

Classification accuracy of the Test of Memory Malingering in persons reporting exposure to environmental and industrial toxins: Results of a known-groups analysis

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Abstract

This study used a known-groups design to examine the classification accuracy of the Test of Memory Malingering in detecting cognitive malingering in patients claiming cognitive deficits due to exposure to environmental and industrial toxins. Thirty-three patients who met Slick et al. criteria for Malingered Neurocognitive Dysfunction were compared to 17 toxic exposure patients negative for evidence of malingering, 14 TBI patients and 22 memory disorder patients, both groups without incentive. The original cutoffs (<45) for Trial 2 and Retention demonstrated perfect specificity (0% false positive error rate) and impressive sensitivity (>50%). These findings indicate the TOMM can be used with confidence as an indicator of negative response bias in cases of cognitive deficits attributed to exposure to alleged neurotoxic substances.

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The problem of malingering has been relatively neglected in cases of alleged toxic exposure (Bianchini et al., 2003). Nonetheless, it is an issue of some importance given that exposure often occurs in a compensable context. Bianchini et al. (2003) demonstrated that malingering does occur in toxic exposure and illustrated the conservative application of empirically based detection techniques and their use within Slick, Sherman, and Iverson (1999) system for the diagnosis of Malingered Neurocognitive Dysfunction (MND). The survey data of Mittenberg, Patton, Canyock, and Condit (2002) suggest that the prevalence of malingering in alleged cases of neurotoxic chemical-related disease is about 30%. The work of van Hout and colleagues (van Hout, Schmand, Wekking, & Deelman, 2006; van Hout, Schmand, Wekking, Hageman, & Deelman, 2003) suggests a similar range. Appropriate assessment of patients claiming cognitive impairment due to toxic exposure requires the assessment of

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potential malingering and the development of scientifically based techniques with which to identify malingering patients.

The purpose of this study was to examine the classification accuracy of the Test of Memory Malingering (TOMM; Tombaugh, 1996, 1997) in persons presenting with claims of cognitive impairment secondary to exposure to occupational and environmental toxins. The TOMM is a widely used forced-choice symptom validity test (SVT; Slick, Tan, Strauss, & Hultsch, 2004). SVTs, including the TOMM, are generally insensitive to actual cognitive ability, including cognitive impairment secondary to brain damage, and instead are considered to measure test-taking effort (Bianchini, Mathias, & Greve, 2001; Tombaugh, 1996, 1997). This is particularly true of the TOMM, which is relatively insensitive to the effects of even severe traumatic brain injury (TBI; Greve, Bianchini, & Doane, *in press*; Rees, Tombaugh, & Boulay, 2001) and other neurological conditions (Teichner & Wagner, 2004; Tombaugh, 1996, 1997).

The TOMM is also relatively insensitive to the effects of other factors which affect cognition such as age (Ashendorf, Constantinou, & McCaffrey, 2004; Teichner & Wagner, 2004), psychiatric illness (Ashendorf et al., 2004; Duncan, 2005; Gierok, Dickson, & Cole, 2005; Rees et al., 2001; Yanez, Fremouw, Tennant, Strunk, & Coker, 2006), and pain (Etherton, Bianchini, Greve, & Ciota, 2005). Overall, existing research indicates that the standard cutoffs of 45 correct for Trial 2 and the Retention Trial produce good specificity though *some* patients with serious objectively documented neuropathology (e.g., dementia; Greve, Bianchini, & Doane, *in press*; Greve, Bianchini, Love, Brennan, & Heinly, *in press*; Teichner & Wagner, 2004; Tombaugh, 1996, 1997) score below the cutoffs. Thus, all but the most seriously neurologically damaged patients should be expected to score at or above 45.

Given the insensitivity of the TOMM to significant neuropathology and other conditions which have documented effects on cognition, one would expect similar results in cases of toxic exposure where both the degree of exposure, the nature of the chemical substances, and presence of brain dysfunction are often unknown, unclear, and/or ambiguous. Few studies have reported TOMM data in the context of toxic exposure. van Hout et al. (2003) reported that 18% of their solvent exposed patients failed the either Trial 2 or the Retention Trial of the TOMM with none scoring significantly below chance. van Hout et al. (2006) did not report failure rates for the TOMM alone but reported that 21.8% failed either the TOMM or the Amsterdam Short-Term Memory (ASTM; Schmand, de Sterke, & Lindeboom, 1999) test. Bowler et al. (2006) reported a 3% failure rate on the TOMM and/or they Rey 15-Item Test (Lezak, Howieson, & Loring, 2004) in a sample of litigating welders claiming neurocognitive injury due to manganese exposure compared to 4% of non-exposed controls.

While these studies report TOMM failure rates, the function of the TOMM in these studies is to control for the effects of effort in the study of the neurocognitive effects of specific chemical substances. These studies were not designed to evaluate the accuracy of the TOMM as a psychometric indicator of malingering in toxic exposure. The strongest method for evaluating the accuracy of a malingering test is referred to as the “known-groups design” (Greve & Bianchini, 2004; Larrabee, 2005; Rogers, 1997). This design requires strict operationalization of malingering and allows for the essential comparison of clinical impairment versus malingering (Greve & Bianchini, 2004). The known-groups design requires, at minimum, two criterion samples: a suspected clinical malingering sample and a nonmalingering clinical control group. Moreover, because it uses clinical patients, the results from known-groups studies can be directly applied in the clinical setting.

The application of the “known-groups” methodology was facilitated by the publication of criteria for the diagnosis of Malingered Neurocognitive Dysfunction (Slick et al., 1999) which was substantially built on the malingering classification scheme developed for research purposes by Greiffenstein et al. (1994). The Slick et al. criteria operationalize the kinds of inconsistencies which Lees-Haley, Iverson, Lange, Fox, and Allen (2003) argue are characteristic of malingering. If correctly applied, these criteria can be used to establish a “known” malingering group.

Thus, the purpose of this study is to use a known-groups design to determine the sensitivity and false positive error rate of TOMM in persons alleging toxic exposure. The Slick et al. (1999) criteria and well-validated malingering indicators were used to classify patients as likely malingering or likely not malingering. Only psychometric indicators of malingering validated in traumatic brain injury patient groups which included persons with objectively documented (e.g., via neuroradiological findings) brain damage were used. By only using data from studies that included persons with documented brain damage in their non-malingering groups, we reduce the risk of false positive errors in persons exposed to substances with well-documented neurotoxic properties (e.g., carbon monoxide). See Table 1 for a detailed list of substances.

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