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Perspectives on Neuropsychological Testimony

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***Abstract*—**For the last decade, statistics show traumatic brain injury (TBI) is a growing concern in our legal system. In an effort to obtain data regarding the influence of neuropsychological expert witness testimony in a criminal case, this study tested three hypotheses. H^1: The majority of jurors will vote not guilty, due to mild head injury. H^2: The jurors will give more credence to the testimony of the neuropsychologist rather than the psychiatrist. H^3: The jurors will be more lenient in their sentencing, given the testimony of the neuropsychologist's testimony. The criterion for inclusion in the study as a participant is identical to those used for inclusion in the eligibility for jury duty in the United States. A chi-squared test was performed to analyze the data for the three hypotheses. The results supported all of the hypotheses; however statistical significance was seen in H^1 and H^2 only.

***Keywords*—**Expert witness, jury decision, neuropsychology, traumatic brain injury.

I. Introduction

TRAUMATIC brain injury is a debilitating injury to the victims, but receives little attention by society at large due to the lack of awareness. Each year, approximately 1.5 million people in America sustain a traumatic brain injury (TBI) and nearly 100,000 of these patients have permanent physical, cognitive, and/or behavioral disabilities [6]. Additionally, researchers estimate TBI results in over 1.1 million emergency department visits, 235,00 hospitalizations, and 50,000 deaths [5].

Over the years, the community has demonstrated misconceptions related to the disabled, specifically the brain-injured population. Some of the common inaccuracies infer that a complete recovery from traumatic brain injury is possible. Also, these inaccuracies imply that a brain-injured person will be left with severe memory deficits while all other functions remain intact. McLellan et al conducted research investigating the community's implicit and explicit attitudes towards the brain-injured population. Their research showed that, "Individuals who are more familiar with brain injury are explicitly less negative regarding those who have sustained such an injury and only those unfamiliar demonstrate a negative implicit bias. These findings are in line with research showing familiarity with mental illness is associated with less dangerous perceptions of people suffering from mental illness [6]." This suggests that when people have information about brain injury, they will be less likely to subscribe to negative perceptions and ultimately minimize negative bias.

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Researchers suggest that the community is prone to have a simplistic understanding of the abilities of a brain-injured person when they lack knowledge and experience with brain injury. If this information were then examined from a forensic perspective, one would inquire if this line of reasoning is applicable to brain-injured individuals who later go on to commit crimes. This information is important as researchers point out that 100% of 15 death row inmates reported head injuries in their life [10]. Loss of consciousness was reported in 11 cases. The lack of evaluation of these methods does the community and our legal system a great disservice in the due process and sentencing of offenders.

The statistics suggest that the United States has a history of incarcerating individuals with a pre-existing condition resulting from traumatic brain injury. Considering the option for a trial by jury, it can be assumed that jury participants are unaware of the research on brain injury and the impact on one's life once in recovery from such injury.

II. Literature Review

According to Bay and Bergman (2006), traumatic brain injury (TBI) is said to be connected with diffuse axonal injury within a rigid skull and can result in lifelong consequences affecting mood, behavior, cognition, and physical health [1]. It is expected that brain injury symptoms will dissipate within 3-12 months with a mild injury. Yet, according to the researchers between 20%-80% of those with mild injuries do not experience symptom abatement and have difficulties with information processing speed, memory, mood, and physical function [1].

Common symptoms associated with mild TBI include headaches, dizziness, sensitivity to noise, sensitivity to light, nausea, fatigue, sleep disturbance, irritability, temper problems, emotional problems, poor concentration, and memory problems [Iverson, 3]. Additional symptoms include: general malaise, noise intolerance, emotional lability, depression, anxiety, insomnia, and reduced tolerance to alcohol. Injured persons often times become preoccupied with these symptoms and fear permanent brain damage. It should be noted that loss of consciousness is not always a determining factor for a person to have a brain injury. Loss of consciousness simply assists clinician's in determining the severity of the injury for the purposes of identifying deficits and specifying treatment. A long-term prognosis might be favorable for the majority of patients with a mild TBI, as it is well recognized that there can be significant short-term behavioral, somatic, and cognitive consequences. Researchers, Silver and McAllister, suggest that a significant minority of patients develop a chronic, often debilitating constellation of signs and symptoms, known as a chronic post-concussive syndrome, that can be vexing to evaluate and treat [Silver, 8].

