# The Relationships Among Neuroscience Knowledge, Traumatic Life Experiences, and Factors Related to Impairment Among Counselors

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*Article*

# The Relationships Among Neuroscience Knowledge, Traumatic Life Experiences, and Factors Related to Impairment Among Counselors

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**Abstract:** This study identifies and addresses the relationship among counselor impairment, counselor trauma experiences, and factors related to impairment. It seeks to identify one potential creative intervention that might assist in the reduction of impairment, through counselor knowledge and use of neuroscience. Using a quantitative study design, participants were recruited and participated in completion of a multiple measurement survey, in which they provided data regarding neuroscience use and knowledge, trauma history, compassion satisfaction, burnout and secondary traumatic stress, and posttraumatic growth. Data was analyzed using stepwise multiple regression and canonical correlation analysis, in order to root out themes within the data. Possible implications of the study data include increasing understanding of how neuroscience knowledge relates to counselor levels of impairment, past trauma, and posttraumatic growth, as well as the need for ongoing support for research regarding the creative incorporation of neuroscience into counselor education and supervision. Additionally, how the use of neuroscience might act as a predictor of levels of PTGI and creative metacognition in counselors with past trauma experiences.

**Keywords:** counselor education and supervision; neuroscience-knowledge; counselor; impairment; trauma; creative psychoeducation; stepwise multiple regression; canonical analysis

## Introduction

Counselors require empirically validated opportunities for posttraumatic growth, through which they can address trauma experiences (Panskepp & Biven, 2012; Wilkinson, 2018), as they have often experienced trauma at varying degrees. When traumatic experiences go unresolved, there is potential for associated symptoms to interfere with ethical practice, clients' trauma treatment, in addition to professional identity development and resilience (Wilkinson, 2011). Theory and technique, backed by recent advances in neuroscience, provide opportunities for growth in both counselors and clients. As a result of increased access to neuroscience concepts, counselors can creatively explain how various techniques work from a physiological perspective. They can also address how brain physiology relates to behavioral change in clients who have experienced trauma (Morgenstern et al., 2013)

The Council for Accreditation of Counseling and Related Educational Programs (CACREP, 2014) and the American Mental Health Counseling Association (AMHCA, 2020) both note neuroscience concepts as standards for inclusion in counselor education programs. However, integrating neuroeducation and neuroscience principles into practice, incorporating these principles in counselor education programs, and including them in supervision models remain underrepresented research areas (Field, 2016). Additionally, limited research has been conducted which addresses the benefits of neuroscience integration to counselors specifically, or its impact on creative cognition, professional identity and sense of resilience.

Lack of self-efficacy stemming from unresolved past trauma and secondary traumatic stress experiences can put counselors at risk of impaired practice. Impaired counselors are at increased risk of maintaining inappropriate boundaries as well as struggling with transference and

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countertransference issues in counselor-client relationships (Blaylock, 2019; Prikhidkho & Swank, 2019). Impaired counselors' compassion satisfaction and fatigue levels can fluctuate (Everall & Paulson, 2004; Figley, 2002), which can impact their levels of cognitive functioning, profoundly interfering with the counselor-client relationships, and potentially causing significant client harm (Robino, 2019). Due to these very real ethical concerns, it is essential to consider counseling methods that can provide counselors with opportunities for posttraumatic growth when working with their clients.

Studies addressing the neuroscience of common mental health concerns, including depression, anxiety, and posttraumatic stress disorder (PTSD), support counseling's efficacy by showing how the brain reacts to creative, therapeutic interventions (Calvo et al., 2019; Field et al., 2019). Neuroeducation explains neurological processes or internal events that move people out of homeostasis and into action so that they can successfully adapt to their environments (Derakhshanrad et al., 2013). It also describes the neurological processes that are the basis for mental health functioning. Educating clients on these processes may increase the sense of shared responsibility for goals, agreement on tasks, bonds between counselors and clients, and reduce self-blame (Ardito & Rabellino, 2011; R. Miller, 2016). Via creative, neuroscience-based psychoeducation, counselors can explain evolutionary concepts like brain neuroplasticity and neurogenesis to their clients during counseling (Ivey et al., 2009; Wilkinson, 2018).

Through potentially addressing burnout and secondary traumatic stress symptoms, known to affect levels of attunement (Stamm, 2010), counselors with a history of traumatic life events may become less susceptible to impairment. Those using neuroeducation or increasing their neuroscience-knowledge base may be more flexible in creative cognition, enhancing their resilience and empathetic (Brockhouse, et al., 2011). Professionals who have their own experiences with traumatic life events and are aware of the physiological processes behind their reactions, the evolutionary basis of these reactions, and also creative intervention methods, can address impairment issues related to unresolved personal concerns (Panksepp & Biven, 2012; Wilkinson, 2018).

The American Counseling Association (ACA), the Association of Counselor Education and Supervision (ACES), and CACREP provide clear gatekeeping directives that describe counselor educator and supervisor responsibilities for protecting the profession's integrity. Gatekeepers address concerns related to professional counselor impairment that could result in harm to future clients (Homrich, 2009). Professional ineffectiveness can result when counselors do not change and grow (Yager & Tovar-Blank, 2007); often a result of becoming stuck in methods of coping that are either ineffective or hazardous within the professional context, leading to a lack of professional self-efficacy (Panskepp & Bivens, 2012). These often stem from earlier life experiences where a productive platform for developing metacognition was nonexistent (Brinck & Liljenfors, 2013).

