Archives of Psychiatry and Behavioral Sciences

ISSN: 2638-5201

Volume 2, Issue 1, 2019, PP: 55-65

Pseudodiagnoses of Malingering of Neuropsychological Symptoms in Survivors of Car Accidents by the Structured Inventory of Malingered Symptomatology

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Abstract

***Background:** The Structured Inventory of Malingered Symptomatology (SIMS) is a widely used test allegedly designed for detection of malingering medical symptomatology. Even a brief perusal of its 75 True-False items reveals that too many of these list legitimate medical symptoms, in particular, symptoms within the post-concussion-whiplash spectrum, as experienced by survivors of motor vehicle accidents (MVAs). The present study examined conceptual overlap of SIMS items with symptoms assessed by the Rivermead Post-Concussion Symptoms Questionnaire and also with symptoms assessed by the scale of Post-MVA Neurological Symptoms (PMNS).*

***Materials and Method:** De-identified archival data of 98 patients (mean age 42.2 years, SD=14.3, 38 males, 60 females) containing scores on Rivermead and PMNS were tabulated to list frequencies of each endorsed symptom. Next to these symptoms, SIMS items were tabulated which conceptually overlap with legitimate post-concussive or post-whiplash neuropsychological signs listed in Rivermead and PMNS.*

***Results:** More than a half of the 75 SIMS items could be potentially endorsed by post-MVA patients due to their neuropsychological symptoms, without any intent to malinger. Each of the SIMS items counts one point towards a cutoff point of > 14: thus, the majority of post-MVA patients are likely to be misclassified by SIMS as malingerers. Many of the other remaining SIMS items could be endorsed by non-malingering patients with some other medical conditions such as acute schizophrenia, or low intelligence, etc. Almost no SIMS items appear suited to reliably differentiate malingerers from legitimate medical patients.*

***Discussion and Conclusions:** A thorough review of all 75 SIMS items suggests that most of them would not adequately differentiate non-malingering persons from malingerers: the items were included in the SIMS without their author's sufficient knowledge of the wide range of possible psychopathology and of other medical conditions. This is consistent with the lack of satisfactorily designed validation studies of the SIMS that would meet standards of the American Psychological Association for tests meant to perform diagnostic tasks. The rates of false positive with SIMS are unacceptably high: clinical use of SIMS implies malpractice.*

Keywords: *Post-Concussion syndrome, Whiplash, Neurologic Impairment, Malingering, False Positives*

Introduction

The Structured Inventory of Malingered Symptoma tology (SIMS) [1, 2] is a widely used test to diagnose malingering. The SIMS is a 75- item True- False Questionnaire with 5 subscales, each of which consists of 15 items to measure psychosis, neurologic impairment, amnestic disorders, low intelligence, and affective disorders, respectively. Each item counts as one point. The SIMS manual recommends the cutoff point of > 14 for the total score.

The process of constructing the SIMS was remarkably flawed. Glenn Smith, in his student years, as a part of his "*doctoral work at the University of Missouri – St. Louis*," prepared a pool of 200 items he considered as suitable for identifying malingerers [2]. A rating procedure was then used to select the best items in the next step: "*nine licensed clinical psychologists were asked to classify each of the initial items into different categories of pathology (psychosis, affective disorder, memory disturbance, neurologic impairment, low intelligence, another category, some combinations of these categories*" (Widows and Smith [2], page 21). Items on which at least two-thirds of the raters agreed were included in the final version of the SIMS.

The instructions to the raters were perhaps too unclear, misunderstood, or incorrect. Maybe most of the raters misinterpreted the instructions as a task of assigning legitimate medical items to the 5 diagnostic categories. Almost all final 75 items indeed appear to list legitimate medical symptoms rather than having a potential to differentiate symptomatic medical patients from malingerers. There is a too wide variety of possible psychopathology as well as an immense variety of physical medical conditions that were perhaps unknown to the SIMS author at the time when he, as a university student, prepared the initial SIMS items: too many SIMS items appear consistent with legitimate medical symptoms rather than representing non-existing pseudomedical signs of illness that would be endorsed only by malingerers.

