QUT Digital Repository:
http://eprints.qut.edu.au/

Sullivan, Karen A. and King, Joanne K. (2008) Detecting faked psychopathology: a comparison of two tests to detect malingered psychopathology using a simulation design. *Psychiatry Research*.

© Copyright 2008 Elsevier

Running Head: Detecting malingered psychopathology

Detecting faked psychopathology: a comparison of two tests to detect malingered psychopathology using a simulation design.

Karen Sullivan*, Joanne King

School of Psychology and Counselling, and Institute of Health and Biomedical Innovation

Queensland University of Technology

*Corresponding author: Karen Sullivan at the School of Psychology and Counselling, Queensland University of Technology, Carseldine, Queensland 4034, Australia. Telephone: 0011 617 3138 4660. Fax: 0011 617 3138 4660. Email: ka.sullivan@qut.edu.au

Abstract

Malingered psychopathology has the potential to be a costly social problem and there is a need for studies that compare the malingering detection capabilities of tests of psychopathology. This study investigated the capacity of two measures to detect simulated psychopathology. Forty-one first-year psychology students were randomly allocated to experimental groups that included malingering and control conditions. Analogue malingerers were given a financial incentive to simulate believable psychological impairment. Controls received standardised test instructions and the prize incentive, contingent on good effort. Using a between-groups simulation design, group differences on the Personality Assessment Inventory and the revised Symptom Checklist 90 were assessed. Group comparisons revealed elevation of the majority of clinical index scores among malingerers and a consistent pattern of results across tests. Analysis of the test operating characteristics of the malingering indices for these measures revealed superior detection of simulated malingering using the PAI, particularly Rogers' Discriminant Function, although classification accuracy of all malingering indexes was improved when adjusted cut-offs were used. Overall, results from this study demonstrate the vulnerability of the PAI and SCL-90-R to simulated psychopathology, but also the capacity of these measures to detect such performance when specific indexes are used.

Keywords: malingering, dissimulation, motivation, test operating characteristics, sensitivity, specificity, base rates

Detecting faked psychopathology: A comparison of two tests to detect malingered psychopathology using a simulation design.

1. Introduction

There is a growing body of literature documenting the prevalence of malingered psychopathology (Larrabee, 2003) and the vulnerability of measures of psychopathology to faked or exaggerated performance (Bagby et al., 2002). Several studies have demonstrated that a range of psychopathologies can be faked by simulating malingerers (Lees-Haley and Dunn, 2002; Baity et al., 2007; Bowen & Bryant, 2006). These include: major depression, post-traumatic stress disorder (PTSD), and generalised anxiety disorder. The extent to which other psychopathologies can be faked has not been as thoroughly investigated, and there is a need to determine the vulnerability of a broader range of psychopathologies than has occurred to date.

The significance of studies investigating the vulnerability of psychopathologies to faked performance can be demonstrated by considering the case of PTSD. This disorder is frequently claimed as a defence in criminal settings (Sparr and Atkinson, 1986; Hall and Hall, 2006) and is compensable in personal injury and disability compensation cases (Resnick, 1993). Studies of the extent to which PTSD can be faked suggest spurious compensation claims for PTSD are common, particularly when there are strong incentives to malinger (Lees-Haley, 1992; Calhoun et al., 2000). The prevalence of faked PTSD has been estimated at 20% to 30% in veterans seeking disability compensation (Frueh et al., 1997) and up to 50% in other samples (Hall and Hall, 2006), highlighting the substantial potential costs associated exaggerated psychopathology. Given that other susceptible psychopathologies, such as depression (Repko and Cooper, 1983; Lees-Haley, 1997) and pain/somatisation (McGuire and Shores, 2001), are also likely to be reported in workers compensation or personal injury claims, the overall potential costs of failing

to detect faked psychopathology are likely very high.

The vulnerability of psychopathologies to faking might partly depend on how easy they can be simulated. In the case of PTSD, this disorder is regarded as relatively easily faked (Calhoun et al., 2000; Hall and Hall, 2007). Naïve participants can readily identify the symptoms of PTSD (Lees-Haley, 1997; Burges and McMillan, 2001). Similarly, the ease of faking other types of psychopathology, such as depression (Lees-Haley, 1997; Walters and Clopton, 2000), pain/somatisation (McGuire et al., 2001), and to a lesser extent, psychoticism (Albert et al., 1980) have also been reported.

Several reasons have been postulated to account for the ease with which some types of psychopathology can be faked. First, the format of some measures of psychopathology may contribute to their vulnerability (Aubrey et al., 1989): Measures of psychopathology that rely on the presentation of symptom checklists may prompt malingerers to endorse symptoms they may not otherwise report, whilst the subjective nature of psychopathology increases the difficulties in proving malingering (Sbordone et al., 2000). Second, the general level of community awareness of some psychological disorders may increase the risk of malingering associated with these disorders. Previous studies have shown that malingering success in depression can be enhanced by symptom knowledge and experience (Steffan et al., 2003), and given that depression accounts for a high proportion of the total burden of disease borne by the community (Usten et al., 2000), it is perhaps unsurprising that individuals can easily simulate depression; a finding independent of whether they receive coaching (Walters and Clopton, 2000). Third, the availability of information that could assist individuals motivated to fake has been noted as another reason for the vulnerability of these disorders to exaggeration. This excludes instances of specific coaching on disorder symptoms, for example, which may be provided by lawyers or others (Victor and Abeles, 2004). Individuals can access the formal diagnostic criteria for various

psychopathologies and may become familiar with disorders of interest given the abundance of information available in the popular media (Lees-Haley and Dunn, 1994) and via the internet (Ruiz et al., 2002). Given the range of psychopathologies that are susceptible to faking, and that this may partly be a function of the methods used to assess such disorders, it is important to know the relative vulnerability of various measures of psychopathology to malingering so that clinicians can select the most resistant tests available, particularly when assessments involve disorders associated with higher malingering prevalence (see Mittenberg et al., 2002) and in circumstances where strong malingering incentives exist (i.e., medico-legal contexts).

