

NEUROTOXIC COMPLAINT BASE RATES OF
PERSONAL INJURY CLAIMANTS:
IMPLICATIONS FOR NEUROPSYCHOLOGICAL ASSESSMENT

JOHN T. DUNN, PAUL R. LEES-HALEY, RICHARD S. BROWN,
CHRISTOPHER W. WILLIAMS AND LUE T. ENGLISH

*Lees-Haley Psychological Corporation
Encino, California*

This study reports base rate data for 113 family practice patients with no history of head trauma or toxic exposure, 68 family practice patients with a history of head trauma or toxic exposure, and 156 personal injury claimants with no history of toxic exposure or head trauma who presented for a psychological evaluation due to emotional distress. Personal injury claimants reported suffering from significantly more neurotoxic and neuropsychologic symptoms than subjects with a reported history of head trauma and/or toxic exposure. The authors urge that evaluating psychologists consider the base rate of these symptoms in litigating populations and use caution in relying on self-reported symptoms as evidence of injury when patients are in litigation.

Various self-reported symptoms and complaints are associated with brain damage caused by head injury and exposure to neurotoxins. (For example, see Anger, 1990; Anger & Johnson, 1985; Baker, 1988; Beaumont, 1990; Cook, 1989; Gibbs, 1986; Hartman, 1988; James, 1985; Johnson, 1990; Lave & Upton, 1987; Lezak, 1983; Markowitz & Gutterman, 1986; Marquis, 1989; Oddy, Coughlan, Tyerman, & Jenkins, 1985; Oddy, Humphrey, & Uttely, 1978; Proctor, Hughes, & Fischman, 1988; R. Russell, Flattau, & Pope, 1990; W. Russell, 1932; Rutherford, Merrett & McDonald, 1977.) Several structured protocols and symptom checklists have been developed to elicit symptoms from patients suspected of having neurotoxic disorders. (For example, see O'Donnell, De Soto, & De Soto, 1993; R. Russell et al., 1990; Williamson, 1990.)

In forensic evaluations, examiners frequently rely on self-reported symptoms as partial evidence of neuropsychological deficits or brain injury caused by toxic exposure. These self-reported symptoms frequently are used as supporting evidence for diagnoses that fall under the general DSM-III-R diagnostic category of Organic Mental Disorders and DSM-IV categories such as Substance-Related Disorders and Delirium, Dementia, and Amnesic and Other Cognitive Disorders. Also, we have seen self-reported symptoms presented by clinicians as the only support for diagnostic labels.

Echoing Meehl's classic argument (Meehl, 1960; Meehl & Rosen, 1955), Gass (1991) and Ziskin and Faust (1988) have argued that there is a need for examiners to consider and account for the base rates of neuropsychological and neurotoxic symptoms in the general population prior to making diagnostic decisions. Failure to consider the prior probabilities of symptoms when using these symptoms as support for diagnostic impressions may render these diagnoses erroneous. Recent research has focused attention on the problem of failing to consider symptom base rates in the evaluations of personal injury claimants (e.g., Elwood, 1993; Matarazzo, 1987, 1990; Matarazzo, Daniel, Prifitera, & Herman, 1988; Matarazzo & Prifitera, 1989).

The authors thank Christine Simon, William E. English, M.D., and Robert Rigg, M.D. for their assistance with this research.

Correspondence should be addressed to Paul R. Lees-Haley, Ph.D., 5445 Balboa Blvd., Suite 117, Encino, California 91316.

The problem of failing to consider base rates of neuropsychological symptoms in forensic examinations may be compounded by the effects of litigation on patient behavior in evaluations. The process or context of personal injury litigation is suggested as affecting patient behavior in ways that serve to undermine the validity of clinical assessment procedures (Fox, 1994; Lees-Haley, 1989, 1990; Lees-Haley & Fox, 1990; Weismann, 1990). The purpose of this study was to explore the influence of symptom base rates and litigation on self-reports of neurotoxic and neuropsychological symptoms.

