adolescents. *Journal of Counseling & Development, 93,* 481-490. https://doi.org/10.1002/jcad.12046

Tatum, O. W. (2014). Ellen r. glass lecture: Extraordinary EEG. *Neurodiagnostic Journal, 54,* 3-21.

Tobia, P. K. (2015). Personal identity and the phineas gage effect. *The Analyst Trust, 75*(3), 396-405. https://doi.org/10.1093/analys/anv041

U.S. Department of Health and Human Services. (2017). *National Institute of Mental Health (NIMH)*. National Institutes of Health. https://www.nih.gov/about-nih/what-we-do/nih-almanac/national-institute-mental-health-nimh.

Wagner, J. N., Mullen, P. R., & Sims, A. R. (2019). Professional counselors' interest in counseling older adults. *Adultspan Journal, 18*(2). https://doi.org/10.1002/adsp.12078

Walton, L. J., Cuccurullo, J. L., Raines, M. A., Vidaurri, N. D., Allan, P. N., Maieritsch, P. K., & Franklin, L. C. (2017). Sometimes less is more: Establishing the core symptoms of ptsd. *Journal of Traumatic Stress, 30,* 254-258. https://doi.org/10.1002/jts.22185

Wen, A., LeMoult, J., McCabe, R., & Yoon, L. K. (2019). Affective flexibility and generalized anxiety disorder: Valence-specific shifting difficulties. *Anxiety, Stress & Coping, 32*(5), 581-593. https://doi.org/10.1080/10615806.2019.1638684.

Wilkinson, D. B. (2017). The limits of neuroscience in counseling: A humanistic perspective and proposed model. *Journal of Humanistic Counseling, 57,* 70-78. https://doi.org/10.1002/johc.12067.

Wilson, C. A. (2017). The effect of neuroscientific training on counselor self-efficacy, program satisfaction, and desire for neuroscience training. (10618753) [Doctoral dissertation, Regent University]

Wolcott, D. M., Lobvowski, G. N., Zeeman, M. J., & McLaughlin, E. J. (2021). Role and experience in situational judgment test responses of pharmacists and pharmacy students. *American Journal of pharmaceutical Education, 85*(1), 68-75. https://doi.org/10.5688/ajpe8194

Yiu, W. T., Cheung, O. S., Siu, Y. L. (2012). Application of bandura's self-efficacy theory to examining the choice of tactics in construction of dispute negotiation. *Journal of Construction Engineering and Management, 38*(3), 331-340. https://doi.org/10.1061/(asce)co.1943-7862.0000403

Appendix A: Invitation Letter

Hello,

My name is Cristina Buus, and I am a Doctoral Candidate with the University of South Dakota working under the direction of my chair, Dr. Adam Hardy. I am currently in the process of conducting a dissertation study on perceived neuroscience knowledge and counselor self-efficacy. You have been chosen as a prospective participant for this research due to your current standing as a pre-licensed or licensed counselor.

If you choose to participate in this study, you will be entered into a drawing for a $50 Amazon gift card.

The purpose of this study is to identify the relationship between perceived neuroscience knowledge and counselor self-efficacy. If you choose to participate, you will be directed to a survey which will take approximately 10-15 minutes to complete. I believe that your time and effort will contribute to counselor education programs and the counseling field.

Thank you for your consideration and your commitment to furthering research efforts in the counseling field. To participate in this study, please open the following link

Perceived Neuroscience Knowledge and Counselor Self-Efficacy Survey

Cristina Buus, Doctoral Candidate, LPC-MH-Supervisee, NCC, QMHP
Division of Counseling and Psychology in Education
School of Education- University of South Dakota
Vermillion, SD 57069
Cristina.Matos@coyotes.usd.edu

Adam Hardy, PhD, LPC-MH, LAC QMHP, NCC
Assistant Professor
Division of Counseling and Psychology in Education
Delzell 209D
University of South Dakota
Adam.Hardy@usd.edu

Appendix B: Informed Consent

You have been asked to participate in a research study examining the neuroscience knowledge and counselor self-efficacy. You were chosen because you are a pre-licensed or licensed counselor. The purpose of this consent form is to provide you with information that my affect your decision to participate in the current research study.

What will I be asked to do?
If you decide to participate in this study, you will be asked to answer a series of survey questions. You will be asked several questions about your demographic characteristics, neuroscience knowledge, and counselor self-efficacy. The survey is estimated to take 15-20 minutes to complete.

What are the risks involved?
The risks associated with this study are considered minimal. You will be asked questions related to counseling experiences which may have been difficult so there may be a risk of emotional distress as a result of answering the survey questions. If you experience emotional distress, you are encouraged to seek counseling services.

