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Neuropsychological Assessment of Battered Women

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NEUROPSYCHOLOGICAL ASSESSMENT OF BATTERED WOMEN

by

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ABSTRACT

NEUROPSYCHOLOGICAL ASSESSMENT OF BATTERED WOMEN.

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This study examined the effect of physical battering on the neuropsychological functioning of women. Twenty-five battered women and twenty-five non-battered women were administered a neuropsychological screening battery (11 separate tests, yielding 16 variables) to assess for possible deficits in the areas of attention/concentration, memory, visual-perceptual skills, sensory-motor skills, novel problem solving, and verbal fluency. All participants completed a demographic questionnaire, a post-concussive syndrome checklist, and a questionnaire evaluating for the presence of depressed mood and possible effects of depression. Potential participants with a history of previous head injury (occurring from a source other than battering) or other neurological disorders were excluded from the study. Groups were matched for age, level of education, and ethnicity.

A Multivariate Analysis of Variance (MANOVA) was employed to test overall group differences considering all 16 neuropsychological variables collectively. The resulting analysis revealed significant group differences $F(7,50) = 7.30$, $p < .0001$ (Wilks Lambda = .21). There was a significant difference between groups with regard to depressed mood, $t(45) = 4.07$, $p < .0001$, with battered women obtaining higher scores on a depressed mood questionnaire. Therefore, a Multivariate Analysis of Covariance was performed on the 16 neuropsychological dependent variables, controlling for the effect of depressed mood. There was a significant difference between groups on 12 of the 16

variables. When applying clinical criteria, battered women exhibited impairment on a larger number of tests than controls, $F(1,49) = 72.14$, $p < .0001$. No significant correlation was found between the number of tests on which battered women participants were impaired and the number of years in which the relationship was physically abusive, $r = -.16$. Similarly, the correlation between the number of battering episodes within the past month and the number of measures on which a battered woman was impaired was not significant, $r = .07$. Battered women endorsed a greater number of symptoms on a postconcussive syndrome checklist than did control participants, $t(48) = 4.48$, $p < .0001$.

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CHAPTER I

INTRODUCTION

Violence Against Women: Overview

The issue of violence against women has recently caught the attention of the nation which has, in turn, advanced discussions on the prevalence of battering and its effect on the physical and mental well-being of women. Domestic violence and its effects are major health care and societal issues, for it impacts both the physical and psychological well-being of women. Studies indicate that battered women frequently utilize emergency psychiatric and medical services (Bergman & Brismar, 1991; Bergman, Brismar & Nordin, 1992; Browne, 1993; Stark, Flitcraft, Zuckerman, Grey, Robison & Frazier, 1981). Battered women endure physical, psychological, and emotional attacks by significant others. Consequently, they report a multitude of both physical complaints and psychological symptoms, the latter including depression, anxiety and hopelessness. There is also an increased risk of suicide (West, Fernandez, Hillard, Schoof & Parks, 1990; Bergman & Brismar, 1991).

Violence against women is cross-cultural and can be found in all ethnic groups and social classes (Burge, 1989; Hutchinson, 1990). Studies have failed to identify a "typical" victim of spouse abuse (Walker, 1979; 1983; 1984; Browne, 1987). Estimates of the incidence of battering in the U.S. range from 10-34% of women (Browne, 1993; Goodman, Koss, Fitzgerald, Russo & Keita, 1993; Hutchinson, 1990; Straus (1991); Walker, 1979) or 1.5 to 3 million cases per year (Goldberg & Tomlanovich, 1984; Straus, Gelles & Steinmetz, 1980), with the frequency of episodes ranging from 3.5 to 20 times within a given year (West et al. 1990). In addition, it is believed that the frequency and intensity of battering episodes may escalate over time, with increasing danger to the woman (Browne, 1987; Hutchinson, 1990). The abuser is most often a male partner or family member (Browne, 1993). The National Crime Victimization Survey Report on Violence Against Women (U.S. Dept. of Justice, 1994), reported an equal probability that the perpetrator of violence may be a relative, intimate, acquaintance, or a stranger. Similarly, approximately two in three women were related to or knew their attackers; whereas only 31% of women reported a stranger as the attacker. In addition, there was an increased likelihood that a woman would receive injuries if the offender was an intimate (59%), compared to when the attacker was a stranger (27%). Strauss (1991) reported that women are 200 times more likely to be abused by a family member than by anyone else. Unfortunately, women in abusive relationships or families have more to fear from loved ones than strangers as they face an increased risk of multiple, serious, or fatal attacks (Browne & Williams, 1989; Finklehor & Yllo, 1985; Langan & Innes, 1986; Lentzner & DeBerry, 1980; Russell, 1982).

Injuries Sustained From Violence

Battered women often suffer physical injuries during an assault. Approximately 80-90% of battered women who seek help from shelters have been injured. Nine to 12 percent of women who reported a violent incident with a spouse within a one year time period indicated they had to seek medical attention (Fisher, Kraus & Lewis 1988). Pushing, slapping, hitting, kicking, biting, strangling, and blows to the head and face, are among the most frequent ways in which women are assaulted (Brismar & Tuner, 1982; Browne, 1993; Geffner & Rosenbaum, 1992; Haug, Prather, & Indresano, 1990; Shepherd, Gayford, Leslie & Scully, 1988; Hutchinson, 1990; Zachariades, Koumoura

& Konsolaki-Agouridaki, 1990). Unlike child abuse, where an individual is more likely to target non-visible areas during an assault, for battered women, the head is often the selected target. Several studies indicate that women receive serious injury to the head as a result of battering by men (Brismar & Tuner, 1982; Fisher, Kraus & Lewis, 1990; Haug et al., 1990; Shepherd et al., 1988; Zachariades, et al., 1990). In addition, the severity and frequency of the assaults tend to increase over time, resulting in even more serious injuries. Although many battered women receive injuries resulting from an attack, most tend to delay seeking help until serious injuries result (Burge, 1989).

Studies suggest that facial injuries are often inflicted during a battering episode (Brismar & Tuner, 1982; Shepherd, et al., 1988; Zachariades, et al., 1990). Brismar and Tuner (1982) conducted a two-year, large scale, retrospective study of individuals admitted to the hospital due to emergency injuries. Of 1,444 patients seen, injuries in 325 (33%) of the men and 133 (29%) of the women, resulted from battery. In 42% of the cases for women, the assailant was either the husband or boyfriend. Fourteen percent of assaults were by relatives and six percent were unknown assailants. Injuries to the face and head were predominant, with fractures of the nose and jaw being most common (162 of 190 injuries). The authors did not report the percentage of males battered by spouses, family members, or unknown assailants.

Shepherd, Gayford, Leslie, and Scully (1988), found that injury to the maxillofacial region is common in battering. During the first six months of 1986, the authors examined 43 victims of assault at an infirmary. The authors divided locations of injuries into anatomical zones, including the face (which was subdivided into upper, middle, and lower), other areas of head and neck, thorax, abdomen, upper limb and lower limb. The face was the most common site of bruising, with 88% of women enduring facial injury of some kind. The middle third of the face was the most commonly lacerated site, followed by the lower third. Twenty-two fractures were recorded among the women, with the fractures being primarily nasal and mandibular. Two women had endured multiple fractures. The authors reported that fists and feet were the most common implements used in assaults. Seventy-five percent of women reported that they knew their assailant.

Examining the etiology of facial injuries in women, Zachariades, Koumoura and Konsolaki-Agouridaki (1990), revealed that 57 of 546 cases were directly or indirectly related to violence by a male. In approximately 76.7% of these cases, the injury was caused by either the husband, boyfriend, or a blood relative. Fractures of the mandible accounted for 39% of the injuries. Ten percent were zygomaticomaxillary complex fractures and two percent were fractures of the nasal bone. In 70% of cases, the assault was by fist. In this study, violence by men was the third most frequent cause of facial trauma to women, behind motor-vehicle accidents and falls. The authors proposed that repeated assaults resulting in serious injuries occur in abusive relationships and the danger of assaults is often underestimated.

Fisher, Kraus, and Lewis (1990), also examined maxillofacial injuries sustained in assaults on 32 women. Eighteen of the women were injured in domestic and school altercations, eight were rape victims, three were attacked during robberies, and three were not categorized. Injuries were most often inflicted by fists, followed by blunt objects, human bites, knives, and guns. Eleven patients had been attacked by a spouse or boyfriend. Sixteen women had single fractures and seven had multiple fractures. Types of injuries included seven mandibular fractures, five zygomatic fractures, seven nasal fractures, three maxillary fractures and eight orbital fractures. No neurologic trauma was noted. The authors contended that domestic violence results in a high percentage of facial injuries in women.

Since a facial fracture requires a blow to the head with a significant degree of force, there is a reasonable possibility that concomitant brain injury may result (Richardson, 1990). Haug, Savage, Likavec, and Conforti (1992) attempted to determine the incidence of closed head injury associated with facial fractures. The authors reviewed 100 such cases in both males and females. Mandibular fractures were most frequently associated with closed head injury (45%). In addition, combinations of fractured facial bones (such as mandible/zygoma or maxilla/zygoma fractures) tended to be associated with more severe intracranial injury. The authors found that midface fractures are also associated with closed head injuries. Fourteen percent of the patients in this study displayed neurological symptoms, clearly indicating brain injury can result from blows to the face.

Neuropsychological Functioning of Boxers: An Analogue to Battering

Due to the lack of research focusing on brain injury and neuropsychological deficits resulting from domestic violence, and to advance the present discussion, brain impairment resulting from boxing will be examined as an analogue of battering.

Neurologic injuries associated with boxing have drawn increasing attention from the academic and popular press. Studies assessing the effects of boxing reveal that many boxers exhibit symptoms of neurological impairment such as loss of motor control, stuttering, tremors, memory loss, headaches, and fatigue (Casson, Sham, Campbell, Tarlau & DiDomenico, 1982; Casson, Siegel, Sham, Campbell, Tarlau & DiDomenico 1984; Drew & Templer, 1992; Enzenauer, Montrey, Enzenauer & Mauldin, 1989; Ross, Casson, Siegel & Cole, 1987; Unterharnscheidt, 1972). In a five year study of boxing injuries in the U.S. Army, Enzenauer, Montrey, Enzenauer and Mauldin (1989), found that approximately 67 hospitalizations resulted annually from boxing. There were 410 admissions for boxing-related injuries and one death as a result of serious head injury. Sixty-eight percent of the hospitalizations resulted from head injuries. Injuries sustained included intracranial injuries and hemorrhage, and fracture of the skull. Injuries to the head were found predominantly in cadets, who were younger and less experienced boxers. Based upon the incidence of head injury in the U.S. Army during this period, the authors proposed that chronic head injury may be seen in up to 10-15% of professional boxers.

Casson, Siegel, Sham, Campbell, Tarlau and DiDomenico (1984), also examined brain injury in boxers. They assessed 18 former and active boxers. The boxers underwent CT and MRI scans of the head. Seven boxers displayed brain abnormalities on both scans. Some subjects reported symptoms including memory loss, stuttering, headache, depression, and lethargy.

Various methods for detecting dysfunction in boxers were examined by McLatchie, Brooks, Galbraith, Hutchison, Wilson, Melville, and Teasdale, (1987). The methods used included neuropsychological assessment, neurological examinations, electroencephalogram (EEG), and CT scans. The authors assessed 20 active amateur boxers and an orthopaedic control group with each of these methods. The neuropsychological test battery included Digit Span from the Wechsler Adults Intelligence Scale - Revised (WAIS-R), a word learning task, logical memory, the Rey-Osterreith Complex Figures Test (Rey-O), and the

Paced Auditory Serial Addition Test (PASAT). Neurological abnormalities were noted in seven of the subjects and these abnormalities were positively correlated with the number of fights in which the subject had participated. Eight subjects exhibited abnormal EEGs, and four of these also had an abnormal neurological exam; however, there was no significant correlation between EEG abnormalities and number of fights. Only one subject had an abnormal CT scan. Of the 20 subjects, nine had poor performances on two or more of the neuropsychological measures. The authors concluded that neuropsychological assessment was the best method among those utilized in this study, for assessing neurological dysfunction in boxers.

