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# Traumatic Brain Injury: The Relationship of Psychosocial Variables and Location of Injury to Post-Injury Depression

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TRAUMATIC BRAIN INJURY: THE RELATIONSHIP OF PSYCHOSOCIAL VARIABLES  
AND LOCATION OF INJURY TO POST-INJURY DEPRESSION

A Dissertation submitted to the  
Graduate College of  
Marshall University

In partial fulfillment of  
the requirements for the degree of  
Doctor of Psychology

in

Psychology

by

Alicia L. Smith

Approved by  
Dr. Steven Mewaldt, Committee Chairperson  
Dr. Massimo Bardi  
Dr. Steven Dreyer

Marshall University  
May 2013

## **Dissertation Acknowledgments**

It is my great pleasure to thank those who made this dissertation possible. I want to begin by expressing my gratitude to my chairman, Dr. Steven Mewaldt, who offered unwavering support and guidance throughout this process. I would also like to express my infinite thankfulness to Dr. Massimo Bardi and Dr. Steven Dreyer, without whom this research would not have been possible. Their generosity and willingness to share their knowledge and expertise are much appreciated. Finally, I would like to thank my friends and family, particularly my husband and children, whose sacrifices, patience, and encouragement will forever be cherished.

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### Abstract

Traumatic Brain Injury (TBI) affects nearly 1.4 million people in the United States annually, and of these, 10% to 77% will experience post-injury depression. Psychosocial variables such as previous substance and alcohol abuse, prior mental illness, low educational attainment, and poverty have been identified as possible risk factors. Additionally, the location of injury appears to play a key role particularly if the injury occurs in the left hemisphere. This study examined archival data from brain-injured patients in an effort to better understand the factors related to post-TBI depression. Past medical records of brain-injured adults ( $N = 52$ ) were reviewed and coded for location of injury, demographic and psychosocial variables, as well as the presence of depression. Results did not reveal significant relationships between past substance or alcohol abuse, prior mental illness, or level of education and post-TBI depression. In addition, there was no significant relationship between location of injury and post-TBI depression; however, results highlighted a possible trend toward left-sided lesions and depression. Further research is needed to shed light on the complexity of affective sequelae following TBI.

*Keywords:* traumatic brain injury (TBI), brain lesion, location, depression

## Traumatic Brain Injury: The Relationship of Psychosocial Variables and Location of Injury to Post-Injury Depression

Traumatic Brain Injury (TBI) is among the leading causes of disability and mortality in the United States with approximately 1.4 million individuals affected annually. Of these, nearly 1.1 million will be treated in emergency departments, and another 235,000 will be hospitalized for varying lengths of time contingent upon the nature and severity of the injury. Common causes of TBI include motor vehicle accidents, falls, sports injuries, military combat, and violence such as intentional and malicious assaults (Center for Disease Control and Prevention [CDC], 2006; National Institute of Health [NIH], 1998). During such injuries, physical damage is caused to the brain, mainly in the cortical, or outermost brain regions, as well as the subcortical, or interior regions, that are found just below the cerebral cortex (Jorge, Starkstein, & Sergio, 2005).

TBIs are associated with a range of both short- and long-term effects including physical, cognitive, behavioral, and affective outcomes (NIH, 1998). Although many of the physical effects of TBI have been explored, research regarding the neuropsychological and affective consequences of TBI is less clear. Several studies suggest that there is an increased risk for developing post-injury depression; however, because prevalence estimates range from 10 to 77% (Alderfer, Arciniegas, & Silver, 2005; Malec, Testa, Rush, Brown, & Moessner, 2007; O'Donnell, Creamer, Pattison, & Atkin, 2004; Varney, Martzke, & Roberts, 1987), it is difficult to draw firm conclusions about the nature of the relationship between depression and brain injury. Further, these estimates are not particularly useful when attempting to identify clinical versus non-clinical depression because the majority of the literature fails to recognize the difference.

One of the biggest challenges researchers seem to face is to understand how and why post-injury depression develops. Several researchers have hypothesized that psychosocial variables such as past substance and alcohol abuse, low educational attainment, poverty, and prior mental illness are contributing factors (Crisp, 2007; Meichenbaum, 2001; Dikmen, Bombardier, Machamer, Fann, & Tempkin, 2004). In addition, neurobiological influence, namely location of brain lesion, is thought to play a significant role as well (Jorge, Robinson, Moser et al., 2004). However, findings thus far are inconsistent. Moreover, many of the aforementioned factors have been studied in isolation, which necessarily complicates any attempt to identify at risk individuals. As such, the purpose of this research is to better understand the mechanism of post-TBI depression.

### **Prior Psychosocial Functioning**

The development of depression after TBI has repeatedly been linked to prior psychosocial functioning. Research indicates that an individual's psychosocial history contributes to the onset of post-injury depression; however, these factors are generally viewed as influential rather than causal.

**Previous substance and alcohol abuse.** Past substance and alcohol abuse has been shown to play a role in post-TBI depression, which is believed to occur as a result of life-style change following injury. Specifically, substance and alcohol abusers are strongly discouraged from using throughout the course of their rehabilitation, which can often go on indefinitely. Such treatment requisites necessarily result in drastic life-style changes, mainly in terms of social network and activities (Corrigan, 1995; Crisp, 2007; Curran, Ponsford, & Crowe, 2000; Rapoport, McCullagh, Streiner, & Feinstein, 2003). When these changes are not particularly

welcomed, they are thought to place an individual at increased risk for developing post-injury depression.

**Prior mental illness.** Research regarding prior psychiatric illness and its effect on the development of post-TBI depression has been mixed though suggestive of potential risk (Meichenbaum, 2001; Alderfer et al., 2005; Crisp, 2007; Dikmen et al., 2004; Hart, Hanks, Bogner, Millis, Esselman, 2007; Jorge, Robinson, Starkstein, & Arndt, 1994; Schofield et al., 2006). Initial efforts by Fann, Leonetti, Jaffe, et al. (2002) failed to establish a significant correlation between pre-morbid disorders and post-TBI depression. Perhaps this finding was due to the authors' objective, which was to determine if psychiatric illness itself was a risk factor for sustaining a TBI. In subsequent efforts, Fann, Burington, Leonetti, et al. (2005) found that prior mental illness was a significant predictor of post-injury psychiatric illness particularly in mild TBI sufferers. Hibbard, Uysal, Kepler, Bogdany, and Silver (1998) also found a relationship between pre-morbid psychiatric disorders and the subsequent onset of depression following TBI. However, their findings suggested an inverse relationship. Their research concluded that individuals without pre-morbid mental illness were at greater risk for developing major depression when compared to those with pre-morbid illness. This finding is likely attributable to the time at which participants were interviewed, approximately eight years post-injury. The study by Hibbard et al. (1998) alludes to an unaccounted for time variable and may suggest more difficult long-term adjustments for those having never experienced affective dysfunction. However, this relationship has not been systematically explored. Further research in this area is needed to better understand the role of pre-morbid mental disorders in the development of post-TBI psychiatric illness.