## Neuroscience, Self-Efficacy, Compassion and Posttraumatic Growth

Aside from the benefits of additional professional competency in this vital content area, counselors might benefit personally from learning about the biogenetic roots of their own traumatic experiences (Panskepp & Bivens, 2012). Compassionate counselors connect to client suffering, which helps clients feel understood, identified with, liked, and involved in a positive therapeutic relationship (Vivino et al., 2009). While considered an innate quality, compassion can be further developed and is an essential part of many therapeutic models, as well as a driving force in our ability to integrate new methods of knowing and exploring (Wilkinson, 2011).

From the perspective of counselor self-efficacy theory, integrating neuroeducation in therapy may help to prevent compassion fatigue, which occurs when counselors become so preoccupied with the suffering of others that they experience secondary traumatic stress and burnout (Coetzee & Laschinger, 2018). In a study on compassion in psychotherapy, a sense of incompetence was listed as a typical reason why counselors felt less compassionate toward clients (Vivino et al., 2009); limiting the counselor's ability to creatively engage in the therapeutic relationship.

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Mental health professionals who become aware of their past traumatic experiences can use this awareness to modify and alter specific aspects of the self (Sartor, 2016). This includes the sense of inadequacy, insecurity, and incompetence often stemming from their traumatic histories and repeated exposure to client trauma narratives, that may undermine their personhood and worldviews (Theriault & Gazzola, 2005; Williams et al., 2012). Counselor awareness also provides a potential opportunity for increased attunement, as a result of the internal resonance process that occurs in the mirror neuron system (Siegel, 2012). The ability to adapt and change one's behavior as a result of watching these changes occur in others can help counselors experiencing their posttraumatic growth through working with clients experiencing this growth (Bybee, 2018). While the field provides evidence of psychoeducation as a tried-and-true method for assisting clients in developing posttraumatic growth (Counselman-Carpenter, 2017; Ochoa et al., 2017), counselors may also experience posttraumatic growth as a result of the creative nature of neuro(psycho)education.

## Current Attitudes on Neuroscience

Counselors competently addressing a client's experience in neuroscientific terms increases their engagement in therapy, responsibility for therapeutic outcomes (Field et al., 2016; Panskepp & Bivens, 2012) and enhances the overall therapeutic relationship through increased professional self-efficacy (Field et al., 2017; R. Miller, 2016). Because of its impact on client outcomes, whether neuroscience-knowledge levels relate to compassion satisfaction, compassion fatigue and vicarious posttraumatic growth in counselors requires further study as well.

While there is much research addressing the potential benefits, there are also some humanistically oriented counselors, who have expressed concerns regarding reductionist practices from the natural sciences and the need to avoid objectifying or dismissing lived human experiences (Busacca et al., 2015; Ivey & Zalaquett, 2011; Wilkinson, 2018). More specifically, they have aimed at the hard problem of consciousness or first-person subjective experiences that they believe neuroscience cannot explain (Wilkinson, 2018). Consciousness, loosely defined as meta-awareness of first-person experience or an individual's ability to think about thinking and then report on it, has historically posed a methodological challenge as it is difficult to describe and quantify (Lutz & Thompson, 2003). From the humanistic perspective, neuroscience's experimental protocols do not include the first-person perspective, instead relying on third-person research. Bridging the gap between first-person reports and third-person research drives concerns about neuroscience discounting phenomenological explanations of the lived human experience (Lutz & Thompson, 2003; Wilkinson, 2018).

However, research has also tied neuroscience education to positive client outcomes such as shame reduction (R. Miller, 2016), a renewed sense of control and motivation to continue therapy, and increased life satisfaction (Hopkins et al., 2016b). Hopkins et al. (2016a) found that client eagerness for a deeper understanding of the physiological components of their thoughts and feelings was so strong that merely discussing neuroscience topics positively impacted therapeutic outcomes. Additionally, whether the discussion of neuroscience topics occurs in support of an ongoing treatment method or as mere talking points with no therapeutic objective, did not seem to matter, and the positive impact on outcomes occurred regardless.

## Current Gaps in the Literature

Few researchers have found evidence of therapeutic interventions that may increase posttraumatic growth for both clients and counselors. Nor have they focused on the relationship between a professional's personal experience, enhanced awareness of therapeutic interventions that increase posttraumatic growth, and how the use of these interventions relate to self-efficacy. At this time, I was not able to locate any existing literature that addressed whether neuroscience-knowledge or using neuroscience in counseling might help to address ethical concerns related to professional impairment in counselors. Nor could I find research on how using neuroeducation in counseling

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might impact compassion satisfaction or fatigue in counselors or impact therapeutic outcomes in clients. Looking at the relationship between counselors' neuroscience-knowledge levels and their potential impact on compassion satisfaction or fatigue, including burnout and secondary traumatic stress, as well as on vicarious posttraumatic growth, may provide insights into how this particular creative counselor skill may impact professional efficacy.