Another study, conducted by Drew, Templer, Schuyler, Newell, and Cannon (1986), examined neuropsychological deficits in 19 licensed professional boxers and 10 control subjects. Tests administered included the Quick Neurological Screening Test, the Randt Memory Test and the Halstead-Reitan Neuropsychological Test Battery. Fifteen of the 19 boxers scored in the impaired range on the Halstead-Reitan Impairment Index, whereas only two of ten control subjects had impaired scores. The Halstead-Reitan Impairment Index, along with the number of errors on the Quick Neurological Screening Test, were positively correlated with the number of professional bouts ($r=.49$ and $r=.80$, respectively). In addition, the Impairment Index was positively correlated with the number of lost bouts ($r=.59$). The number of bouts was negatively correlated with the Memory Index ($r= -.62$). Generally, impairments increased with the number of bouts and with number of lost bouts. The authors concluded that cognitive deficits revealed were consistent with previous literature on the "punch drunk" syndrome, which includes dysarthria, memory deficits, cerebellar vestibular dysfunction and many sensory, motor and cognitive deficits. The authors also felt that the effects of mild head trauma may be cumulative in that repeated subconcussive head blows may be more damaging than less frequent, but more severe, trauma.

Head Injury: An Overview

Head injuries may be classified as either closed or penetrating (open). An open head injury is classified when the injury results in the exposure of the contents of the skull, such as a gunshot wound or some other means when the skull is penetrated. Resulting damage is generally focal in nature. A closed head injury typically results from blunt impact, such as a physical blow, or when the head collides with a fixed object. Most often this occurs as a result of a motor-vehicle accident, fall, or when a person is struck by an object. Acceleration/deceleration injury typically results. Subsequent damage is usually diffuse but sometimes focal in nature. Lesions at the site of impact ("coup") can occur as well as "contrecoup" injuries at the opposite pole (Grubb & Coxe, 1978; Lezak, 1983; Richardson, 1990). In closed head injury, the damage is most often diffuse and results from tearing of stretching of nerve fibers. This is referred to as "shear strain" and is seen microscopically throughout the brain (Evans, 1992; Richardson, 1990). Due to the microscopic nature of diffuse injury, CT scans and neurologic exams often fail to detect such damage.

Usually, the duration of loss of consciousness, or alteration in consciousness, is used to determine the level of severity of brain injury. However, mild or moderate head injury can be present even when there has been no loss of consciousness (Kay, 1986; Kraus & Nourjah, 1989). More often, an individual may experience feelings of agitation, confusion, disorientation, or otherwise feeling dazed.

Long-term deficits can result even from mild head injuries and are usually difficult to detect. Subsequently, they are not usually noticed until after an individual attempts to return to work or school. Complaints then typically include short-term memory difficulties, impaired concentration, and problems with the efficiency and integration of mental processes. This may include impairments in shifting and divided attention, novel problem solving, abstract and flexible thinking, and difficulty in new learning.

Individuals with head injuries, particularly milder types, often report symptoms which have come to be referred to as "postconcussion syndrome." The three most common include headache, fatigue, and dizziness (Levin, Gary, High, Mattis, Ruff, Eisenberg, Marshall & Tabaddor, 1990). Five factors have been identified by Levin et al., (1990) into which complaints may be grouped, and include Cognitive-Depression, Somatic, Sensory-Sleep, Gustatory-Olfactory, and Irritability-Anxiety. Other symptoms may include depression, insomnia, memory and concentration impairment, fatigue, dizziness, headache, nausea, disorientation, amnesia, confusion, and agitation. Sometimes these symptoms continue for weeks or even months after injury and, in some cases, may persist for more than a year (Binder, 1986; Binder & Rattok, 1989). In many cases, individuals fail to return to prior levels of functioning (Kay, 1986). These latter outcomes are more likely for individuals who experience high stress, have deficient coping skills, or have had prior neurologic insults (Long & Ross, 1992).

Effects of Multiple Head Injuries

A cumulative effect of multiple head injuries has been proposed, with increasing neuropsychological deficits occurring from repeated head injuries (Binder & Rattok, 1989; Drew, et al. 1986; Evans, 1992; Gronwall, 1989; Gronwall & Wrightson, 1975; Kay, 1986). For example, a study by Gronwall and Wrightson (1975) revealed that 20 individuals receiving a second concussion had a significant decrease in their rate of information processing as compared to individuals who had sustained only one concussion. In addition, they recovered more slowly than subjects receiving only one concussion. Subjects with multiple concussions were matched with others sustaining a single concussion of similar severity on duration of post-traumatic amnesia, age, conscious state on arrival, gender, and occupation. Subjects were administered four trials of the Paced Auditory Serial Addition Task (PASAT) within 48 hours of injury, with repeated testing every week until recovery (defined as obtaining a score falling within one standard deviation of the mean). Groups were then separated into mild and severe, yielding a total of four groups: mild control (single concussion), severe control (single concussion), mild multiple concussion, and severe multiple concussion. Subjects in the mild multiple group, and in both severe groups performed more poorly than the mild control group. In addition, those subjects with mild multiple concussions performed similarly to those participants in the severe control (single concussion) group. Lastly, participants sustaining severe multiple concussions performed significantly worse than any of the groups. The authors concluded that the results support the notion that there is a cumulative effect of concussion, with multiple severe concussions resulting in more severe deficits. In addition, the deficit in rate of information processing persists significantly longer when there are multiple concussions.

It is reasonable to assume, then, that risk for head injury increases over time with repeated battering. For example, Roberts, Whitwell, Acland, and Bruton, (1990), reported a case in which an autopsied battered woman's brain resembled those seen with dementia pugilistica (brain injury associated with boxing). Similarly, Adlakha and Lobl (1993), reported acute neurologic deficit in a battered woman. The woman exhibited symptoms of dysarthria and right motor and sensory hemiplegia. Although her CT scan upon admission was normal, a 24 hour repeat scanning revealed an infarction involving portions of the left temporal and parietal lobes, along with mass effect and midline shift. In addition, the authors reported there was "traumatic internal carotid artery dissection likely induced by hyperextension or rotation of the neck, direct trauma to the neck or mandible, intraoral trauma, or fracture through the base of the skull."

Purpose of the Present Study

The purpose of the present study was to assess the effects of partner battering on the neuropsychological functioning of women. An area needing further investigation was whether battering (one episode or repeated assaults) results in brain injury, thereby leading to neuropsychological impairment. In the present study, female participants were administered a neuropsychological test battery designed to assess major components of cognitive functioning, including memory, verbal fluency, intelligence, attention and concentration, abstract reasoning, sensory and perceptual functioning, and fine motor control.

Hypotheses

Five hypotheses were proposed in the present study:

1) It was anticipated that battered women would endorse more depressive symptoms than non-battered women. Specifically, battered women would obtain significantly higher scores on the Center for Epidemiological Studies - Depressed Mood Scale than non-battered women.

2) Battered women were expected to exhibit significantly lower scores on some or all neuropsychological tests measures as compared to non-battered women. This was anticipated to be reflected in results derived from significance testing of group differences on continuous variables.

3) Similarly, a significant difference was expected between the groups when criteria for clinical impairment were applied to individual test scores. Battered women were expected to be clinically impaired on more test measures than non-battered women.

4) In concordance with the notion that there is a cumulative effect of multiple head injuries (Binder & Rattok, 1988; Drew et al., 1986; Gronwall, 1980; Gronwall & Wrightson, 1975; Kay, 1986), relatively greater neuropsychological impairment was expected with increased episodes of battering. Within the battered women group, those participants who were in the battering relationship for a longer period of time were expected to demonstrate greater impairments than those with less time in the relationship. Specifically, a significant positive correlation was expected between the number of years in the relationship and the number of tests on which a participant was impaired.

5) Lastly, battered women were also expected to endorse a greater number of symptoms than non-battered women on the postconcussive checklist.

CHAPTER II

METHOD

Participants

Twenty-five battered women from local women's shelters and support groups were asked to participate. In addition, 25 non-battered control participants (solicited from churches, beauty salons, hospitals, and a local newspaper) were asked to complete the study. All participants were between 18 and 45 years of age and received ten dollars for their participation in the study. The present study met the requirements for research with human subjects, and was approved by the Institutional Review Board of Eastern Virginia Medical School.

Participants with histories of neurobehavioral risk factors were excluded. Specifically, those participants reporting a history of medical, neurological (including previous head injury from a source other than battering), psychiatric or substance abuse treatment were excluded. Controls were matched with the battered women participants on the variables of age, education, and ethnicity. One participant was excluded from the study due to a pre-existing neurological disorder. The data of two participants was excluded from analysis because of a history of head injury resulting from motor-vehicle accidents (this information was obtained after testing was completed). Three participants approached were excluded due to inpatient psychiatric history.

Procedure

All assessments were conducted by the principal investigator or by examiners recruited for this study. To ensure accuracy and standardization, all examiners were trained by the principal investigator. Their skills were demonstrated to a doctoral level clinical neuropsychologist who oversaw the study. All testing procedures were clearly outlined in print, with opening remarks, instructions, and test order being standardized. All tests were scored by the principal investigator using standardized scoring criteria from test manuals.

Potential experimental participants were approached at the battered women's shelter and provided consent (see Appendix A). They wre then administered a prescreening questionnaire (see Appendix B). Those women meeting criteria outlined above were asked to continue in the study. Experimental participants were assessed in a quiet room in a battered women's shelter. Control participants were tested in a medical school neuropsychology testing lab or a quiet room elsewhere (i.e., place of employment). Before each participant was assessed, she provided written consent for participation in the study (Appendix C). Each participant was offered feedback as to her performance on the neuropsychological screening evaluation (see Appendix D). In addition, each participant completed a background information questionnaire (see Appendix E), a summary of which can be seen in Table 1, and the Center for Epidemiological Studies - Depressed Mood Questionnaire (see Appendix F), prior to administration of the neuropsychological screening test battery.

All participants completed the following tests: Center for Epidemiological Studies - Depressed Mood Scale (CES-D); Controlled Oral Word Association Test, Digit Span and Digit Symbol (from Wechsler Adult Intelligence Scale - Revised); Grooved Pegboard; Judgment of Line Orientation; Sensory-Perceptual Exam; Trail Making Test; Wechsler Memory Scale - Revised (Logical Memory I and II and Visual Reproduction I and II subtests); Wisconsin Card Sorting Test; and the Wonderlic Personnel Test. In addition, all participants completed a background questionnaire which included a postconcussive syndrome checklist.

Assessment Measures

Neuropsychological tests are designed to assess different aspects of cognitive functioning. Individuals with mild to severe head injuries may display various deficits on testing, among these are problems with memory (both verbal and visuo-spatial), attention, concentration, information processing, and speed of mental processes. In addition, they may have difficulties in dividing attention, verbal fluency, abstract and flexible thinking, problem solving abilities, and new learning. A brief summary of tests utilized and the domains which they assess can be seen in Table 1.

All test measure scores were converted to either a percentile rank or to an age and education-corrected T-score (Heaton, Grant, and Matthews, 1991), with the exception of sensory-perceptual errors, and scores on the WPT and CES-D, which remain as raw scores. A percentile ranking of 12 or below (a more conservative cut off), falling more than one deviation from the mean, indicated impairment. Additionally, a T-score falling at 39 or below was considered clinically impaired. These cut-offs represent scores that fall at least one standard deviation below the mean and are generally acknowledged as being clinically significant.

Center for Epidemiological Studies - Depressed Mood Scale (CES-D)

The CES-D is an instrument used to assess depressed mood (see Appendix F). It consists of 20-items which are rated on a four-point scale. The CES-D was originally designed to assess the presence of depressed mood in the general population. The participant rates each item on a four point scale (0 = rarely or none of the time; 3 = most

Table 1

Tests Utilized and Domains Assessed

Test	Domain Assessed
	Attention
Trail Making Test Part A	Assesses simple attention/concentration skills, sequencing and includes a motor component.
Trail Making Test Part B	Assess more complex attentional skills with the ability to alternate between two sets of stimuli.
Digit Span	Assess both simple and complex auditory attention, as well as the ability to mentally manipulate information.
Digit Symbol	Attentional task along with a motor component.
	Memory
Logical Memory I & II	Assesses immediate and delayed recall of auditory information that is organized in a contextual manner.
Visual Reproduction I & II	Assesses immediate and delayed recall of visual-graphic stimuli.
	Verbal Fluency
Controlled Oral Word Association Test	Assesses an individual's ability to voluntarily generate a word list on command.
	Visual/Spatial Perception
Judgment of Line Orientation	Assesses an individual's ability to discriminate and judge the orientation of lines.

Table 1 Continued

Tests Utilized and Domains Assessed

Test	Domain Assessed
	Intellectual/Executive Functioning
Wisconsin Card Sorting Test	Assesses problem solving, and ability to utilize feedback to monitor and change response style.
Wonderlic Personnel Test	Assesses general intellectual level.
	Sensory-Perceptual/Motor
Sensory-Perceptual Exam	Assesses an individual's ability to detect sensory stimulation in visual, auditory, and tactile fields.
Grooved Pegboard	Assesses manual fine motor speed and dexterity.

of the time) based upon the number of occasions she has experienced the symptoms in the past week. The score is the sum of the number of points rated for all items. Test-retest reliability ranges from .51 to .67 (two or eight weeks) and .32 to .54 (3 months to one year). Internal consistency yields alphas of .85 for the general population and .90 for the psychiatric population.