**Level of education.** Low educational attainment has also been associated with post-traumatic depression. Dikmen et al. (2004) found that having less than a high school education was a significant predictor of depression after injury mainly because of limited resources such as lack of financial security and access to necessary treatments. Other authors have noted similar correlations as well (Alderfer et al., 2005; Crisp, 2007; Hart et al., 2007; Schofield et al., 2006), though again, the observed relationships were not believed to be causal per se, but rather, likely to place TBI victims at risk for affective consequence.

Similarly, in a multi-center investigation of depression post-TBI, Seel et al. (2003) found poverty and poor social functioning to be positively correlated with depression post-injury. Because vocational endeavors can be impacted by TBI, it is easy to understand these findings particularly if the TBI victim was impoverished prior to his or her accident. As the rehabilitation process is often indefinite, return to work attempts may fall to the wayside or become impractical, thus making poverty an inescapable misfortune.

Although research into prior psychosocial functioning has produced relatively consistent results regarding the onset of depression post-TBI, these findings are typically viewed as contributory not causal. Efforts to understand causal factors have evolved into more intricate research designs; the aim of which is to isolate affected brain regions in attempt to gain knowledge relative to the neurobiological mechanism involved in post-TBI depression.

### **Location of Injury**

**Left hemispheric insult.** Several studies have sought to find a direct neurobiological mechanism involved in, or responsible for, the development of post-traumatic depression. Robinson and Szetela (1981) found significant correlations between major depression and left hemispheric lesions as did Lipsey, Robinson, Pearlson, Rao, and Price (1983). Specifically,

Lipsey et al. examined patients with damage to both the left and right hemispheres of the brain resulting from cerebrovascular accident (CVA) and trauma. They found a significant relationship between the left frontal region and the onset of depression particularly severe or major depression. Jorge et al. (1993) as well as Fedoroff et al. (1992) identified the left dorsolateral prefrontal cortex and left basal ganglia as areas likely responsible for depressive symptomatology. According to Jorge et al. (1993), there is a connection between depression and the acute period after injury particularly when the damage occurs to the left side. During a TBI, the physical damage sustained often disrupts the gray matter volume within the brain. When this disruption occurs in the left prefrontal area, as opposed to the right prefrontal area, it causes an activation of the limbic and paralimbic systems. This activation ultimately results in a disturbance of emotional regulation, thus predisposing TBI sufferers to developing depression.

Jorge, Robinson, Moser, et al. (2004) later designed a study to analyze several potential correlates of major depression following TBI by using neuroimaging (refined structural MRI) and extensive neuropsychological testing. They found post-TBI depression to be associated with considerably reduced left prefrontal gray matter volumes namely in the ventrolateral and dorsolateral regions. Moreover, subjects with major depression also showed significantly greater impairment(s) in problem-solving ability and cognitive flexibility as compared to their non-depressed counterparts, again suggesting a likely correlation between site specific injuries and affective consequence.

**Right hemispheric insult.** Although there is an emerging body of literature relating depression to left hemispheric lesions, there is less mention of right hemispheric involvement. As postulated by Jorge et al. (1993), the risk of developing depression is especially pronounced during the acute phase of injury particularly if the lesion is located in the left rather than the right

prefrontal area. However, research suggests that the right hemisphere of the brain may be responsible for our sense of self particularly our corporeal and emotional selves (Devinsky, 2000). This line of reasoning suggests that damage to this area would inhibit or diminish our capacity to be aware of our deficits post-TBI. In the absence of such awareness, victims of TBI would presumably exhibit fewer, if any, depressive symptoms. Further research is needed to better understand the implications of right hemispheric injury and the development of post-injury mood disorders.

This study aimed to build upon existing research to identify factors involved in the onset of post-TBI depression. First, because psychosocial factors are believed to contribute to affective dysfunction following brain injury, it was hypothesized that individuals with a history of substance or alcohol abuse, prior mental illness, and low educational attainment would more frequently experience post-injury depression. Second, and key to this study, it was hypothesized that victims of TBI would be more likely to experience post-traumatic depression if the site of lesion is located in the left hemisphere.

## **Method**

### **Participants**

A sample was obtained from archived medical records maintained in an outpatient neuropsychology clinic located in South Charleston, West Virginia. The clinic provides both psychiatric and psychological assessment and treatment of cognitive and affective disturbance following brain injury. The study was granted IRB exempted approval on April 17, 2013 (reference number 194465-1).

### **Procedures**

Archived patient records maintained at an outpatient neuropsychology practice were reviewed for this study. Individual charts were selected from a registry of patients having undergone neuropsychological assessment with the last 10 years. From this registry, patient records were scanned for documented history of traumatic brain injury and location thereof (left versus right hemisphere or global involvement). Evidence for brain injury was obtained via emergency department summaries, imaging scan reports, as well as other hospital records located within the individual patient charts. Injuries were coded in an Excel spreadsheet as having occurred in either the left or right hemisphere, or as global if multiple sites of lesion or bilateral damage was noted.

Charts were also reviewed for evidence of clinical depression as assessed using the Minnesota Multiphasic Personality Inventory-2 (MMPI-2). Individuals with valid profiles who obtained a T-score of  $> 65$  on the Depression scale were considered depressed and those with a T-score of  $< 65$  were considered not depressed and coded as such. Profiles were deemed invalid if validity scales were elevated (T-score  $> 65$ ), and not included for analysis to avoid potentially confounding variables.

Demographic variables including gender, age, and level of education attainment were also obtained from patient charts. Regarding the latter, three levels of educational achievement were coded: less than high school education, high school graduate, and college degree. Additional information collected from patient charts included history of substance or alcohol abuse, prior mental illness, and time post-injury the neuropsychological assessment took place. Past substance or alcohol abuse was coded as either present, absent, or recreational use only based upon anecdotal responses given during the clinical interview. Patients were considered to have prior mental illness if their charts reflected a history of having received psychiatric

treatment. Time post-injury was broken down into three categories: less than six months, six months to one year, and one year or later.

Charts used were provided with an ID and stored as numbers, avoiding any reference to individual patient names. There was no link between coding and patient identifiers. Use of case numbers allowed for analysis of individual variability while preserving the anonymity of the patients' records. Because data were archival, informed consents were not obtained.

### **Statistical Analysis**

To determine if relationships existed among each of the independent variables (previous substance or alcohol abuse, prior mental illness, level of education, and location of brain injury) and the dependent variable (depression), chi-square tests for independence were conducted. In addition, because age was a potential factor, an independent samples t-test was performed to compare participant age and occurrence of depression ( $\alpha = .05$ ). SPSS 21 statistical software was used for all statistical processing.