Many studies analyze the effects of brain injury on cognitive and intellectual functioning and neglect to

investigate how personality changes after an injury. Golden and Golden focus on the severity of personality dysfunction following brain injury in their research and are the forerunners in this domain. In current literature, there seems to be a poverty of research investigating the significance associated with changes in personality and there is minimal research available to objectively address the issue [2]. Researchers highlight the fact that the research in this area is inconsistent as the data highlights conflicting findings regarding the relationship between maladaptive personality characteristics, psychological distress, and performance on neuropsychological tests in populations identified by moderate head injuries.

After researching the severity of personality changes in offenders affected by brain injury, researchers found that loss of consciousness played an important role in the effects on one's personality changes. The authors wrote:

"*This profile suggests that greater loss of consciousness is associated with increased anger, anxiety, inconsistency, health problems, and difficulty with returning to work and success in treatment. This appears to occur in the absence of substantial cognitive deficits suggesting a strong role for the impact of loss of consciousness on personality alone independent of cognitive changes [2].*"

Bay and Bergman (2006) reviewed a research study from 1999, which concluded that anger responses are noted to be significantly greater 1 year after injury in a trauma group with TBI compared to a trauma control group. The authors proposed that anxiety after TBI is positively related to symptom frequency. In addition, Bay and Bergman (2006) proposed that there is a positive and significant relationship between anger and symptom frequency in a sample of people with mild-to-moderately injured TBI. They also proposed that there is a positive and significant relationship between perceived stress and brain injury symptoms. All hypotheses were supported. Therefore, Bay and Bergman (2006) concluded that TBI symptom frequency is significantly and positively related to anxiety, anger/hostility, and perceived global stress.

Ivkovic and Hans (2003) introduced an interesting concept, how does a juror understand expert witness testimony? This is a reasonable question to pose. One of the most common types of expert evidence is medical testimony, with about 40% of experts in medicine or mental health. For those jurors without a medical background, it can be difficult to consolidate the information in order to make a sound decision. Today, jurors are presented with an increasing amount of technology and scientific evidence to process. "The question of juror understanding of expert evidence has aroused a great deal of interest in the legal community. Litigators often present key trial evidence through expert witnesses. These experts are given wide latitude in their testimony, and their ability to convey complex points to a jury can make or break a case. Aside from their own experiences, hunches, and intuitions, trial lawyers have limited systematic information available to predict how the jury will receive expert evidence [4]."

In cases where the expert witness is medically trained, it is critical for the expert to only testify in areas where they have trained in order to prevent providing the jury with information that may sway them against what is in the best interest of justice. It can be inferred that the more concise the data, the more credible the expert is perceived by the jury. In a survey conducted by Ivkovic and Hans, the results indicated that the majority of jurors agreed that expert testimony was crucial to the outcome of their cases [4]. They stated, "They emphasized the expert's ability to convey technical information non-technically, the expert's willingness to draw firm conclusions, the expert's reputation as a leading expert, and the expert's impressive educational credentials as more influential [4]." Additionally, researchers agree that expert evidence in the courtroom is key. "A number of studies have found that expert evidence has a greater impact on fact finders to the extent that the witness ties the evidence explicitly to issues in the case [7]."

While jurors may be overwhelmed by the amount of evidence that is presented, the researchers indicate that the jurors rely heavily on the testimony of the experts. Many psychologists and legal scholars contend that juries are competent decision makers, even in the most complex cases. These researchers have maintained that juries are accurate and efficient fact-finders, responsible, and remarkably adept. During a trial, evidence is provided to the jurors in a multitude of ways, but the expert witness is typically the primary source of substantial evidence in the case. In order to be admitted into a trial, expert witness's testimony must be rooted on training, experience, and specialized knowledge. Experts are often asked to discuss information or conceptualize information for jurors that are outside the realm of common knowledge. If information is too complicated to comprehend, it can be assumed that jurors may ignore it.