What are the benefits of the study?
The results of this study are likely to help the field of counseling better understand neuroscience knowledge and counselor self-efficacy.

Do I have to participate?
Participation in this study is entirely voluntary. You may decide not to answer any questions on the survey or withdraw entirely at any time. Your decision to participate or decline will be kept anonymous. Your responses cannot be traced back to you.

Whom do I contact with questions?
If you have questions about this study you may contact Cristina Buus at Cristina.Matos@coyotes.usd.edu or Dr. Adam Hardy at Adam.Hardy@usd.edu. If you have questions or concerns about your rights as a participant, you are encouraged to contact the Institutional Review Board (IRB) of the University of South Dakota at HumanSubjects@usd.edu (605-677-6184).

Consent
After reading the content of this consent form, consider whether you have additional questions which may impact your decision to participate. If all questions have been answered to your satisfaction, you may either click “accept” or “decline” below. Choosing to decline will close the current web page. Choosing to accept certifies that you are at least 18 years of age and have decided to participate in this current study. You will be forwarded directly to the survey.

Appendix C: Survey

1. Have you taken this survey in the past? (will end survey if answered 'yes')
2. Are you working in the field as a professional counselor?

Counselor Self-efficacy and Perceived Neuroscience Knowledge

3. How many years have you been practicing as a licensed counselor?

4. What license(s) to practice counseling do you hold?

5. What is your age?

6. What is your gender identity

   How would you rate the benefits of neuroscience knowledge while performing counseling? **(Likert 1-7) 1- low perceived knowledge, 7 – high perceived knowledge.**

7. Did you graduate from a CACREP program?

8. How tall are you?

Neuroscience is defined as the study of the brain and nervous system functioning in relation to behavior.

The following questions are asking about perceived neuroscience knowledge. How would you rate your perceived knowledge in the following areas?
(Likert 1-7: 1 – low perceived knowledge, 7- high perceived knowledge)

9. How the central nervous system operates?

10. How the peripheral nervous system operates

11. Talking with clients about the neurophysiological underpinnings of behavior?

12. Discussing diagnoses from multiple perspectives (genetic, molecular, cellular, neurocircuitry, behavior, and self-report)?

13. Neural development across the lifespan (genetic, social and/or environmental factors that influence the development of the human nervous system)

14. The structure of neurons

15. Physiology of the sympathetic nervous system

16. Physiology of the parasympathetic nervous system

17. Neurocognitive processes underlying executive function, feelings, learning, memory, sensation, and perception.

18. Neurophysiological causes and behavioral implications of various medical conditions (autoimmune disorders, epilepsy, stroke, obesity)

19. Neurophysiological causes and behavioral implications of traumatic brain injury.

20. Current research (mechanisms, efficacy, effectiveness) related to the use of biofeedback (neurofeedback, actigraphy data) for enhancing therapeutic outcomes in clinical mental health counseling.

21. How drugs are absorbed, metabolized, and eliminated.

22. How psychotropic medications influence behavior change and am able to identify possible contraindications and adverse effects.

23. The biological components of the therapeutic relationship.

24. Locate, appraise, and assimilate research from allied fields such as neuroscience, endocrinology, immunology, nutrition, and psychiatry into clinical practice.

25. Normal changes in the brain as a result of age

26. Articulate how physiology factors (genes, molecules, circuits, immune functioning, endocrinology, gut microbiome) modulate human behavior.

27. Articulate how psychological factors (neurocognitive, personality) modulate human behavior

28. Articulate the basic principles of pharmacology (dose-response, side effects, interactions, pharmacokinetics, pharmacodynamics, routes of administration, distribution.)

Counselor Self Estimate Inventory (COSE)