A multi-dimensional scaling (MDS) analysis was conducted in order to provide a model of independent associations among the variables. MDS was a preferred method for the present study because unlike MANOVA or factor analysis, MDS does not require data to be multi-normally distributed. MDS is a data reduction technique that is used to aid the researcher in finding structures within the data set that may not be overtly apparent. MDS refers to graphical models that provide a spatial representation of the similarity structure of variables. By using correlations, the relationships (i.e. proximities) among variables can be displayed graphically. The variables are represented by a set of points in two or higher dimensional space (a map). Thus, the closer two or more variables are on the map, the more highly correlated they are. Conversely, the farther apart they are, the less correlated they are. In order to "map" all of the

variables into a desired space (two dimensional or greater), a certain lack of fit has to be accepted. This lack of fit is referred to as the s-stress. The values of s-stress range from 0 (perfect fit) to 1 (worst possible fit). The aim of MDS is to find a map of the variables that minimizes the s-stress for a given number of dimensions. The number of dimensions can be likened to the number of latent underlying factors in the dataset. Thus, when choosing the number of dimensions to represent the data, one must consider 1) the number of variables in the model, 2) the lack of fit (s-stress value), given the number of dimensions, 3) an index of fit of the model (r-squared value), and 4) interpretability of the dimensions. The first point addresses the fact that for each dimension of the data, there should be approximately 4 variables entered into the model. Thus, for a 2-dimensional map, approximately 8 variables should be used. The second point addresses how well the MDS map actually “fits” the data. Stress values below .15 are typically considered acceptable. The third point addresses the variance accounted for within the model. As is the case with any regression analysis, one must consider the amount of variance being accounted for. Typically, r-squared values of .8 or higher are desirable. Finally, one must pick a solution based on interpretability of the dimensions. Parsimony is crucial to interpreting the “map” of any given dataset. MDS is a technique that provides additional information about the “structure” of a dataset, which is not possible with standard parametric statistical techniques.

### **Results**

The sample included 52 adults (18 female, 34 male,  $M_{\text{age}} = 42.2$  years,  $SD = 15.5$ , age range: 18-83) with a documented history of traumatic brain injury. Of these, 25 % ( $n = 13$ ) had a history of past substance or alcohol abuse and 36.5 % ( $n = 19$ ) had a history of prior mental illness. Time post-injury varied among participants studied. Nearly 31 % ( $n = 16$ ), were assessed within the first six months, 15.4 % ( $n = 8$ ), within six to twelve months and 53.8 % ( $n =$

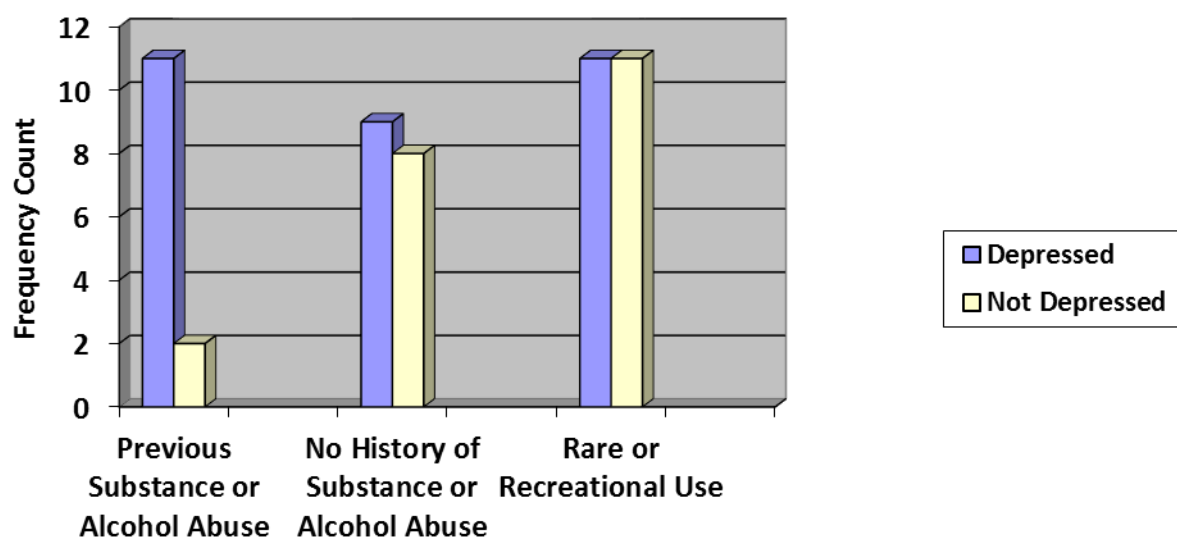
28) one year or later. Approximately 13.5 % ( $n = 7$ ) of the individuals studied had less than a high school education, 58 % of were high school graduates ( $n = 30$ ), and 28.8 % ( $n = 15$ ) were college graduates.

Of the sample, nearly 23 % ( $n = 12$ ) had injuries in the left hemisphere, 28.8 % ( $n = 15$ ), had injuries in the right hemisphere, and almost half (48.1 % ,  $n = 25$ ) had global involvement. At the time of assessment, approximately 60 % ( $n = 31$ ) were considered to be clinically depressed ( $n = 31$ ), and 40.4 % ( $n = 21$ ) showed no indication of depression.

### Prior Psychosocial Functioning and Depression

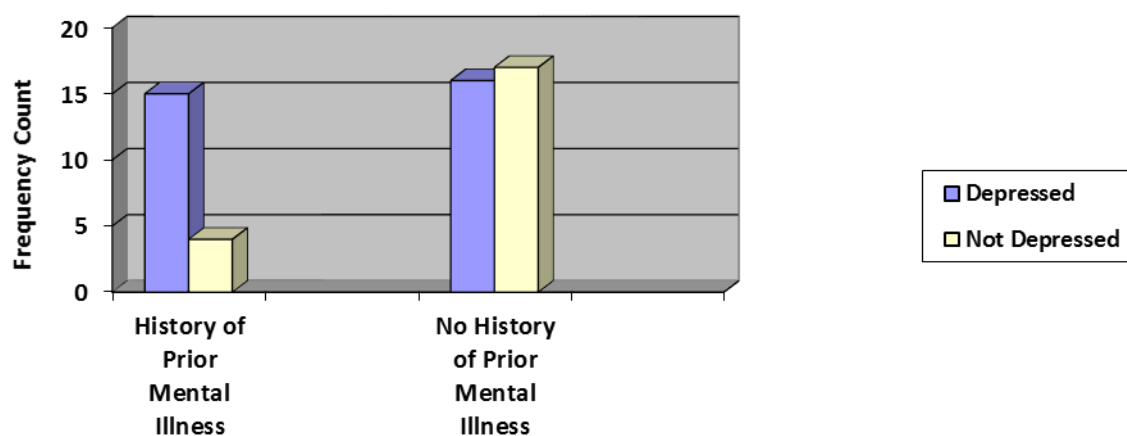
**Past substance or alcohol abuse.** Figure 1 presents the data for incidence of post-TBI depression and history of substance or alcohol abuse. Although the figure suggests that a history of abuse was less common among non-depressed patients, a chi-square test for independence, though in the correct direction, was not statistically significant,  $\chi^2(2) = 4.5$ ,  $n = 52$ ,  $p = .10$ .

[Figure 1] Incidence of Substance/Alcohol Abuse and Post-Injury Depression



**Prior mental illness.** Figure 2 shows the data for incidence of post-traumatic depression and prior mental illness. Though the figure suggests that the likelihood of post-TBI depression was higher for individuals with a previous history of mental illness than for those without, a chi-square test for independence (with Yates Continuity Correction) indicated that the relationship only approached statistical significance,  $\chi^2 (1) = 3.47, n = 52, p = .06$ .