## Research Questions

The purpose of this study was to examine the relationships among posttraumatic growth, compassion satisfaction, burnout, and secondary traumatic stress, as they relate to counselor past trauma and knowledge of neuroscience. The following research questions guided the study:

1. What is the canonical relationship between a composite of the predictor scores of neuroscience-knowledge and past trauma, and a composite of the criterion scores of posttraumatic growth, compassion satisfaction, burnout, and secondary traumatic stress?
2. What is the Multiple R and the increase in R as the predictors of 1) neuroscience-knowledge, and 2) Past Trauma (LEC) scores are added to the equation for predicting the criterion of Posttraumatic Growth (PTGI)?
3. 3. What is the Multiple R and the increase in R as the predictors of 1) neuroscience- knowledge, and 2) Past Trauma (LEC) scores are added to the equation for predicting the criterion of compassion satisfaction?
4. What is the Multiple R and the increase in R as the predictors of 1) neuroscience- knowledge, and 2) Past Trauma (LEC) scores are added to the equation for predicting the criterion of compassion fatigue subscale burnout?
5. What is the Multiple R and the increase in R as the predictors of 1) neuroscience- knowledge, and 2) Past Trauma (LEC) scores are added to the equation for predicting the criterion of compassion fatigue subscale Secondary Traumatic Stress?

## Method

*Panel Selection*

Participants were recruited through purposive criterion sampling, and received a recruitment letter via email through various counseling listservs as well as by invitation through counseling and counseling association interest groups. The letter provided information such as the study purpose, the participant's role, and potential risks and benefits. The invitation included a link to the self-report questionnaire, which included study assessments which could be completed by counselors meeting criteria of being a practicing counselor.

*Data Collection*

Data was collected through QualtricsXM (Qualtrics, 2020) survey containing a demographics form, a neuroeducation self-report, the Life Events Checklist (LEC-5; Weathers et al., 2013), the Professional Quality of Life Scale-Version 5 (ProQOL5; Stamm, 2010), and the Posttraumatic Growth Inventory (PGI; Tedeschi & Calhoun, 1996).

*LEC-5*

The LEC-5 self-report tool is used to assess experiences of traumatic events. It includes 17 items that are considered traumatic such as natural disasters, incidents of violence, and injury or death, among others, that individuals may have witnessed or learned about or which could have happened to them. Participants also indicated if the trauma was a result of their job (Weathers et al., 2013). For each past traumatic event, clients rated their experience of the event on a 5-point nominal scale: 1 = happened to me, 2 = witnessed it, 3 = learned about it, 4 = not sure, and five = does not apply (Gray et al., 2004).

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The LEC has adequate interrater reliability, with a mean kappa value for all items of .61 and a Test-retest correlation of r =.82, p < .001. Convergent validity of the LEC has been measured through comparison with similar measures such as the Traumatic Life Events Questionnaire, (Kubany et al., 2000), with a total scale correlation of r = –.55, p < .001, and has demonstrated strong convergence with the PTSD Checklist (Weathers et al., 1991), and the PTSD Checklist-Military version (U.S. Department of Veterans Affairs, 2019). It is one of the most commonly used trauma measures for adults, as indicated by its development as a method of assessing individuals for meeting PTSD diagnostic criteria in the DSM-5 (Elhia et al., 2005; U.S. Department of Veterans Affairs, 2019).

*Neuroeducation Use*

Participants completed a neuroeducation self-report to determine if they use neuroeducation with clients. This self-report was created for this study through a thorough review of the literature as well as a Delphi study I completed before this study that confirmed the most common topics addressed when providing neuroeducation to clients (Epstein & McRoberts, 2020). Participants were asked to state if they do or do not use neuroeducation in their practices. This data was collected for post hoc examination, although it was not included in this study analysis.

*Neuroscience-Knowledge and Neuromyths Questionnaire*

Accuracy of neuroscience-knowledge was assessed using an item questionnaire based on the Organization for Economic Cooperation and Development's (2002) Neuromyths research findings as well as Howard-Jones's (2014) neuroscience-knowledge findings. The Neuroscience Knowledge and Neuromyths Questionnaire has been included in numerous previous research studies (Anderson & Dela Salla, 2012; Dekker et al., 2012; Howard-Jones, 2014; Macdonald, 2018; Weisberg et al., 2008) addressing neuromyths and neuroscience-knowledge in education and counseling settings worldwide.

The Neuroscience Knowledge and Neuromyth survey questions align with the current AMHCA (2020) standards on neuroscience-knowledge and practice for counselors. The initial questionnaire contained 32 questions, all related to AMHCA standards. The questionnaire's current form included these 32 items, 15 of which are neuromyths as defined by the OECD (2002), such as "Individuals learn better when they receive information in their preferred learning style (e.g., auditory, visual)." The remaining 17 statements are general claims about the brain, such as "The left and right hemisphere of the brain always work together" (Howard-Jones, 2014). Some have adopted this measure to include an "I don't know" column, this option will not which was also included in this study survey, with "I don't know" items combined with false answers during analysis. Additional sample questions include "Production of new connections in the brain can continue into old age" and "We only use 10% of our brain."

Participants were scored based on incorrect and correct item answers. A total score of 32 points is possible, with a minimum score of 0, or no correct answers. Individual total scores ranged from 0–32 possible points, and each score was left in this format, then analyzed in combination with scores on the LEC-5 and PTGI.

Dekker et al.'s (2012) Neuromyth Survey has been used in empirical studies worldwide to assess belief in neuromyths and has produced similar results (Gleichgerrcht et al., 2015; Karakus et al., 2014; Rato et al., 2013), suggesting that this measure has internal consistency. Additionally, per email communication with the authors, as noted in two other studies (Murtaugh, 2016; Palis, 2016), the Neuromyth Survey has a reliability using Cronbach's alpha of .46. Content validity is also demonstrated by the use of expert neuroscientists who took the pilot survey and from which statements with consensus on either true or false answers were included in the published version.