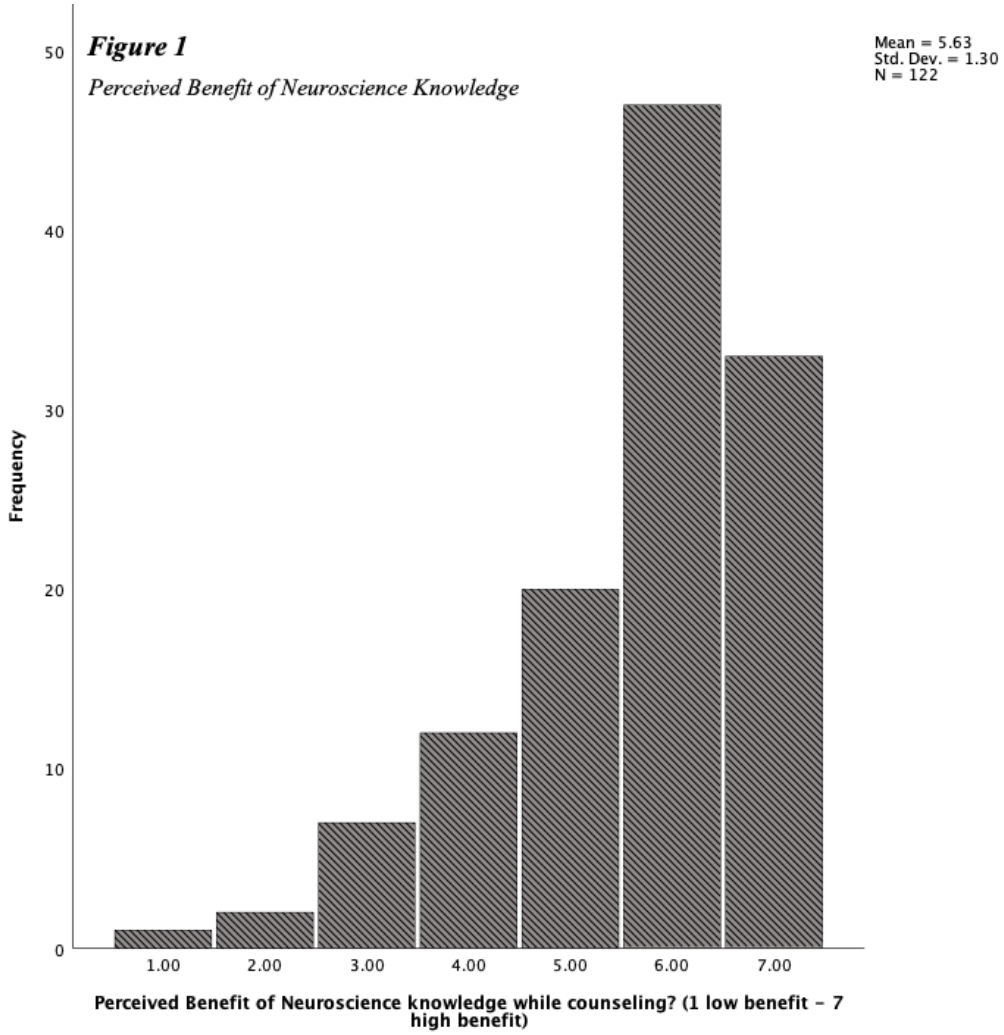
This is not a test. There are no right or wrong answers. Rather – it is an inventory that attempts to measure how you feel you will behave as a clinician in a counselling situation. Please respond to the items as honestly as you can so as to most accurately portray how you think you will behave as a clinician. Do not respond with how you wish you could perform each item - rather answer in a way that reflects your actual estimate of how you will perform as a clinician at the present time.

Below is a list of 37 statements. Read each statement, and then indicate the extent to which you agree or disagree with that statement.

1. When using responses like reflection of feeling, active listening, clarification, and probing, I am confident I will be concise and to the point.
2. I am likely to impose my values on the client during the interview. (6-1)
3. When I initiate the end of a session, I am positive it will be in a manner that is not abrupt or brusque and that I will end the session on time.
4. I am confident that I will respond appropriately to the client in view of what the client will express (e.g., my questions will be meaningful and not concerned with trivia and minutia)
5. I am certain that my interpretation and confrontation responses will be concise and to the point
6. I am worried that the wording of my responses lack reflection of feeling, clarification, probing, and may be confusing and hard to understand. (6-1)
7. I feel that I will not be able to respond to the client in a non-judgmental way with respect to the client's values and beliefs. (6-1)
8. I feel I will respond to the client in an appropriate length of time *neither interrupting the client nor waiting too long to respond) (6-1)
9. I am worried that the type of response I use at a particular time, i.e., reflection of feeling, interpretation, etc., may not be the appropriate response.
10. I am sure that the content of my responses i.e., reflection of feeling, clarification, and probing will be consistent with and not discrepant from what the client is saying.
11. I feel confident that I will appear competent and earn the respect of my client
12. I am confident that my interpretation and confrontation responses will be effective in that they will be validated by the client's immediate response.
13. I feel confident that I have resolved conflicts in my personal life so that they will not interfere with my counseling abilities.
14. I feel that the content of my interpretation and confrontation responses will be consistent with and not discrepant from what the client is saying.
15. I feel that I have enough fundamental knowledge to do effective counseling
16. I may not be able to maintain the intensity and energy level needed to produce client confidence and active participation. (6-1)
17. I am confident that the wording of my interpretation and confrontation responses will be clear and easy to understand.

