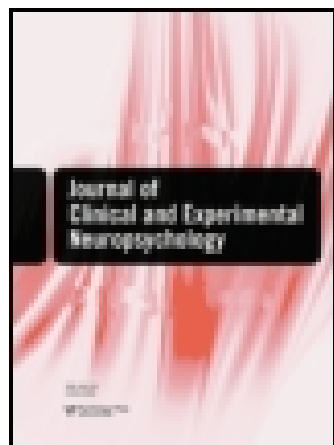


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## Base Rates of Malingering and Symptom Exaggeration

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### ABSTRACT

Base rates of probable malingering and symptom exaggeration are reported from a survey of the American Board of Clinical Neuropsychology membership. Estimates were based on 33,531 annual cases involved in personal injury, ( $n=6,371$ ), disability ( $n=3,688$ ), criminal ( $n=1,341$ ), or medical ( $n=22,131$ ) matters. Base rates did not differ among geographic regions or practice settings, but were related to the proportion of plaintiff versus defense referrals. Reported rates would be 2–4% higher if variance due to referral source was controlled. Twenty-nine percent of personal injury, 30% of disability, 19% of criminal, and 8% of medical cases involved probable malingering and symptom exaggeration. Thirty-nine percent of mild head injury, 35% of fibromyalgia/chronic fatigue, 31% of chronic pain, 27% of neurotoxic, and 22% of electrical injury claims resulted in diagnostic impressions of probable malingering. Diagnosis was supported by multiple sources of evidence, including severity (65% of cases) or pattern (64% of cases) of cognitive impairment that was inconsistent with the condition, scores below empirical cutoffs on forced choice tests (57% of cases), discrepancies among records, self-report, and observed behavior (56%), implausible self-reported symptoms in interview (46%), implausible changes in test scores across repeated examinations (45%), and validity scales on objective personality tests (38% of cases).

The prevalence or base rate of symptom exaggeration and malingering has been the subject of estimates that vary widely in magnitude and objectivity. Empirical studies that report base rates in consecutive series of patients are available. Larrabee (in press) reviewed this literature and found a prevalence of 40% in 1,363 compensation seeking cases of mild head injury combining results from 11 published studies that used objective diagnostic measures. Similar prevalence estimates have been reported by investigators using a variety of methodological approaches (Binder & Kelly, 1996; Green, Rohling, Lees-Haley, & Allen, 2001; Grote et al., 2000; Millis, 1994; Rohling, 2000; Youngjohn, Burrows, & Erdal, 1995). Base rates of malingering and exaggeration may vary for different diagnoses or refer-

ral circumstances. Approximately 25–30% of patients claiming disability due to fibromyalgia, chronic fatigue syndrome, or major depressive disorder may perform in the range that suggests probable malingering on forced choice tests (Gervais, Russell, Green, Allen, Ferrari, & Pieschl, 2001; Green et al., 2001; Van der Werf, Prins, Jongen, Van der Meer, & Bleijenberg, 2000). Similar results have been reported for about 40% of patients claiming disability due to chronic pain (Gervais, Green, Allen, & Iverson, 2001). Probable symptom exaggeration in the context of personal injury litigation, worker's compensation, or disability claims has been reported in 25–30% of cases assessed with the MMPI-2 or forced choice word recognition measures regardless of purported diagnosis (Green et al., 2001; Lees-Haley, 1997).

The base rate of malingering in criminal competence and sanity cases as assessed by structured interviews or the Rey 15-item test appears to be between 20 and 30% (Frederick, 2000; Miller, 2001; Rogers, 1997).

The recognition of probable malingering or symptom exaggeration in individual cases requires several inferential methods. The diagnosis typically involves consideration of the medical record, the patient's self-report, observed behavior, and the results of a comprehensive neuropsychological examination (Slick, Sherman, & Iverson, 1999). Greiffenstein, Baker, and Gola (1994) observed a 37% base rate of probable malingering in compensation seeking mild head injury patients when clinical criteria (severity of cognitive impairment inconsistent with mild head trauma, discrepancies among records, self-reported, and observed behavior, implausible self-reported symptoms) were considered in conjunction with an empirically derived cutoff score on a forced choice test. Base rates that are representative of those observed in clinical practice may be used statistically to determine the efficiency of any specific diagnostic method, and to determine the probability of malingering or symptom exaggeration in individual cases (Meehl & Rosen, 1955). The current study provides estimates of the prevalence of malingering and symptom exaggeration for a variety of potential clinical circumstances based upon the results of a national survey of neuropsychological practices.