*Posttraumatic Growth Inventory (PTGI)*

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The PTGI (Tedeschi & Calhoun, 1996) rates the extent to which participants feel they have experienced growth. Participants were asked to rate 21 areas that are sometimes reported to change after traumatic events from 0 (I did not experience this change as a result of my crisis) to 5 (A very great degree as a result of my crisis). Intermediate scale anchors are 1 (I experienced this change to a very small degree), 2 (a small degree), 3 (a moderate degree), and 4 (a great degree). Participants rated their growth in the five areas of relating to others, identifying new possibilities, personal strength, spiritual change, and appreciation of life. Total scores ranged from 0 to 105, with scores below 60 indicating a low level of growth, scores between 60 and 79 indicating a moderate level of growth, and scores 80 or above indicating a high level of growth (Tedeschi & Calhoun, 1996). The PTGI was used to assess PTG levels among the participants in the proposed study. This assessment was used to assess the extent to which counselor PTG scores relate to scores on the LEC and neuroscience-knowledge total scores in terms of directionality and significance.

The PTGI has been used in several other studies to measure PTG in various populations. Counselors were instructed to focus on the questions in terms of their work with clients as opposed to their own experience of a crisis directly (i.e., the experience is not a result of a personal crisis but instead as a result of their work with clients; Linley & Joseph, 2007; Shiri et al., 2008). Tedeschi and Calhoun (1996) reported the PGI's reliability to be .90 for the 21 items altogether, and internal consistency of the individual factors ranging from $\propto$ = .67 – .87. Additional evidence of this measure's validity has been addressed by comparing responses to other growth reports (Shakespeare-Finch & Enders, 2008; Weiss & Berger, 2006).

*Professional Quality of Life Measure Version 5*

The ProQOL5 (Stamm, 2010) is a 30-item self-report measure that asks participants about experiences in the last 30 days. It contains measures for compassion satisfaction, burnout, and secondary traumatic stress. Scores in these areas were used to assess the extent to which counselors in the proposed study have experience in each of these three areas. ProQOL scores in these areas were individually analyzed as they relate to the LEC and the Neuroscience Knowledge Survey findings.

The three scale areas were scored independently. Calculations of scores on the ProQOL are manualized and required either reversing certain items, then summing the total of items identified as a part of each subsection. The purpose of this assessment was not to achieve a composite score, but to obtain scores in these three different areas as a method of identifying positive and negative aspects of counseling work.

The ProQOL has been used in over 200 published studies and has good construct validity (Stamm, 2010). Reliability has been measured independently for each subscale area as follows: Compassion Satisfaction alpha scale reliability = 0.88, Burnout alpha scale reliability – 0.75. Secondary Trauma alpha scale reliability = not given (Stamm, 2010). Permission was granted to use ProQOL5 in the proposed study.

*Data Analysis*

Data was collected from September 28, 2020, to October 14, 2020, at which time a total of 178 responses had been collected. 135 contained complete data sets. Data was analyzed using JASP (2020) for multiple regression, and the XLSTAT (2020) package for Microsoft Excel, for canonical correlation analysis. A canonical analysis was used to answer research question one, while a multiple regression analysis was used for data analysis of research questions two through five. Multiple regression was completed to investigate the relationships between and among the predictor variables of levels of past trauma and neuroscience-knowledge, and criterion variables of Posttraumatic growth, Compassion Satisfaction, and compassion fatigue subscales of burnout and Secondary Traumatic Stress. A Canonical Correlation Analysis (CCA) was conducted to determine what relationship existed between composite scores of the predictor variables (trauma scores and neuroscience-knowledge scores) and criterion variables related to impairment.

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Using JASP (2020), each variable was examined in isolation; through the creation of plots, as well as a frequency distribution for each variable independently. Frequency distributions were created for past trauma scores and neuroscience-knowledge scores. The main effect multiple regression model was created before the creation of an interaction model, which allowed for a significance test of the difference between the R-squared values. After this, the data was analyzed to determine the practical significance of each correlational relationship.

## Results

*Participant Demographics*

Data was collected from September 28, 2020, to October 14, 2020, at which time a total of 178 responses had been collected. Partial responses were disqualified from analysis to ensure that all responses could be analyzed using both Multiple Regression and Canonical Correlation Analysis techniques. Partial data was kept for post-hoc analysis along with complete responses. In total, 135 complete responses were collected and analyzed.

These 135 responses included demographics, neuroscience self-report responses, as well as scores from the LEC-5, NKQ, PROQOL-5, and PTGI measures. Descriptive values from the LEC-5 and NKQ measures were converted into numerical data. Each participant's complete data set was then summed into a total score for each measure. PROQOL subscale Burnout scores required some reversing of scores per PROQOL-5 scoring instructions (Stamm, 2010), after which totals were summed as well.

*Participant Demographics*

All 135 participants identified as current, practicing counselors, and consented to the study. Ages ranged from 29 to 73 years, with a mean age of 42.6 years (SD= 12.20). 121 participants identified as female (89.6%), 15 male (11.1%), and 1 non-binary (0.007%). 10 identified as African American (7%), 1 as Asian (0.007%), 126 as Caucasian (93.3%), 7 as Hispanic/Latino (5%), and 3 as Other (2%).