Some SIMS items can be identified as inappropriate even by lay persons without any prior education in psychology or medicine, solely for logical reasons, as having no capacity whatsoever to differentiate malingerers from non-malingering patients: "*I am depressed all the time,*" "*I have trouble sleeping,*" or "*I have difficulty remembering the day of the week*." These items may differentiate between healthy honest undergraduates and healthy undergraduates instructed to feign illness, but not malingerers from honest patients. Yet each of such items rather absurdly counts one point towards being branded as a malingerer. A frequent error of relatively inexperienced psychologists while briefly perusing the SIMS is to assume that the 15 items in its "Psychosis" subscale are "atypical": in fact, many of those 15 items have a genuine potential to be endorsed by acutely ill psychotic patients, i.e., by non-malingering persons.

It is noteworthy that SIMS contains many items descriptive of post-concussive symptoms such as memory problems, irritability, fatigue, dizziness, and headaches. The 2015 film "Concussion" educated the lay public about neuropathological-histological work of Bennet Omalu [3, 4] on players of American football which showed that cerebral damage in concussions occurs with sudden acceleration or deceleration of the head even in persons who neither sustained visible head injuries nor fully lost consciousness and still appear able to perform at least some simple tasks. Microvascular injuries and axonal shearing occur in such incidents while the gray and the white part of the brain slide over each other during the sudden excessive acceleration or deceleration of the skull that is usually associated with a slight rotational movement. SIMS items such as "*My major problem is that my brain is injured*" in this "malingering" test may alert even some laymen that this test is suspect or worthless. Concussive cerebral and whiplash injuries typically occur in motor vehicle accidents (MVAs), yet the SIMS is used very frequently by psychologists contracted by car insurance companies. The SIMS is prone to disqualify many such non-malingering patients from receiving treatments and other benefits.

In a preliminary stage of the present study, a thorough perusal of SIMS items by three clinical psychologists with more than 40 years of experience each and by a neuroscientist showed that more than a half of SIMS items describe legitimate medical complaints such as depression or post-concussive and whiplash symptoms. The SIMS author, Glenn Smith, as a university student at the time, was presumably unaware, that many of his items conceptually represented valid neuropsychological symptoms, for example, already the Item #1 "*Sometimes I lose all feeling in my hand so that it is as if I have a glove on*." In fact, the "stocking-glove syndrome" has been known for years as medically indicative of peripheral neuropathy [5]. Similarly, SIMS items describing numbness in some of the limbs or in parts of the limbs, or instances of impaired muscular control over some of the limbs are not indicative of malingering, but describe commonly occurring pathologies within the whiplash spectrum. One SIMS item describes what may be the post-whiplash tinnitus (SIMS Item 44: "*There is a constant ringing in my ears*") and another one seems to deal with post-whiplash paresthesia in

the form of tingling in the limbs, that in extreme cases, may be felt as a painful or uncomfortable sensation some patients have described "*like bugs crawling under the surface of my skin*" (SIMS Item 39). In fact, the Spanish translation of "to tingle" is "hormiguear" which is defined by an encyclopedic dictionary [6] as "*experimentar en una parte del cuerpo una sensación comparable a la que resultaría si por ella corrieran hormigas*" (in English: to experience a feeling in a part of the body comparable to the one that would result if ants were running through it). This is how some patients report it. However, in some other persons, the "tingle" is felt as if an electrical current were running into the particular section of the body, in sufficient intensity to cause pain or discomfort such as would interfere with sleep. The "tingle" can be one of the first subjectively experienced signs of herniated discs or spinal nerve impingement that would later on show in MRIs.

A psychological scale has been published recently [7, 8] to quantify such post-whiplash symptoms. These symptoms are reported frequently by survivors of car accidents, including those with no obvious secondary gain, and by those without any bone fractures, limb dislocations, or visible external injuries. They also occur in self-employed persons with spinal injuries verified via MRI who do not seek any disability benefits, but continue working in spite of their pain. This new instrument to measure such symptoms has been labeled as the scale of Post-MVA Neurological Symptoms (PMNS) [8]. It was developed on the basis of clinical work with persons injured in MVAs (diagnosed, via MRI, with spinal stenosis and herniated discs) and on subjective experience of health care professionals. As already mentioned, each endorsed SIMS item counts one point: the more of such legitimate post-concussive or whiplash symptoms are reported, the more likely is the patient to be denied treatment by his SIMS scores and branded as a malingerer or suspected malingerer.