A number of tests of psychopathology have been developed that include validity scales designed to detect deceptive, bizarre, discrepant or rare responding. In some cases, several validity indices exist for a single test (e.g., PAI) but very few comparative studies of the utility of measures within and between tests have been undertaken (for an exception see Braxton et al., 2007). Therefore, the aim of the present study was to assess the relative diagnostic validity of malingering indices from two measures of psychopathology in the detection of simulated malingering.

2. Method

2.1. Participants

Participants were first-year psychology students who received course credit for participation. The sample comprised 30 (73%) females and 11 (27%) males with a mean age of 25 years (*SD* = 10; range = 17 – 56 years). The majority of participants were from English-speaking backgrounds (85%), with no self-reported history of mental illness (76%). There were no significant differences between experimental groups as a function of age, F (1, 39) = 3.438, P

> .05, sex, χ^2 (1, N = 41) = 0.005, p > .05, ethnicity, χ^2 (1, N = 41) = 2.489, *P* > .05, or psychological history, χ^2 (1, N = 41) = 0.992, *P* > .05.

2.2. Materials

Participants completed two measures of personality and psychopathology, the PAI (Morey, 1991) and Symptom Checklist-90 Revised (SCL-90-R; Derogatis, 1992). The PAI is a 344-item, self-report inventory measuring clinical and personality variables (see Kurtz and Blais, 2007). This test is considered "acceptable" by forensic psychologists for a wide range of purposes, including the assessment of malingering (Lally, 2003) and it's utility as a measure of psychopathology in traumatic brain injury was recently demonstrated (Demakis et al., 2007). The PAI has twenty-two scales comprising: eleven clinical, two interpersonal, five treatment-related and four validity scales. The clinical syndromes assessed are somatic complaints, anxiety, anxiety related disorders, depression, mania, paranoia, schizophrenia, borderline features, antisocial features, and alcohol and drug problems. Participants rated each item on a four-point ordinal scale ranging from F (*false, not at all true*) to VT (*very true*).

For this study we employed one of the four standard PAI malingering indexes (the Negative Impression Management scale [NIM]) and two supplementary scores - the Malingering Index (MAL; Morey, 1996) and the Rogers Discriminant Function (RDF; Rogers et al., 1996). The NIM detects exaggerated unfavourable presentation based on bizarre and unlikely symptoms; it is derived from nine PAI items, with a score of ≥ 92T indicative of definite malingering (Morey, 1991). The MAL is designed to detect over and under-endorsed items inconsistent with clinical populations; it is derived from eight configural features of various PAI scales with a score of ≥ 5 indicating likely malingering (Morey, 1996). The RDF is designed to detect response

patterns inconsistent with clinical populations; it is derived from a combination of discriminant function weighted scores from various PAI scales.

The SCL-90-R is a 90-item self-report screening instrument used to assess current psychological pathology in psychiatric and medical patients (Derogatis, 1992). It is reported as widely used in the assessment and diagnosis of psychiatric conditions (Rohling et al., 1999). In addition to three global distress indexes, the SCL-90-R has nine scales: Somatisation, obsessive-compulsive, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation and psychoticism. Participants rated items on a five-point Likert scale ranging from 1 *(not at all)* to 5 (*extremely)* with higher scores indicating greater psychopathology. One of the SCL-90-R global distress indexes, the Positive Symptom Total (PST), was used in this study as an indicator of malingering. The PST provides an indication of a dramatising response style indicative of faking bad. Consistent with test manual recommendations, a PST score of > 50 for males and > 60 for females was used to assess malingering (Derogatis, 1992).

2.3. Procedure

After providing informed consent and completing a demographic questionnaire, participants read an instructional-set specific to group membership (see Appendix). Malingerers were instructed to believably fake psychological impairment on the PAI and SCL-90-R for a chance to win one hundred dollars cash, and to facilitate believable simulations they were given a list of psychological symptoms to study before testing (see Appendix). Controls received standard test instructions, with compliance affording them a chance to win the prize. Participants then completed the PAI and SCL-90-R which were counterbalanced to mitigate order effects.

Following psychological testing, all participants completed a post-experimental questionnaire specific to group membership and received written and verbal debriefing. Consistent with recommendations regarding the conduct of simulated malingering studies (Nies

and Sweet, 1994), post-experimental questionnaires were used to assess understanding and compliance with experimental instructions.

3. Results

3.1. Group comparisons: Clinical indexes.

Group differences between malingerers and controls on the 11 clinical scales of the PAI were examined using MANOVA[1]. Significant multivariate effects were found for these scales, Pillai's trace = 0.674, F (11, 29) = 5.442, $p < .001$. Table 1 displays the PAI clinical scale means, standard deviations, and results from univariate tests (with Bonferoni correction $P = 0.004$) for each individual clinical scale as a function of group. This table shows significant group differences on most clinical scales, with the exception of mania and antisocial features.

In terms of the magnitude of malingering on the PAI, and whether this was sufficient to warrant clinical diagnosis, group means were compared to test manual cut-offs. Malingerers warranted diagnosis for somatic complaints, paranoia and drug and alcohol problems. Marked scale elevations (> two SDs above scale norm) were noted among malingerers for depression, schizophrenia, anxiety, anxiety-related disorders (i.e., PTSD) and borderline features although these did not reach diagnostic cut-offs. Controls did not warrant any psychopathology diagnosis.