[Figure 2] **Incidence of Prior Mental Illness and Post-Injury Depression**



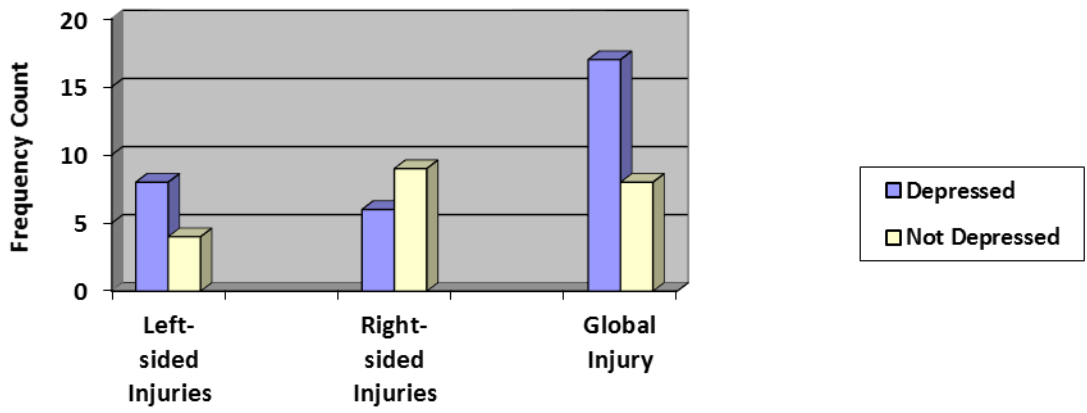
**Level of education.** No relationship between education level and the onset of depression following brain injury was observed,  $\chi^2 (2) = .44, n = 52, p = .80$ .

### Location of Injury and Depression

Figure 3 presents the data for the occurrence of post-TBI depression among those with left or right hemispheric lesions as well as for those with global injury. Although the figure appears to indicate a somewhat increased rate of depression among those having sustained left-hemispheric lesions, particularly when compared to those with right-sided injuries, a chi-square test for independence indicated that the relationship was not statistically significant,  $\chi^2 (2) = 3.38, n = 52, p = .185$ .



[Figure 3] Incidence of Post-Injury Depression by Site of Lesion

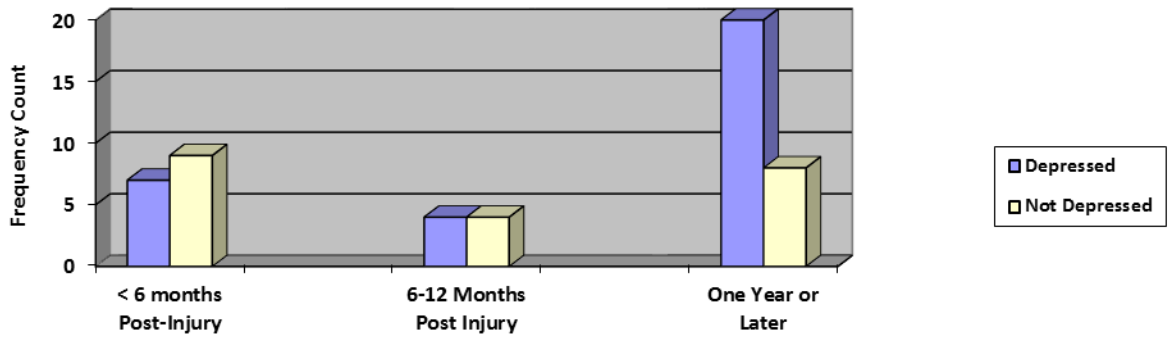


When considering only left versus right injuries for analysis, the chi-square test for independence again failed to reveal a statistically significant relationship between location of injury and depression,  $\chi^2 (1) = .981, n = 27 p = .322$ .

**Time Post-Injury, Gender, Age and Depression**

**Time.** Figure 4 shows the frequency of post-injury depression across three time intervals following the injury (less than six months, six to twelve months, and one year or more post-injury). Whereas it seems a greater number of individuals become depressed at one year or later post-injury, a chi-square test of independence indicated the relationship was not significant,  $\chi^2 (2) = 3.6, n = 52, p = .165$ .

[Figure 4] Time Post-Injury and Depression

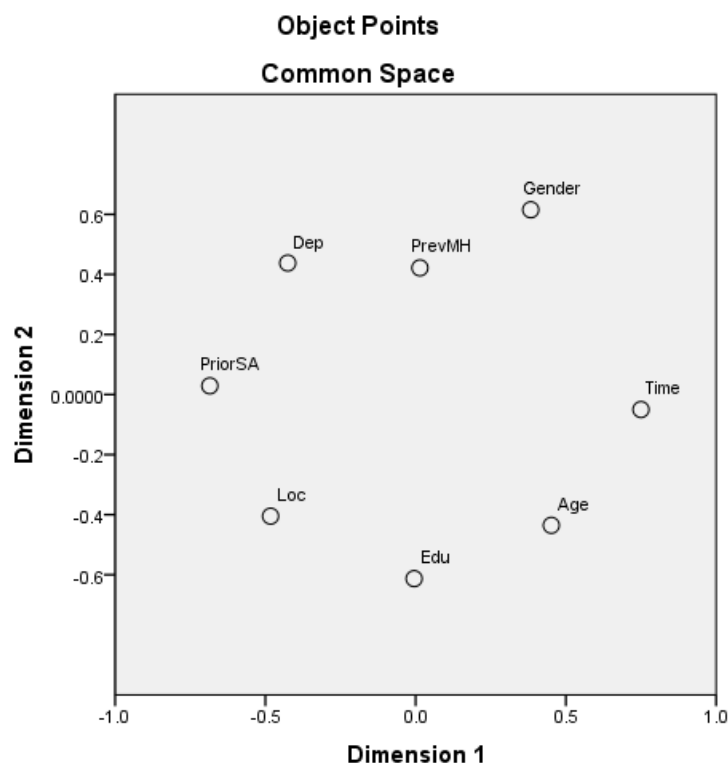


**Gender and age.** No relationship between gender and post-TBI depression was found,  $\chi^2(1) = .21, n = 52, p = .65$ . Further, there were no significant differences in patient ages among those depressed ( $M = 43.4, SD = 11.4$ ) and those not depressed ( $M = 40.6, SD = 20.32$ ),  $t(50) = .63, p = .53$ , two-tailed.

### Multidimensional Scaling

Multidimensional scaling (MDS) was also completed and generated Figure 5. The Kruskal's stress test index determined a stress value equal to .15, indicating a good fit between the dimensions and the mapped distances. The r-squared value indicated that 94% of the variance was explained by the data. Based on the two dimensions (representative of this sample), depression following brain injury was most closely related to previous substance abuse and prior mental illness. Location of injury was more related to prior substance abuse and education.