The Rivermead Post-Concussion Syndrome Scale [9] is excellently suited for evaluations of long term sequelae of the initial cerebral concussion in patients injured in MVAs. The diagnosis of cerebral concussion is often missed by busy emergency physicians [10] and that of the post-concussion syndrome is missed later on also by many family physicians.

The recently published PMNS scale [8] is specifically designed to evaluate only neuropsychological symptoms that are not already included in the Rivermead [9], but are frequently reported by post-MVA patients as a part of the MVA related overall impairment of the central and peripheral nervous system. The PMNS scale includes items such as impaired balance, tinnitus, hand tremor, or paresthesia in the limbs. Many psychologists contracted by car insurance companies still blindly rely on SIMS in diagnosing post MVA patients: these professionals seem unaware of conceptual overlap of SIMS items with those of Rivermead and PMNS scales. The present study evaluates the overlap in symptomatology of SIMS items with those in Rivermead and PMNS.

Materials and Method

De-identified archival data on 98 post-MVA patients (mean age 42.2 years, SD=14.3; age from 18 to 83 years; 38 men, 60 women) were analysed statistically to determine frequencies of persons endorsing those Rivermead and PMNS items that show some noticeable conceptual overlap with items listed in the SIMS.

The data in this sample are from psychological assessments of patients undertaken after their MVAs. These assessments took place in the context of insurance claims in the years 2016 to 2018 and included the patients' responses to the Rivermead Post-Concussion Symptoms Questionnaire [9] and the scale of Post-MVA Neurological Symptoms (PMNS) [8].

The number of weeks since their MVA ranged from 4 to 142 (mean at 51.6 weeks, SD=31.6).

This sample of 98 post-MVA patients overlaps partly with a sample used in an already published factor-analytic study of the neuropsychological symptoms [11] and also with a sample used in a study of post-MVA symptoms prone to confound results of so called "effort tests" [12].

In the present study, the data on frequencies of "Impaired Balance" (an item of the PMNS scale) were available only from a different sample of post-MVA patients (N=65; mean age 42.4, SD=14.5; age range 19 to 81; 25 men, 40 women): the frequency data on all other PMNS items were obtained with an earlier, shorter version of the PMNS scale in which the item "Impaired Balance" was not yet included.

Results

Conceptual Overlap of Rivermead and SIMS Items

The items of Rivermead post-concussion symptoms questionnaire show some degree of conceptual overlap with 26 SIMS items (see Table 1). These are legitimate symptoms of the post-concussion syndrome. Each of these 26 counts one point towards the diagnosis of malingering via SIMS. The patient could thus potentially accumulate already 26 points, i.e., far above the cutoff point of > 14 for the total SIMS score recommended by SIMS manual [2].

Furthermore, if the person's concentration and problem solving capacity are impaired as a part of the post-concussion syndrome, this would also be adversely reflected in the patient's score on arithmetic or logical reasoning tasks presented by SIMS items 4, 67, 68, and 73, thus potentially providing the patient with additional points towards being classified as a malingerer.

Table 1. *Overlap in content of Rivermead and SIMS items*

Rivermead items:	% of patients endorsing the Rivermead item	Item numbers of related SIMS items	Less directly related SIMS items
Headaches	85.7	74	
Dizziness	70.4	74	
Nausea/Vomiting	48.0		
Oversensitivity to Loud Noise	83.7		
Sleep Disturbance	97.0	32, 43	
Fatigue	98.0	52	
Irritability	92.0	45	
Depression, Tearful	91.8	2, 6, 16, 17, 19, 23, 24, 37, 47,	72
Frustrated/Impatient	95.9		
Poor Memory	83.7	9, 15, 18, 22, 27, 30, 33, 36, 45, 53	
Poor Concentration	90.8	33, 41	4, 67, 68, 73
Taking Longer to Think	84.7	70	
Blurred Vision	48.0	50	
Oversensitivity to Bright Lights	74.5		
Double Vision	29.6		
Restlessness	91.8		

Conceptual Overlap of PMNS and SIMS Items

The overlap of symptoms listed in the PMNS scale with SIMS items seems less extensive, but still noteworthy (see Table 2): it could potentially contribute up to 8 more points towards the diagnosis of malingering.