Base Rates and Litigation

Due to the unique context of litigation and the effects it may have on patient behavior evaluations, Lees-Haley (1992) investigated the neuropsychological complaint base rates of personal injury claimants who were making claims of emotional distress. Claimants had no known history of brain injury, toxic exposure, or documented neuropsychological impairment. Subjects who presented for psychological evaluations and were in litigation, but had no history of head injury (i.e., personal injury claimants), reported experiencing symptoms associated with neuropsychological impairment at high rates. For example, 91% of the sample reported headaches, 83% concentration problems, 64% reported feeling disorganized, 53% numbness, 50% dizziness, 48% memory problems, and 33% reported word-finding problems. However, the sample size was relatively small, and no control group was utilized in this study.

In a follow-up study, Lees-Haley and Brown (1993) compared neuropsychological complaint base rates of a much larger sample of personal injury claimants with a control group not involved in litigation. Subjects in both groups had no known history of head injury, toxic exposure, seizure disorder, or neuropsychological impairment. Significant differences were found between groups on a majority of complaints and symptoms associated with neuropsychological impairment and brain injury. Personal injury claimants reported experiencing significantly more neuropsychological symptoms than the control group.

Based on these findings, Lees-Haley and Brown (1993) cautioned that clinicians who rely in part on subjective self-reports of symptoms by claimants and those clinicians who use symptom checklists as evidence of brain injury need to consider the base rates of neuropsychological symptoms in specific populations. The authors also cautioned that the iatrogenic effects of symptom checklists on claimants need to be considered in forensic evaluations and that further research on base rate phenomena is needed.

The present research expanded upon the Lees-Haley and Brown (1993) study by including neurotoxic symptoms and a third group of subjects who reported a history of head injury or toxic exposure (brain-injured group) for comparison. To the extent that head injury or toxic exposure results in any long-term effects, it was hypothesized that subjects in the brain-injured group would endorse head-trauma and neurotoxic symptoms more frequently than subjects in either the personal-injury or noninjured subjects. In addition, based on previous research (Lees-Haley, 1992; Lees-Haley & Brown, 1993), it was hypothesized that personal-injury subjects would endorse symptoms more frequently than noninjured subjects.

METHOD

Subjects

The personal-injury group consisted of 88 males and 68 females ($N = 156$), with a mean age of 36.44 years ($SD = 13.11$). These subjects were personal-injury claimants with no reported history of head injury or toxic exposure who presented for a comprehensive psychological evaluation due to claims of emotional distress. During the forensic evaluation, these subjects reported psychological injuries as the result of a diverse

range of emotionally stressful and upsetting experiences, such as overwork, wrongful termination, verbal harassment by co-workers or supervisors, discrimination, physical injuries, pain syndromes, motor vehicle accidents, sexual assaults, physical assaults, and various types of accidents. Some personal-injury subjects complained of orthopedic problems and muscle pains.

The noninjured group consisted of 113 patients with no reported history of head injury or toxic exposure who were seeking an examination or treatment with their family physician. This group contained 39 males and 74 females. Mean age for the control group was 35.04 ($SD = 13.16$).

The brain-injured group consisted of 68 patients who reported a history of head injury and/or toxic exposure. The brain-injured group consisted of 30 males and 33 females ($N = 63$), with a mean age of 36.7 years ($SD = 9.27$). Five subjects failed to report their gender. These subjects also were seeking examination or treatment with their family physician. Forty-nine subjects reported having experienced a head injury. Eight subjects reported experiencing a toxic exposure, and 11 subjects reported experiencing both a head injury and toxic exposure. The mean time since injury or exposure was 12.5 years.

Measures

Because there is no standardized symptom checklist that includes both neurotoxic and neuropsychologic symptoms and because the available published checklists do not include distractor items, a 63-item symptom checklist was developed and used in this study. This 63-item checklist was based on symptoms reported in the research (Anger, 1990; Beaumont, 1990; Cook, 1989; Gibbs, 1986; Hartman, 1988; Lezak, 1983; Markowitz & Gutterman, 1986; Marquis, 1989; Oddy et al., 1985; Oddy et al., 1978; W. Russell, 1932; Rutherford et al., 1977).