[Figure 5]



## Discussion

This study focused on patients with TBI who had been referred for neuropsychological assessment to an outpatient clinic in WV. It attempted to build upon existing research in identifying various factors that might explain depressive symptoms after brain injury. We attempted to determine whether prior psychosocial functioning (e.g. past substance or alcohol abuse, previous mental illness, and low educational attainment) would be associated with greater incidence of post-TBI depression and whether the location of the brain injury might also be predictive of the likelihood of developing depression. Unfortunately, though several trends were observed, they were not statistically significant--a likely repercussion of having an inadequate sample size.

First, the relationship between prior mental illness and post-TBI depression approached significance ( $p = .06$ ) as did the relationship between previous substance and alcohol abuse and depression, though slightly less so. Moreover, using multidimensional scaling (MDS), each of these variables was “mapped” as being closely related to post-injury depression. These findings could suggest that those having struggled with either addiction or prior psychiatric history are at increased risk for developing depression following brain injury, a finding that has been supported in the literature (Crisp, 2007).

Moreover, the relationship between location of injury and depression after TBI also trended toward significance. Somewhat surprisingly, however, this trend became less apparent when global injuries were removed from the analysis. However, this finding should be interpreted with caution. As noted, the total  $N$  for the study was 52. When participants with global injuries were removed from the analysis, the sample became substantially more limited ( $N = 27$ ); thus making it difficult to test hypotheses or draw any firm conclusions. Although this

finding was generally unanticipated, it was supported by MDS, as location of injury and depression were not highly correlated variables.

Another somewhat unanticipated observation was the trend toward significance in relating time-post injury to depression. Although there was a greater frequency of depressed individuals among those assessed at one year or greater (as compared to those in more acute phases of recovery), this trend should be carefully considered. For example, within the patients' charts, there was no indication of time in which the depressive illness initially presented. Therefore, the time of onset may have actually been some time earlier; thus, data may be misleading.

These findings are, in large, theoretically and empirically compatible with findings from existing research. For example, previous substance and alcohol abuse as well as prior mental illness has been linked to post-TBI depression (Crisp, 2007 & Meichenbaum, 2001) as has location of brain injury, particularly left-hemispheric lesions (Jorge, Robinson, Moser, et al., 2004). In addition, time after injury has also been correlated to depression. As Hibbard et al. (1998) suggested, there may be long-term adjustment related difficulties for some victims of TBI. Though this study failed to reach a level of statistical significance when exploring these same variables, findings were suggestive of emerging trends consistent with that of TBI research. Moreover, the fact that this study did not find any significant relationships where other researchers have is, in itself, consistent with TBI literature (Bay and Jacobus, 2008; Fann, Burington, Leonetti, et al., 2004; Hibbard et al., 1998; Meichenbaum, 2001).

There are several probable reasons why the hypotheses in this study were not verified. First, as reiterated throughout the methods and results sections, the sample size studied was small ( $N = 52$ ). The small sample size necessarily affected the way in which data were coded, with

mostly categorical data being used to avoid having too many variables within an already limited sample size. Consequently, this method of coding prohibited a more intricate analysis of data that may have otherwise produced more meaningful results (e.g. regression, analysis of variance, etc.). Although a larger sample size was desired, only 52 of the 132 charts reviewed for this study contained the necessary information needed for analysis. Specifically, some patient charts did not contain prior medical records noting the location of brain lesion and, as noted, others had invalid personality profiles that could not be used. Thus, this study is limited in much the same way as several other research designs aiming to understand the relationship of TBI and depression; variables were studied in isolation with a limited sample.

The complexity of affective consequence resulting from brain injury calls for additional research. Although psychosocial variables have been routinely correlated to depression following TBI, as noted, their role is considered contributory, not causal. Research aimed at identifying a neurobiological indicator of post-TBI depression appears key particularly to isolate causal factors that will allow for earlier identification of at-risk persons. Some, albeit few, studies have linked left-hemispheric lesions to depression; however, more studies are needed to better understand the relationship and to generalize results.

Another line of research that has produced relatively mixed results is that involving the effects of injury severity on post-TBI depression (Rapoport, McCauley, Levin, Song, and Feinstein, 2002 & Bay and Jacobus, 2008). This ambiguity further complicates efforts to understand affective consequence secondary to brain injury. For example, some researchers argue that injury severity is so inconsistent that it could be irrelevant to the onset of post-TBI depression and they maintain that other factors may better account its occurrence (Dikmen,

Bombardier, Machamer, Fann, & Tempkin, 2004; Malec, Testa, Rush, Brown, & Moessner, 2007; Meichenbaum, 2001; Seel & Kreutzer, 2003).

Collectively, the findings from this and other studies signify the need for additional research. With increased focus currently being given to the risks and consequence involved with TBI, particularly with the number of veterans returning from war, we are challenged to continue our efforts to better understand the physical, cognitive, and affective outcomes common to victims of injury. By becoming aware of and continuing to engage in research, we will fulfill just that.



**Office of Research Integrity**  
 Institutional Review Board  
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IRB1 #00002205

IRB2 #00003206

April 17, 2013

Steven Mewaldt, Ph.D.  
 Psychology Department

RE: IRBNet ID# 194465-1

At: Marshall University Institutional Review Board #2 (Social/Behavioral)

Dear Dr. Mewaldt:

<b>Protocol Title:</b>	[194465-1] TBI and Depression	
<b>Expiration Date:</b>	April 17, 2014	
<b>Site Location:</b>	MU	
<b>Submission Type:</b>	New Project	APPROVED
<b>Review Type:</b>	Exempt Review	

In accordance with 45CFR46.101(b)(4), the above study and informed consent were granted Exempted approval today by the Marshall University Institutional Review Board #2 (Social/Behavioral) Designee for the period of 12 months. The approval will expire April 17, 2014. A continuing review request for this study must be submitted no later than 30 days prior to the expiration date.

This study is for student Alicia Smith.

If you have any questions, please contact the Marshall University Institutional Review Board #2 (Social/Behavioral) Coordinator Michelle Woomeer, B.A., M.S at (304) 696-4308 or woomeer3@marshall.edu. Please include your study title and reference number in all correspondence with this office.

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intentional and unintentional traumatic brain injury: Longitudinal changes and impact on subjective well-being. *Rehabilitation Psychology*, 52, 152-161.

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**CURRICULUM VITAE**

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**EDUCATION**

- Psy.D.     **Marshall University**, Huntington, WV  
Program: Clinical Psychology, Doctoral, APA Accredited  
Degree Anticipated: May 2013  
Cumulative GPA: 4.0  
Dissertation Title: *Traumatic Brain Injury: The Relationship of Psychosocial Variables and Location of Injury to Post-Injury Depression*  
Dissertation Chair: Steven Mewaldt, Ph.D.
- M.A.       **Marshall University**, Huntington, WV  
Major: Clinical Psychology  
Degree Awarded: May 2007  
Cumulative GPA: 4.0
- B.A.       **University of Charleston**, Charleston, WV  
Major: Psychology  
Degree Awarded: May 2005  
Cumulative GPA: 4.0  
Thesis Title: *Does Weight Level Influence Students' Perceptions of Quality Teacher Attributes?*  
Thesis Advisor: Marty Spiker, Ph.D.