Participants reported stated of residence as Alabama (1), Arizona (2), Alaska (3), California (4), Connecticut (4), Delaware (1), Florida (5), Georgia (5), Hawaii (2), Idaho (1), Illinois (4), Indiana (1), Kentucky (7), Louisiana (2), Maine (2), Maryland (3), Massachusetts (2), Michigan (2), Missouri (3), Mississippi (1), Montana (1), North Carolina (2), New York (1), New Hampshire (1), New Mexico (1), Ohio (7), Oregon (3), Pennsylvania (23), South Carolina (3), Tennessee (4), Texas (24), Wisconsin (6), and West Virginia (2). In addition, 1 participant reported residence in Northwest Australia.

Mental health counseling credentials reported were professional counselor (88), social worker (21), school counselor (16), psychologist (6), and other (4). Participants reported levels of education as bachelor's (1), master's degree (113), doctoral degree (17), and other (4). Years of experience ranged from 0 to 50 (Mean = 11.31, SD = 9.86). Participants self-reported 55 different primary theoretical orientations. 111 participants (82.2%) reports using neuroeducation in practice, while 24 (17.7%) reported they did not. Of those that answered "yes" to using neuroeducation with clients, years of use ranged from 1 to 30 years, (Mean=5.81, SD=5.24). Clinicians who did report use of neuroeducation with clients, reported varying percentages of clients with whom they addressed neuroeducation (M=58.896%)

## Descriptive Data by Assessment

*Life Experiences Checklist-5 (LEC-5)*

Participant mean score on the LEC-5 was 16.86 out of a total of 68 possible points. While this score is low compared to the possible number of points, this suggests that participant clinicians are reporting that in total, they have either experienced, witnessed, heard about, or been told about a total of 16.86 traumatic events. The top three scoring traumas reported by participants were sexual

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assault (177 answers), other unwanted sexual experiences (214), and other stressful or traumatic life events (215). Given that these numbers are greater than the total participant pool (N=135), this suggests that a number of participants have experienced more than one type of trauma in each of these areas.

*Neuroscience Knowledge and Neuromyth Questionnaire (NKQ.)*

Participants' mean score on the NKQ was 18 out of a total of 32 points. This equates to a 56% score on the NKQ, if the NKQ was being given like a test. Three items on the NKQ contained the most incorrect answers, with only 4 participants answering correctly on question 21 (3% of participants), 2 on question 25 (1% of participants), and 4 on question 30 (3% of participants). Interestingly, all three of these questions are neuromyths (discussed in Chapter Two).

*Professional Quality of Life Assessment (PROQOL)*

**Compassion Satisfaction Subscale (CS).**

Participants' mean score on the CS subscale was 41.87 (SD= 5.12), out of a possible score of 50. Participants total scores on individual questions related to compassion satisfaction were highest on questions 22 (M=4.42 out of 5), "I believe I can make a difference through my work," 24 (M=4.39), "I am proud of what I can do to help," and 30 (4.41), "I am happy that I chose to do this work."

**Burnout Subscale (BO).**

Participants' mean score on the BO subscale was 21.4 (SD=5.64). Mean scores on questions related to burnout ranged from 1.62 to 2.89 out of 5. Individual questions with the highest averages were questions 19 (M=2.896), "I feel worn out because of my work as a helper," 21 (M=2.58), "I feel overwhelmed because my caseload seems endless," 26 (M=2.81), "I feel bogged down by the system."

**Secondary Traumatic Stress Subscale (STS).**

Participants' mean score on the STS subscale was 21.18 (SD=6.26). Mean scores on individual questions ranged from 1.50 to 2.88 out of 5. Individual questions with the highest averages were questions 5 (M= 2.88), "I jump or am startled by unexpected sounds," 7 (M= 2.44), "I find it difficult to separate my personal life from life as a helper," and 11 (M= 2.296), "Because of my helping, I have felt "on edge" about various things.

*Posttraumatic Growth Inventory (PTGI)*

Participants' mean score on the PTGI was 60.66 (SD= 24.21). According to the PTGI scoring information, below 60 is equivalent to low posttraumatic growth, 60-79: moderate, and 80+ as high growth. Participant average scores were highest on questions 2 (M=3.41), "I have a greater appreciation of the value of my own life," 10 (3.50), "I know better that I can handle difficulties," and 15 (3.36), "I have more compassion for others." Participant scores were lowest on questions 14 (M=2.46), "I am able to do better things in my life," 20 (M= 2.36), "I am more likely to try to change things which need changing," and 21 (M= 2.33), I have a stronger religious faith.``

**Canonical Correlation Analysis**

A canonical correlation analysis (CCA) was conducted to explore the relationship between two multivariate sets of variables all measured on the same individuals. In this case, the relationship measured was between a composite of the predictor variables of neuroscience-knowledge and past trauma, and a composite of the criterion variables of compassion satisfaction, burnout, secondary traumatic stress, and posttraumatic growth (Figure 1). Analysis was completed using XLSTAT (2020). Multivariate normality and homogeneity of variance was assessed through the creation of plots and a correlation matrix, as well as computation of Eigenvalue and Wilk's Lambda ($\lambda$) scores. The alpha level was set at a standard $\alpha$=.05. CCA advantages include a reduced likelihood of Type 1 error, as only one test is performed which simultaneously compares variables, thus reducing the test wise (TW) error rate. CCA also honors the reality of research by allowing for the investigation of multiple

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causes and effects at the same time (Sherry & Henson, 2005). The CCA results were used to answer Hypothesis One.