Results for the SCL-90-R are also shown in Table 1. These results are generally consistent with PAI data, given that significant multivariate effects between malingerers and controls were observed, Pillai's trace = 0.408, F (9, 31) = 2.376, $p < .05$, whilst univariate analyses (with Bonferoni correction $P = 0.005$) revealed malingerers scored significantly higher on all individual clinical scales than controls. Interpersonal sensitivity and psychoticism

[1] Note, group comparisons using *non*-parametric statistics were also undertaken. Since the choice of statistic type (parametric versus non-parametric) did not change the pattern of results, the results of one set of comparisons is shown. Following the precedent set by Bowen and Bryan, (2007) parametric comparisons are shown.

exceeded a mean of 70 for controls (two *SD*s > *M*), whereas all clinical scale mean *T* scores exceeded 70 for malingerers.

3.2. Group comparisons: Malingering indexes.

Group differences for the three malingering indexes of the PAI (NIM, MAL, RDF) and the malingering index of the SCL-90-R (PST) were examined. All malingering indexes were elevated in the anticipated direction with malingerers' performance on all indexes higher (indicating more faking) than that of controls. There was a significant overall multivariate effect between groups, Pillai's Trace = 0.585, F (4, 36) = 12.693, $p < .001$. Univariate analyses with Bonferoni correction ($P = 0.0125$) revealed that malingerers scored significantly higher (faked more) than controls on all individual malingering indexes. In addition, Cohen's *d* revealed large effect sizes (Cohen, 1988) reflecting the magnitude of group differences between malingerers and controls for each index. Means, standard deviations, effect sizes and univariate tests for all malingering indexes as a function of group are reported in Table 2.

To explore the magnitude and clinical significance of faking on the malingering indexes, group means were compared to published cut-offs. All indexes, with the exception of the MAL, identified simulators as malingerers, and controls as non-malingerers (the MAL classified both groups as non-malingerers). Thus whilst the MAL, with published cut-offs of three and five, failed to classify simulators as malingerers, it was efficient in statistically differentiating between groups. These results indicate the efficacy of the malingering indexes to differentiate malingerers from non-malingerers, although in the case of the MAL, the use of the recommended cut-off scores in isolation would not have permitted correct diagnosis.

3.3. Classification Accuracy of Malingering Indexes

In accordance with recent recommendations that statistics other than those based on group comparisons should be reported (American Psychiatric Association, 1994; Woods et al., 2003),

further analyses were undertaken to explore the test operating characteristics associated with malingering indexes from the PAI and SCL-90-R. These results are presented in Table 3. Overall, three of the four malingering indexes (NIM, RDF, and PST) achieved acceptable sensitivity and specificity. The NIM (≥ 73 and ≥77) and the RDF correctly classified the greatest number of participants in the sample (Hit rate = 0.85). The RDF achieved the highest sensitivity (.89) of the indexes and although specificity was comparable (.82), it was lower than the majority of the other indexes. The NIM (≥ 73 and ≥77) achieved good specificity at .95, although perfect specificity was obtained on this index by higher cut-offs (i.e., NIM ≥ 92, ≥ 110).

Using PST test-manual cut-offs (> 50 males, > 60 females) provided the next greatest sensitivity (.68), although its specificity was the lowest at .68. The remaining indexes achieved sensitivities at less than chance level (.26 to .47) although their respective specificities were preserved (.91 to 1). These results are consistent with the reported effect sizes between malingerers and controls in Table 2 where the RDF and NIM demonstrated superior effect sizes of over one and a half standard deviations. Whilst the NIM (≥ 92, ≥ 110) and MAL (≥ 5) achieved below chance sensitivities, the likelihood that elevations of their scales accurately reflected malingering was perfect (positive predictive power [PPP] = 1). The NIM (≥ 73 and ≥77) also elicited sound PPP (.93), whilst the RDF achieved a more modest PPP (.81). The best estimates of negative predictive power (NPP) were achieved by the RDF (.90) and NIM (≥ 73 and ≥77; .81) demonstrating these indexes' abilities to accurately predict non-malingering based on their non-elevated indexes.

A further comparison of the diagnostic validity of the malingering indexes was calculated using receiver operating characteristics analysis (ROC). ROC analyses demonstrate the relationship between sensitivity and specificity for varied cut-offs. Using the dichotomous group variable of malingerers versus non-malingerers, ROC analysis suggest the RDF and NIM were

the most accurate, RDF area under the curve (AUC) = 0.892, NIM AUC = 0.859, MAL AUC = 0.799, PST AUC = 0.748. A review of all possible cut-offs for each index revealed alternative optimal cut-offs to those reported in the literature for identifying the participants in this sample. Table 4 provides a summary of ROC cut-offs yielding the most efficient sensitivity and specificity outcomes for this sample. These alternative cut-offs show that the RDF and NIM have the highest hit rates.

4. Discussion

4.1. Clinical indexes: the extent and nature of malingered psychopathology

Participants instructed to fake impairment for potential financial reward reflected significantly greater psychopathology than controls on the tests studied. This finding suggests that malingering was successfully induced. Faked performances at levels suggestive of clinically significant psychopathology were apparent on all but two clinical scales. This result suggests that the number and type of psychopathology vulnerable to faking may be greater than previously demonstrated. Past studies have shown the vulnerability of disorders like PTSD, but there have been relative few malingering investigations of the vulnerability of other conditions (such as substance related disorders; for a recent exception see Bowen and Bryant, 2006).