Controlled Oral Word Association Test

The Controlled Oral Word Association Test (COWA) was developed as part of Benton and Hamsher's (1989) Multilingual Aphasia Examination. Verbal fluency measures, such as the COWA, contribute to the detection of aphasia and are considered sensitive markers of cognitive deficits since they aid in distinguishing lesions of different loci (Borkowski, Benton, & Spreen, 1967; Miller & Hague, 1975). Similarly, it has been demonstrated to be sensitive to frontal lobe injury (Parks, Loewenstein, Dodrill, Barker, Yoshii, Chang, Emran, Apicella, Sheramata & Duara, 1988; Perret, 1974), to closed head injury (desRosiers & Kavanagh, 1987). Injury to the brain often produces difficulties in the speed and spontaneity of verbal production. However, verbal fluency skills usually are not affected by symptoms of depression which can mimic organic decline (Lezak, 1983).

The COWA consists of three word-naming trials in which the participant is required to produce as many words as she can (excluding proper nouns, or the same word with a different suffix) that begin a particular consonant of the alphabet (C, F, and L). The total of all words produced in the three one-minute trials are age- and education-corrected. Test-retest reliability is .88 following a 19 to 42 day interval (desRosiers & Kavanagh, 1987).

Grooved Pegboard

Grooved Pegboard (Klove, 1963) is a test of fine motor coordination and is part of the Wisconsin Neuropsychological Test Battery (Harley, Leuthold, Matthews, & Bergs, 1980; Matthews & Klove, 1964). It is believed to be sensitive to general slowing which could be attributable to brain dysfunction or medication effects (R.F. Lewis & Rennick, 1979; Matthews & Haaland, 1979; Matthews & Harley, 1975). In addition, it is believed to be sensitive to lateralization effects (Haaland, Cleeland & Carr, 1977; Haaland & Delaney, 1981). The test consists of 25 slots arranged in 5 x 5 grid. Metal pegs are designed with a ridge along one side and the reciprocal slots are arranged so that the ridge is positioned in varying directions. This requires the participant to manipulate the peg (with one hand only), when placing the peg in the slot. The time it takes for the participant to complete the task was recorded, as well as the number of pegs dropped. The time for completion was translated into a T-score based on age and level of education (Heaton, Grant & Matthews, 1991). Each participant performed the task first with her nondominant hand, then with her dominant hand. Test-retest reliability is .83 following a 10 to 47 day interval (Lezak, 1983).

Judgment Of Line Orientation

Judgment of Line Orientation (Benton, Hamsher, Varney & Spreen, 1983; Benton, Varney & Hamsher, 1978), assesses spatial perception; specifically, the ability to judge the angular orientation of lines. It is considered to be sensitive to right hemisphere dysfunction (Benton, Hannay & Varney, 1975). There are two forms, H and V. Both forms contain the same items, but are presented in a different order. Form V was used in the present study. There are a total of 35 items on the test, including five designated practice items and 30 test items. On the upper half of the stimulus plate booklet, two lines are displayed. The bottom half of the booklet consists of a collection of radii (numbered 1 through 11) arranged in 180 degrees (i.e. at 18-degree increments). The participant was asked to carefully look at the two lines on the top half and point to the corresponding lines in the lower section, while stating the numbers of the corresponding lines aloud. Scores reflect the total number of correct items. Test-retest reliability (from Form H to Form V) was .90.

Post-Concussive Syndrome Checklist (PCSC)

The Post-Concussive Syndrome Checklist (Gouvier, Cubic, Jones, Brantley & Cutlip, 1992) is a 10- item checklist that evaluates the presence of headache, dizziness, irritability, memory problems, concentration difficulties, fatigue, visual disturbances, aggravation by noise, judgment problems, and anxiety. The PCSC was modeled after the Postconcussion Checklist (Oddy, Humphrey & Uttley, 1978) to evaluate for the presence of postconcussion symptoms. The Postconcussion Checklist (PCL) has been used in research on head injury (Oddy, Coughlan, Tyerman & Jenkins, 1985; Oddy, Humphrey & Uttley, 1978; Weddell, Oddy, & Jenkins, 1980), although its use is limited because of not utilizing normal control groups or measuring postconcussion symptoms aside from others attributed to head injury. In addition to measuring the presence of these symptoms, the PCSC (see Appendix G) requires the individual to rate the frequency, intensity, and duration of each symptom, which the PCL did not do. These symptoms often follow concussion and are generally subjective in nature. Although this measure was designed to assess the frequency, intensity, and duration of these symptoms, it is used merely for descriptive purposes in the present study. The participants in the present study appeared to have difficulty in completing this measure. Of particular note, battered women participants were confused in completing the intensity and duration aspects. Therefore, due to this confusion, only the frequency aspect of the checklist was used.

Sensory-Perceptual Exam

The Sensory-Perceptual Exam (Reitan & Wolfson, 1993), assesses tactile, auditory, and visual field detection. These modalities are first assessed unilaterally to ensure that the patient can perceive a threshold level stimulus. Then, stimuli were delivered bilaterally and simultaneously to assess for deficits (i.e. suppressions). The exam also includes additional tests. In Finger Recognition, the participant is asked, with eyes closed, to identify the individual fingers that are touched by the examiner on each hand. In the Fingertip Number Writing component, the participant is asked to identify numbers written with a stylus on the fingertips of her hand while her eyes are closed. For all components of the Sensory-Perceptual Exam, a comparison of the number of errors on each side of the body is the critical variable. One of the most important kinds of errors is "suppressions", which is the failure to perceive a sensation on one side of the body when both sides are simultaneously stimulated. The number of errors a participant makes is the dependent variable. Test-retest reliability has been reported at .82 (Lezak, 1983). The Sensory-Perceptual Exam is part of the Halstead-Reitan Neuropsychological Test Battery, which has been demonstrated to be useful in detecting the presence of brain dysfunction (Klonoff, Fibiger & Hutton, 1970; Matthews, Shaw & Klove, 1966; Schreiver, Goldman, Kleinman, Goldfader & Snow, 1976). In addition, studies have demonstrated that the Sensory-Perceptual Exam is useful in detecting lateralized lesions (Boll, 1974; Reitan, 1970; Wheeler & Reitan, 1962).

Trail Making Test

The Trail Making Test (Reitan, 1958), is a part of the revised Halstead-Reitan Battery. This test requires the individual to integrate scanning, sequencing and cognitive flexibility in a speeded fashion, and is considered to be one of the best measures of general cortical function (Reitan, 1955, 1958). The test is divided into two parts, A and B. Part A consists of circles, numbered 1 through 25, which the participant is instructed to connect, in sequence, as quickly as possible. Part B consists of circles containing both numbers (1-13) and letters (A-L) which the participant is asked to connect in alternating sequence (i.e. 1-A-2-B...), as quickly as possible. Time to completion for each part comprises the score for the participant. In addition, the total number of errors for each portion are recorded. The scores are converted to T scores (corrected for age- and educational- level) for determining clinical impairment (Heaton, Grant, and Matthews, 1991). Test-retest reliability has been reported at .78 for Part A and .67 for Part B (Lezak, 1983), and high diagnostic prediction rates are found when discriminating between brain injured and normal control participants (Lewinsohn, 1973). In addition, Trails has been demonstrated to brain dysfunction in general (O'Donnell, 1983) , particularly closed head injury (desRosiers & Kavanaugh, 1987) and alcoholism (Grant, Adams, & Reed, 1984; Grant, Reed & Adams, 1987).

Wechsler Adult Intelligence Scale - Revised (WAIS-R): Digit Span Subtest

The Digit Span subtest of the WAIS-R (Wechsler, 1981), involves both auditory discrimination and attention-concentration (Lezak, 1983). It is composed of two sections (Digits Forward and Digits Backward), each consisting of seven pairs of random numerical sequences, of increasing length. These are read aloud by the examiner at a rate of one per second. In Digits Forward, the participant is asked to simply repeat each sequence exactly as it is read by the examiner. In Digits Backwards, the participant is asked to repeat the digits in the exact reverse order. The latter requires the use of working memory, and therefore, requires greater effort than exact repetition, as it entails simultaneous processing of both memory and reversing operations (Lezak, 1983). The WAIS-R manual reports an average test-retest reliability coefficient of .83 for the Digit Span subtest. This test was included in the present battery as a measure of attention and immediate memory. The total number of correct responses is considered the raw score, which is converted to age- and education level T-scores (Heaton, Grant, & Matthews, 1991). Digit span abilities have been found to be sensitive to brain impairment (Black & Strub, 1978; Weinberg, Scott & Snashall, 1970; Weinberg, Diller, Gerstman & Schulman, 1972).

Wechsler Adult Intelligence Scale - Revised (WAIS-R): Digit Symbol Subtest

The Digit Symbol subtest of the WAIS-R (Wechsler, 1981) requires the integration of motor speed, sustained attention, and visual-motor coordination in a speeded symbol substitution task of 90 seconds in duration. This subtest is believed to be particularly sensitive to brain dysfunction and the score is likely to be depressed even when damage is minimal (Hirschenfang, 1960; Lezak, 1983). Digit Symbol has an average test-retest reliability coefficient of .82. Digit Symbol was included in the battery as a measure of psychomotor functioning as well as sustained attention. The participant's raw score is the number of correctly completed items. This was then converted to an age- and education level T-score (Heaton, Grant, & Matthews, 1991).

Wechsler Memory Scale - Revised: Logical Memory Subtest

The Logical Memory subtest of the Wechsler Memory Scale - Revised (WMS-R) was selected for use in the present battery to measure immediate (I) and delayed (II) recall of verbal material. In Logical Memory I, the participant is read two paragraph-length stories and free recall (verbatim, if possible) is solicited immediately following each. Free recall is again requested after a 30-minute delay. Raw scores (i.e. immediate and delayed recall for both subtests) based on standardized scoring procedures yield age-corrected percentile rank scores. The Logical Memory I and II subtests were scored according to the WMS-R manual. These scores were then converted to percentiles which are also provided by the manual. The WMS-R was standardized on six age groups. Internal consistency estimates for Logical Memory I (using split-half reliability), range from .68 to .80, with an average of .74. For Logical Memory II, the range is .55 to .85, for all age groups, with an average of .75. The WMS-R has been demonstrated to be sensitive to memory disturbance, particularly individuals with Alzheimer's Disease, Huntington's Disease, Korsakoff's, long-term alcoholism, neurotoxin exposure, schizophrenia and depression (Butters, Salmon, Cullum, Cairns, Troster, Jacobs, Moss & Cermak, 1988; Crosson & Weins, 1988; Fischer, 1988; Ryan & Lewis, 1988).

Wechlser Memory Scale-Revised: Visual Reproduction Subtest

The Visual Reproduction subtest of the WMS-R measures memory for visual-graphic information. It consists of an analogous process to the Logical Memory subtest, utilizing several geometric shapes. In Visual Reproduction I, the participant is asked to reproduce several geometric figures after a brief (10 second) presentation of each figure. Following a 30-minute delay, the participant is again asked to reproduce the figures, this time from memory (Visual Reproduction II). Internal consistency estimates for Visual Reproduction I (using coefficient alpha) ranged from .46 to .71 including all age groups.

with an average of .59. For Visual Reproduction II, the range was .38 to .59, with an average of .46. The Visual Reproduction I and II subtests were scored according to the WMS-R manual then converted to percentiles provided by the manual.

Wisconsin Card Sorting Test (WCST)

The Wisconsin Card Sorting Test (Heaton, 1991), requires the individual to employ both inductive and deductive reasoning skills and to shift cognitive strategy in response to feedback. Scores obtained include the number of categories achieved, number of correct responses, errors, the number of perseverative responses, inefficiency of learning, and the ability (or failure) to maintain a cognitive set. The test consists of four stimulus cards and 128 response cards. The stimulus cards include: 1) one red triangle, 2) two green stars; 3) three yellow crosses; and 4) four blue circles. The response cards also consist of these forms, in varying numbers and colors. The participant is asked to match the response card to one of the key cards, and is not informed of the current sorting principle. The participant is then informed whether the response is correct or incorrect, and is not allowed to try again with the same card. It is the participant's job to utilize feedback from the examiner to change response styles so that she can correctly sort the cards. After the participant obtains ten consecutive correct placements, the sorting principle changes without warning. This continues until the participant has either completed six total sorting categories or utilizes all response cards. The participant's score consists of two separate numbers: the total number of categories completed and the total number of perseverative responses. In addition to these scores, in the present study, the sum of the perseverative responses were used with the expanded norms provided by Heaton, Grant and Matthews (1991), which provided a scaled score and a T-score based on age- and education level.