Table 2. *Overlap in content of PMNS and SIMS items*

Items of the Scale of Post-MVA Neurological Symptoms	% of patients endorsing the PMNS item	SIMS
Hand Tremor	41.8	
Instances of Impaired Muscular Control over leg	46.4	35, 64
Instances of Impaired Muscular Control over Arm or Hand	39.8	35
Tingling in the Limbs	68.1 (24.7 in arms, 25.8 in hands, 25.8 in legs)	39
Numbness in the Limbs	67.7 (25.0 in arms, 26.1 in hands, 27.3 in legs)	59
Loss of Feeling in the Limbs	29.2 13.2 in arms, 13.2 in hands, 13.2 in legs)	1
Bladder Control Problems	23.7	
Bowel Control Problems	20.6	
Stutter	16.3	
Syndrome of Word Finding Difficulty	56.1	60
Difficulty Articulating Words	25.5	
Tinnitus	75.3	44
Impaired Balance*	75.4	26

**Note to Table 2: the data on impaired balance are from a different sample of post-MVA patients (N=65, mean age 42.4, SD=14.5, age range 19 to 81, 25 men, 40 women).*

Conceptual Inappropriateness of Some Other Sims Items Allegedly Meant to Represent the Construct of Malingering

In addition to the overlap with Rivermead and PMNS scales, the SIMS Item 20 "*My major problem is that my brain is injured*" and Item 71 "*Once a week I suddenly find myself cold even though the actual temperature is warm*" also list potentially legitimate medical issues and could not separate malingerers from some non-malingering patients.

Thus, there are 26 out of 75 SIMS items that seem to overlap with Rivermead, possibly 4 more SIMS items logically consistent with symptoms listed by Rivermead, and 8 SIMS items that somewhat overlap with those in the PMNS scale, and yet some other suspect SIMS items. If all these are added together, they conceptually disqualify more than a half of the 75 SIMS items. Briefly, the SIMS cannot be seriously considered as a measure of malingering medical symptomatology; otherwise any lists of legitimate medical symptoms could be copyrighted and then fraudulently advertised to psychologists as "tests of malingering."

Not even counted in the present study are SIMS items with the potential to be endorsed by non-malingering patients suffering from an acute psychosis, i.e., the 15 items of the SIMS "psychosis subscale," or items with potential to be endorsed by persons with subnormal intelligence, i.e., the 15 items of the SIMS "low intelligence subscale." The SIMS was already tested on those two diagnostic groups and it failed, as shown by the review by van Impelen et al. [13]. Some items from the "psychosis subscale" appear to provide reasonably good examples of delusional ideation (e.g., delusion of "thought insertion," or of magical power of plants) as reported by some persons with acute schizophrenia. Many such patients might endorse items that mention auditory hallucinations ("voices") such as the Item 13 "*There is nothing that I can do, besides taking medication, that has any effect on the voices I hear*." A credible test of malingering should not list any such legitimate psychiatric symptoms.

Furthermore, even persons free of florid psychosis might endorse the Item "*I believe that the government has installed cameras in stop lights to spy on me,*" because cameras have indeed been installed at some traffic lights to catch persons who ran the red signal in some cities in the United States, Canada, Australia, New Zealand, the United Kingdom, and in Singapore.

A different practical problem is caused by SIMS Items 14 and 63 which deal with US history and geography: the test is also sold in its unchanged form for use in Canada and scored there in the same manner as in the US, thus increasing even further the likelihood of misdiagnosing non-malingering patients as malingerers. Many Canadian high school graduates never had any classes in US history or geography.

Correlations of Rivermead and PMNS Items with Age and Gender

Some readers may question whether at least some of the neuropsychological deficits assessed by the Rivermead and PMNS scales could be attributed more to advanced age or also perhaps even to gender rather than to concussive or whiplash injuries from MVAs.