**$H1_0$**

The CCA contained linear combinations of the variables within each set, and between sets. Summary statistics for each variable are shown in Table 1. The midline separates Y1 variables past trauma and neuroscience, from Y2 variables compassion satisfaction (CS), burnout (BO), secondary traumatic stress (STS), and posttraumatic growth (PTGI). All variable observations contained complete data sets, with no missing data present. Table 1 also provided evidence of how the variable scales differed in maximum and minimum values, mean and standard deviation.

In this data set, there were a total of two canonical functions. The two synthetic variables (composites of the predictor and criterion variables) within the first function (F1) yielded a squared canonical correlation (eigenvalue) of .053. The second function (F2) yielded a squared canonical correlation of .010. The Wilks Lambda test, explained the variance unexplained by the model which was found to be .938 and .990. Collectively, the full model across all functions was found to not be significant, given the Lambda values, and associated Pr>F statistics of .403 and .740 (Sherry & Henson, 2005).

**Table 2.** Correlation Matrix.

| *Variables* | *LEC-5* | *NKQ* | *PRQ CS* | *PRQ BO* | *PRQ STS* | *PTGI* |
|---|---|---|---|---|---|---|
| *LEC-5* | ***1*** | | | | | |
| *NKQ* | *0.093* | ***1*** | | | | |
| *PRQ CS* | *-0.063* | *0.199* | ***1*** | | | |
| *PRQ BO* | *0.059* | *-0.129* | *-0.647* | ***1*** | | |
| *PRQ STS* | *-0.004* | *-0.107* | *-0.311* | *0.647* | ***1*** | |
| *PTGI* | *0.027* | *0.122* | *0.286* | *-0.098* | *0.149* | ***1*** |

As noted, Pr (.403, 0.740) > F (1.045, 0.419), indicating that there is no significance of the relationship between a composite of the predictor scores of neuroscience-knowledge and past trauma, and a composite of the criterion scores of posttraumatic growth, compassion satisfaction, burnout, and secondary traumatic stress. Additionally, as demonstrated by Tables 6 and 7, F1 and F2 correlations are minimal at 0.230 and 0.098 respectively, (Sherry & Henson, 2005). Based on this data, this writer fails to reject the null hypothesis, as neither of the functions are considered noteworthy.

*Analysis of Individual Variable Importance*

While $H1_0$ failed to be rejected, the correlation matrix containing canonical variates was reviewed in order to interpret the correlations between canonical variate pairs. According to the correlation matrix, there is little relationship among the predictor variables of neuroscience-knowledge and past trauma scores, suggesting these variables are not highly correlated. There is a stronger relationship among the criterion variables, as evidenced by higher correlation scores between Burnout and Compassion satisfaction (-0.647) which are inversely related, and burnout and secondary traumatic stress (0.647), which are positively correlated. There is also a moderate, inverse correlation between secondary traumatic stress and compassion satisfaction scores (-0.311). Limited correlation exists between criterion and predictor variables according to the correlation matrix, with

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the strongest positive correlations existing between posttraumatic growth and compassion satisfaction (0.286), and neuroscience-knowledge and compassion satisfaction (0.199).

Relevant predictor and criterion variables are represented by the standardized canonical coefficients (Tables 9 and 10). According to the F1 predictor variables (Table 9), the primary contributor to the composite variable was neuroscience knowledge, with a weight of .995. The primary F1 contributor to the criterion composite was compassion satisfaction. With a weight of .848, with more minimal contributions coming from STS (-.391) and PTG (.339).

*Stepwise Multiple Regression Analysis*

A stepwise multiple regression was conducted using JASP (2020) to evaluate hypotheses two, three, four, and five, and examined the relationships among posttraumatic growth, compassion satisfaction, and burnout and secondary traumatic stress (STS), as they relate to counselor past trauma and knowledge of neuroscience. At each step, each criterion variable was entered first, followed by each of the predictor variables in turn, to determine the increase in R and Multiple R at each step. Stepwise criteria for probability to enter was set at p <= .050, and probability of p to remove p=> .100, as this is the standard. Assumptions testing was completed at each step to rule out multicollinearity using the Variance Inflation Factor (VIF) and tolerance analysis. The results are described below by hypothesis. For **$H2_0$**, **$H4_0$, and $H5_0$,** there was no increase in R as either predictor variable was added into the equation. Therefore, the null hypothesis was accepted.

**$H3_0$**

A stepwise multiple regression was conducted to evaluate whether a practical increase in R would occur at each step of neuroscience-knowledge and past trauma being added to the equation for compassion satisfaction. At step one, no increase in R occurred as a result of the addition of past trauma. Step two, indicated an increase in R of 0.199 and R2 of 0.040, with a $p < 0.021$ (Tables 3 and 4). This suggests that a significant relationship exists between neuroscience-knowledge and compassion satisfaction, with 4% of the variance of compassion satisfaction scores accounted for by neuroscience-knowledge. Past trauma did not enter into the equation at step 2. Since the analysis indicated a change in R and Multiple R, the null hypothesis is rejected. However, the standard error of 0.13 (Table 5) should be taken into consideration, as it indicates that estimates with this model may be wrong up to 13% of the time.