Test-retest reliability has been reported as .87 (Lezak, 1983). The WCST has been demonstrated to be sensitive to brain dysfunction (Milner, 1963; Drewe, 1974; Pendleton & Heaton, 1982; Robinson, Heaton, Lehman & Stilson, 1980), particularly in detecting frontal lobe damage.

Wonderlic Personnel Test

The Wonderlic Personnel Test (WPT) is a brief (12 minutes) self-administered test of general cognitive ability. It has been used extensively in the evaluation of applicants for employment in both government and business institutions. There are twelve equivalent alternate forms of the WPT. The WPT correlates highly with the WAIS-R Full Scale IQ (r=.92) and yields an estimated hit rate in prediction, falling within 10 points of the WAIS-R Full Scale IQ. Test-retest reliability ranges from .82 to .94 within a short time period. Longitudinally, the test-retest reliability is .94. Alternate forms test-retest reliability ranges from .73-.95. It was used in the present study as a general measure of intelligence.

CHAPTER III

RESULTS

A single factor between subjects design was employed. The groups were matched on age, education, and ethnicity. The independent variable was the group (battered vs. non-battered) to which the participant belonged. The dependent variables compared between groups included T-scores, percentiles, and raw scores on the various neuropsychological test measures. Age and education corrected T-scores (Heaton, Grant & Matthews, 1991) were utilized whenever possible. They were obtained for the Digit Span subtest of the Wechsler Memory Scale - Revised (WMS-R), the Digit Symbol subtest of the Wechsler Adult Intelligence Scale - Revised (WAIS-R), Grooved Pegboard (dominant and nondominant hands), Trail Making Test, Parts A and B, and the Wisconsin Card Sorting Test (WCST) perseveration score. When age and education corrected T-scores were not available, raw scores and percentiles were used as dependent variables. The raw scores utilized included those on the Center for Epidemiological Studies - Depressed Mood Questionnaire (CES-D), the total number of errors on the Sensory-Perceptual Exam, the total correct on the Wonderlic Personnel Test, and the number of categories obtained on the WCST. Percentiles were obtained for scores on the Controlled Oral Word Association Test (COWA), Judgment of Line Orientation Test (JOLO), and on the Logical Memory (I and II), and Visual Reproduction (I and II) subtests of the WMS-R. Correlational analyses were conducted between variables including age, education, the CES-D score, and the 16 neuropsychological test measures. Table 2 displays the correlations between these variables and indicates level of significance. The level of significance required was adjusted from the $p < .05$ level to $p < .003$ level to be more

Table 2

Correlations Between Age, Education, CES-D and Neuropsychological Test Measures

Test	JOLO	Number of Categories	Perseverative Responses on WCST	COWA
Age	-.07	-.55**	-.33	.08
Education	.15	-.15	-.05	.27
CES-D	-.16	.08	.21	.17
Trails A	.34	.16	-.09	.38
Trails B	.46*	.33	.02	.57**
Digit Span	.40	.16	.02	.38
Digit Symbol	.40	.14	.13	.37
Logical Memory I	.40	.24	-.04	.32
Logical Memory II	.35	.20	.10	.29
Visual Reprod. I	.46*	.18	-.02	.42
Visual Reprod. II	.47*	.18	-.03	.44
COWA	.44*	-.01	-.10	----
WPT	.15	.05	-.10	.35
JOLO	----	.31	.22	.44
WCST Categories	.31	----	.52**	-.01

Table 2 Continued

Correlations Between Age, Education, CES-D and Neuropsychological Test Measures

Test	WPT	Sensory-Perceptual	Pegboard Dominant	Pegboard Nondominant
Age	.08	-.03	.12	-.16
Education	.16	.17	.20	-.08
CES-D	-.14	.27	-.18	-.30
Trails A	.38	-.20	.32	.50*
Trails B	.49*	-.20	.41	.55**
Digit Span	.24	-.44	.15	.33
Digit Symbol	.25	-.21	.26	.38
Logical Memory I	.41*	-.21	.42	.44*
Logical Memory II	.40	-.37	.34	.34
Visual Reprod. I	.23	-.31	.59**	.44*
Visual Reprod. II	.27	-.39	.42*	.33
COWA	.35	-.05	.46*	.33
WPT	----	-.37	.29	.32
JOLO	.15	-.38	.46*	.53**
WCST Categories	.05	-.07	.16	.44

Table 2 Continued

Correlations Between Age, Education, CES-D and Neuropsychological Test Measures

Test	Trails A	Trails B	Digit Span	Digit Symbol	Logical Memory I	Logical Memory II
Age	-.12	-.23	-.16	-.05	-.14	-.19
Education	-.01	.03	-.01	-.16	.20	.19
CES-D	-.21	-.11	-.23	-.35	-.29	-.19
Trails A	----	.72**	.48*	.32	.45*	.43
Trails B	.72**	----	.53**	.33	.63**	.56**
Digit Span	.48*	.53**	----	.51**	.33	.39
Digit Symbol	.32	.33	.51**	----	.22	.24
Logical Memory I	.45*	.63**	.33	.22	----	.87**
Logical Memory II	.43*	.56**	.39	.24	.87**	----
Visual Reprod. I	.34	.51**	.37	.11	.53**	.55**
Visual Reprod. II	.29	.48*	.45*	.08	.46*	.54**
COWA	.38	.57**	.38	.37	.32	.29
WPT	.38	.49*	.24	.25	.41*	.40
JOLO	.34	.46*	.41	.40	.40	.35
WCST Categories	.16	.33	.16	.14	.24	.20

Table 2 Continued

Correlations Between Age, Education, CES-D and Neuropsychological Test Measures

Test	Visual Reprod. I	Visual Reprod.II	Age	Education	CES-D
Age	.00	.02	----	.20	-.27
Education	.08	.16	.20	----	.18
CES-D	-.10	-.06	-.27	.18	----
JOLO	.46*	.47*	-.07	.15	-.16
WCST Categories	.18	.18	-.55**	-.15	.08
WCST Per. Resps.	-.02	-.03	-.33	-.05	.21
Sensory-Perceptual	-.31	-.39	-.03	.16	.27
Pegboard Dominant	.59**	.42*	.12	.20	-.18
Pegboard Nondominant	.44*	.33	-.16	-.08	-.30

*p<.001
**p<.0001

conservative in interpretation, given the number of correlations.

Hypotheses Tested

A t-test did not reveal a significant difference between the groups with regard to age, $t(45) = .27$, $p > .79$ or education level, $t(45) = .43$, $p > .67$. Table 3 displays demographic information of the participants. In addition, other information obtained from the demographic questionnaire (concerning length of relationship, marital status, substance abuse history, physical abuse history, and medical treatment) can be seen in Table 4.

Hypothesis I

The first hypothesis of the present study was that battered women would endorse a greater number of items on a depressed mood questionnaire. An independent t-test revealed a significant difference between groups with respect to depressed mood, $t(45) = 4.07$ $p < .0001$, with battered women obtaining higher scores on the CES-D ($M = 20.40$, $SD = 12.97$) than controls ($M = 8.20$, $SD = 7.46$). The battered women participants mean score fell above the cutoff for clinical depression.

Hypothesis II

The neuropsychological test measures were believed to represent highly correlated aspects of cognitive functioning. In addition, depressed mood is believed to affect an individual's performance on neuropsychological measures. Therefore, a (MANCOVA) was employed to test overall group differences considering the 16 neuropsychological variables collectively while controlling for the effect of depressed mood, as measured by the CES-D. The resulting analysis revealed significant group differences in neuropsychological test performance in relation to the participant's group, $F(1,47)$, $= 7.30$, $p < .0001$ (Wilks Lambda = .21). The MANCOVA was followed by individual

Table 3

Demographic Information

Subject Variable	Battered Women	Controls
Age (years)		
Mean	29.16	28.63
SD	7.61	5.23
Education (years)		
Mean	12.94	12.79
SD	1.41	.77
Ethnicity		
Whites (n)	11	11
Blacks (n)	14	13
Other (n)	0	1

Table 4

Other Demographic Information Obtained

Item	Percentage Endorsed Battered	Percentage Endorsed Non-Battered
Marital Status		
Married	56%	44%
Separated	8%	20%
Divorced	0%	12%
Living with Boyfriend	36%	16%
Other or No Relationship	0%	8%
Income Level		
Under $7500	44%	4%
7500-14,999	40%	12%
15,000-24,999	8%	44%
25,000-34,999	8%	20%
35,000-49,999	0%	16%
50,000+	0%	4%
Alcohol Use		
Acknowledging Alcohol Use	36%	80%
Drug Use		
Acknowledging Prescription Drug Use	34%	16%

Table 4 Continued

Other Demographic Information Obtained

Item	Percentage Endorsed Battered	Non-Battered
Acknowledging Recreational Drug Use in Past or Present	32%	76%
Acknowledging Outpatient Treatment for Alcohol or Substance Abuse	8%	4%
Physical Abuse History		
Physical Abuse as a Child	28%	8%
Prior Physically Abusive Relationship	36%	64%
Current Abuse History		
Length of Time Relationship Has Been Abusive		
<6 months	16%	N/A
6mos - 1 year	12%	N/A
1-2 years	16%	N/A
2-3 years	4%	N/A
3-4 years	8%	N/A
4-5 years	24%	N/A
5+ years	20%	N/A

Table 4 Continued

Other Demographic Information Obtained

Item	Percentage Endorsed Battered	Non-Battered
Times Struck in Past Month		
0	12%	N/A
1-3	40%	N/A
4-6	36%	N/A
7-10	8%	N/A
11+	4%	N/A
Medical Services		
Requiring Medical Services for Injuries	60%	N/A

Analyses of Covariance for each measure . The adjusted means for each measure as well as the standard deviations and F-ratios are presented in Table 5 and below. The resulting analysis revealed that the groups differed significantly on each measure, with the exception of Grooved Pegboard with the dominant hand, at the $p < .05$ level. However, given that each participant was administered several tasks, producing 16 variables, a Bonferroni t statistical procedure was used to adjust the alpha level, changing the critical value to $p < .003$. Therefore, only those measures exceeding the critical value are considered significant.

1. On the Logical Memory I (immediate verbal recall) subtest of the WMS-R, a significant difference between groups was observed, $F(1,49) = 12.98$, $p < .0008$. Battered womens' ($M = 38.76$, $SD = 25.48$) percentile scores were significantly lower than controls' ($M = 67.68$, $SD = 21.61$). Similarly, there was a significant difference between groups on the Logical Memory II (delayed verbal recall) subtest, $F(1,49) = 17.82$, $p < .0001$, with battered women recalling significantly less verbal material ($M = 38.16$, $SD = 23.22$), thereby obtaining lower percentile scores, than controls ($M = 65.56$, $SD = 20.14$).

2. On the Visual Reproduction I (immediate recall of visual-graphic information) subtest of the WMS-R, a significant difference between groups was not in evidence $F(1,49) = 7.93$, $p < .007$. Battered women did not obtain significantly lower percentile scores ($M = 35.88$, $SD = 28.58$) than did controls ($M = 56.16$, $SD = 21.85$). However, there was a significant difference between groups with respect to the delayed recall component of visual information (Visual Reproduction II) on the WMS-R, $F(1,49) = 17.37$, $p < .0001$, with battered women again obtaining lower percentile scores ($M =$

Table 5

Neuropsychological Test Means, Standard Deviations and Level of Significance Controlling for Depressed Mood

	Battered Women		Controls		
Test	M	SD	M	SD	F-ratio
Digit Span (T-score)	44.12	8.98	55.80	7.48	21.07**
Digit Symbol (T-score)	39.16	8.89	51.64	8.56	16.53*
Grooved Pegboard Dominant Hand (T-score)	38.32	11.35	45.36	11.46	3.06
Grooved Pegboard Nondominant Hand (T-score)	32.40	9.84	42.80	8.56	10.13*
Trails A (T-score)	43.28	12.23	52.84	7.88	8.03
Trails B (T-score)	40.36	11.68	51.12	6.66	17.24**
WCST Perseverative Responses (T-score)	49.12	16.04	55.36	13.02	8.02
WCST (Number of Categories)	4.96	1.59	5.84	.62	11.97*
JOLO (Percentile)	22.16	22.18	55.60	20.02	33.23**

Table 5 Continued

Neuropsychological Test Means, Standard Deviations and Level of Significance Controlling for Depressed Mood

	Battered Women		Controls		
Test	M	SD	M	SD	F-ratio
COWA (Percentile)	40.88	29.50	58.36	20.15	14.86*
Logical Memory I (Percentile)	38.76	25.48	67.68	21.61	12.98*
Logical Memory II (Percentile)	38.16	23.23	65.56	20.14	17.82**
~~Visual Reproduction I~~ (Percentile)	~~35.88~~	~~28.58~~	~~56.16~~	~~21.85~~	~~7.93~~
Visual Reproduction II (Percentile)	31.44	27.19	57.32	21.03	17.37**
Sensory-Perceptual Exam (Number of Errors)	4.60	3.88	.80	1.52	15.48*
WPT (Raw score)	18.72	5.12	22.08	4.37	5.11
Total Number of Tests Considered Clinically Impaired	4.52	1.96	.68	.69	72.14**

*p < .001
**p < .0001

31.44, SD = 27.19) than controls (M = 57.32, SD = 21.03).