Two types of psychopathology were not successfully faked. Faked presentations of mania and antisocial features at were not identified on the PAI. Whilst malingerers scored higher than controls on these measures, differences were not significant nor in the clinical range. Previous research has shown decreased reporting of mania and/or antisocial symptoms relative to other symptoms following general (Sivec et al., 1994; Morey and Lanier, 1998; Bagby et al., 2002) and specific (PTSD) faking instructions (Bowen and Bryant, 2007). Compared to disorders that are susceptible to malingering (e.g., depression), the relative robustness of these conditions may be attributed to lower levels of relevant community knowledge and experience.

Alternatively, the negative social stigma associated with these conditions may be particularly strong (Agronin and Maletta, 2000), acting as a deterrent against malingering despite instructions. Further research is needed to examine the relative vulnerability of various disorders to malingering, in particular to draw out the role of variables such as illness knowledge and social stigma.

The disorders malingered most flagrantly were: somatic complaints and depression (PAI), psychoticism and phobic anxiety (SCL-90-R). High malingering prevalence (≥20% of cases) has been reported for: somatic complaints, in particular, pain (> 40%; Gervais et al., 2001); depression (16%; Mittenberg et al., 2002); and, psychoticism in forensic contexts (20%; Rogers, 1986). The finding that highly susceptible disorders are also the ones most likely to be faked is important. The broader discussion of the extent and manner in which malingering was induced suggests that malingering assessment is necessary for a wide range of mental disorders, and also that particular scrutiny is required for highly vulnerable psychopathologies.

A contrary interpretation of our results is that the symptoms endorsed do not reflect the susceptibility of psychopathologies; rather findings might be due to simulators' indiscriminate symptom endorsement. Further, the failure to reflect two specific disorders (mania and antisocial features) might be attributed to under representation of relevant symptoms on out list, rather than reduced disorder familiarity. These alternate explanations can not be ruled out, although the first one seems unlikely given findings from our post-experimental questionnaire (at least a quarter of participants were "conservative in reporting symptoms" and did "not report extreme symptoms").

4.2. Malingering indexes: a comparative examination of detection capabilities.

Whilst malingering indexes on both measures demonstrated significant elevations for malingerers compared to controls, the three PAI malingering indexes (NIM, MAL, RDF) elicited larger effects than the SCL-90-R, PST. This result may not be surprising given that the RDF and

MAL were developed to detect malingering, whilst the PST is not a malingering index per se; instead it reflects a dramatising response style that may indicate faking bad. That said, using cut-offs based on PAI and SCL-90-R test guidelines, the MAL was the only index that erroneously classified malingerers as non-malingerers. Whilst statistical differences between malingerers and controls were identified using the MAL and it elicited a larger effect than the PST, the PST was better at differentiating malingerers from non-malingerers using clinical decision rules.

The RDF was the most sensitive malingering indicator, detecting 89% of malingerers. This finding is consistent with research reporting: a) RDF sensitivity in excess of 80% (Morey, 1996; Rogers et al., 1996), and b) the superiority of the RDF over alternative PAI malingering indexes (Morey and Lanier, 1998). However, the RDF was weak in terms of specificity. Further, although the malingering base rate in our study (41%) was not artificially high compared to reported estimates (Greiffenstein et al., 1994; Mittenberg et al., 2002; Larrabee, 2003), positive and negative predictive power (PPP; NPP) was computed as a further indication of test accuracy (Rogers et al., 1998). The overall test accuracy of the RDF was 81%. This suggests that despite its sensitivity, the RDF may misclassify 19% of non-malingerers as malingerers. The NIM (≥ 73 and ≥ 77) and PST (> 50 males, > 60 females) also detected malingerers at above chance levels, whilst the remaining published cut-offs and the MAL failed to detect malingering. ROC analyses demonstrate the potential for all indexes to detect the malingering at above chance levels, depending on cut-offs used.

Whilst consideration of the test operating characteristics may help inform test selection decisions, clinicians are reminded that validity scores should not be used in isolation (Iverson and Binder, 2000). Although routine use of effort tests is recommended (Stevens et al., 2008), caution is needed when interpreting their results. Further malingering research investigating the properties of malingering scores as a function of disorder type and sample would provide greater

insight into their diagnostic validity. This could be achieved by manipulating simulation instructions to reflect variable potential costs and benefits, or by using a sample of genuine malingerers. This study used a convenience sample and for this reason findings should be interpreted cautiously.

Overall, results suggest both tests are vulnerable to faking and capable of detecting malingering, with the PAI demonstrating advantage in terms of detection capabilities over the SCL-90-R. The significance of this study is that it is one of the first to assess the *relative* efficacy of malingering indexes from multiple measures of psychopathology, and that it has explored the extent and manner in which malingered psychological disorders may occur. Importantly, our results show that in addition to those disorders we already know can be faked, there are a number of other conditions that are susceptible to malingering.

Acknowledgements:

The Human Research Ethics Committee of Queensland University of Technology (QUT-3975H) approved all research documented in this report. Preliminary results from this study were presented as a poster at the Australian Psychological Society College of Clinical Neuropsychologists Annual Conference, Melbourne 2005. The authors wish to acknowledge the generous assistance of Kate Ryan who provided help with the collection of data for this project and the financial support of School of Psychology and Counselling, Queensland University of Technology.

References

Agronin, M.E., Maletta, G., 2000. Personality disorders in late life: Understanding and overcoming the gap in research. American Journal of Geriatric Psychiatry 8, 4–18.