Fifty-four symptoms on the 63-item checklist were neuropsychological complaints commonly reported by patients subsequent to head trauma or toxic exposure. Nine items were distractor symptoms that are not generally recognized as being associated with brain injury due to head trauma or toxic exposure (e.g., bleeding, constipation, elbow pain, shoulder pain, and foot pain). Distractor symptoms were included to allow for a comparison of claimants and controls on symptoms not generally recognized as being associated with head injury or toxic exposure.

Procedure

Immediately prior to a comprehensive forensic psychological evaluation, the personal-injury subjects were administered the 63-item symptom checklist and asked to endorse symptoms that they have experienced since their injury. The checklist was administered at the outset of the examination, prior to any testing or potentially suggestive clinical interviewing. Noninjured subjects and head-injured subjects were administered the same checklist with identical instructions prior to undergoing examination or treatment with their family physician.

RESULTS

Initial analyses were conducted to test the homogeneity of the three groups on age and gender composition. Analyses of variance (ANOVA) revealed that the groups did not differ by age, $F(2,329) = .533$, $p > .58$, but the groups did differ by gender composition, $F(2) = 12.67$, $p < .002$. Whereas the personal-injury group was predominately comprised of males (88/156, 56%), and the head-injured group was split roughly evenly (30 male, 33 female, and 5 unreported), the non-head-injured group consisted of a greater proportion of women (74/113, 65%). To investigate the possible influence of gender on symptom reporting, an aggregate variable of total symptoms was created by

summing the total number of symptoms endorsed for each subject (range = 0-63). An ANOVA revealed that no significant difference existed between males and females on total number of symptoms endorsed, $F(2,342) = .648, p > .42$, so gender no longer was considered in further analyses.

Group differences on symptom total revealed that the personal-injury group endorsed more symptoms ($M = 25.17$) than the head-injured group ($M = 14.04$), or the non-injured group ($M = 8.57$), $F(2,329) = 68.58, p < .001$. Individual group comparisons showed that the personal-injury group endorsed more symptoms than the head-injured group, $t(222) = 5.72, p < .001$, and the non-head-injured group, $t(266) = 11.05, p < .001$. In addition, the head-injured group endorsed significantly more symptoms than did the non-head-injured group, $t(178) = -4.17, p < .001$.

To examine differences among groups in individual symptom endorsement, chi-square analyses were conducted on each of the 63 variables on the symptom inventory. An overall chi-square between the three groups yielded significant differences for 55 of the 63 (87%) symptoms. (See Table 1.) The following eight symptoms showed no differential responding rates between groups and are not included in Table 1: back pain, bleeding, broken bone, constipation, fear of cancer, foot pain, not knowing who I am, and seizures. Of these eight, six are distractor items (back pain, bleeding, broken bone, constipation, foot pain, and fear of cancer).

Table 1
Symptom Frequencies and Group Comparisons for Personal Injury (Non Brain) ($n = 156$), Head Injured/Toxic ($n = 68$), and Family Medicine Controls ($n = 113$) Groups

Symptom	P. I.	H. I.	F. M. Ctrl.	Chi Sq.	Sig.	P. I. vs. H. I.	P. I. vs. F. M. Ctrl.	F. M. Ctrl. vs. H. I.
Anxiety	86.50	55.90	40.70	63.59	c	c	c	
Trouble sleeping	81.40	39.70	29.50	80.06	c	c	c	
Headaches	76.90	57.40	50.40	21.65	c	b	c	
Depression	76.30	41.20	26.50	69.39	c	c	c	
Tension	74.40	39.70	24.10	69.91	c	c	c	a
Concentration problems	71.20	33.80	21.20	71.39	c	c	c	
Fatigue	71.20	55.90	36.60	31.68	c	a	c	a
Difficulty concentrating	69.20	32.40	17.70	75.55	c	c	c	a
Impatience	64.10	41.20	32.70	27.85	c	b	c	
Irritability	62.80	30.90	26.50	41.09	c	c	c	
Restlessness	62.80	36.80	16.10	59.44	c	c	c	b
Confusion	57.70	17.60	5.30	90.68	c	c	c	a
Feeling disorganized	57.70	32.40	19.50	41.92	c	c	c	
Thinking clearly	57.10	26.50	10.60	64.76	c	c	c	b
Neck pain*	55.80	39.70	31.30	16.62	c	a	c	
Loss of interest	51.30	14.70	13.30	54.88	c	c	c	
Easily distracted	49.40	23.50	15.00	38.31	c	c	c	
Loss of efficiency	49.40	13.20	9.70	60.24	c	c	c	
Loss of temper	48.70	19.10	10.60	50.10	c	c	c	
Attention problems	47.70	25.00	9.80	44.78	c	b	c	a
Memory problems	45.50	20.60	12.40	37.82	c	c	c	
Word finding	45.50	23.50	11.60	37.43	c	b	c	
Feeling partially disabled	44.20	16.20	3.50	61.46	c	c	c	b