## METHOD

Surveys were mailed to the 388 members of the American Board of Clinical Neuropsychology (ABCN) who were listed as currently engaged in active practice. The anonymous survey contained fill in questions about practice demographics, sources of referral, percentages of cases that involved probable symptom exaggeration or malingering, and the methods used for diagnosis (see Appendix). Surveys were returned by 144 neuropsychologists (37%). In 13 cases the respondent could not estimate base rates, typically because their practice did not involve a significant number of litigating or compensation seeking patients. Prevalence estimates were therefore based upon the surveys returned by 131 (35%) of 375 possible respondents.

## RESULTS

Demographic characteristics of the respondents appear in Table 1. Geographic distribution of practice did not differ significantly from that of the ABCN membership,  $\chi^2(4, 131) = 8.54$ ,  $p < .05$ . The average respondent had been in practice for 18.48 years ( $SD = 7.24$ ), and interpreted an average of 21.33 ( $SD = 15.02$ ) neuropsychological examinations per month. Prevalence estimates are therefore based on 33,531 annual cases involved in personal injury ( $n = 6,371$ ), disability ( $n = 3,688$ ), criminal ( $n = 1,341$ ), or medical ( $n = 22,131$ ) matters.

The percentage of annual cases that were characterized by probable symptom exaggeration or malingering in each practice setting appears in Table 2. Prevalence estimates did not differ significantly among practice settings or geographic regions, and were not significantly related to the

Table 1. Demographic Characteristics of Survey Respondents ( $N = 131$ ).

Region of practice (%)	
West	28
Midwest	24
Northeast	21
South	24
Canada	3
Practice setting (%)	
Private or group practice	47
University affiliated hospital or medical center	33
Rehabilitation, general, veteran's, or psychiatric hospital	30
Percentage of annual referrals	
Personal injury litigation	19
Disability or worker's compensation claims	11
Criminal litigation	4
Medical or psychiatric not involving litigation or compensation	66
Percentage of personal injury or disability cases	
Referred by plaintiff's attorney or doctor	63
Referred by defense attorney or insurer	37
Percentage of criminal cases	
Referred by defense attorney	68
Referred by prosecuting attorney	32

Table 2. Bases Rates of Probable Malingering or Symptom Exaggeration by Setting.

Annual cases	<i>M</i> (95% CI)
Civil cases	
Private or group practice	29.85 (5.64)
University affiliated hospital or medical center	26.52 (6.61)
Rehabilitation, general, veteran's, or psychiatric hospital	31.01 (7.89)
Criminal cases	
Private or group practice	21.09 (6.85)
University affiliated hospital or medical center	19.50 (12.97)
Rehabilitation, general, veteran's, or psychiatric hospital	11.25 (13.91)
Medical or psychiatric cases not involving litigation or compensation	
Private or group practice	7.10 (1.64)
University affiliated hospital or medical center	7.38 (1.82)
Rehabilitation, general, veteran's, or psychiatric hospital	11.56 (6.15)

Note. Means and 95% confidence intervals are reported in percentages.

number of examinations interpreted. Reported base rates were significantly related to the proportion of plaintiff versus defense referrals in personal injury ( $r = .20, p = .014$ ) and disability cases ( $r = .24, p = .005$ ). Patients referred by defense attorneys or insurers had higher rates of probable malingering and exaggeration. Base rates in criminal cases were significantly related to the proportion of prosecution versus defense referrals ( $r = .24, p = .04$ ). Rates were higher in cases referred by prosecuting attorneys. Prevalence estimates were therefore statistically adjusted to control for variance due to referral source. Corrected estimates (Table 3) represent the base rates of probable malingering and exaggeration in civil or criminal cases if the effects of referral source are removed.

Table 3. Base Rates of Probable Malingering or Symptom Exaggeration by Referral Type.