Albert, S., Fox, H., Kahn, M. 1980. Faking psychosis on the Rorschach: Can expert judges detect malingering? Journal of Personality Assessment 44, 115-119.

American Psychiatric Association. 1994. Diagnostic and statistical manual of mental disorders. (4th ed.). American Psychiatric Association, Washington.

Aubrey, J.B., Dobbs, A.R., Rule, B.G., 1989. Laypersons' knowledge about the sequelae of minor head injury and whiplash. Journal of Neurology, Neurosurgery, and Psychiatry 52, 842-846.

Bagby, R., Nicholson, R., Bacchiochi, J., Ryder, A., Bury, A., 2002. The predictive capacity of the MMPI-2 and the PAI validity scales and indexes to detect coached and uncoached feigning. Journal of Personality Assessment78, 69-86.

Baity, M.R., Siefert, J.F., Chambers, A., Blais, M., 2007. Deceptiveness on the PAI: a study of naïve faking with psychiatric inpatients. Journal of Personality Assessment 88, 16-24.

Bowen, C. Bryant. R.A., 2006. Malingering posttraumatic stress on the Personality Assessment Inventory. International Journal of Forensic Psychology 1, 22-28.

Burges, C., McMillan, T. 2001. Brief report. The ability of naïve participants to report symptoms of post-traumatic stress disorder. British Journal of Clinical Psychology 40, 209-214.

Braxton, L.E., Calhoun, P.S., Williams, J.E., Boggs, C., D., 2007. Validity rates of the Personality Assessment Inventory and the Minnesota Multiphasic Personality Inventory-2 in a VA medical center setting. Journal of Personality Assessment 88, 5-15.

Calhoun, P.S., Earnst, K.S., Tucker, D.D., Kirby, A.C., Beckham, J.C., 2000. Feigning combat-related posttraumatic stress disorder on the Personality Assessment Inventory. Journal of

Personality Assessment 75, 338-350.

Cohen, J., 1988. Statistical power analysis for the behavioural sciences (2nd ed.). Lawrence Erlbaum Associates, New Jersey.

Demakis, G.J., Hammond, F., Knotts, A., Cooper, D.B., Clement, P., Kennedy, J., Sawyer, T., 2007. The Personality Assessment Inventory in individuals with traumatic brain injury. Archives of Clinical Neuropsychology 22, 123-130.

Derogatis, L., 1992. SCL-90-R: Administration, scoring and procedures manual II for the revised version. Clinical Psychometric Research, Towson.

Erdal, K., 2004. The effects of motivation, coaching, and knowledge of neuropsychology on the simulated malingering of head injury. Archives of Clinical Neuropsychology 19, 73-88.

Frueh, B.C., Gold, P.B., de Arellano, M.A., 1997. Symptom over reporting in combat veterans evaluated for PTSD: Differentiation on the basis of compensation seeking status. Journal of Personality Assessment 68, 369-384.

Gervais, R.O., Green, P., Allen, L.M., Iverson, G.L., 2001. Effects of coaching on symptom validity testing in chronic pain patients presenting for disability assessments. Journal of Forensic Neuropsychology 2, 1-20.

Greiffenstein, M.F., Baker, W.J., Gola, T., 1994. Validation of malingered amnesia measures with a large clinical sample. Psychological Assessment 6, 218-224.

Hall, R.C.W, Hall, R.C.W., 2006. Malingering of PTSD: forensic and diagnosit considerations, characteristics of malingerers and clinical presentations. General Hospital Psychiatry 28, 525-535.

Hall, R.C.W, Hall, R.C.W., 2007. Detection of malingered PTSD: an overview of clinical, psychometric, and physiological assessment: where do we stand? Journal of Forensic Sciences 52, 717-725.

Iverson, G.L., Binder, L.M., 2000. Detecting exaggeration and malingering in neuropsychological assessment. Journal of Head Trauma Rehabilitation 15, 829–858.

Kurtz, J.E. Blais, M.A., 2007. Introduction to the special issue on the Personality Assessment Inventory. Journal of Personality Assessment 88, 1-4.

Lally, S.J., 2003. What tests are acceptable for use in forensic evaluations? A survey of experts. Professional Psychology: Research and Practice 4, 491-498.

Larrabee, G.J., 2003. Detection of malingering using atypical performance patterns on standard neuropsychological tests. The Clinical Neuropsychologist 17, 410-425.

Lees-Haley, P.R., Dunn, J., 1994. The ability of naïve subjects to report symptoms of mild brain injury, post-traumatic stress disorder, major depression, and generalized anxiety disorder. Journal of Clinical Psychology 50, 252-256.

Lees-Haley, P.R., 1992. Efficacy of MMPI-2 validity scales and MCMI-II modifier scales for detecting spurious PTSD claims: F, F-K, fake bad scale ego strength, subtle-obvious subscales, DIS and DEB. Journal of Clinical Psychology 48, 681-689.

Lees-Haley, P.R., 1997. MMPI-2 base rates for 492 personal injury plaintiffs: Implications and challenges for forensic assessment. Journal of Clinical Psychology 53, 745-755.

McGuire, B.E., Harvey, A.G., Shores, E.A., 2001. Simulated malingering in pain patients: A study with the pain patient profile. British Journal of Clinical Psychology 40, 71-79.

McGuire, B.E., Shores, E.A. 2001. Simulated pain on the Symptom Checklist 90-revised. Journal of Clinical Psychology 57, 1589-1596.

Mittenberg, W., Patton, C., Canyock, E., Condit, D., 2002. Base rates of malingering and symptom exaggeration. Journal of Clinical and Experimental Neuropsychology 24, 1094-1102.