Table 1 (continued)

Symptom	P. I.	H. I.	F. M. Ctrl.	Chi Sq.	Sig.	P. I. vs. H. I.	P. I. vs. F. M. Ctrl.	F. M. Ctrl. vs. H. I.
Weakness	43.60	14.70	6.30	53.16	c	c	c	
Dizziness	41.00	27.90	21.20	12.41	b		c	
Nausea	39.10	32.40	19.50	11.83	b		c	
Sexual problems	38.50	17.60	8.00	34.93	c	b	c	
Shoulder pain*	37.80	23.50	14.30	18.83	c		c	
Slowed thinking	37.80	16.20	5.40	41.27	c	b	c	a
Blurred vision	37.20	32.40	17.70	12.21	b		c	a
Rapid heartbeat	36.50	19.10	15.00	17.80	c	a	c	
Poor judgment	34.60	16.20	3.60	39.49	c	b	c	b
Recent memory problems	34.60	17.60	5.40	33.87	c	a	c	a
Chest pressure	34.00	13.20	13.30	20.40	c	b	c	
Trouble hearing	34.00	27.90	12.40	16.32	c		c	a
Numbness	34.00	20.60	5.40	31.46	c		c	b
Painful tingling	34.00	16.20	5.40	33.49	c	a	c	a
Visual problems	34.00	20.60	7.10	27.21	c		c	a
Trouble reading	33.30	5.90	.90	56.13	c	c	c	
Fear of non-cancer illness	32.70	19.10	6.20	27.86	c		c	a
Trouble walking	32.10	5.90	3.50	45.05	c	c	c	
Trembling	30.80	14.70	5.40	28.34	c	a	c	
Feeling totally disabled	30.10	2.90	2.70	48.08	c	c	c	
Bumping into things	29.50	13.20	14.20	12.40	b	a	b	
Diarrhea*	28.20	47.10	25.70	10.23	b	b		b
Perspiring for no reason	25.60	13.20	4.50	22.18	c		c	
Loss of common sense	24.40	5.90	3.50	28.45	c	b	c	
Marital problems	23.70	11.80	8.80	11.90	b		b	
Fine motor coordination	19.90	4.40	1.80	26.01	c	b	c	
Long-term memory problems	17.90	7.40	.00	24.30	c		c	a
Speech problems	17.30	5.90	1.80	19.22	c	a	c	
Slurred speech	15.40	5.90	.90	18.17	c		c	
Elbow pain*	13.50	22.10	8.00	7.29	a			a
Impotence	13.50	1.50	3.50	13.72	b	a	a	
Not knowing where I am	11.50	4.40	.00	15.30	c		c	
= Mean No. Symptoms	25.17	14.04	8.57					

Note. — *Indicates that the symptom is a distractor item. The lower case letters indicate the significance level for that particular group comparison: a = significant difference at $p < .05$; b = significant difference at $p < .01$; c = significant difference at $p < .001$.

Given the large number of comparisons (63), significant differences would be expected to result by chance. However, these data reveal significant differences on 51 of 54 (94%) non-distractor items, which indicates a considerable difference among the three

groups in neuropsychologic and neurotoxic symptom endorsement. Interestingly, the order of frequency of endorsement was remarkably consistent; the personal-injury group almost always endorsed the symptom most frequently (exceptions are limited to the distractor items of diarrhea and elbow pain), followed by the head-injured group, with the non-head-injured group reporting symptoms with the lowest frequency.