Typically, a neuropsychological evaluation involves a synthesis of numerous data points that are obtained via clinical interview, observation, review of collateral data, and administration of objective psychological tests. In general, a comprehensive neuropsychological evaluation consists of assessment of an individual's general intellectual functioning, motor skills, language abilities, visuospatial skills, memory, and executive functioning (e.g., attention, processing speed, planning, organization) [9]. The primary focus of a psychiatric evaluation is typically to relieve symptoms through the prescription of psychotropic medications. The thoroughness of this interview is then interpreted for the layperson to understand and then present into evidence for the jurors to consider in their verdict. If the defendants cognitive functioning is not thoroughly assessed, ultimately, the testifying clinicians create a massive problem for the jurors.

III. Methodology

This is a quantitative experimental within subjects research design that incorporates the testimony of a psychiatrist versus that of a neuropsychologist as independent variables. The dependent variables consist of: the verdict given by jurors, the influence of the testimony of the psychiatrist versus that of the neuropsychologist, and the leniency of the jurors in sentencing.

This study tested the following hypotheses regarding the influence of neuropsychological test interpretations in a criminal case:

H^1: The majority of jurors will vote not guilty, due to mild head injury.

H^2: The jurors will give more credence to the testimony of the neuropsychologist over the psychiatrist.

H^3: The jurors will be more lenient in their sentencing, given the testimony of the neuropsychologist. The criterion for inclusion in the study as a participant was identical to those used for inclusion in the eligibility for jury duty. According to the United States Courts, in order to be legally qualified for jury services, an individual must: be a United States citizen, be at least 18 years of age, reside primarily in the judicial district for one year, be adequately proficient in English, have no disqualifying mental or physical condition, not currently subject to felony charges, and never have been convicted of a felony (unless civil rights have been legally restored).

Each participant was provided a web address to access an introductory letter, informed consent, vignette, and a survey to complete. A secure server, Qualtrics, hosted this information online at www.qualtrics.com. The research participants were instructed to read the vignette and complete the questions provided. Researchers are free to exit the only survey at any time without penalty. The vignette captured the details of a pending criminal case on a brain injured defendant as well as the expert witness testimony provided in court. In addition to the demographic information, the survey questions were geared to test the three hypotheses presented in this study.

Each hypothesis was tested using a chi-squared analysis. The alpha was set at 0.05 to assess for statistical significance with 1 degree of freedom. This study consisted of a minimum number of participants to be 30 and a maximum number of participants to be 38.

IV. Results

This research project solicited 37 participants to complete a web-based survey developed by the researcher and hosted by Qualtrics. A representative of Qualtrics sent the survey to a prescreened population that is likely to have met the qualifications for this study. Any participant that did not meet the criteria for jury selection was immediately prompted to the end of the survey. To analyze the data, a chi-squared goodness-of-fit test was performed, as well as a chi-squared test of independence.

The participants consisted of 18 (49%) males and 19 (51%) females. The ages ranged from 18-years-old to 62-years-old. The mean age was 42.2 with a standard deviation of 14.49. Table presents demographical information below.

TABLE I
Demographic Information of Juror Population

	[37] *n (%)*
Total	37
Gender	
Male	18 (49%)
Female	19 (51%)
Age	
Mean	42.2 years old
Standard Deviation	14.49
Ethnicity	
African American	10 (27%)
Asian	5 (14%)
Caucasian	15 (41%)
Latin	2 (5%)
Middle Eastern	1 (3%)
Native American	3 (8%)
Other	1 (3%)
Education	
GED	1 (3%)
High School	9 (24%)
Some College	7 (19%)
Associates Degree	5 (14%)
Bachelors Degree	7 (19%)
Medical Degree	0 (0%)
Doctorate in Psychology	0 (0%)
Other Graduate Degree	8 (22%)

Three hypotheses were tested regarding how the influence of neuropsychological testing interpretations would influence jury decision making in a criminal case.