Morey, L., 1991. Personality Assess Inventory: Professional manual. Psychological Assessment

Resources, Florida.

Morey, L., 1996. An interpretive guide to the Personality Assessment Inventory (PAI). Psychological Assessment Resources, Florida.

Morey, L., Lanier, V., 1998. Operating characteristics of six response distortion indicators for the Personality Assess Inventory. Assessment 5, 203-214.

Nies, K.J., Sweet, J.J., 1994. Neuropsychological assessment and malingering: A critical review of past and present strategies. Archives of Clinical Neuropsychology 9, 501-552.

Repko, G.R., Cooper, R., 1983. A study of the average workers' compensation case. Journal of Clinical Psychology 39, 287-295.

Resnick, P.J., 1993. Defrocking the fraud: The detection of malingering. Israel Journal of Psychiatry Related Sciences 30, 93-101.

Rogers, R., 1986. Malingering and deception. In: Rogers R. (Ed.) Conducting insanity evaluations. Van Nostrand Reinhold, New York, pp. 61-76.

Rogers, R., Sewell, K., Cruise, K., Wang, E., Ustad, K., 1995. The PAI and feigning: A cautionary note on its use in forensic-correctional settings. Assessment 5, 399-405.

Rogers, R., Sewell, K., Morey, L., Ustad, K., 1996. Detection of feigned mental disorders on the Personality Assess Inventory: A discriminant analysis. Journal of Personality Assessment 67, 629-640.

Rohling, M. L., Green, P., Allen, L.M. Iverson, G.L. 2002. Depressive symptoms and neurocognitive test scores in patients passing symptom validity tests. Archives of Clinical Neuropsychology 17, 205-222.

Ruiz, M., Drake, E., Marcottee, D., Glass, A., van Gorp, W., 2002. Trying to beat the system: Misuse of the internet to assist in avoiding the detection of neuropsychological symptom dissimulation. Archives of Clinical Neuropsychology 8, 846.

Sbordone, R.J., Syeranian, G.D., Ruff, R.M., 2000. The use of significant others to enhance the detection of malingerers from traumatically brain-injured patients. Archives of Clinical Neuropsychology 15, 465-477.

Schoenberg, M.R., Dorr, D., Morgan, C.D., 2003. The ability of the Millon Clin Multiaxial Inventory-Third Edition to detect malingering. Psychological Assessment 15, 198-204.

Sivec, H.J., Lynn, S.J., Garske, J.P., 1994. The effect of somatoform disorder and paranoid psychotic role-related dissimulations as a response set on the MMPI-2. Assessment 1, 69-81.

Sparr, L.F., Atkinson, R.M., 1986. Posttraumatic stress disorder as an insanity defense: Medicolegal quicksand. American Journal of Psychiatry 143, 608-613.

Steffan, J.S., Clopton, J.R., Morgan, R.D., 2003. An MMPI-2 scale to detect malingered depression (Md scale). Assessment 10, 382-392.

Stevens, A., Friedel, E., Mehren, M., Merten, M., 2008. Malingering and uncooperativeness in psychiatric and psychological assessment: Prevalence and effects in a German sample of claimants. Psychiatry Research 157, 191-200.

Sullivan, K., Keane, B., Deffenti, C., 2001. Malingering on the RAVLT part 1: Deterrence strategies. Archives of Clinical Neuropsychology 16, 627-641.

Sullivan, K., Lange, R.T., Dawes, S., 2007. Symptom exaggeration base rates and detection methods in Australia. Journal of Forensic Neuropsychology 4, 49-70.

Sullivan, K., Richer, C., 2002. Malingering on subjective complaint tasks. An exploration of the deterrent effects of warning. Archives of Clinical Neuropsychology 17, 691-708.

Ustun, T.B., Ayuso-Mateos, J.L., Chatterji, S., Mathers, C., Murray, C.J., 2004. Global burden of depressive disorders in the year 2000. British Journal of Psychiatry 184, 386-392.

Victor, T., Abeles, N., 2004. Coaching clients to take psychological and neuropsychological

tests: A clash of ethical obligations. Professional Psychology: Research and Practice 35, 373-379.

Walters, G., Clopton, J., 2000. Effect of symptom information and validity scale information on the malingering of depression on the MMPI-2. Journal of Personality Assessment 75, 183-199.

Woods, S.P., Weinborn, M., Lovejoy, D.W., 2003. Are classification accuracy statistics underused in neuropsychological research? Journal of Clinical and Experimental Neuropsychology 25, 431-439.

Table 1.

Clinical Indices of the PAI and SCL-R-90: Means, Standard Deviations, and Group Differences.

	Controls (n = 22)		Malingerers (n = 19)		
SCALE	*M*	*SD*	*M*	*SD*	*F*(1,39)
PAI					
SOM	56.4	11.2	104.2	34.3	38.17*
ANX	51.1	9.6	81.8	17.67	50.08*
ARD	51.2	10.1	81.4	19.7	39.80*
DEP	50.2	10.1	91.7	23.5	56.75*
MAN	51.4	12.2	55.3	18.1	0.69
PAR	50.4	9.5	85.2	23.6	40.32*
SCZ	50.0	9.8	87.8	24.2	45.15*
BOR	50.4	8.2	70.4	16.7	24.79*
ANT	51.7	9.6	60.6	20.1	3.37
ALC	50.9	8.9	70.3	22.3	14.15*
DRG	53.7	10.6	90.3	31.3	28.12*
SCL-90-R					
SOM	60.3	19.6	91.2	30.3	14.85*
O-C	65.2	17.8	89.9	22.8	15.10*
IS	72.6	21.6	102.9	32.1	12.94*
DEP	66.0	20.2	96.1	28.5	15.48*
ANX	60.3	25.0	101.3	31.6	21.46*
HOS	64.0	19.8	86.7	31.8	7.73*
PHOB	57.0	27.8	104.8	46.2	16.60*
PAR	62.1	19.3	89.5	31.9	11.43*
PSY	72.7	37.5	124.0	51.1	13.69*