Additional comparisons revealed that the personal-injury group differed markedly from both the head-injured sample and the noninjured group on most symptoms. In addition, comparisons between the head-injured group and the noninjured group indicate significant differences in a number of symptoms. (See Table 1, last column.) The mean time since head injury toxic exposure in this sample was in excess of 12 years, yet significant differences in symptom endorsement were found for nearly half of the neuropsychologic and neurotoxic symptoms, when head-injured and noninjured patients were compared.

DISCUSSION

Results of this study showed that personal-injury litigants with no reported history of head injury or toxic exposure endorsed neurotoxic and neuropsychologic symptoms at a significantly higher rate than did nonlitigant subjects who reported having suffered head trauma or toxic exposure. These unexpected results are inconsistent with the initial hypothesis of this study. However, results of this study are consistent with previous research (Lees-Haley & Brown, 1993) in that personal-injury litigants did endorse symptoms at a significantly higher rate than did nonlitigant subjects with no reported history of head trauma or toxic exposure. Thus, the second hypothesis of this study was supported by these results.

These data are consistent with the view that there are chronic neuropsychologic or neurotoxic complaints associated with head injury and toxic exposure, although this study does not clarify the extent to which these complaints pre-existed or were caused by the exposure or injury. Given the evidence that symptomatic individuals are more likely to suffer injuries (e.g., Cottrol & Frances, 1993; Sims, Bivins, & Obeid, 1989; Van der Kilk, 1987), this is an area that merits further investigation.

The results with regard to symptom endorsement rates of personal-injury litigants support the opinion that the significance of self-reported symptoms should be considered cautiously in forensic settings. Due to the high base rate of neuropsychological and neurotoxic symptom reporting in personal-injury litigants, the claim that the patient has suffered neuropsychological impairment due to a toxic exposure or traumatic brain injury should not be based solely on self-report in forensic cases. Given the opinion of some that examiners are increasingly reliant on self-report measures to assess neuropsychological status (O'Donnell et al., 1993), caution is especially advised.

This is consistent with Matarazzo's (1990) APA presidential address, in which he reports that some testifying psychologists are unfamiliar with the effects on neuropsychological tests of age, education, IQ, gender, and alcohol use in healthy individuals. These psychologists go on to conclude erroneously the presence of neuropsychological impairment when, in fact, the so-called impaired test scores are actually a function of advancing age, poor education, low IQ, substance abuse, etc. Thus, Matarazzo (1990) argues that to increase the validity of psychological assessments, issues such as base rates need to be considered.

Examiners should consider research that indicates that many symptoms considered neuropsychological in nature are common in the general population. Gouvier, Uddo-Crane, and Brown (1988) report that several of the cognitive, physical, and psychological subjective complaints that comprise the constellation of symptoms in "post-concussional syndrome" are common in a normal population. These authors found that in most cases

there were no significant differences between the frequency of symptoms reported by the head-injured group and the uninjured groups.

Further, Hartman (1988) points out that many neurotoxic and neuropsychologic symptoms are nonspecific (e.g., headache, depression, forgetfulness, etc.) and that a psychological history will allow the examiner to consider alternative explanations for these complaints. An example of the overlap and ambiguity of such symptoms is found in the diagnosis of post-concussion syndrome. Post-concussion syndrome is defined in the glossary of mental disorders contained in the International Classification of Diseases—9th Revision (ICD-9) (Med-Index, 1991) as, "States occurring after generalized contusion of the brain, in which the symptom picture may resemble that of frontal lobe syndrome or that of any of the neurotic disorders . . . The symptoms are more common in persons who have previously suffered from neurotic or personality disorders, or when there is the possibility of compensation" (p. 297). This definition indicates that the symptom picture of post-concussion syndrome mimics that of neurotic disorders and some personality disorders. This definition further supports the need to obtain base rate data on neuropsychological and neurotoxic symptoms, particularly in cases in which compensation is available.