3. No significant group differences were revealed on the Trails Making Test, Part A, F (1,49) = 8.03, p < .007, a simple measure assessing attention and sequencing skills, and also involving a motor component. Battered women did not achieve significantly lower T-scores (M = 43.28, SD = 12.23), than control participants (M = 52.84, SD = 7.88). However, there was a significant group difference on the Trail Making Test, Part B, F (1,49) = 17.24, p < .0001, with battered women obtaining lower T-scores (M = 40.36, SD = 11.68) than control participants (M = 51.12, SD = 6.66), thereby indicating longer completion times. This measure was more complex than the Trails A test, as it assessed attention and an individual's ability to sequence and alternate between two sets of stimuli.

4. There was a significant difference found between groups on the Digit Symbol subtest of the WAIS-R, F (1,49) = 16.53, p < .0002. Control participants obtained higher T-scores (M = 51.64, SD = 8.56) than battered women participants (M = 39.16, SD = 8.90).

5. On the Digit Span subtest of the WAIS-R, assessing auditory attentional skills (reciting digits in both forward and reverse order), there was a significant difference between groups, F (1,49) = 21.07, p < .0001. Battered women participants achieved significantly lower T-scores (M = 44.12, SD = 8.97) than control participants (M = 55.80, SD = 7.48).

6. Analysis of the number of categories achieved on the Wisconsin Card Sorting Test (measuring cognitive flexibility and problem solving) revealed a significant between groups difference, F (1,49) = 11.97, p < .0012. Control participants achieved a higher

number of categories (M= 5.84, SD = .62) than battered women participants (M = 4.96, SD = 1.59). However, there was not a significant difference between the groups with respect to the number of perseverative responses on the WCST, F (1,49) = 8.02, p <.007. Battered women obtained T-scores (M = 49.12, SD = 16.04) not significantly different from those of control subjects (M = 55.36, SD = 13.02).

7. On the Grooved Pegboard test, assessing fine motor skills, a significant difference was found, F (1,49) = 10.13, p <.003, with the nondominant hand. Battered women obtained T-scores (M = 32.4, SD = 9.84) using their nondominant hands that were lower than those obtained by control participants (M = 42.80, SD = 8.55). There was no significant difference between the groups with the dominant hand F (1,49) = 3.06, p <.087, with battered women (M = 38.32, SD = 11.35) scoring similarly to controls (M = 45.36, SD = 11.45).

8. On the Sensory-Perceptual Exam (measuring visual, auditory, and tactile field detection), a significant difference was revealed, F (1,49) = 15.48, p = <.0003. Battered women made more errors in field detection (M = 4.6, SD = 3.88) than did controls (M = .8, SD = 1.52).

9. On the Judgment of Line Orientation test, there was a significant difference between groups, F (1,49) = 33.23, p <.0001. Control participants obtained higher percentile scores (M = 55.60, SD = 20.02) than battered women (M = 22.16, SD = 22.18).

10. On the Controlled Oral Word Association test, a test assessing verbal fluency skills, there was a significant difference between groups, F (1,49) = 14.86, p <.0004. Battered women obtained lower percentile scores (M = 40.88, SD = 29.50) than control

participants (M = 58.36, SD = 20.15).

11. A significant difference was not found between groups on the Wonderlic Personnel Test, evaluating general intellectual ability, F (1,49) = 5.11), p <.0284. Battered women participants obtained scores (M = 18.72, SD = 5.12) that were not different than those of control participants (M = 22.08, SD = 4.37).

Hypothesis III

The third main hypothesis of the study was that battered women participants would exhibit clinical impairment on a larger number of tests administered than control participants. An Analysis of Covariance on the number of tests from the screening battery on which an individual participant was determined to be clinically impaired, revealed a significant between group difference, F (1,49) = 72.14, p <.0001. Battered women participants were impaired on a greater number (total number of measures = 16) of neuropsychological test measures (M = 4.52, SD = 1.96) than control participants (M = .68, SD = .69).

Hypothesis IV

The fourth hypothesis was related to the notion that there is a cumulative effect of multiple head injuries. Relatively greater neuropsychological impairment was expected with increased episodes of battering. However, no significant positive correlation between the number of tests on which battered woman participants were impaired and the number of years in which the relationship was physically abusive, was found, r = -.16. Similarly, the correlation between the number of battering episodes within the past month and the number of measures on which a battered woman was impaired was not significant, r = .07.

Hypothesis V

Battered women were also expected to endorse a greater number of symptoms than the control group on the postconcussive checklist, indicating the presence of a greater number of symptoms associated with head injury. Indeed, an independent t-test revealed a significant difference between the groups on the number of symptoms endorsed, $t(48) = 4.48$, $p < .0001$. All but one of the women from the battered women group indicated the presence of at least one postconcussion symptom which occurred often. Only seventeen control participants endorsed symptoms. Table 6 displays the frequency for each symptom based on group. Chi-squares performed on the postconcussive symptoms revealed significant differences with regard to memory, $x\ (1, N = 50) = 16.10$, $p < .0001$, problems with concentration, $x\ (1, N = 50) = 12.00$, $p < .001$, and anxiety, $x\ (1, N = 50) = 10.96$, $p < .001$.

Table 6

Frequency of Postconcussive Symptoms Based On Group

Symptom	Battered Women	Controls
Headache	72.0%	48.0%
Dizziness	36.0%	4.0%
Irritability	64.0%	64.0%
Memory Problems	56.0%	4.0%
Difficulty Concentrating	64.0%	16.0%
Fatigue	64.0%	60.0%
Visual Disturbance	16.0%	4.0%
Aggravation from Noise	40.0%	24.0%
Judgment Problems	12.0%	0.0%
Anxiety	44.0%	4.0%

CHAPTER IV

DISCUSSION

Summary and Discussion of the Results for Hypothesis I

Not surprisingly, battered women participants exhibited a greater level of depressed mood than controls. This was not unexpected given their current situation and past experiences. Individuals who have suffered head injury may also experience depressed mood (Evans, 1992; Kay, 1986), but it is unclear to what degree cognitive deficits contribute to level of depressed mood and possible lowered self-esteem. It might be postulated that an interaction exists between compromised coping skills and an extremely stressful situation, contributing to depressed mood. Battered women who have suffered head injury may feel as if they are not functioning as they should but may not understand the reason why. This may lead to a cycle where a battered woman feels caught; her impaired cognitive skills contribute to lowered self-esteem which, in turn, contributes to depression. Batterers often use psychological abuse, particularly in attempting to undermine a woman's feelings of self-esteem and self-efficacy. This may take the form of telling the woman she is "stupid," and that she is incapable of "doing things right." A battered woman who may have noticed a decrease in her cognitive skills may believe her abuser, which could possibly contribute to lowered self-esteem and greater depressed mood. One participant in this study related that she felt "humiliated" at being unable to complete household tasks. She clearly described difficulties in the planning and execution of tasks such as cooking and laundering. Perhaps a battered woman whose self-esteem is tied to pleasing her spouse may be more susceptible to developing depression, which, in turn, may affect her cognitive functioning.

Although depressed mood is an important factor and should not be minimized or discarded, the effects were controlled for statistically in the present study in an effort to examine the degree of cognitive deficits without the influence of depression.

Summary and Discussion of the Results for Hypothesis II

As expected, battered women participants exhibited decreased performance on neuropsychological test measures compared to controls. This was found for eleven of 17 dependent variables. Significant differences were not found on Grooved Pegboard with the dominant hand, Wonderlic Personnel Test, Trail Making Test (Part A), the number of perseverative responses on the WCST, and on the immediate recall portion of the WMS-R Visual Reproduction subtest. Battered women demonstrated impairment on a number of measures assessing various domains. These include attention and concentration, immediate and delayed recall of verbal information, delayed recall of visual-graphic information, verbal fluency, visual-perceptual skills, and problem solving ability. These results may suggest that women who have endured numerous physical assaults may demonstrate an overall slowing in cognitive processes regardless of mood state.

The reason for the lack of significance found with regard to Grooved Pegboard with the dominant hand is unclear. The mean T-score for the battered women's group fell in a mildly impaired range, although it was not statistically different from that of the controls. Perhaps the Grooved Pegboard measure utilizes an area of the brain that is more susceptible to focal damage rather than diffuse damage which is most often seen in mild to moderate closed head injury. Therefore, in the future, it may be useful to use measures which have greater sensitivity to relatively small changes in cognitive functioning as opposed to assessing for more focal deficits.

Battered women may not have demonstrated lower scores on the Trail Making Test (part A) since it is a relatively simple sequencing task. When the task was made more complex by requiring them to alternate between two sets of stimuli, they exhibited significantly lower scores than controls. Perhaps when a task is relatively simple in nature battered women will fall within normal limits. However, when a task utilizes more complex attentional skills, they may demonstrate slower processing, if not impairment.

Battered women achieved fewer categories on the WCST. This may signify difficulty in cognitive shifting and processing. However, in their response styles, they did not demonstrate a tendency to perseverate, obtaining T-scores similar to those of controls. They could have been utilizing a "hit and miss," random pattern of responding rather than perseverating to the same principle. Further research could examine the pattern of response style on this measure.

Immediate recall of visual graphic information appeared to be intact for battered women. However, they demonstrated lower percentile scores in delayed recall when compared to controls (although the mean percentile scores fell within an average range). Battered women exhibited intact recall but had difficulty in later remembering this information, perhaps indicating problems in retrieving rather than encoding of this type of information. Further research could utilize a recognition component of visual graphic memory, examining more closely the difficulty with retrieval vs. encoding.

Battered women scored similarly to non-battered women on the Wonderlic Personnel Test, indicating intact intellectual abilities. This finding was surprising given that the battered women group tended to display difficulty with regard to overall slowing of cognitive processing, and that the WPT is a timed test. Perhaps when the task involves learned information, battered women will perform similar to non-battered women. Further research could examine the relationship between their performance on tasks utilizing more academic type information as compared to more novel tasks.

Summary and Discussion of the Results for Hypothesis III

When applying clinical criteria, battered women demonstrated impairment on a significantly greater number of neuropsychological test measures than did controls. Battered women participants were impaired on an average of 4.5 measures, whereas controls averaged impairment on less than one (.69) measure. This lends support to the notion that battered women may incur significant brain injury resulting from domestic assault. Given the degree of force that is frequently used in a battering episode, one may assume that resulting trauma to the brain may occur. Battered women demonstrated impairment in areas including attention/concentration, verbal and delayed visual memory, problem solving, verbal fluency, and visual-perceptual skills.

There was no consistent pattern of deficits observed in the battered women group, suggesting that the incurred brain injury is diffuse in nature, and is not specific to particular domains of cognition. This is similar to what is seen in individuals with known closed head injury, where the damage is often diffuse, and results from the microscopic damage to nerve fibers.

Seven (24%) battered women reported having lost consciousness during at least one battering episode, though it has been proposed that significant head injury can occur even when there has been no loss of consciousness (Kay, 1986; Kraus & Nourjah, 1989). Instead, the individual may experience feelings of agitation, confusion, disorientation, or feeling dazed. Although these symptoms were not assessed in the current study, future research may assess whether battered women participants experience these symptoms rather than loss of consciousness, how frequently, and to what degree. However, this requires the woman to attempt to recall information of which she might not be aware. For example, she may not be able to remember and, therefore, accurately report the number of times when she has lost consciousness or experienced a disruption in orientation.

Summary and Discussion of the Results for Hypothesis IV

One might assume that multiple assaults involving trauma to the head would lead to a cumulative effect of brain injury, resulting in an even greater number of neuropsychological deficits in women who have been in an abusive relationship for a longer period of time. However, no significant correlation was found between the length of a battering relationship and the number of tests on which a battered woman was impaired.

Rather than the length of time a woman is in the abusive relationship, perhaps what is more important is what is referred to as the "second impact syndrome" (Kelly, 1995). This theory proposes that the interim time until an individual receives a subsequent concussion is more important than the number of concussions alone in the disruption of cognitive processes. Concussions which occur temporally closer together are assumed to lead to greater deficits when compared to an individual who receives an equal number of concussions over a longer period of time. This may explain the lack of significance between the length of the relationship and the number of deficits in the present study. Perhaps the women who demonstrated impairment on a greater number of measures incurred relatively rapid successive injuries rather than abuse spread over time. Specifically, those women with greater deficits may have sustained frequent, intense attacks prior to entering the shelter.