Cases	<i>M</i> (95% CI)	
	Reported	Adjusted
Personal injury cases	28.66 (3.71)	30.43 (3.64)
Disability or worker's compensation	30.12 (4.22)	32.73 (4.10)
Criminal cases	19.25 (5.85)	22.78 (5.83)
Medical or psychiatric cases	8.11 (1.56)	8.11 (1.56)

Note. Means and 95% confidence intervals are reported in percentages. Adjusted values are corrected to remove significant variance due to referral source.

Prevalence estimates in cases that involve litigation or compensation related to a given diagnosis are shown in Table 4. Estimates that have been statistically adjusted to remove the influence of referral source are also provided for civil cases. The effect of referral source on base rates in criminal cases was not statistically significant for any diagnostic group.

Table 4. Base Rates of Probable Malingering or Symptom Exaggeration in Litigating or Compensation Seeking Cases by Diagnosis.

Cases	<i>M</i> (95% CI)	
	Reported	Adjusted
Mild head injury	38.50 (7.06)	41.24 (4.51)
Fibromyalgia or chronic fatigue	34.74 (5.86)	38.61 (5.54)
Pain or somatoform disorders	31.41 (5.67)	33.51 (5.50)
Neurotoxic disorders	26.49 (5.98)	29.49 (5.75)
Electrical injury	21.99 (6.02)	25.63 (5.54)
Depressive disorders	14.95 (4.32)	16.08 (4.24)
Anxiety disorders	13.57 (4.26)	13.57 (4.26)
Dissociative disorders	10.51 (5.33)	10.51 (5.33)
Seizure disorders	9.35 (3.37)	9.35 (3.37)
Moderate or severe head injury	8.82 (2.00)	8.82 (2.00)
Vascular dementia	2.39 (1.02)	2.39 (1.02)

Note. Means and 95% confidence intervals are reported in percentages. Adjusted values are corrected to remove significant variance due to referral source.

Table 5. Percentage of Diagnostic Impressions Supported by Criteria in Probable Malingering or Symptom Exaggeration Cases.

Severity of cognitive impairment inconsistent with condition	64.83
Pattern of cognitive test performance inconsistent with condition	64.28
Scores below empirical cutoffs on forced choice tests	57.30
Discrepancies among records, self-report, and observed behavior	55.61
Implausible self-reported symptoms in interview	46.02
Scores below empirical cutoffs on other malingering tests	45.95
Implausible changes in test scores across repeated examinations	45.25
Scores above validity scale cutoffs on objective personality tests	37.85
Scores below chance on forced choice tests	30.04

Respondents were surveyed to determine which methods or procedures supported the diagnosis of probable malingering. Table 5 demonstrates that neuropsychologists typically rely upon multiple methods for assessing the probability of symptom exaggeration. The average respondent considered 7.53 ( $SD=2.35$ ) of 9 possible indicators in forming an opinion. Diagnostic impressions were supported by an average of 4.47 ( $SD=1.34$ ) indicators.

## DISCUSSION

Diagnostic accuracy can be improved by knowledge about the prevalence of a condition. The base rates presented here may therefore be useful in and applicable to a variety of clinical circumstances. These estimates correspond with the rates that have been previously reported in empirical studies that used objective diagnostic methods, and are representative of those observed in a variety of practice settings. Current base rates were informed by several sources of evidence that meet accepted diagnostic criteria for probable malingering (Slick et al., 1999).

Inconsistency between the observed and expected severity of cognitive impairment appears to be one of the most common characteristics of symptom exaggeration (Demakis et al., 2001). Patterns of test performance that fail to make neuropsychological sense and are inconsistent with the condition constitute another salient indication of probable malingering (Larrabee, 1990; Larrabee, in press; Mittenberg, Aguila-Puentes, Patton, Canyock, & Heilbronner, in press). Incon-

sistent patterns of performance on the Wechsler Adult Intelligence Scale, 3rd edition (WAIS-3), the Halstead-Reitan Battery, or on tests of memory and attention span may be reliably identified (Millis, Putnam, Adams, & Ricker, 1995; Mittenberg et al., in press; Mittenberg, Azrin, Millsaps, & Heilbronner, 1993; Mittenberg, Rotholz, Russell, & Heilbronner, 1996; Mittenberg et al., 2001; Mittenberg, Theroux, Zielinski, & Heilbronner, 1995). Extensive research also supports the diagnostic accuracy of empirically derived cutoff scores on forced choice tests (Bianchini, Mathias, & Greve, 2001; Iversen & Binder, 2000), empirically derived cutoff scores on other malingering tests (Greiffenstein et al., 1994; Greiffenstein, Baker, & Gola, 1996), implausible self-reported symptoms (Suchy & Sweet, 2000), implausible changes in test scores across repeated examinations (Cullum, Heaton, & Grant, 1991; Reitan & Wolfson, 1997), validity scales on objective personality assessments (Larrabee, 1998, in press), and performance that is significantly lower than chance on forced choice tests (Bianchini et al., 2001).