We strongly recommend further research on base rates of neuropsychological complaints among multiple populations, including forensic and nonforensic, neurological, family practice, psychiatric, and nondiseased populations. Without base rate data, we have to agree with Reitan (1992) that neuropsychologists do not know what normal is and that unless we know what the norm is, we cannot identify the exception to the norm. Because the overwhelming majority of neuropsychological measures are norm-based measures, we believe that basic research on normative behavior is essential to the validity of our enterprise.

REFERENCES

- ANGER, W. K. (1990). Human neurobehavioral toxicology testing. In R. W. Russell, P. E. Flattau, & A. M. Pope (Eds.), *Behavioral measures of neurotoxicity* (pp. 69-85). Washington: National Academy Press.
- ANGER, W. K., & JOHNSON, B. (1985). Chemicals affecting behavior. In J. O'Donoghue (Ed.), *Neurotoxicity of industrial and commercial chemicals* (Vol. 1, pp. 51-148). Boca Raton, FL: CRC Press.
- BAKER, E. L. (1988). Organic solvent neurotoxicity. *Annual Review of Public Health, 9*, 223-232.
- BEAUMONT, J. G. (1990). Neurobehavioral tests: Problems, potential, and prospects. In R. W. Russell, P. E. Flattau, & A. M. Pope (Eds.), *Behavioral measures of neurotoxicity* (pp. 86-100). Washington: National Academy Press.
- COOK, P. B. (1989). *Occupational health hazards* (2nd ed.). Oxford: Heinemann Medical Books.
- COTTRILL, C., & FRANCES, R. (1993). Substance abuse, comorbid psychiatric disorder, and repeated traumatic injuries. *Hospital and Community Psychiatry, 44*, 715-716.
- ELWOOD, R. W. (1993). Psychological tests and clinical discriminations: Beginning to address the base rate problem. *Clinical Psychology Review, 13*, 409-419.
- FOX, D. (1994). Normative problems for the Wechsler Memory Scale-Revised logical memory test when used in litigation. *Archives of Clinical Neuropsychology, 9*, 211-214.
- GASS, C. S. (1991). Emotional variables and neuropsychological test performance. *Journal of Clinical Psychology, 47*(1), 100-104.
- GIBBS, M. S. (1986). Psychopathological consequences of exposure to toxins in the water supply. In A. H. Lebovits, A. Baum, & J. E. Singer (Eds.), *Advances in environmental psychology* (Vol. 6, pp. 47-70). Hillsdale, NJ: Erlbaum.
- GOUVIER, W. D., UDDO-CRANE, M., & BROWN, L. M. (1988). Base rates of post-concussional symptoms. *Archives of Clinical Neuropsychology, 3*, 273-278.
- HARTMAN, D. E. (1988). *Neuropsychological toxicology*. New York: Pergamon Press.
- JAMES, R. C. (1985). Neurotoxicity: Toxic effects in the nervous system. In P. L. Williams & J. L. Burson (Eds.), *Industrial toxicology* (pp. 123-137). New York: Van Nostrand Reinhold.
- JOHNSON, B. L. (Ed.) (1990). *Advances in neurobehavioral toxicology*. Chelsea, MI: Lewis.