The only Rivermead items significantly ($p<.05$, 1-tailed) correlated with age were blurred vision (.19, $p=.034$) and oversensitivity to bright lights ($r=.18$, $p=.037$): these symptoms were slightly more frequently reported by older persons. Females slightly more frequently reported headaches ($r=.22$, $p=.017$), fatigue ($r=.20$, $p=.024$), depression ($r=23$, $p=.013$), and oversensitivity to bright lights ($r=.18$, $p=.040$).

The only PMNS items significantly ($p<.05$, 1-tailed) correlated with age were impaired muscular control over leg ($r=.34$, $p<.001$) and over arm or hand ($r=.33$, $p<.001$): older persons were more likely to report these difficulties. With respect to the role of gender in symptom frequencies on the PMNS scale, no significant correlations (at $p<.05$, 1-tailed) were found.

All the significant gender and age related correlations reported here are weak and of too little or no practical value for clinical predictions. Hence, neither gender nor age could be considered as a major confounding factor in the frequencies of endorsed Rivermead and PMNS items.

Discussion

The present study focused preponderantly on SIMS use with survivors of car accidents. The post-concussive symptoms and also symptoms in the whiplash spectrum are known to be reported by these patients, whether or not they are evaluated in the context of litigations, applications for insurance benefits, or

for disability status. More than a half of SIMS items describe the real post-MVA medical symptoms of post-concussive and whiplash injuries and therefore could not possibly differentiate between a malingerer and a legitimate post-MVA patient.

To some extent, the results of the present study seem applicable also to medical patients in correctional settings who sustained head injuries in fights or in accidents. Their sense of frustration and pervasive irritability could be a part of their post-concussive syndrome. Furthermore, frontal lobe injuries may contribute to their impaired impulse control such as may be expressed by aggressive outbursts. Their plea for medical treatment or assessment may be erroneously denied due to their elevated SIMS scores.

With respect to post-MVA patients, the rationale for expecting the post-concussion syndrome has been already explained in the introductory part of this article: axonal shearing and microvascular trauma occur even in persons who did not sustain visible head injuries, did not fully lose consciousness, and were able to carry out simple tasks in the first hours after their MVA. It is unreasonable to assume that the Rivermead items (see Table 1) such as Fatigue (reported by 98.0% of the sample of post-MVA patients), or Sleep Disturbance (reported by 97.%), or Poor Concentration (reported by 90.8 %) are predominantly reported by malingerers with a secondary gain. The same is true about items of the PMNS scale (see Table 2) such as Tinnitus (endorsed by 75.3 % of post-MVA patients) or Tingling in the Limbs (endorsed by 68.1 %), or the syndrome of Word Finding Difficulty (endorsed by 56.1%). Such symptoms are reported even by self-employed persons who are not applying for post-injury benefits or disability status and who continue working.

A peculiar psychometric characteristic of the SIMS are the unrealistically low cutoff scores recommended by the SIMS author for the 5 subscales: the cutoff point of > 1 point recommended for the psychosis subscale of the SIMS and > 2 for the other 4 SIMS subscales [2]. This too frequently enables an insurance psychologist to indicate, in an official psychological report, that the patient was classified as malingerer on 4 out of the 5 SIMS subscales, see published case histories of blatantly flawed assessments via SIMS [14], containing statements such as follows: "*on the SIMS, her results showed her to have a significant degree of symptom exaggeration with elevations across four of the five subscales, but especially of atypical symptoms of neurologic and memory impairment*." The present study demonstrates unequivocally that the SIMS items represent typical rather than "*atypical*" medical symptoms. If the patient's scores rise above these precariously low cutoff points on any of these 5 subscales, multiple interpretations are feasible. For example, this could mean that the post-MVA patient, possibly due to accident related cognitive difficulties, pain, and fatigue, failed to adequately focus on the item text, or was at that particular moment genuinely unable to correctly perform the simple arithmetic calculations required by some of SIMS items, or made frequent clerical errors while marking the items as True or False due to reduced capacity for sustained attention. Or perhaps the patient somewhat decompensated due to anxiety of being scrutinized by an emotionally distant psychologist or due to exhaustion from the tiring ride of several hours to the psychologist's office and from the long assessment interview. Interpreting elevated SIMS scores simplistically as indicative of malingering, suspected malingering, or symptom magnification is irresponsible.