**ADDITIONAL COURSEWORK**

- 08/2005-12/2005     **Marshall University Graduate College**, South Charleston, WV  
Graduate Coursework in Educational Research
- 1/2006-5/2006     **Marshall University Graduate College**, South Charleston, WV  
Graduate Coursework in School Psychology

## CLINICAL WORK EXPERIENCE

9/2012-  
Present      Behavior Health Consultant  
Cabin Creek Health Systems: Riverside Health Center, Belle, West Virginia

Provide brief behavior health interventions, often using an MI protocol, for patients suffering from a variety of medical illnesses and psychological stressors. Create behavior management plans designed to encourage lifestyle change and stress management. Consult with patients regarding medication compliance, and deliver psychoeducational services to individuals and families in both a primary care center and school based health center. Conduct psychological assessments, and provide immediate feedback to patients and families regarding areas of concern. Lead group discussion(s) and task force efforts involving the betterment of patient care in rural WV. Collaborate with a multidisciplinary team to assist in diagnosis and treatment planning. *Patient Population:* Underinsured and uninsured individuals with varying medical conditions and psychological stressors. Age: Birth to geriatrics.

Supervisor: Steven Dreyer, Ph.D.

3/2008-  
5/2010      Supervised Psychologist  
PsyCare, Incorporated, Charleston, WV

*Charleston Area Medical Center [CAMC], Medical Rehabilitation Unit*  
Continued part time training and work in a psychological capacity on the subsequently referenced medical rehabilitation unit. Please refer to the section designated Master's Psychology Intern for a descriptive narrative regarding the duties and responsibilities associated with this position.

Supervisor: Steven Dreyer, Ph.D.

## CLINICAL EXPERIENCE [Doctoral Training]: *Predoctoral Internship*

7/2011-  
7/2012      West Virginia University, WELLWVU Carruth Center, Paid, Stipend- \$25,000 (APA Accredited)  
Morgantown, West Virginia

Areas of Required Rotation and Competency:

### *Intervention*

Provide individual and group therapy to individuals seeking services for a variety of concerns and psychological disorders including, but not limited to, anxiety and depressive disorders, thought disorders, posttraumatic stress disorder, personality disorders, substance abuse, and adjustment disorders. Develop evidence based treatment plans using CBT and MI protocols. Work in conjunction with a multi-disciplinary team including primary care physicians and psychiatric medical providers. *Patient Population:* University students seeking outpatient mental health services. Age: early to mid-adult.

Supervisors: T. Anne Hawkins, Ph.D., Al Kasprovicz, Ph.D., Tandy McClung, Ed.D.

### *Assessment*

Conduct clinical interviews and perform diagnostic evaluations designed to identify the presence of executive dysfunction, attention deficit and learning disorders. Administer cognitive, intellectual, academic, and continuous performance tests and write comprehensive/integrative psychological reports based upon the clinical findings thereof. Provide feedback and recommendations to individuals with a variety of functional and academic impairment. Work in consultation with the Office of Disability Services to provide appropriate accommodation to qualified individuals. *Patient Population:* University students experiencing varying levels of academic/educational disadvantage. Age: early to mid-adult.

Supervisor: Daniel Long, Ph.D.

### *Crisis Management/Intervention*

Provide direct clinical services four hours weekly to center's walk-in crisis clinic. Conduct risk assessment and triage of individuals in crisis and in need of immediate intervention. Provide after hours, emergency on-call services for individuals in distress and engaging in a variety of risk behaviors. Facilitate, when deemed necessary, inpatient hospitalization and intensive outpatient treatments. *Patient Population:* University students in crisis or otherwise requiring immediate intervention or consultation. Age: early to mid-adult.

Supervisors: T. Anne Hawkins, Ph.D., Tandy McClung, Ed.D.

### *Consultation*

Provide consultative services to a variety of individuals and entities in both clinical and educational capacities. Provide direct clinical consultation to individuals in need of brief intervention, as well as to those presenting to the walk-in clinic. Work in conjunction with WVU student health physicians to provide consultation to individuals presenting with a diverse range of concerns, both medical and psychological. Prepare and market wellness initiatives to the WVU community and work as a liaison to a number of university agencies including, but not limited to, academic departments, the Office of Disability Services, the Office of Social Justice, Residence Life and Education, and the Student Conduct Board. *Population:* Students, Staff, Faculty, and various other university and community entities seeking consultative mental health services. Age: adult.

Supervisors: Paul Castelino, Ph.D., Al Kasprovicz, Ph.D., T. Anne Hawkins, Ph.D.

### *Supervision*

Provide direct supervision to clinical trainees at both the masters and doctoral levels. Implement a variety of supervision models to encourage professional growth and development among trainees. Provide didactic training in the use of empirically validated treatment models for various psychological presentations including, but not limited to, anxiety, depression, trauma, somatization, and chronic pain. *Population:* Clinical trainees enrolled in mental health graduate programs. Age: adult.

Supervisors: Ian Kellems, Ph.D., Paul Castelino, Ph.D.

### *Internship Didactics*

Attend weekly intern seminar series focusing on a variety of issues pertinent to the practice of psychology. Participate in bi-weekly professional development and

multicultural/diversity seminars. Attend weekly staff meetings, case conferences, and assessment and supervision seminars. Present case conceptualizations and facilitate seminar discussions twice monthly.

#### Optional Rotation

##### *Clinical Specialization: Behavior Health Psychology*

Provide direct clinical service to individuals presenting to the WVU Health Sciences Center. Work in consultation with the director of student health services, as well as other medical providers to provide psychological intervention/consultation for individuals experiencing distress secondary to medical illness, as well as to those contemplating lifestyle change/modification. Provide intervention to those experiencing anxiety, depression, and adjustment related concerns. Also provide intervention to victims of sexual assault.

Supervisor: Al Kasproicz, Ph.D.; Onsite preceptor, Brian Quigley, M.D.

### **CLINICAL EXPERIENCE: Doctoral Practica**

9/2010-  
5/2011      Rural Practicum, Unpaid  
Cabin Creek Health Systems, Cabin Creek, West Virginia

Provided brief behavior health interventions, often using an MI protocol, for patients suffering from a variety of medical illnesses and psychological stressors. Create behavior management plans designed to encourage lifestyle change and stress management. Consult with patients regarding medication compliance, and deliver psychoeducational services to individuals and families in a primary care center. Conduct psychological assessments, and provide immediate feedback to patients and families regarding areas of concern. Collaborate with a multidisciplinary team to assist in diagnosis and treatment planning. *Patient Population:* Underinsured and uninsured individuals with varying medical conditions and psychological stressors. *Current place of employment.* See section noted above. Age: Birth to geriatrics.

Supervisor: Marianna Footo-Linz, Ph.D.; Onsite preceptor, Betsy Kent, MSW.