**Table 3.** Summary statistics.

| Variable | Observations | Obs. with missing data | Obs. without missing data | Minimum | Maximum | Mean | Std. deviation |
|---|---|---|---|---|---|---|---|
| LEC-5 | 135 | 0 | 135 | 0.000 | 51.000 | 16.859 | 9.527 |
| NKQ | 135 | 0 | 135 | 0.000 | 30.000 | 18.030 | 3.432 |
| PRQ CS | 135 | 0 | 135 | 27.000 | 50.000 | 41.874 | 5.101 |
| PRQ BO | 135 | 0 | 135 | 10.000 | 38.000 | 21.400 | 5.703 |
| PRQ STS | 135 | 0 | 135 | 11.000 | 44.000 | 21.178 | 6.252 |
| PTGI | 135 | 0 | 135 | 0.000 | 102.000 | 60.659 | 23.674 |

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**Table 5.** Stepwise Summary for PRoQOL Compassion Satisfaction with Past Trauma at Step One.

| Step | R | $R^2$ | Adjusted $R^2$ | RMSE | $R^2$ Change | F Change | df1 | df2 | p |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.000 | 0.000 | 0.000 | 5.101 | 0.000 | | 0 | 134 | |
| 2 | 0.199 | 0.040 | 0.032 | 5.018 | 0.040 | 5.477 | 1 | 133 | 0.021 |

## Summary

Results of the stepwise multiple regression found that there was not a statistically significant relationship among the two predictor variables of neuroscience-knowledge and past trauma, and posttraumatic growth, burnout or secondary traumatic stress as evidenced by a zero change in the values of R or Multiple R at each step. There was a statistically significant, yet very minimally correlated relationship between neuroscience-knowledge, when added to the equation for compassion satisfaction, at the second step, upon the removal of the past trauma variable. Analysis of the composites of the predictor and criterion variables found no significant relationship overall, among all variables. However, statistically significant relationships among individual variate pairs include .

## Discussion

Counselors require empirically validated opportunities for posttraumatic growth, through which they can address unresolved personal concerns (Panskepp & Biven, 2012; Wilkinson, 2018). The purpose of this study was to address current gaps in the literature related to the relationships among factors related to impairment, trauma experiences, and neuroscience knowledge. While previous research in areas of trauma and growth among counselors has demonstrated that counselors' ability to increase awareness of their emotions and regulate them assists with maintaining benevolence and empathy, increases self-efficacy, and may help to prevent compassion fatigue (Bandura, 1977; Rozensvit, 2016; Stamm, 2010), the results of this current study found few significant relationships between individual factors of impairment and neuroscience-knowledge scores, or among composites of neuroscience-knowledge, past trauma, and factors related to impairment.

However, analysis of individual measurement data provided an informative snapshot regarding the number of clinicians who report trauma exposure. This validates existing population data suggesting the extent of trauma exposure occurring nationwide (US. Census Bureau, 2016). Counselor compassion satisfaction scores were high, overall, suggesting that the population of counselors studied mostly experienced high levels of compassion satisfaction. Interestingly, posttraumatic growth scores were low, suggesting that while counselors find themselves with a high level of compassion satisfaction, they are experiencing only minimal levels of posttraumatic growth. While previous research has identified that posttraumatic growth may help to prevent compassion fatigue (Coetzee & Laschinger, 2018), this study did not find a significant relationship between these two variables either.

This study, while providing an interesting snapshot of the data, was also fairly skewed geographically. As demonstrated by the location demographics in Chapter Four, the majority of participants were from East Coast states. While counselors from all across the U.S. were invited to participate, this study mainly pulled participants from the East coast and as a result, is mostly representative of neuroscience-knowledge, trauma experience, and impairment in this area.

### *Limitations of the Study*

Limitations to this study included that study design did not include questions regarding whether the participant population had received any form of counseling treatment which may have

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already addressed previous trauma. This may be an area to incorporate into future research as a method of comparison. Additionally, the inclusion of a participant population which included all types of practicing counselors may have limited the study as well. Given that a neuroeducation self-report was included in the survey, it would have been possible to limit the study to only counselors who report to use neuroeducation or believe they have neuroscience-knowledge. However, this may have led to an underpowered survey, given that of the 179 surveys collected, only 135 were fully completed.

The generality of this study was also a limitation. In an effort to collect a wide breadth of descriptive data, and information representative of *impairment,* the study ended up containing over 80 questions. From the incomplete response rates collected (25% incomplete, 75% complete), this writer observed that many of these responses were incomplete towards the end. Since the survey data included a percentage scale of completeness, this writer could see that many participants completed up to 86% of the survey, and then simply never finished. It is possible that the length of the survey led to fatigue, which limited the number of full responses.

The outbreak of the COVID-19 pandemic, which occurred during the time of this study, may have acted as a limitation as well. Given that COVID-19 has affected the ability of therapists to work in person, it is possible that response rates, as well as scores on the survey, were impacted (Nissen, 2020; Sanderson et al., 2020). The COVID-19 pandemic is its own trauma, affecting the social, emotional and economic well-being of counselors and clients (Taylor et al., 2020), and therefore, there is no real precedent this writer was able to use to determine the most contextually sensitive, yet effective methods of survey transmission and data collection.

*Recommendations for Future Research*

While this study provided limited insight into the potential benefits counselors may experience from neuroscience knowledge, or its impact on past trauma and impairment, it did provide evidence of the need for future exploration in this area. Future research might further defining what neuroscience knowledge means specifically, to counselors as opposed to clients alone, as well as what methods can be used to disseminate this information to counseling groups. While neuroscience knowledge is now an identified standard in both AMHCA (2020) and CACREP (2016) guidelines, the data collected from the Neuroscience Knowledge and Neuromyth Questionnaire (Howard-Jones, 2014) suggests that even counselors who reported years of neuroscience use, subscribed to a number of neuromyths, and maintained a subpar level of accuracy in neuroscience information overall (M=18 out of 32 correct answers, equivalent to a test score of a 56%).