The website of the SIMS publisher indicated (as of April 18, 2019) that this test "*demonstrates sensitivity, specificity, and efficacy across both simulation and known-groups designs with honest responders, psychiatric patients, and clinical malingerers*." In contrast, the meta-analytic review of SIMS by van Impelen et al. [13] concluded that SIMS has a "*substandard specificity*" and suggested that its cutoff score need be raised almost twofold to improve SIMS' specificity, but those authors also noted that, in such a case, then "*the SIMS will only identify the most blatant forms of feigning, and hence lose its quality as a screening instrument*." Furthermore, van Impelen's team cautioned the readers that "*heightened SIMS scores do not necessarily reflect feigned psychopathology. They might also be the result of irrelevant responding due to, for example, fatigue, frustration, indifference, defiance, or incomprehension*." [13]

Some authors used the cutoff score > 16, for example, as in Lewis' forensic study [15], but such score still misclassified 39% of honest responders as malingerers.

It is noteworthy that even the SIMS manual admits that "*the false positive error of mislabeling a symptomatic individual as a malingerer could result in the infringement on that individual's civil liberties through litigation despite incompetence to stand trial, unfair incarceration by way of a conviction of guilty versus Not Guilty by Reason of Insanity (i.e., NGRI), or death penalty sentencing. Such misclassification could have further serious implications because the misclassified individual does not receive needed services, such as psychiatric intervention or disability benefits. Stigmatization may be a long-term consequence of a misclassification of malingering, with numerous negative implications for subsequent diagnosis, services, and benefits across a variety of settings. Furthermore, such misclassification may have personal consequences for the diagnosing mental health professional, ranging from the filing of legal or malpractice suits to the possibility of retribution by an unstable recipient of such diagnosis*" (SIMS manual, [2] p. 11).

A physician specialized in neurology, after perusing the text of SIMS items and becoming familiar with its scoring system, may justifiably accuse psychologists of practicing "quack medicine without a medical licence." Similarly, an experienced neuropsychologist, after a thorough review of SIMS items, may feel scandalized by the blatant malpractice by psychologists intruding naively into his specialty. The public reputation of psychology as a credible science is indeed at stake.

The SIMS manual [2] claims that the SIMS "*has been validated with clinical forensic samples, psychiatric samples, and nonclinical samples.*" Such statements have misled thousands of professional psychologists to assume that the SIMS validation proceeded in accordance with the Standards for Educational and Psychological Testing [16] as specified by the American Psychological Association (APA). The APA standards would require the author to verify if the SIMS indeed differentiates adequately between instructed malingerers and patients with legitimate medical symptoms even before the test is marketed and offered as "valid" for clinical or forensic use. In fact, Smith developed his test only via "an analogue procedure," i.e., not by comparing appropriate criterion groups, i.e., malingerers (or instructed malingerers) to symptomatic patients. Smith only compared healthy college undergraduates instructed to malinger medical symptoms to responses of healthy college undergraduates instructed to respond honestly [1, 2]. The lack of proper criterion groups explains why so many obviously inept SIMS items were included in his questionnaires, those listing legitimate medical symptoms that would remained unendorsed by healthy college students, but are endorsed by students instructed to malinger medical conditions. Any lists of very legitimate medical symptoms could be successfully "validated" by such "analog procedures," copyrighted, and then fraudulently sold to psychologists as "validated tests of malingering."

Unfortunately, such a dubious "analogue" procedure was extended recently by Parks, Gfeller, Emmert, and Lammert [17] to "validate" the SIMS to detect malingering of post-concussive symptoms and of PTSD. The persons in Parks' study were only undergraduate students instructed to malinger the post-concussive and PTSD symptoms: they were provided with lists of related legitimate medical symptoms (as described in DSM-4). The study was not extended to include persons with genuine post-concussive or PTSD symptoms, as required for test validation compliant with APA standards [16]. Despite this, Parks and his co-authors mistakenly concluded that their findings support the use of the SIMS in neuropsychological assessments as a symptom validity test to detect exaggeration of the post-concussional disorder and of PTSD symptoms.

In contrast, the present study demonstrates that the SIMS does not even consist of an appropriate item content that appears meaningful with respect to assessing malingering of the post-concussion syndrome: almost all, if not all, patients with intense legitimate post-concussion symptoms can be logically expected to be misclassified by SIMS as malingerers.