8/2009-  
11/2010      Community Practicum, Unpaid  
University Psychiatric Associates, Huntington, WV

##### *Hanshaw Geriatric Center*

Administered a variety of neuropsychological assessments aimed to identify cognitive disorders, particularly dementing illnesses including, but not limited to, Alzheimer's Disease, Vascular Dementia, Parkinson's Disease Dementia, and Dementia with Lewy Bodies. Conducted follow-up assessments for diagnosed individuals to monitor rates of disease progression, and made safety recommendations when deemed appropriate. Provided brief caretaker interventions and family counseling, and assisted in allocating necessary resources. *Patient Population:* Geriatric individuals experiencing cognitive decline/memory impairment, often with co-occurring medical/physical diagnoses. Age: Adults/geriatrics ages 65 and older.

Supervisor: Steven Cody, Ph.D.

*Mildred Mitchell Bateman Hospital*

Conducted clinical interviews and psychological/neuropsychological evaluations of patients admitted to an inpatient psychiatric hospital. Administered and interpreted cognitive, intellectual, achievement, and personality assessments, and wrote psychological reports based upon the findings thereof. Performed additional, follow-up testing for patients whose discharge was prolonged, and provided individual therapy using CBT strategies for chronically mentally ill patients experiencing affective and psychotic disorders, as well as personality and substance abuse disorders. Wrote behavior modification plans for patients suffering from schizophrenia, bipolar disorder, delusional disorders, and traumatic brain injury (TBI). Co-led a DBT based group that focused on effective communication, mindfulness, and distress tolerance for patients diagnosed with borderline personality disorder. Received didactic training in forensic assessment, and observed evaluations of patient admitted to the forensic unit. Participated in treatment team meetings with psychiatrists, clinical social workers, counselors, nurses, and patient advocates. Assisted medical staff/treatment team with diagnosis and treatment planning. *Patient Population:* Chronic and acutely mentally ill individuals admitted to an inpatient psychiatric hospital. Age: Adult through geriatrics.

Supervisor: Steven Cody, Ph.D.

11/2008-  
8/2009

Clinical Practicum, Unpaid  
Marshall University Psychology Clinic, Huntington, WV

Conducted initial assessments/clinical interviews of university students and community members seeking mental health services. Completed diagnostic assessments for students pursuing academic assistance/accommodations through the HELP program. Using a CBT model, provided individual therapy for depression, anxiety, and adjustment difficulties. Facilitated structured exposure for social phobia and PTSD. Provided skills training and psychoeducational services for parents with children diagnosed with ADHD. Prepared and presented case conceptualizations, and conducted outreach activities both on and off campus. *Patient Population:* University students and community members seeking outpatient mental health services. Age: Children, adolescents, and adults.

Supervisors: Marty Amerikaner, Ph.D; Marianna Footo-Linz, Ph.D

11/2008-  
5-2009

Head Start Mental Health Consultant, Unpaid  
Marshall University Psychology Clinic, Huntington, WV

Conducted bi-monthly site visits to various Head Start classrooms throughout the region. Performed classroom observations, conducted assessments, and developed and implemented behavior modification plans. Consulted with classroom teachers on the management of problematic behaviors, and addressed academic concerns. Provided parents with information on positive behavior support and extinction methods. *Population:* Children enrolled in head start classrooms throughout the region. Age: 3-5 years.



Supervisors: Marianna Footo-Linz, Ph.D., Keith Beard, Psy.D

### **CLINICAL EXPERIENCE: *Master's Practica***

11/2006-  
05/2007      Master's Psychology Intern, Unpaid  
PsyCare, Incorporated, Charleston, WV

*Charleston Area Medical Center [CAMC], Medical Rehabilitation Unit, CARF accredited*

Completed didactic training regarding the neuropsychological and affective consequence of traumatic brain injury (TBI), spinal cord injury (SCI), and cerebrovascular accidents (CVA). Conducted interviews and evaluations, including neuropsychological testing, of patients suffering from a variety of trauma-related/medical conditions and illnesses including TBI, SCI, CVA, Guillain-Barre Syndrome (GBS), Multiple Sclerosis (MS) and amputation. Provided individual therapy for patients experiencing depression, anxiety, and adjustment difficulties. Encouraged life-style changes/modifications to promote successful rehabilitation. Worked with a multidisciplinary team including physicians, physical therapists, occupational therapists, speech therapists, recreational therapists, and social workers to monitor patient's progress. Accompanied patients to physical and occupational therapies to assist in management of anxiety while in therapy. Provided psychoeducational services to patient's families regarding their condition, and consulted with treatment team on post-discharge planning. *Patient Population:* Medically compromised individuals experiencing loss or impairment in functioning secondary to trauma-related event or medical illness. Age: Adolescence through geriatrics.

Supervisor: Steven Dreyer, Ph.D.; Onsite Preceptor, Ramon Lansang, M.D.

07/2006-  
01/2007      Psychological Trainee/Student Clinician, Unpaid  
Marshall University Community Clinical Services Center, Dunbar, WV

Conducted clinical interviews/intake assessments in an outpatient, community clinic. Completed psychological evaluations including cognitive, achievement, and personality assessments. Provided individual therapy for child, adolescent, and adult clients. Conducted couples and family therapy, and supervised court mandated, parent-child visitations for clients having lost custodial rights. Developed and implemented behavior modification plans addressing various childhood problematic behaviors such as school refusal, anger management, and fighting. Wrote treatment plans, and attended weekly case conferences. Performed consultative duties with schools, court systems, and regional jails. *Population:* Community members seeking low-cost, outpatient services for a variety of psychological difficulties. Age: Children through adults.

Supervisor: Tony Goudy, Ph.D.

### **TEACHING AND MENTORING EXPERIENCE**

1/2011-  
5/2011      Teaching Assistant  
Department of Psychology, Marshall University

- Course assisted with: PSY 635, *Child and Family Diagnosis and Therapy*, prepared and co-led class lecture(s) and evaluated students' performance of various skill sets pertaining to child and family diagnoses and intervention.

Supervisor: Jennifer Tiano, Ph.D.

1/2009-  
12/2010      Practicum Instructor  
Department of Psychology, Marshall University

- Course taught: PSY 621, *Child Assessment Practicum*, taught administration and interpretation of WPPSI-III, WISC-IV, WJ-III, BASC-2, CRS-R, Vineland, MMPI-A, and D-KEFS (four sections)

Supervisor: Thomas Linz, Ph.D.

8/2008-  
12/2008      Practicum Instructor  
Department of Psychology, Marshall University

- Course taught: PSY 620, *Adult Assessment Practicum*, taught administration and interpretation of WAIS-III, WASI, WRAT-4, WIAT-II, WMS-III, Cognistat, MMPI-2, and MCMI-III.

Supervisor: Tony Goudy, Ph.D.

8/2007-  
5/2008      Adjunct Instructor,  
Department of Psychology, West Virginia State University

- Course taught: PSY 151, *An Introduction to General Psychology* (three sections)

## RESEARCH EXPERIENCE

10/2011-  
4/2013      Dissertation Research  
Marshall University Psychology Department, Huntington, WV

Explored the relationship(s) between psychosocial variables and location of brain lesion in the onset of post-TBI depression.

Committee: Steven Mewaldt, Ph.D., Massimo Bardi, Ph.D., Steven Dreyer, Ph.D.