Notes. (i) PAI = Personality Assessment Inventory; SOM = Somatic Complaints; ANX = Anxiety; ARD = Anxiety Related Disorders; DEP = Depression; MAN = Mania; PAR = Paranoia; SCZ = Schizophrenia; BOR = Borderline Features; ANT = Antisocial Features; ALC = Alcohol Problems; DRG = Drug Problems. (ii) SCL-90-R = Symptom Checklist-90 Revised; SOM = Somatisation; O-C = Obsessive-Compulsive; I-S = Interpersonal Sensitivity; DEP = Depression; ANX = Anxiety; HOS = Hostility; PHOB = Phobic Anxiety; PAR = Paranoid Ideation; PSY = Psychoticism. Means shown as *T*-scores; a *T*-Score ≥ 70 represents 2 *SD*s from the standardisation sample. For the SCL-90-R, the manual indicates that *T*-scores reach ceiling at 81*T*. For the purposes of assessing group differences whilst enabling comparisons on a standardised metric, ceilings were not applied in this study.
*$P < 0.05$

Table 2

Performance on the Malingering Indexes: Means, Standard Deviations, Effect Sizes, and Group Differences.

	Controls (n = 22)		Malingerers (n = 19)			
Scale	*M*	*SD*	*M*	*SD*	*F*(1,39)	*d*[a]
PAI						
NIM	52.89	9.95	97.97	38.61	27.94**	1.70
MAL	0.82	0.91	2.68	1.95	16.27**	1.29
RDF	0.92	1.52	1.76	1.43	33.53**	1.86
SCL-90-R						
PST	42.55	23.44	66.95	25.58	10.15*	0.96

Note. NIM = Negative Impression Management Scale (PAI; ≥ 92*T* = malingering); MAL = Malingering Index (PAI; ≥ 5 = malingering); RDF = Roger's Discriminant Function Index (PAI; > 0.12368 = malingering); PST = Positive Symptom Total (SCL-90-R; > 50 males, > 60 females = malingering). The cut-offs listed are original recommended cut-offs by test authors.

[a]Cohen's *d* = effect sizes for malingerers versus controls.

*$P < .01$. **$P < .001$.

Table 3

Effectiveness of the PAI and SCL-90-R Malingering Indexes.

Malingering Index	Frequency[a]	Sens[b]	Spec[c]	HR[d]	PPP[e]	NPP[f]
PAI						
NIM ≥ 73	14 | 1 5 | 21	0.74	0.95	0.85	0.93	0.81
NIM ≥ 77	14 | 1 5 | 21	0.74	0.95	0.85	0.93	0.81
NIM ≥ 92	9 | 0 10 | 22	0.47	1.00	0.76	1.00	0.69
NIM ≥ 110	8 | 0 11 | 22	0.42	1.00	0.73	1.00	0.67
MAL ≥ 3	8 | 1 11 | 21	0.42	0.95	0.71	0.89	0.66
MAL ≥ 5	5 | 0 14 | 22	0.26	1.00	0.66	1.00	0.61
RDF	17 | 4 2 | 18	0.89	0.82	0.85	0.81	0.90
SCL-90-R						
PST >50 males/>60 females	13 | 7 6 | 15	0.68	0.68	0.68	0.65	0.71
PST > 77 males/>84 females	9 | 2 10 | 20	0.47	0.91	0.71	0.82	0.67

Note. PAI = Personality Assessment Inventory; SCL-90-R = Symptom Checklist-90 Revised; NIM = Negative Impression Management Scale (PAI); MAL = Malingering Index (PAI); RDF = Roger's Discriminant Function Index (PAI); PST = Positive Symptom Total (SCL-90-R). Sens = Sensitivity; the proportion of malingerers accurately classified by an elevated malingering index; Spec = specificity; the proportion of non-malingerers correctly identified by the elevated indexes; HR = hit rate; the overall classification accuracy combining sensitivity and specificity; PPP = positive predictive power; the likelihood that an elevated malingering index accurately indicates malingering; NPP = negative predictive power; the likelihood that a non-elevated malingering index accurately reflects non-malingering. PPP/NPP estimates are impacted by malingering base rates.

[a]Frequency is presented as 2 X 2 contingency tables:  where a = true positives; b = false positives; c = false negatives; d = true negatives. bSensitivity = a/a+c. cSpecificity = d/b+d. dHit rate = a + d/a+b+c+d. [e]PPP = a/a+b. [f]NPP = d/c+d.

Table 4

ROC Analysis Optimal Cut-off Scores for the PAI and SCL-90-R in the Current Sample of Simulating Malingerers and Controls (n = 41).

Malingering Index	Cut-off Score	Sensitivity %	Specificity %
NIM	55	85	64
	64	79	91
	75	74	96
MAL	2	68	77
RDF	.41	90	86
	.69	84	91
PST	46	84	64
	56	74	68
	61	68	77
	65	58	86

Notes. ROC = Receiver Operating Characteristics; PAI = Personality Assessment Inventory; SCL-90-R = Symptom Checklist-90 Revised; NIM = Negative Impression Management Scale (PAI); MAL = Malingering Index (PAI); RDF = Roger's Discriminant Function Index (PAI); PST = Positive Symptom Total (SCL-90-R). Optimal scores in terms of both sensitivity and specificity are reported.