Additionally, one interesting aspect of this dissertation study was the neuroeducation self-report in which clinicians who did report use of neuroeducation with clients, reported varying percentages of clients with whom they addressed neuroeducation (M=58.896%). Previous research has also indicated some therapist preference regarding use of neuroscience with differing populations, as they questioned effectiveness (Field, Beeson, & Jones, 2016). Future research may wish to address therapist rationale regarding how clinicians assess clients as appropriate for neuroeducation, its relationship to theoretical orientation, and personal values, regarding the biogenetic roots to thoughts, feelings, and behaviors. Also, whether this choice is culturally specific, relates to age, gender, ethnicity, counselor's own trauma experiences, or other factors could be addressed.

Whether knowledge and use of neuroscience in sessions relates to levels of cognitive creativity and posttraumatic growth would also inform whether neuroeducation as an intervention can help the wounded healer, as well as the client. This draws attention to, and the need for support of ACA efforts to inform the "practice standards of the future," and the recognition of the need for a unified vision of how neuroeducation can explain and enhance counseling practice (Field, Jones & Russel-Chapin, 2017, p. Vii). With this in mind, addressing the percentage of clinicians who do not use neuroeducation (18% of the study population), or the known discourse among humanistic counselors regarding its benefits to clients (Barnes, 1987; Epstein & McRoberts; 2020; Linstone and Turoff, 1975),

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is essential to appropriate and useful integration of neuroscience-knowledge and interventions; as well as a solid understanding on the ways in which clinicians might benefit from its incorporation.

While a number of books, clinical tools. and scholarly works have been developed which enhance the use of neuroscience in practice (Beeson & Field, 2017; Epstein & McRoberts, 2020; Miller, 2016), a lack of quantitative evidence supporting its benefits with client populations still remains. Researchers may wish to further examine the themes within the existing literature, compare their use among various types of counselors, with specific specialties, and focus on the ways in which neuroscience use impacts important components of practice such as the therapeutic alliance, transference, countertransference, and parallel processing (ACA, 2014).

One area to start might be within the current frameworks including neuroscience-based cognitive behavioral therapy (n-CBT), eye movement desensitization and reprocessing (EMDR), positive psychology, and neurofeedback, among others (SAMHSA, 2014; World Health Organization, 2013). These therapeutic frameworks already incorporate neuroscience-knowledge into practice; although are all post-master specializations, so their study would not necessarily mitigate the need for study of entry level counselors as well. It is also common for creative counselors, using experiential methods with clients like play, art, sand, movement, or dance, with clients, to maintain knowledge of how, and educate clients on how these interventions "work" from a brain-based perspective.

As a result, the creation of a neuroscience-knowledge criteria specific to counselors, and a method of assessing this knowledge, is needed. The neuroscience-knowledge questionnaire used, while empirically validated, is not specialized to the needs of counselors or to neuroscience concepts used in psychoeducation. While it is currently, the available method of looking into neuroscience-knowledge, fully understanding neuroscience-knowledge and its benefits to counselors may require a counselor-specific version; something that will require further research.

Continued study regarding counselor neuroscience-knowledge and its relationship to impairment, may also involve redefining concepts like the *mind* and *mental well-being* (Miller, 2016). How counselors conceptualize the developing mind, subjective experience, and relationships, and its connection to successful outcomes in counseling practice, will assist with enhancing the identity of and supporting the human species (Goss, 2016). This requires additional study into the views and experiences of clinicians attempting to integrate neuroscience into practice.

Additional study centered in neuroscience-knowledge and posttraumatic growth may wish to focus on the creation of a series of unified neuroscience concepts to integrate into and connect with specific counseling goals (Miller, 2016). Given that accurate timing of neuroscience intervention is key to client readiness for the intervention, counselors' thorough understanding of the appropriateness and timeliness of specific interventions is key. Therefore, an additional area of interest may be study of the relationship between appropriately timed neuroeducation interventions, and secure attachment status in clients (Miller, 2016).

## Conclusion

The counseling profession continues to require methods to prevent and reduce burnout; a primary responsibility of counselor educators and supervisors (ACA, 2014). While this study did not provide complete evidence of neuroeducation as a potential intervention, it did shed light on a number of interesting factors related to neuroeducation, as well as provide evidence of the continued need to explore creative, or complementary methods which may reduce symptoms of burnout and secondary traumatic stress, while focusing on understanding and mitigating counselor's own experiences with trauma. Counselors are able to be creative when incorporating neuroeducation into practice (Miller, 2016); which may ultimately assist in their own processes of divergent thinking.

Counselors devote their lives to helping others heal through working to understand and share in the healing process. In order to maintain professional efficacy, counselors must address personal and professional barriers to wellness (Yager & Tover-Blank, 2007) When counselors are capable of working through their own experiences, they own the interventions they use with their clients;

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having first-hand understanding of how and why they are effective. Counselors who exude wellness, and healing, mirror both positive methods and positive consequences of these methods to clients (Keysers & Gazzola, 2009). Understanding and using neuroscience may be a viable answer, yet more research is required to fine tune exactly what relationship exists between neuroscience-knowledge, counselor well-being, professional identity self-efficacy, and client outcomes.

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