05/2009-  
08/2009      Graduate Research Assistant  
Marshall University Psychology Department, Huntington, WV

Entered data for research project designed to determine what factors influence success among students enrolled in an online, undergraduate organic chemistry course. Assisted in compiling data for presentation at the West Virginia Higher Education Technology Conference.

Advisors: Steven Mewaldt, Ph.D., Kenneth O'Conner, Ph.D.

08/2004-  
05/2005      Research Practicum & Undergraduate Thesis  
University of Charleston, Charleston, WV

Designed a study to test the hypothesis that children will routinely assign fewer quality attributes to teachers who appear overweight, or obese. Recruited participants, prepared materials, coded questionnaires, and collected and analyzed data using SPSS. Findings were presented (see below).

Advisor: Martha Spiker, Ph.D.

## PUBLICATIONS

**Smith, A.** (2009). Borderline personality behaviors: Does their stigma reinforce them? *Behavior Analysis Digest International*, 21(1), 1-2.

## POSTER PRESENTATIONS

**Smith, A.** (2005). *Does weight level influence students' perceptions of quality teacher attributes?* Presented at the Tri-State Psychology Conference, Morgantown, WV.

**Smith, A.** (2005). *Does weight level influence students' perceptions of quality teacher attributes?* Presented at the University of Charleston's Annual Research Forum, Charleston, WV.

## PROFESSIONAL DEVELOPMENT

- 2010 Collaborative Family Healthcare Association 12<sup>th</sup> Annual Conference  
Event Seminars Attended: [1] *Why Integrative Primary Behavioral Health?*, Bill McFeature, Ph.D., [2] *Integrating Primary Care and Behavioral Health: Challenges Opportunities, and Solutions*, Armando Hernandez, Ph.D., Meghan Fondow, Ph.D., Neftali Serrano, Psy.D. Beth Zeidler, Psy.D., [3] *The 5 As (Assess, Advise, Agree, Assist, Arrange): Practice Skills Using an Evidence-Based Model for Assessment and Intervention with Chronic Pain, (Part 1)*, Christopher Hunter, Ph.D., Jeffrey Goodie, Ph.D., [4] *The 5 As, (Assess, Advise, Agree, Assist, Arrange): Practice Skills Using an Evidence-Based Model for Assessment and Intervention with Obesity and Insomnia*, Christopher Hunter, Ph.D., Jeffrey Goodie, Ph.D., [5] *Polypharmacy: An Invisible Epidemic and the Power of Interdisciplinary Teams Fighting Dangerous Medicine*, Demetra Antimisiaris, Pharm.D., James O'Brien, M.D., [6] *The Elephant in the Room: Evidence Based Assessment and Treatment of Trauma and Posttraumatic Stress Disorder in Primary Care*, Christine Runyan, Ph.D., Alexa Connell, Ph.D.
- 2010 Seminar: *WV Trauma, PTSD, and Grief*, Eric Gentry, Ph.D, Lecturer, Premier Education Solutions Incorporated [Total CEU's Earned: 5]
- 2009 West Virginia Psychological Association Fall Conference  
Event Seminars Attended: [1] *Developmentally Sensitive Assessment Techniques for Infants and Toddlers*, Marianna Footo-Linz, Ph.D., [2] *Besides Alzheimer's Disease: Vascular and Lewy Body Dementias*, Steven Cody, Ph.D., [3] *Traumatic Brain Injury: Applications for Clinical Practice*, James F. Phifer, Ph.D., [4]

*Psychotherapeutic Issues in Working with Traumatic Brain Injury Populations*,  
Agnieszka A. Hornich, Psy.D.  
[Total Event CEU's Earned: 13]

- 2009 Bereavement Conference: *Dancing with Grief: Caregiver's Grief and its Impact on the Bereaved*, Ravi J. Isaiah, DMin., LPC, Linda Cooper, RN-CS, MSN, LPC, Charleston Area Medical Center Health Education and Research Institute [Total CEU's Earned: 5.5]
- 2009 West Virginia Psychological Association Spring Conference  
Event Seminars Attended: [1] *Global Review of Traditional Treatment Settings in Psychology*, Amy Wilson-Strange, Ph.D., Fred J. Kreig, Ph.D., and Harold Slaughter, M.S. [2] *Global Review of Emerging Treatment Settings in Psychology*, David A. Clayman, Ph.D., Michael Murry, Ph.D., Kenneth Devlin, M.A. [Total Event CEU's Earned: 7]
- 2008 Seminar: *Administration and Interpretation of the WAIS-IV*, Gloria Maccow, Ph.D; Guest, Marshall University Department of Psychology [Total CEU's Earned: 5]
- 2007 Seminar: *Your Changing Brain: New Research on the Brain and Learning*, Nancy Knopp, Ph.D; Guest, University of Charleston
- 2006 Workshop: *Teaching Children to Grieve*, Carole Riley, Ph.D, WV Institute for Spirituality
- 2006 Seminar: *The Use and Interpretation of Woodcock-Johnson III Tests of Cognitive Abilities*, Nancy Mathers, Ph.D; Guest, West Virginia School Psychologists Association and Marshall University [Total CEU's Earned: 3]
- 2006 Seminar: *Functional and Behavioral Assessment*, Fred Kreig, Ph.D, West Virginia School Psychologists Association and Marshall University [Total CEU's Earned: 3]
- 2005 Workshop: *Utilizing Dreams in the Counseling Process*, Joe Richard, Ed.D, Marshall University Graduate College
- 2005 Workshop: *An Introduction to Hypnosis*, Joe Richard, Ed.D, Marshall University Graduate College

## **VOLUNTEER AND COMMUNITY SERVICE**

- 2010-Present American Red Cross, *Disaster Preparedness and Relief Volunteer*
- 2010-Present Charleston Montessori School, *Literacy Advocate and Reading Coordinator*
- 2008-2010 Mountaineer Montessori School Board of Directors, *Fundraising Chair*
- 2009 Marshall University Brain Awareness Week, *Event Coordinator and Expo Lecturer*
- 2008-2009 Cabell County Head Start, *Behavioral and Academic Consultant*
- 2008 Marshall University Psychology Awareness Week, *Guest Speaker*
- 2007-2008 George Washington High School, *Social Sciences Tutor*
- 2006-2007 West Virginia Department of Corrections, *Mental Health Advocate*
- 2005 Tri-State Psychology Conference, *Event Coordinator*

## AWARDS AND PROFESSIONAL SOCIETIES

2010-Present	Collaborative Family Healthcare Association, Student Member
2009-Present	American Psychological Association, Student Member
2008-Present	West Virginia Psychological Association, Student Member
2005-Present	Psi Chi, National Honor Society in Psychology
2005-Present	Pi Gamma Mu, International Honor Society in Social Sciences
2005	Certificate of Merit, Top Scholar Award, <i>History and Systems in Psychology</i>
2004	Certificate of Merit, Top Scholar Award, <i>Theories of Personality</i>
2001	Certificate of Merit, Top Scholar Award, <i>Human Development</i>

## REFERENCES

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 West Virginia University  
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