Summary and Discussion of the Results for Hypothesis V

Battered women endorsed a greater number of symptoms on the Postconcussive Syndrome Checklist, thereby indicating the presence of symptoms related to head injury. These include headache, fatigue, blurred vision, sensitivity to noise, sensitivity to light, decreased concentration, impaired judgment, anxiety, and memory problems. Interestingly, there was a positive correlation between the number of symptoms endorsed and the level of depressed mood. Perhaps post-concussive symptoms contribute to or interact with a battered woman's level of depressed mood. Gouvier et al. (1992) found that symptoms varied with level of stress. Although battered women in the present study are likely experiencing a high level of stress, they endorsed items that one would not necessarily associate with stress alone. Battered women frequently endorsed headache, irritability, difficulty concentrating, and memory problems. In addition, they also endorsed other symptoms such as visual disturbance, judgment problems, dizziness, and sensitivity to noise, which may not be as highly linked to stress. Control participants also frequently endorsed headache, irritability, and fatigue. However, they were less likely to acknowledge dizziness, memory problems, concentration difficulties, visual disturbance, and judgment problems. In the future, it may be beneficial to separate the particular symptoms and examine their relationship with perceived stress, depressed mood, and cognitive deficits.

These symptoms continue for weeks, or even months, after injury and, in some cases, may persist for more than a year (Binder, 1986; Binder & Rattok, 1989). These individuals often fail to return to prior levels of functioning (Kay, 1986). These latter outcomes are more likely for individuals who experience high stress, have deficient coping skills, or have had prior neurologic insults (Long & Ross, 1992). Future studies should follow the battered women over time and monitor not only their cognitive recovery, but also their report of postconcussive symptoms.

Clinical Implications

Battering episodes tend to escalate in severity and frequency over time and may eventually lead to death. Forty-four percent of battered women participants in the present study reported having received medical treatment for injuries sustained during a battering episode. Some of the injuries included lost teeth, blackened eyes, bruises and cuts to the face, shoulder dislocations, vaginal bruising, broken noses, concussion, internal injuries, bites to the face, and fractured hands. In addition, three women reported having endured miscarriages as a direct result of a battering episode. Several studies indicate that women receive serious injury to the head as a result of battering by men (Brismar & Tuner, 1982; Fisher, Kraus & Lewis, 1990; Haug et al., 1990; Shepherd et al., 1988; Zachariades, et al., 1990). The results of this study support these prior findings.

The results of this study demonstrate that the effects of battering are not likely limited to the immediate physical injury and psychological distress that is seen following a battering episode. Rather, they indicate that battered women can incur brain injury with possibly long-lasting effects which may, in turn, impact many areas of their lives. It is possible that women who have suffered a head injury from abuse may have decreased ability to cope with their environment. They may demonstrate impairment, as do others with head injury, with regard to inflexibility of thinking, impulsiveness, and impaired problem solving. The neuropsychological compromise that battered women experience may lead her to behave more impulsively, show a decrease in judgment, exhibit increased confusion, and demonstrate a decrease in planning and organizational abilities. They may also experience a decrease in attention/concentration skills, memory, executive functioning, and other cognitive skills which may impact her ability to perceive danger. As a result of decreased cognitive skills, a battered woman may behave in a manner which others may perceive as "unreasonable." Although the purpose of this study was only to investigate an association between battering and neuropsychological impairment, future investigations, might discover a relationship between lowered cognitive functioning and an increased likelihood of a woman remaining in an abusive relationship.

Violence against women pervades our society. We, as health professionals, may contribute to the problem by ignoring the issue. Health care practitioners frequently come into contact with battered women and, in the past, have contributed to victim blaming. It may have been easy to perceive women presenting with certain symptoms as "hysterical," and therefore, deny needed evaluation and treatment. Instead, health professionals might become more involved in accurately identifying battered women as they present in emergency rooms and mental health centers. An empathic demeanor may allow a battered woman to reveal her "secret," which may in turn, lead to a referral to a shelter or service which might benefit her.

Limitations of the Study and Suggestions for Future Research

Medical records of battered women participants were not available. It would have been informative to examine those records to obtain documentation of particular injuries, including any CT or MRI results. In addition, future research might focus on obtaining neuropsychological testing on battered women a more acute stage of recovery from injury (e.g. as she presents in an emergency department). Also, following the women over time to monitor their progress and recovery of neuropsychological functions, as well as their emotional adjustment, could aid in determining whether a distinct pattern of recovery exists for this type of injury.

The level and nature of depressed mood could be examined to evaluate for separate cognitive and subjective factors. This could help in better determining what aspects contribute to a battered woman's depression. Perhaps education with respect to typical sequelae of head injury may help battered women in coping with post-injury cognitive and emotional changes that may occur.

Frequently, injury to the maxillofacial region is common in battering (Shepherd et al. 1988). However, the women included in this study did not report a high number of injuries to the face. Perhaps more information can be gleaned if the groups are separated into the types of injuries sustained and the length of time of the abusive relationship. These injuries could be separated into anatomical zones as Shepherd et al. (1988) did, including the face (which was subdivided into upper, middle, and lower), other areas of head and neck, thorax, abdomen, upper limb and lower limb. Again, medical records could provide very useful information in relation to types of injuries, locations, and severity.

Assessing battered women while they are residing in a shelter is not ideal. There are many distractions, such as children running about and other activities. Although a separate, quiet room was utilized in the current study, it did not completely eliminate noise. In addition, many of the battered women participants had children and were concerned about them while they were tested (although they arranged to have another woman watch them). Battered women are at a critical juncture while at a shelter, as they are transitioning from an abusive relationship to a more stable home life. While this may seem less stressful for most of us, it may actually be more anxiety provoking for battered women, as it is a completely new situation. The women are worrying about finances, finding jobs, homes, and establishing connections with other services. Therefore, they may be experiencing a higher level of anxiety. This was suggestive in their report of anxiety on the post-concussive syndrome checklist. Perhaps re-evaluating the women once they have successfully made the transition would provide information with regard to symptom resolution and cognitive deficits. It would at least control for the influence of a high level of anxiety on test performance. In addition, it may provide a pattern of recovery while also examining the influence and impact that both anxiety and depressed mood can have on one's cognitive functioning.

REFERENCES

Adlakha, A., & Lobl, J.K. (1993). Acute neurologic deficit in a battered woman. Hospital Practice, 12, 95-98.

Benton, A.L., & Hamsher, K.deS. (1989). Multilingual Aphasia Examination. Iowa City, Iowa: AJA Associates.

Benton, A.L., Hamsher, K. deS., Varney, N.R., & Spreen, O. (1983). Contributions to neuropsychological assessment. New York: Oxford University Press.

Benton, A.L., Hannay, H.J. & Varney, N.R. (1975). Visual perception of line direction with unilaterally brain disease. Neurology, 25, 907-910.

Benton, A.L., Varney, N.R., & Hamsher, K.deS. (1978). Visuospatial judgment: a clinical test. Archives of Neurology, 35, 364-367.

Bergman, B. & Brismar, B. (1991). A 5-year follow-up study of 117 battered women. American Journal of Public Health, 81, (11), 1486-1489.

Bergman, B., Brismar, B., & Nordin, C. (1992). Utilisation of medical care by abused women. British Medical Journal, 305, 27-28.

Binder, L.M. (1986). Persisting symptoms after mild head injury: a review of the postconcussive syndrome. Journal of Clinical and Experimental Neuropsychology, 8(4), 323-346.

Binder, L.M. & Rattok, J. (1989). Assessment of the postconcussive syndrome after mild head trauma. In Lezak, M. D. (Ed)., Assessment of the behavioral consequences of head trauma. Alan R. Liss, Inc.: New York.

Black, F.W. & Strub, R.L. (1978). Digit repetition performance in patients with focal brain damage. Cortex, 14, 12-21.

Boll, T.J. (1974). Right and left cerebral hemisphere damage and tactile perception: Performance of the ipsilateral and contralateral sides of the body. Neuropsychologia, 12, 235-238.

Borkowski, J.G., Benton, A.L., & Spreen, O. (1967). Word fluency and brain damage. Neuropsychologia, 5, 135-140.

Brismar, B. & Tuner, K. (1982). Battered women. A surgical problem. Acta Chir Scand, 148, 103-105.

Browne, A. (1987). When battered women kill. New York: Free Press.

Browne, A. (1993). Violence against women by male partners: prevalence, outcomes and policy implications. American Psychologist, 48, 1077-1087.

Browne, A. & Williams, K.R. (1989). Exploring the effect of resource availability and the likelihood of female-perpetrated homicides. Law and Society Review, 23, 75-94.

Burge, S.K. (1989). Violence against women as a health care issue. Family Medicine, 21(5), 368-373.

Butters, N., Salmon, D.P., Cullum, C.M., Cairns, P., Troster, A.I., Jacobs, D., Moss, M. & Cermak, L.S. (1988). Differentiation of amnesic and demented patients with the Wechsler Memory Scale - Revised. Clinical Neuropsychologist, 2, 133-148.

Casson, I.R., Sham, R., Campbell, E.A., Tarlau, M., & DiDomenico, A. (1982). Neurological and ct evaluation of knocked-out boxers. Journal of Neurology, Neurosurgery, and Psychiatry, 45, 170-174.

Casson, I.R., Siegel, O., Sham, R., Campbell, E.A., Tarlau, M. & DiDomenico, A. (1984). Brain damage in modern boxers. The Journal of the American Medical

Association, 251(20), 2663-2667.

Crosson, J.R. & Weins, A.N. (1988). Wechsler Memory Scale - Revised: Deficits in performance associated with neurotoxic solvent exposure. Clinical Neuropsychologist, 2, 181-187.

desRosiers, G., & Kavanagh, D. (1987). Cognitive assessment in closed head injury: stability, validity, and parallel forms for two neuropsychological measures of recovery. International Journal of Clinical Neuropsychology, 9, 162-173.

Drew, R.H., & Templer, D.I. (1992). Contact sports. In Templer, D.I., Hartlage, L.C. & Cannon, W.G. (Eds.), Preventable brain damage (pp. 15-29). New York: Springer Publishing Co.

Drew, R.H., Templer, D.I., Schuyler, B.A., Newell, T.G. & Cannon, W.G. (1986). Neuropsychological deficits in active licensed professional boxers. Journal of Clinical Psychology, 42(4), 520-525.

Drewe, E.A. (1974). The effect of type and area of brain lesion on Wisconsin Card Sorting Test performance. Cortex, 10, 159-170.

Enzenauer, R.W., Montrey, J.S., Enzenauer, R.J. & Mauldin, W.M. (1989). Boxing -related injuries in the U.S. Army, 1980 through 1985. JAMA, 261, (10), 1463-1466.

Evans, R.W. (1992). Mild traumatic brain injury. Traumatic brain injury, 3(2), 427-439.

Finklehor, D., & Yllo, K. (1985). License to rape: Sexual abuse of wives. New York: Holt, Rinehart & Winston.

Fischer, J.S. (1988). Using the Wechsler Memory Scale - Revised to detect and characterize memory deficits in multiple sclerosis. The Clinical Neuropsychologist, 2, 149-172.

Fisher, E.B., Kraus, H. & Lewis, Jr. V.L. (1990). Assaulted women: Maxillofacial injuries in rape and domestic violence. Plastic and Reconstructive Surgery, 161-162.

Geffner, R. & Rosenbaum, A. (1992). Brain impairment and family violence. In Templer, D.I., Hartlage, L.C. & Cannon, W.G. (Eds.), Preventable brain damage, (pp. 58-71). New York: Springer Publishing Co.

Goldberg, W.G. & Tomlanovich, M.C. (1984). Domestic violence victims in the emergency department. JAMA, 251 (24), 3259-3264.

Goodman, L.A., Koss, M.P., Fitzgerald, L.F., Russo, N.F., & Keita, G.P. (1993). Male violence against women. Current research and future directions. American Psychologist, 48 (10), 1054-1058.

Gouvier, W.D., Cubic, B., Jones, G., Brantley, P., & Cutlip, Q. (1992). Postconcussion symptoms and daily stress in normal and head-injured college populations. Archives of Clinical Neuropsychology, 7, 193-211.

Grant, I., Adams, K.M. & Reed, R. (1984). Aging, abstinence and medical risk in the prediction of neuropsychological deficit among long-term alcoholics. Archives of General Psychiatry, 41, 710-716.