Rates of probable malingering or symptom exaggeration appear to vary significantly depending upon the presumptive diagnosis, and to differ for civil and criminal cases. Higher rates of probable malingering were reported for cases referred by defense attorneys and insurers in civil matters, and in criminal cases referred by prosecutors. Selection of cases by the referral source may account for these results. It is also possible for diagnostic impressions to be influenced by the referrer. Lawyers typically prepare their clients for neuropsychological examinations, and may

discuss expected symptoms, test content, and detection of malingering (Essig, Mittenberg, Petersen, Strauman, & Cooper, 2001). Clinicians may be influenced by financial considerations, particularly when the payment of fees depends upon an award of compensation. Payment arrangements of this nature (termed a letter of protection or lien) appear to be common in civil cases (Essig et al., 2001). However, the source of referral appears to have had a minimal influence upon currently reported base rates. Prevalence estimates would be 2–4% higher if the effect of referral source was removed.

Base rates can be used to determine the accuracy of any diagnostic method. A diagnosis is more likely to be correct than incorrect when the ratio of the base rate for the diagnosis to the probability of not having the diagnosis exceeds the ratio of false positives to true positives for a specific method (Meehl & Rosen, 1955). The diagnosis of probable malingering in a mild head injury case is therefore more likely to be correct than not if a test is used that produces fewer than 39% false positive and more than 61% true positive decisions.

Diagnoses can be made with a known degree of accuracy on the basis of prevalence estimates alone. For example, an accuracy rate of 61% could be achieved by considering all mild head injury claims genuine at a 39% base rate of malingering. A diagnostic method will be more efficient than predictions that are made by using prevalence estimates alone if the positive predictive value of the method (the proportion of accurate to total positive diagnoses) exceeds the proportion of the population without the diagnosis (Meehl & Rosen, 1955). Diagnostic efficiency in mild head injury cases can therefore be improved

using methods with positive predictive accuracy above 61%.

Prevalence estimates can be combined with information about the accuracy of a method to determine the probability of correct diagnosis in individual cases. An example of this probabilistic approach to the interpretation of WAIS-3 performance patterns appears in Table 6. Table values display the positive predictive accuracy associated with a diagnosis of malingering at a 40% base rate. The probability of diagnosis is shown as a function of Vocabulary-Digit Span scaled score differences, or scores from an equation that evaluates the overall WAIS-3 subtest pattern for degree of inconsistency with the results of head injury (Mittenberg et al., 2001, 1995). Higher levels of diagnostic confidence are associated with greater inconsistency on these or any other measures regardless of the base rate. More extensive discussion of these statistical methods can be found in Millis and Volinsky (2001) and Mossman and Hart (1996).

In clinical practice conclusions are based upon consideration of multiple diagnostic criteria rather than individual test scores (Slick et al., 1999). Greater confidence is associated with the use of multiple criteria because each criterion that is satisfied increases the base rate of the diagnosis. For example, the presence of a substantial external incentive increases the base rate of probable malingering from 8% in general medical cases to about 30% in cases that are potentially compensable (Table 3). Another consideration is the presence of apparent impairment. Questions about the validity of impairment do not logically arise when no impairment is apparent. This intuitively obvious factor may have a significant effect on base rates. For example, meta-analysis

Table 6. Probability of Malingered Head Injury for WAIS-3 scores at a 40% Base Rate.