As predicted, the data supported H^1 and statistical significance was found. The data suggests that presenting neuropsychological test interpretations during expert witness testimony did appear to influence the jurors' verdict decision. The results indicated that 10 (27%) jurors voted guilty and 27 (73%) jurors voted not guilty. Table II presents $x^2(1) = 7.81$, $p = .005$.

TABLE II
Verdict Decision - Guilty Vs. not Guilty

$x^2(1) = 7.81$, $p=.005$	*n (%)*
Guilty	10 (27%)
Not Guilty	27 (73%)

H^2 was supported by this data, offering statistical significance. The jurors found the neuropsychologist's expert witness testimony to be more credible. The results indicated that 29 (78%) jurors voted for the neuropsychologist, while 8 (22%) voted for the psychiatrist. Table III presents $x^2(1) = 11.92$, $p = .001$.

TABLE III
CREDIBILITY - NEUROPSYCHOLOGIST VS. PSYCHIATRIST

$x^2(1) = 11.92, p = .001$	*n (%)*
Neuropsychologist	29 (78%)
Psychiatrist	8 (22%)

H^3 was supported by the data in this research project; however the data did not offer statistical significance. The jurors did, in fact, choose to be more lenient in their sentencing, given the testimony of the neuropsychologist. The results indicated that 6 (67%) voted yes and 3 (33%) voted no. Table IV presents $x^2(1) = 2.00$, $p = .07$ (1-tailed).

TABLE IV
JURY DECISION ON SENTENCE LENIENCY (DUE TO THE TESTIMONY OF THE NEUROPSYCHOLOGIST)

$x^2(1)=2.00,p=.07$	*n (%)*
Yes	6 (67%)
No	3 (33%)

V. DISCUSSION

After conducting the research proposed in this study, it appears the majority of the participants voted not guilty due to the mild head injury proposed in the vignette. Additionally, the researcher asked the jurors which expert witness testimony influenced their verdict decision the most. More than 80% of the jurors agreed that the neuropsychologist did, in fact, influence the jury member's verdict decision.

As predicted in the second hypothesis, the research participants found the neuropsychologist to be more credible and were more influenced by the neuropsychologist in general for their verdict decision. The neuropsychologist's testimony provided detailed information regarding the defendant's clinical case. This testimony offered neuropsychological test interpretations to the jury and conceptualized the defendant's injury from a neuropsychological standpoint detailing his cognitive strengths and weaknesses from a post injury perspective. The psychiatrist's testimony offered a clinical interpretation of his perception of the defendant's neurological condition as well as the defendant's CT scan results. After reading the information presented in both expert testimonies, the research participants felt that the neuropsychologist's testimony was more influential and more credible, as well. Thus, this data offered statistical significance and supports the researchers second hypothesis.

The data collected supports the researcher's third hypothesis, which states that participants will be more lenient on sentencing given the expert witness testimony of the neuropsychologist. This statement proves to be true based on the data collected in this study. More than 60% of the research participants voted they would be more lenient on sentencing due to the testimony of the neuropsychologist. The data collected did not offer statistical significance largely due to fact that majority of the jurors voted the defendant not guilty; therefore were unable to offer a sentencing decision.

VI. CONCLUSION

The information in this study offers pertinent information for psychologists who have plans to testify in court on behalf of the defendant or prosecution. In addition, this study supports prior research that suggests that neuropsychological testing is a pertinent aspect of clinical information on a patient. Furthermore, the information in this study reveals that community members feel that the medical evidence of a CT scan simply is no longer enough information to make an informed jury decision. This research study provided useful insight to expert witness influences on jurors when it pertains to the effects of brain injury in the courtroom. This study is a small stepping-stone towards explaining how critical it is to discuss all details of a patient's strengths and weaknesses in expert testimony. One minor detail could be the determining factor in a court case between a two year or ten year sentence.

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