Grant, I., Reed, R. & Adams, K.M. (1987). Diagnosis of intermediate-duration and subacute organic mental disorders in abstinent alcoholics. Journal of Clinical Psychiatry, 48, 319-323.

Gronwall, D. (1989). Cumulative and persisting effects of concussion an attention and cognition. In Levin, H.S., Eisenberg, H.M. & Benton, A.L. (Eds), Mild head injury.

Oxford University Press: New York.

Gronwall, D. & Wrightson, P. (1975). Cumulative effect of concussion. The Lancet, Nov. 995-997.

Grubb, R.L. & Coxe, W.S. (1978). Trauma to the central nervous system. In Liasson, S.G., Prensky, A.L. & Hardin, Jr. W.B.(Eds.), Neurological pathophysiology. University Press: New York.

Harley, J.P., Leuthold, C.A., Matthews, C.G., & Bergs, L.E. (1980). Wisconsin Neuropsychological Test Battery T-score norms for older Veterans Administration Medical Center patients. Madison, Wisconsin: Dept. of Neurology, University of Wisconsin Medical School.

Haug, R.H., Prather, J., & Indresano, A.T. (1990). An epidemiologic survey of facial fractures and concomitant injuries. Journal of Oral and Maxillofacial Surgery, 48, 926-932.

Haug, R.H., Savage, J.D., Likavec, M.J., & Conforti, P.J. (1992). A review of 100 closed head injuries associated with facial fractures. Journal of Oral and Maxillofacial Surgery, 50, 218-222.

Heaton, R.K. (1981). Wisconsin Card Sorting Test Manual. Odessa, FL: Psychological Assessment Resources.

Heaton, R.K., Grant, I., & Matthews, C.G. (1991). Comprehensive norms for an expanded Halstead-Reitan battery. Odessa, FL: Psychological Assessment Resources, Inc.

Hirschenfang, S. (1960). A comparison of WAIS scores of hemiplegic patients with and without aphasia. Journal of Clinical Psychology, 16, 351.

Hutchinson, J. (1990). Battered women. In Spurlock, J. & Rabinowitz, C.B. (Eds)., Women's progress. Promises and problems. Plenum Press: New York.

Kay, T. (1986). The unseen injury. Minor head trauma. (Brochure). National Head Injury Foundation, Inc.: Southboro, Massachussetts.

Kelly, J.P. (1995). Concussion. In Torg, J. & Shephard, R.J. (Eds.), Current therapy in sports medicine. Philadelphia: Mosby.

Klonoff, H., Robinson, G.C. & Thompson, G. (1969). Acute and chronic brain syndromes in children. Developmental Medicine and Child Neurology, 11, 198-213.

Klove, H. (1963). Clinical neuropsychology. In Foster, F.M. (Ed.), The medical clinics of North America. Saunders: New York.

Kraus, J.F. and Nourjah, P. (1989). The epidemiology of mild head injury. In Levin, H.S., Eisenberg, H.M. & Benton, A.L. (Eds.), Mild head injury. Oxford University Press: New York.

Langan, P.A. & Innes, C.A. (1986). Preventing domestic violence against women. Washington, D.C.: U.S. Department of Justice, Bureau of Justice Statistics.

Lentzner, H.R. & DeBerry, M.M. (1980). Intimate victims: A study of violence among friends and relatives. Washington, D.C.: U.S. Department of Justice, Bureau of Justice Statistics.

Levin, H.S., Gary, Jr., H:E., High, Jr., W.M., Mattis, S., Ruff, R.M., Eisenberg, H.M., Marshall, L.F., & Tabaddor, K. (1990). Minor head injury and the postconcussional syndrome: methodological issues in outcome studies. In Levin, H.S., Grafman, J., and Eisenberg, H.M. (Eds.). Neurobehavioral recovery from head injury.

Oxford University Press: New York.

Lewinsohn, P. (1973). Psychological aspects of patients with brain injury. Unpublished manuscript, University of Oregon, Eugene, Oregon.

Lewis, R.F. & Rennick, P.M. (1979). Manual for the Repeatable Cognitive-Perceptual-Motor Battery. Clinton Township, MI: Ronald F. Lewis.

Lezak, M. (1983). Neuropsychological assessment. Oxford University Press: New York.

Long & Ross (1992). Handbook of head trauma. Acute care to recovery. New York: Plenum Press.

Matthews, C.G. & Haaland, K.Y. (1979). The effect of symptom duration on cognitive and motor performance in Parkinsonism. Neurology, 29, 951-956.

Matthews, C.G. & Harley, J.P. (1975). Cognitive and motor-sensory performances in toxic and nontoxic epileptic subjects. Neurology, 25, 184-188.

Matthews, C.G., & Klove, H. (1964). Instructional manual for the Adult Neuropsychology Test Battery. University of Wisconsin Medical School: Madison, Wisconsin.

Matthews, C.G., Shaw, D.J. & Klove, H. (1966). Psychological test performances in neurological and "pseudo-neurologic" subjects. Cortex, 8, 62-92.

McLatchie, G., Brooks, N., Galbraith, S., Hutchison, J.F. Wilson, L., Melville, I. & Teasdale, E. (1987). Clinical neurological examination, neuropsychology, electroencephalography and computed tomographic head scanning in active amateur boxers. Journal of Neurology, Neurosurgery and Psychiatry, 50, 96-99.

Miller, E., & Hague, F. (1975). Some characteristics of verbal behaviour in presenile dementia. Psychological Medicine, 5, 255-259.

Milner, B. (1963). Effects of different brain lesions on card sorting. Archives of Neurology, 9, 90-100.

Oddy, M., Coughlan, T., Tyerman, A. & Jenkins, D. (1985). Social adjustment after closed head injury: A further follow-up seven years after injury. Journal of Neurology, Neurosuregery, and Psychiatry, 48, 564-568.

Oddy, M., Humphrey, M. & Uttley, D. (1978). Subjective impairment and social recovery after closed head injury. Journal of Neurology, Neurosurgery, and Psychiatry, 41, 611-616.

O'Donnell, J.P. (1983). Neuropsychological test findings for normal, learning disabled, and brain damaged young adults. Journal of Consulting and Clinical Psychology, 51, 726-729.

Parks, R.W., Loewenstein, D.A., Dodrill, K.L., Barker, W.W., Yoshii, F., Chang, J.Y., Emran, A., Apicella, A., Sheramata, W.A., & Duara, R. (1988). Cerebral metabolic effects of a verbal fluency test: A PET scan study. Journal of Clinical and Experimental Neuropsychology, 10, 565-575.

Pendleton, M.G. & Heaton, R.K. (1982). A comparison of the Wisconsin Card Sorting Test and the Category Test. Journal of Clinical Psychology, 26, 67-70.

Perret, E. (1974). The left frontal lobe of man and the suppression of habitual responses in verbal categorical behavior. Neuropsychologia, 12, 323-330.

Reitan, R.M (1955). Certain differential effects of left and right cerebral lesions in human adults. Journal of Comparative and Physiological Psychology, 48, 474-477.

Reitan, R.M (1958). Validity of the Trail Making Test as an indication of organic brain damage. Perceptual and Motor Skills, 8, 271-276.

Reitan, R.M. (1970). Sensorimotor functions, intelligence and cognition, and emotional status in subjects with cerebral lesions. Perceptual and Motor Skills, 31, 275-284.

Reitan, R. & Wolfson, D. (1993). The Halstead-Reitan Neuropsychological Test Battery: Theory and clinical interpretation. Tucson, AZ: Neuropsychology Press.

Rey, A. (1941). L'examen psychologique dans les cas d'encephalopathie traumatique. Archives de Psychologie, 37, 126-139.

Richardson, J.T.E. (1990). Clinical and neuropsychological aspects of closed head injury. Taylor and Francis: London.

Roberts, G.W., Whitwell, H.L., Acland, P.R. & Bruton, C.J. (1990). Dementia in a punch-drunk wife. The Lancet, 918-919.

Robinson, A.L., Heaton, R.K., Lehman, R.A.W. & Stilson, D.W. (1980). The utility of the WCST in detecting and localizing frontal lobe lesions. Journal of Consulting and Clinical Psychology, 48, 605-614.

Ross, R.J., Casson, I.R., Siegel, O., and Cole, M. (1987). Boxing injuries: Neurologic, radiologic, and neuropsychologic evaluation. Head And Neck Injuries, 6(1), 41-51.

Russell, D.E. (1982). Rape in marriage. New York: Macmillan.

Ryan, J.J. & Lewis, C.V. (1988). Comparison of normal controls and recently detoxified alcoholics on the Wechsler Memory Scale - Revised. Clinical Neuropsychology, 2, 173-180.

Schreiver, D.J., Goldman, H., Kleinman, K.M., Goldfader, P.R., & Snow, M.Y. (1976). The relationship between independent neuropsychological and neurological detection and localization of cerebral impairment. Journal of Nervous and Mental Disease, 162, 360-365.

Shepherd, J.P., Gayford, J.J., Leslie, I.J. & Scully, C. (1988). Female victims of assault: A study of hospital attenders. Journal of Cranio-Maxillo-Facial Surgery, 16, 233-237.

Stark, E., Flitcraft, A., Zuckerman, D., Grey, A., Robison, J. & Frazier, W. (1981). Wife abuse in the medical setting: An introduction for health personnel (Monograph No. 7). Washington, D.C.: Office of Domestic Violence.

Straus, M.A. (1991). Physical violence in american families: incidence, rates, causes and trends. In Knudsen, D.D. & Miller, J.L. (Eds.), Abused and battered: social and legal responses to family violence (pp.17-34).

Straus, M.A., Gelles, R.S., & Steinmetz, J.K. (1980). Behind closed doors: Violence in the American family. Garden City, JH: Anchor/Doubleday.

United States Department of Justice (1994). Violence against women. A national crime victimization survey report.

Unterharnscheidt, F.J. (1972). Head injury after boxing. Scandinavian Journal of Rehabilitative Medicine, 4, 77-84.

Walker, L.E. (1979). The battered woman. New York: Harper & Row.

Walker, L.E. (1983). The battered women syndrome study. In Finklehor, D., Gelles, R.J., Hotaling, G.T. & Straus, M.A. (Eds.), The dark side of families: Current family violence research. Beverly Hills, California: Sage Publications.

Walker, L.E. (1984). The battered woman syndrome. Springer Publishing Company, Inc.: New York.

Wechsler (1987). Wechsler Adult Intelligence Scale - Revised. New York: Psychological Corporation.

Weddell, R., Oddy, M. & Jenkins, D. (1980). Social adjustment after rehabilitation: A two year follow-up of patients with severe head injury. Psychological Medicine, 10, 257-263.

West, C.G., Fernandez, A., Hillard, J.R., Schoof, M. & Parks, J. (1990). Psychiatric disorders of abused women at a shelter. Psychiatric Quarterly, 61, (4), 295-301.

Weinberg, J., Diller, L., Gerstman, L. & Schulman, P. (1972). Digit span in left and right hemiplegics. Journal of Clinical Psychology,

Wheeler, L. & Reitan, R.M. (1962). The presence and laterality of brain damage predicted from responses to a short aphasia screening test. Perceptual and Motor Skills, 15, 783-799.

Wonderlic Personnel Test and Scholastic Level Exam User's Manual. (1992). Wonderlic Personnel Test, Inc: Libertyville, Illinois.

Zachariades, N., Koumoura, F., & Konsolaki-Agouridaki, E. (1990). Facial trauma in women resulting from violence by men. Journal of Oral Maxillofacial Surgery, 48, 1250-1253.

APPENDIX A

SUBJECT SCREENING CONSENT FORM

NEUROPSYCHOLOGICAL ASSESSMENT OF BATTERED WOMEN

INVESTIGATORS: Michael Stutts, Ph.D., Mona Tiernan, M.S.

DESCRIPTION:

The purpose of this screening is to assess whether I meet the criteria to participate in a research study assessing the effects of physical assault on the neuropsychological functioning of battered women. I understand that I will be asked to answer 6 questions related to my age, education, medical, and psychiatric history.

The wording of this consent form reflects requirements placed on The Medical College of Hampton Roads by regulations and law designed to protect anyone who volunteers to participate in a research study. Please sign and return this form if you are willing to answer questions on a screening questionnaire. Your signature at the end of this consent form attests to your having read and understood the following details of the purpose of the questionnaire and the study:

I agree to answer questions on a questionnaire designed to assess my appropriateness to participate in a study. If meeting certain criteria, I understand that I will then be asked to complete a neuropsychological screening battery (at a later date), which is a series of tests that will take about 2 ½ hours and assesses areas such as memory and attention/concentration. I understand that if I meet criteria, I will be asked to read and sign a second consent form pertaining to the research study itself.