Vocabulary-Digit Span		Discriminant Equation	
Scaled score difference	Probability	Score	Probability
2	.73	0	.74
3	.85	.1	.77
4	.91	.2	.82
5	> .99	.6	.90
		.7	> .99

*Note.* See Mittenberg et al. (2001) for the derivation of scaled score difference and discriminant equation scores.

of neuropsychological studies indicates that 95% of mild head trauma patients display no significant cognitive impairment 3 months or more post-injury (Binder, Rohling, & Larrabee, 1997). If about 40% of litigating mild head trauma cases demonstrate malingered impairment and 5% are actually impaired, the base rate of probable malingering in cases with apparent cognitive impairment is approximately 88%. The rates of probable malingering and symptom exaggeration reported in the current survey may therefore underestimate base rates in litigating or compensation cases that are encountered in clinical practice.

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## APPENDIX

**ABPP Survey on Probable Symptom Exaggeration and Malingering**

1. In which region do you practice  
     \_\_\_\_\_ West      \_\_\_\_\_ Midwest      \_\_\_\_\_ Northeast      \_\_\_\_\_ South      \_\_\_\_\_ Canada
2. Indicate one primary practice setting  
     \_\_\_\_\_ private or group practice      \_\_\_\_\_ rehabilitation hospital  
     \_\_\_\_\_ university hospital or medical center      \_\_\_\_\_ general hospital or medical center  
     \_\_\_\_\_ veteran's affairs medical center      \_\_\_\_\_ psychiatric hospital  
     \_\_\_\_\_ university
3. \_\_\_ \_\_\_ Years of clinical practice
4. \_\_\_ \_\_\_ \_\_\_ Number of neuropsychological examinations interpreted monthly
5. Percentage of total annual neuropsychological referrals involve  
     \_\_\_\_\_ % personal injury litigation  
     \_\_\_\_\_ % disability or worker's compensation claims  
     \_\_\_\_\_ % criminal litigation  
     \_\_\_\_\_ % medical or psychiatric not involving litigation or seeking compensation
6. Percentage of PERSONAL INJURY OR DISABILITY CASES referred  
     \_\_\_\_\_ % referred by treating doctor  
     \_\_\_\_\_ % referred by plaintiff's attorney  
     \_\_\_\_\_ % referred by defense attorney or insurer  
     \_\_\_\_\_ % self referred
7. Percentage of CRIMINAL CASES referred or requested by  
     \_\_\_\_\_ % defense  
     \_\_\_\_\_ % prosecution
8. What percentage of your annual cases in each category involve PROBABLE SYMPTOM EXAGGERATION OR MALINGERING  
     \_\_\_\_\_ % of personal injury cases  
     \_\_\_\_\_ % of disability or worker's compensation cases  
     \_\_\_\_\_ % of criminal cases  
     \_\_\_\_\_ % of medical or psychiatric cases not involved in litigation or seeking compensation
9. What percentage of your LITIGATING OR COMPENSATION SEEKING CASES examined for the following disorders involve probable symptom exaggeration or malingering  
     \_\_\_\_\_ % of mild head injury claims  
     \_\_\_\_\_ % of moderate or severe head injury claims  
     \_\_\_\_\_ % of depressive disorder claims  
     \_\_\_\_\_ % of anxiety disorder claims  
     \_\_\_\_\_ % of pain or somatoform disorder claims  
     \_\_\_\_\_ % of dissociative disorder claims  
     \_\_\_\_\_ % of vascular dementia claims  
     \_\_\_\_\_ % of seizure disorder claims  
     \_\_\_\_\_ % of neurotoxic disorder claims  
     \_\_\_\_\_ % of electrical injury claims  
     \_\_\_\_\_ % of fibromyalgia or chronic fatigue claims

10. In what percentage of your PROBABLE SYMPTOM EXAGGERATION OR MALINGERING CASES do each of the following support your impression

- \_\_\_ % below empirical cutoff on forced choice tests
- \_\_\_ % below chance on forced choice tests
- \_\_\_ % below empirical cutoff on other malingering tests
- \_\_\_ % pattern of cognitive test performance does not make neuropsychological sense (inconsistent with condition)
- \_\_\_ % severity of cognitive impairment inconsistent with condition
- \_\_\_ % implausible changes in test scores across repeated examinations
- \_\_\_ % above validity scale cutoffs on objective personality tests
- \_\_\_ % discrepancies among records, self-report, and observed behavior
- \_\_\_ % implausible self-reported symptoms in interview

Thank you. Please mail the survey in the enclosed return addressed envelope.