The use of SIMS has spread beyond the English speaking regions as shown by its published translations into German, Spanish, and Italian. This lamentable trend shows that too many of us in professional psychology are easily misled by what seems to be authority figures to use inept tests without critically examining their items first.

Van Impelen's team [13], and even the authors of the latest SIMS manual (Widows and Smith [2]), recommend not to use the SIMS as a standalone indicator of malingering. For example, some clinicians administer the SIMS jointly with Green's Medical Symptom Validity Test [18] or Green's Non-Verbal

Medical Symptom Validity Test [19], however, there are valid concerns that even Green's tests may also over-diagnose malingering in certain clinical groups such as the post-MVA patients due to their fatigue and chronic difficulties with sustained focus and sustained attention [12]. Such Symptom Validity Tests (SVTs) are far from infallible. For example, Suchy's team [20] examined 530 clinical cases with well documented multiple sclerosis who were not involved in any litigation and all were merely being evaluated for treatment planning or follow-up: 11% of them failed malingering tests. Numerous symptoms of multiple sclerosis overlap with those of post-MVA patients: e.g., fatigue, dizziness, cognitive impairment, tingling or numbness in some parts of the body, balance problems, depression, motor incoordination, speech problems, and some degree of urinary incontinence. If a psychologist has assessed 400 cases over the last years, and if the rate of MVA patients falsely identified as malingerers were also 11%, then on the average, 44 individuals are unjustly left in pain without treatment and without financial support to which they are entitled by the law. However, as suggested by Lewis' study of SIMS, the rates of false positives may be as elevated as 39%, even if a stricter SIMS cutoff of > 16 points is applied.

In some parts of their SIMS articles, Smith and Burger [1] and Widows and Smith [2] recommend a cautious interpretation of their total SIMS score, e.g., as follows "*The SIMS total score provides an overall estimate of the likelihood that an individual is feigning symptoms of psychiatric or cognitive disorder. Respondents who obtain a SIMS total score of greater than 14 are identified as possible malingering individuals who are considered to be in need of further evaluation, given the high number of atypical, improbable, inconsistent, or illogical symptoms endorsed*." [2] Widows and Smith ([2] page 15) recommend using the following words in the test report "*This individual endorsed a high frequency of symptoms that are highly atypical in patients with genuine psychiatric or cognitive disorders, raising the suspicion of malingering*." While such cautious formulation may partly protect the SIMS user from malpractice, these "expert statements" still usually have iatrogenic consequences of denials or indefinite delays of treatments by psychometrically naive car insurance clerks, who assume that, if a validity test administered by an expert yields suspect scores, this indicates that the patient's claims are most probably false and should be delayed, ignored, or rejected [14].

Furthermore, as frequently mentioned in the present article, too many SIMS items represent real medical symptoms likely to be endorsed by genuinely ill or disabled patients, not only those with post-concussive or whiplash symptoms, but also by depressive, or acutely psychotic, or chronic pain patients, or by persons with low intelligence: each of these diagnostic groups may find more than 14 particular SIMS items consistent with their genuine medical condition. The endorsement of such SIMS items certainly does not represent reports of "*atypical, improbable, inconsistent, or illogical symptoms,"* those *"highly atypical in patients with genuine psychiatric or cognitive disorders…"* as claimed by Widows and Smith [2], on page 15 of the manual. These two authors consider such words suitable for interpretations of elevated SIMS scores.

Generalizations from a sample of young persons used by Smith (presumably all or almost all healthy undergraduate college students) to the middle-aged or elderly patients are highly questionable because more health complaints are likely to be experienced with increasing age. In Smith's samples of relatively healthy undergraduates, the cutoff score of > 14 could separate those reporting more than 14 health problems ("instructed malingerers") on SIMS items from those responding honestly. Presumably almost all undergraduates instructed to respond honestly reported less than 14 health problems, unlike normal adults beyond college age for whom cutoffs as high as 24 might be needed to diagnostically separate, in the "analog validation" procedure, normal persons from instructed malingerers. [13] The inherent current inadequacy of SIMS is that it would need be first validated separately not only for each diagnostic group, using real medical patients in comparisons to instructed malingerers, but also on the entire adult age range: it is necessary to examine the potentially confounding impact of age, before the SIMS is used clinically on individual cases. It is noteworthy that the website of the SIMS publisher indicated (as of April 18, 2019) that the SIMS is suitable for age from 18 to 99 years.