CONFIDENTIALITY:

I understand that the data obtained from the screening questionnaire will be coded, using numbers rather than names, and will be kept strictly confidential. Although I will not be asked these questions directly, confidentiality will not be maintained if I express a desire to harm myself or others, or if I reveal knowledge of physical or sexual abuse to a child or elderly individual. In addition, I understand that if I go on to participate in the research study, and if data from this study are published or presented at meetings, I will not be identified by name without my written permission. I also understand that in order to ensure that Food and Drug Administration (FDA) regulations protecting subjects are being followed, it may be necessary for a representative of the FDA to review my study records. Lastly, I am informed that results of this assessment are for research purposes only and are not intended for litigation purposes.

APPENDIX A Continued

RISKS:

There is no known risk associated with participation in answering this prescreening questionnaire other than the inconvenience of spending up to 15 minutes of my time completing the questionnaire. It is possible that there may be other risks not yet identified.

BENEFITS:

I understand that my participation in completing this questionnaire has no direct benefit to myself. However, if I am asked to participate in the actual research study, I understand that my participation may contribute to a better understanding of the effects of domestic assault on the neuropsychological functioning of battered women. This may provide some information about the type of problems, if any, battered women have in areas such as attention/concentration and memory.

COSTS AND PAYMENTS:

I understand that I will not be compensated in any manner for my completing this questionnaire.

NEW INFORMATION:

Any new information obtained during the course of this research that may affect my willingness to continue participation in the study will be provided to me.

WITHDRAWAL PRIVILEGE:

I further understand that my participation in this study is voluntary and that I may choose not to participate or to withdraw from the study at any time without penalty.

COMPENSATION FOR ILLNESS OR INJURY:

I understand if I suffer a physical injury or illness as a result of participating in this research study, I will not receive a financial payment. The Medical College of Hampton Roads (MCHR) provides no compensation plan or free medical care plan to compensate me for such injuries. If I believe I have suffered an injury as a result of my participation in any research program, I may contact Dr. William J. Cooke, (804) 446-8423, an employee of MCHR, who will review the matter with me.

VOLUNTARY CONSENT:

I certify I have read all of this consent form or it has been read to me and that I understand it. If I have any questions pertaining to the research or my rights as a research subject.

APPENDIX A Continued

I may contact Michael, Stutts, Ph.D., whose phone number is (804) 446-5888. A copy of this consent form will be given to me. My signature below means I freely agree to complete this prescreening questionnaire.

Date	SIGNATURE
Date	WITNESS
Date	INVESTIGATOR

APPENDIX B

SCREENING QUESTIONNAIRE

1. How old are you? ______ Birthdate: ________

2. How far did you go in school? ________________

3. Have you ever had a head injury (such as a concussion or struck your head in an automobile accident) or any other neurological problems (such as seizures or a stroke)?
   No ______ Yes _____ Explain____
   ____
   ____
   ____

4. Have you ever been treated for alcohol or substance abuse?
   No _____ Yes _____ Explain__________
   ____
   ____

5. Do you take prescription drugs? No _____ Yes _____
   If yes, which ones?____
   ____

6. Have you ever received psychiatric treatment (inpatient or outpatient) for emotional problems (such as counseling, therapy, or prescribed psychiatric drugs)?
   No _____ Yes _____ Explain____
   ____
   ____

APPENDIX C

SUBJECT CONSENT FORM

NEUROPSYCHOLOGICAL ASSESSMENT OF BATTERED WOMEN

INVESTIGATORS: Michael Stutts, Ph.D., Mona Tiernan, M.S.

DESCRIPTION:

The purpose of this research study is to assess the effects of physical assault on the neuropsychological functioning of battered women.

The wording of this consent form reflects requirements placed on The Medical College of Hampton Roads by regulations and law designed to protect anyone who volunteers to participate in a research study. Please sign and return this form if you are willing to be a part of the present study. Your signature at the end of this consent form attests to your having read and understood the following details of this study:

I agree to participate in this research study and understand that I will be administered a neuropsychological screening battery, a background questionnaire, and a mood assessment scale. The neuropsychological battery will consist of various verbal and paper-and-pencil tests assessing memory, problem solving, sensory and perceptual skills, and attention and concentration. The mood assessment scale consists of 20 statements, and I am to indicate which apply to me. The background questionnaire includes information about my education level and medical history. The entire procedure from start to finish will take no longer than 2 and ½ hours.

CONFIDENTIALITY:

I understand that the data will be coded, using numbers rather than names, and will be kept strictly confidential. Although I will not be asked these questions directly, confidentiality will not be maintained if I express a desire to harm myself or others, or if I reveal knowledge of physical or sexual abuse to a child or elderly individual. In addition, I understand that if data from this study are published or presented at meetings, I will not be identified by name without my written permission. I also understand that in order to ensure that Food and Drug Administration (FDA) regulations protecting subjects are being followed, it may be necessary for a representative of the FDA to review my study records. Lastly, I am informed that results of this assessment are for research purposes only and are not intended for use in litigation.

RISKS:

There is no known risk associated with participation in this study other than the

APPENDIX C Continued

inconvenience of spending up to 2 ½ hours of my time completing the neuropsychological battery, the mood assessment scale and the background questionnaire. It is possible that there may be other risks not yet identified. I will be informed of any significant new findings developed during the course of the research which may affect my decision to continue participating.

BENEFITS:

I understand that my participation in this study may contribute to a better understanding of the effects of domestic assault on the neuropsychological functioning of female victims. In addition, I understand that I will be compensated ten dollars for my participation.

COSTS AND PAYMENTS:

I understand that I will be compensated ten dollars for my participation in this research study. Payment will be made in cash (with my signature attesting to receipt of payment) and will be made after completion of the assessment. If I should choose to withdraw, my compensation will be prorated as to the length of time I have participated, at five dollars per hour.

WITHDRAWAL PRIVILEGE:

I further understand that my participation in this study is voluntary and that I may choose not to participate or to withdraw from the study at any time without penalty.

COMPENSATION FOR ILLNESS OR INJURY:

I understand if I suffer a physical injury or illness as a result of participating in this research study, I will not receive a financial payment. I am advised that if I should suffer any injury as a result of my participation in this study, the Medical College of Hampton Roads provides no insurance coverage, compensation plan, or free medical care plan to compensate me for such injury. If I believe I have suffered an injury as a result of my participation in any research program, I may contact Dr. William J. Cooke, (804) 446-8423, an employee of MCHR, who will review the matter with me.

FEEDBACK:

I understand that I have the right to receive face-to-face feedback about my performance on the tests administered. At the end of the testing session, I will be asked to complete a form stating whether I wish to receive feedback about the results.

APPENDIX C Continued

VOLUNTARY CONSENT:

I certify that I have read the preceding or it has been read to me and that I understand its contents. If I have any questions pertaining to the research or my rights as a research subject, I may contact Dr. Michael Stutts whose phone number is (804) 446-5888. A copy of this consent form will be given to me. My signature below means I freely agree to participate in this experimental study.

________________ Date	__________________________ SIGNATURE
________________ Date	__________________________ WITNESS
________________ Date	__________________________ INVESTIGATOR

APPENDIX D

FEEDBACK FORM

I, ____, am requesting feedback of the results obtained from this brief neuropsychological assessment. I understand that feedback will be provided by Mona Tiernan, under the supervision of Michael L. Stutts, Ph.D. In addition, I understand that it is my responsibility to schedule the feedback session. I may do this by calling 446-5888 on Mondays only, 9 am to 6 pm, and asking for Mona Tiernan.

__________ Date   ______________________ Signature

I, ____, am declining feedback of the results obtained from this brief neuropsychological assessment. I understand that in so doing, I am giving up my right to receive results of this assessment.

__________ Date   ______________________ Signature

__________ Date   ______________________ Witness

__________ Date   ______________________ Investigator

APPENDIX E

DEMOGRAPHIC QUESTIONNAIRE

1. Are you: (Circle One) Married Living with Boyfriend Other
   ____

2. How long have you been in this relationship?
   ____

3. How old are you? _____ Birthdate ________

4. How far did you go in school? ____________

5. Are you employed outside the home?
   If yes, are you: Full time_____ part-time______

6. What is your income level? Below $7,499/yr
   7500-14,999/yr 15,000-24,999/yr 25,000-34,999/yr
   35,000-49,999/yr 50,000+

6. Do you use alcohol? yes no

7. On the average, how many drinks do you have each week?
   O; 1-3; 4-6; 7-10; 11+

8. Do you or have you used recreational/street drugs?
   yes___ no___ If so, which ones?____________________
   ____

9. Have you ever been treated for alcohol or substance abuse?
   No_____ Yes _____

10. Do you use prescription drugs? yes no
    If so, which ones? ____________________

11. Were you physically abused as a child?
    Yes _____ No _____

12. Have you ever been in a relationship where hitting occurred before this one? Explain (How many times; how many different people; how long did the relationship last?)____________________
    ____

APPENDIX E Continued

These next few questions are about your most recent relationship:

13. About how long has the physical fighting and hitting in your most recent relationship been going on?
    Less than six months ______ 6 months to 1 year _____
    1-2 years _____ 2-3 years ______ 3-4 years _____
    4-5 years _______ More than 5 years _________

14. How many times would you say you have been hit within the past two months?
    0 ____ 1-3___ 4-6___ 7-10___ 11+___

15. When was the first time you were hit during a fight by the person you were most recently in a relationship with?

    ____
    ____

16. When was the last time?

    ____

These next few questions are about relationships in general where hitting has occurred:

17. As a result of the physical fights and hitting have you ever had any of the following: (please indicate about how many times you have had this injury)

    lost teeth _____ broken jaw ______ black eye _____
    concussion _____ broken nose _____ lost hair ______
    broken eyeglasses _____ bruises/cuts to face _______
    permanent eye injury ______ head injury _______
    internal injuries _______ other broken bones ______
    lost consciousness/blacked out _______
    Skull fracture _____

    Any other injuries not mentioned above?

    ____
    ____

APPENDIX E Continued

18. Have you ever been treated medically for an injury you received during a physical fight with a person you were in a relationship with?
    No _____ Yes _____

    If yes, what type of services did you receive and what for
    ____
    ____
    ____
    ____

19. Have you ever been admitted to the hospital because of an injury from a fight resulting from a person you were in a relationship with?
    No _____ Yes _____ If yes, what for__________________
    ____
    ____

General questions:

20. Have you ever been in an automobile accident?
    yes ____ no_____

    If yes, when and did you receive any injuries?
    ____
    ____
    ____

APPENDIX F

CENTER FOR EPIDEMIOLOGICAL STUDIES - DEPRESSED MOOD SCALE

1=Rarely or none of the time (less than 1 day)
2=Some or a little of the time (1-2 days)
3=Occasionally or a moderate amount of time (3-4 days)
4=Most or all of the time (5-7 days)

DURING THE PAST WEEK:

_____ 1. I was bothered by things that usually don't bother me.
_____ 2. I did not feel like eating; my appetite was poor.
_____ 3. I felt that I could not shake the blues even with help from my family or friends.
_____ 4. I felt that I was just as good as other people.
_____ 5. I had trouble keeping my mind on what I was doing.
_____ 6. I felt depressed.
_____ 7. I felt that everything I did was an effort.
_____ 8. I felt hopeful about the future.
_____ 9. I thought my life had been a failure.
_____ 10. I felt fearful.
_____ 11. My sleep was restless.
_____ 12. I was happy.
_____ 13. I talked less than usual.
_____ 14. I felt lonely.
_____ 15. People were unfriendly.
_____ 16. I enjoyed life.
_____ 17. I had crying spells.
_____ 18. I felt sad.
_____ 19. I felt that people dislike me.
_____ 20. I could not "get going."

APPENDIX G

POSTCONCUSSIVE SYNDROME CHECKLIST

Have you experienced any of the following symptoms within the past six months? Please rate about how many times and how long each lasted.

FREQUENCY
1 = Not at all
2 = Seldom
3 = Often
4 = Very often
5 = All the time

	FREQUENCY
Headache	_______
Dizziness	_______
Irritability	_______
Memory Prob	_______
Difficulty	_______
Concentrating	_______
Fatigue	_______
Visual Disturbances	_______
Aggravated by Noise	_______
Judgment Problems	_______
Anxiety	_______

VITA

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EDUCATION AND TRAINING

PREDOCTORAL INTERNSHIP

Allegheny General Hospital and Allegheny University of the Health Sciences, Pittsburgh Pennsylvania. Clinical Neuropsychology Track.

GRADUATE

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UNDERGRADUATE

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AWARDS AND HONORS

1989 Elizabeth Guy Award for the Outstanding Undergraduate in Psychology.
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1989 Alan Chaikin Award for Honors Thesis
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