Appendix – Symptom checklist, experimental instructions, and pre- and post-experimental questionnaires.

Pre-experimental Questionnaire

Please complete the questionnaire below. Be assured that all information is strictly confidential and no names are required.

1. Your Age _____ Years

2. Gender Male/Female (please circle)

3. Please indicate the highest education level you have participated in.
(Please tick)
- □ High School
- □ TAFE/similar studies
- □ Undergraduate studies
- □ Postgraduate studies

4. Are you from a non-english speaking background? Yes/No (please circle)

5. Have you ever been treated for mental health problems (e.g. depression, anxiety)?

Yes/No (please circle)

5b. If yes, is this ongoing? Yes/No (please circle)
5c. If no, when did you last receive treatment? Months ago _____ or Years ago_____

6. Are you currently taking any medications for mental health problems (e.g. depression, anxiety)?

Yes/No (please circle)

6a. If yes, please list_____

Post-Experimental Questionnaire to participants in malingering conditions

1. Could you please briefly explain what you were required to do?

_____
_____
_____
_____

2. Can you recall what the benefits of faking were? _____

3. Can you recall what the of costs of faking were?_____

4. Did you actually fake or exaggerate symptoms on the psychological tests?
Yes/No (please circle)

5. If you did fake or exaggerate symptoms, what strategies did you use to fake?
(Please tick)
- □ Did not report extreme symptoms
- □ Felt confident could outsmart system
- □ Relied on given or personal knowledge
- □ No strategy used
- □ Other_____

6. Did you consider the costs (course credit revoked) and benefits (chance of $100) when deciding whether or not to fake? Yes/No (Please circle)

7. On a scale of 1-5 to what degree did the warning that the psychological tests could detect faking impact your decision to fake or not?

1-----2-----3-----4-----5 (please circle)
Least impact Most impact

8. On a scale of 1-5 how believable do you think you were at faking the psychological tests?

1-----2-----3-----4-----5(please circle)
Not believable Very believable

9. On a scale of 1-5 how honest do you feel you were in answering the questions in the psychological tests?

1-----2-----3-----4-----5
Not honest Very honest
(faked responses)

Post-Experimental Questionnaire to participants in control condition

1. Could you please briefly explain what you were required to do?

_____
_____
_____
_____

2. If you decided to fake or exaggerate symptoms on these tests, what strategies would you use to do so?

(Please circle)

Would not report extreme symptoms
Would feel confident could outsmart system
Would rely on given or personal knowledge
Wouldn't use a strategy
Other_____

3. On a scale of 1-5 how honest do you feel you answered the questions in the psychological tests?

1-----2-----3-----4-----5
Very honest Faked responses

Written instruction to controls

This study requires you to complete two psychological tests designed to measure psychological functioning.

Please follow both test instructions carefully completing both tests to the best of your ability. Your careful compliance with instructions will enable you to go into a draw to win $100. Please ensure you answer **every** question as incomplete tests will not count.

Written instructions to naïve malingerers

This study requires you to complete two psychological tests designed to measure psychological functioning.

If you can believably fake psychological impairment on these tests, you will go into a draw to win $100. To help you fake, a list of characteristic symptoms associated with these disorders is given below. Please spend the next couple of minutes perusing this list as it will not be available to you during testing. Your careful compliance with instructions will enable you to go into a draw. Please ensure you answer **every** question as incomplete tests will not count.

Written instructions to warned malingerers

This study requires you to complete two psychological tests designed to measure psychological functioning.

If you can believably fake psychological impairment these tests, you will go into a draw to win $100. To help you fake, a list of characteristic symptoms associated with these disorders is given below. Please spend the next couple of minutes perusing this list as it will not be available to you during testing. Your careful compliance with instructions will enable you to go into a draw. Please ensure you answer **every** question as incomplete tests will not count.

Please note, however, that these tests are able to detect faking, and if you decide to fake and are caught, you will not receive your course credit for participating in today's study.

Symptom Checklist

- ☑ Headaches
- ☑ Nausea or upset stomach
- ☑ Numbness
- ☑ Pain
- ☑ Perception of having many health problems
- ☑ Repeated unpleasant thoughts
- ☑ Difficulty making decisions
- ☑ Blank mind
- ☑ Feelings easily hurt
- ☑ Feeling inferior or critical of others
- ☑ Crying easily
- ☑ No interest or pleasure in activities
- ☑ Feeling hopeless about the future
- ☑ Nervousness or shakiness inside
- ☑ Spells of terror or panic
- ☑ Feeling tense or keyed up
- ☑ Inflated self-esteem – feeling like you are very important
- ☑ Sudden shifting of mood
- ☑ Easily annoyed or irritated
- ☑ Urges to beat, injure or harm someone
- ☑ Frequent arguments and hostility
- ☑ Feeling afraid to go out of the house
- ☑ Having to avoid certain things due to fear
- ☑ Feeling uneasy in crowds
- ☑ Feeling most people cannot be trusted
- ☑ Feeling you are being watched or talked about
- ☑ Having ideas or beliefs others do not share
- ☑ The idea someone else can control your thoughts
- ☑ Having thoughts that are not your own
- ☑ Hearing voices others do not hear
- ☑ Poor appetite
- ☑ Too much or too little sleep
- ☑ Thoughts of death or dying
- ☑ Over or under eating
- ☑ Socially isolated
- ☑ Feeling empty, bored or unfulfilled
- ☑ Involvement in intense, unstable relationships
- ☑ Little regard for others and society
- ☑ Reckless, dangerous behaviour
- ☑ Excessive drinking or drugs