- LAVE, L. B., & UPTON, A. C. (Eds.) (1987). *Chemicals, health, and the environment*. Baltimore: Johns Hopkins University Press.
- LEES-HALEY, P. (1992). Neuropsychological complaint base rates of personal injury claimants. *Forensic Reports, 5*, 385-391.
- LEES-HALEY, P. (1989). Litigation Response Syndrome: How the stress of litigation confuses the issues in personal injury, family and criminal litigation. *Defense Counsel Journal, 56*, 110-114.
- LEES-HALEY, P. (1990). Contamination of neuropsychological testing by litigation. *Forensic Reports, 3*, 421-426.
- LEES-HALEY, P., & BROWN, R. S. (1993). Neuropsychological complaint base rates of 170 personal injury claimants. *Archives of Clinical Neuropsychology, 8*, 203-209.
- LEES-HALEY, P., & FOX, D. (1990). Neurological false positives in litigation: Trail Making Test findings. *Perceptual and Motor Skills, 70*, 1379-1382.
- LEZAK, M. (1983). *Neuropsychological assessment*. New York: Oxford University Press.
- MARKOWITZ, J. S., & GUTTERMAN, E. M. (1986). Predictors of psychological distress in the community following two toxic chemical incidents. In A. H. Lebovits, A. Baum, & J. E. Singer (Eds.), *Advances in environmental psychology* (Vol. 6, pp. 89-107). Hillsdale, NJ: Erlbaum.
- MARQUIS, J. K. (Ed.) (1989). *A guide to general toxicology* (2nd, rev. ed.). Basel, Switzerland: Karger.
- MATARAZZO, J. D. (1987). Validity of psychological assessment: From the clinic to the courtroom. *Clinical Neuropsychologist, 1*, 307-314.
- MATARAZZO, J. D. (1990). Psychological assessment versus psychological testing. *American Psychologist, 45*, 999-1017.
- MATARAZZO, J., DANIEL, M., PRIFITERA, A., & HERMAN, D. (1988). Intersubtest scatter in the WAIS-R standardization sample. *Journal of Clinical Psychology, 44*, 940-950.
- MATARAZZO, J., & PRIFITERA, A. (1989). Subtest scatter and premorbid intelligence: Lessons from the WAIS-R standardization sample. *Psychological Assessment: A Journal of Consulting and Clinical Psychology, 1*, 186-191.
- MED-INDEX (1991). *International classification of diseases* (9th rev.). Salt Lake City, UT: Author.
- MEEHL, P. E. (1960). The cognitive activity of the clinician. *American Psychologist, 15*, 19-27.
- MEEHL, P. E., & ROSEN, A. (1955). Antecedent probability and the efficiency of psychometric signs, patterns, or cutting scores. *Psychological Assessment, 4*, 190-192.
- 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, Neurosurgery, and Psychiatry, 48*, 564-568.
- ODDY, M., HUMPHREY, M., & UTTELY, D. (1978). Subjective impairment and social recovery after closed head injury. *Journal of Neurology, Neurosurgery, and Psychiatry, 41*, 611-616.
- O'DONNELL, W. E., DE SOTO, C. B., & DE SOTO, J. L. (1993). Validity and reliability of the Revised Neuropsychological Impairment Scale (NIS). *Journal of Clinical Psychology, 49*, 372-382.
- PROCTOR, N. H., HUGHES, J. P., & FISCHMAN, M. L. (Eds.) (1988). *Chemical hazards of the workplace* (2nd ed.). Philadelphia: Lippincott.
- REITAN, R. (1992). *Clinical neuropsychology: We've arrived but do we want to stay?* Paper presented at the annual meeting of the American Psychological Association, New York.
- RUSSELL, R. W., FLATTAU, P. E., & POPE, A. M. (Eds.) (1990). *Behavioral measures of neurotoxicity* (pp. 359-394). Washington, D.C.: National Academy Press.
- RUSSELL, W. R. (1932). Cerebral involvement in head injury. *Brain, 55*, 549-603.
- RUTHERFORD, W. H., MERRETT, J. D., & McDONALD, J. R. (1977). Sequelae of concussion caused by minor head injuries. *Lancet, 1*, 1-4.
- SIMS, D. W., BIVINS, B. A., & OBEID, F. N. (1989). Urban trauma: A chronic recurrent disease. *Journal of Trauma, 29*, 940-946.
- VAN DER KILK, B. A. (1987). *Psychological trauma*. Washington: American Psychiatric Press.
- WEISSMAN, H. (1990). Distortions and deceptions in self presentation: Effects of protracted litigation in personal injury cases. *Behavioral Sciences and the Law, 8*, 67-74.
- WILLIAMSON, A. M. (1990). The current status of test development in neurobehavioral toxicology. In R. W. Russell, P. E. Flattau, & A. M. Pope (Eds.), *Behavioral measures of neurotoxicity* (pp. 56-68). Washington: National Academy Press.
- Ziskin, J., & Faust, D. (1988). *Coping with psychiatric and psychological testimony* (4th ed.). Marina del Rey, CA: Law and Psychology Press.