18. I am not sure that in a counseling relationship I will express myself in a way that is natural, without deliberating over every response or action. (6-1)
19. I am afraid that I may not understand and properly determine probably meanings of the client's nonverbal behaviors. (6-1)
20. I am confident that I will know when to use open or closed-ended probes and that these probes will reflect the concerns of the client and not be trivial.
21. My assessment of client problems may not be as accurate as I would like them to be. (6-1)
22. I am uncertain as to whether I will be able to appropriately confront and challenge my client in therapy. (6-1)
23. When giving responses i.e., reflection of feeling, active listening, clarification, probing, I'm afraid that they may not be effective in that they won't be validated by the client's immediate response. (6-1)
24. I do not feel that I possess a large enough repertoire of techniques to deal with the different problems my clients may present. (6-1)
25. I feel competent regarding my abilities to deal with crisis situations that may arise during the counseling sessions e.g., suicide, alcoholism, abuse, etc.
26. I am uncomfortable about dealing with clients who appear unmotivated to work towards mutually determined goals. (6-1)
27. I may have difficulty dealing with clients who do not verbalize their thoughts during the counseling session. (6-1)
28. I am unsure as to how to deal with clients who appear noncommittal and indecisive. (6-1)
29. When working with ethnic minority clients, I am confident that I will be able to bridge cultural differences in the counseling process.
30. I will be an effective counselor with clients of a different social class.
31. I am worried that my interpretation and confrontation responses may not, over time, assist the client to be more specific in defining and clarifying their problem. (6-1)
32. I am confident that I will be able to conceptualize my client's problems.
33. I am unsure as to how I will lead my client towards the development and selection of concrete goals to work towards. (6-1)
34. I am confident that I can assess my client's readiness and commitment to change.
35. I feel I may give advice. (6-1)
36. In working with culturally different clients, I may have a difficult time viewing situations from their perspective. (6-1)
37. I am afraid that I may not be able to effectively relate to someone of lower socioeconomic status than me. (6-1)

Appendix D: Figure 1



Appendix E: Table 1

Table 1
Descriptive Statistics

	Range	Mean	SD	Skewness	Kurtosis
Perceived NS Knowledge	5.80	4.19	1.19	-.309	-.360
Perceived Benefit of NS Knowledge	6	5.63	1.29	-1.12	1.02
Counselor Self-efficacy	2.56	4.9	.545	-.329	-.227
Years of Experience	50	9.06	8.68	1.76	4.15
Licensure Tier	1	1.29	.454	.953	-1.10
Age	53	43.41	12	.599	-.258
Gender	3	1.88	.398	-.387	6.23
CACREP Status	1	1.2	.399	1.53	.360

Appendix F: Table 2

Table 2

Multiple Regression Results for Perceived Neuroscience Knowledge

	R^2	Adj. R^2	β	Std Error β	Sig
Constant	.211	.165	1.928	.924	.039
Age			.007	.012	.585
Years of experience			.024	.015	.106
Perceived Benefit of NS Knowledge			.328	.080	<.001
Licensure Tier			.049	.212	.818
Gender			-.011	.242	.963
CACREP Status			-.073	.245	.766

n= 110

Appendix G: Table 3

Table 3

Bivariate correlations for variables

		Perceived NS Knowledge	Counselor Self-Efficacy	Age	Years of Experience	Perceived Benefit of NS Knowledge	Licensure Tier	Gender	CACREP Status
Perceived NS Knowledge	Pearson Correlation	1	.338**	.228**	.200*	.389**	.095	-.127	-.004
	Sig (2-tailed)		<.001	.006	.016	<.001	.255	.126	.966
Counselor Self-Efficacy	Pearson Correlation	.338**	1	.257**	.210*	.217*	-.014	-.046	-.048
	Sig (2-tailed)	<.001	.	.003	.015	.026	.871	.596	.578
Age	Pearson Correlation	.228**	.257**	1	.667**	.033	.036	-.128	.123
	Sig (2-tailed)	.006	.003	.	<.001	.716	.654	.111	.124
Years of Experience	Pearson Correlation	.200*	.210	.667**	1	.034	-.075	-.109	.040
	Sig (2-tailed)	.016	.015	<.001	.	.708	.351	.174	.624
Perceived Benefit of NS Knowledge	Pearson Correlation	.389**	.217*	.033	.034	1	.036	-.251**	-.002
	Sig (2-tailed)	<.001	.026	.716	.708	.	.695	.005	.980
Licensure Tier	Pearson Correlation	.095	-.014	.036	-.075	.036	1	.051	.075
	Sig (2-tailed)	.255	.871	.654	.351	.695	.	.523	.352
Gender	Pearson Correlation	-.127	-.046	-.128	-.109	-.251**	.051	1	-.091
	Sig (2-tailed)	.126	.596	.111	.174	.005	.523	.	.259
CACREP Status	Pearson Correlation	-.004	-.048	.123	.040	-.002	.075	-.091	1
	Sig (2-tailed)	.966	.578	.124	.624	.980	.352	.259	.

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).