Pain and headaches are mentioned only in SIMS Items 39 and 74. Therefore, some habitual users

of the SIMS might argue that criticisms of this test raised in the present article are valid only for persons with post-concussive and whiplash symptoms due to the conceptual overlap of SIMS with Rivermead and PMNS. They could suggest that the SIMS might perform well on patients reporting "pain only," when no concussion or whiplash had occurred. However, these psychologists should validate the SIMS on pain patients first, in strict compliance with APA standards, before considering such use permissible. There are also other psychological considerations that caution against the use of the SIMS on chronic pain patients. Although pain and headaches are directly mentioned only in SIMS Items 39 and 74, an unrelenting pain or severe headaches produce, over many months or years, adverse secondary effects such as a severe sleep impairment, insomnia related fatigue, depression, irritability, impatience, and an overall impairment of cognitive functioning (failure to focus or sustain attention over time even on easy logical or arithmetic tasks, impaired problem solving, memory problems): persons with severe pain and pain related insomnia experience symptoms somewhat similar to the post-concussion syndrome, i.e., symptoms listed in many SIMS items, and thus, are prone to be mislabeled as malingerers via SIMS. Even a brief transient presence of an intense headache or some other pain per se is a powerful distractor likely to interfere with responses to some cognitive tasks in the "Low Intelligence" subscale (15 items) of the SIMS.

The fatigue alone is also a confounding factor in tests involving cognitive performance, i.e., also on the Low Intelligence subscale of the SIMS. The American Academy of Clinical Neurology published a consensus statement to indicate that scores on cognitive tasks (e.g., those on "effort tests") can be confounded by factors such as fatigue (Heilbronner, Sweet, Morgan, Larrabee, et al. [22], see page 1100). It has been pointed out by van Impelen's team [13] that some of the SIMS items have an inadequate or too complex sentence structure: such items can be misinterpreted more frequently by patients exhausted by chronic pain and insomnia.

Van Impelen's excellent review [13] of the SIMS reports that already Widder [22] pointed out that SIMS items describe potentially genuine medical symptoms (specifically, items 5, 6, 10, 43, 66 that deal with changes in taste of food, change in body shape, laughing rarely, difficulty maintaining sleep, and being inactive). Obvious examples of genuine medical symptoms provided in van Impelen's article, of symptoms that are likely to be salient even to lay persons are items 32, 52 which describe insomnia and lack of energy. Kobelt, Göbber, Bassler and Peterman [23] found that SIMS scores above 16 were more common in depressive patients that in other groups: this is obviously due to the very large number of SIMS items that describe legitimate depressive symptoms. Van Impelen listed "*other SIMS items that might tap into genuine psychopathology, notably items #15 (memory problems), #20 (head injury), and #44 (tinnitus)*" (van Impelen [13], page 1353). While the content of SIMS items has already been criticized by other authors, the special contribution of the present article is extending the review of potentially genuine medical symptoms within the SIMS to items prevalent in post-MVA patients that typically experience symptoms within the post-concussion-whiplash spectrum. The impact of SIMS is particularly iatrogenic in this clinical group.

Which methods seem more acceptable than the SIMS or Green's tests as evidence in insurance disputes? At this time, it is difficult to document the presence of mild cerebral concussion via medical imaging procedures. Even some minor and potentially undetected damage to certain brain area could have major adverse functional repercussions. In contrast, the physical damage to spine associated with some of the whiplash symptoms is more easily detected and documented via MRIs. Typically, the whiplash damage to afferent and efferent nerves occurs at the points at which they enter or exit the spinal column between the vertebrae. The spinal discs tend to be also injured in the whiplash. The discs throughout the spine act as shock absorbers between the bony vertebrae. These discs are tough ligaments that hold the vertebrae of the spine together and they also function as cartilaginous joints that allow for some mobility in the spine. While X-rays typically fail to detect existing damage to spinal discs or existing nerve impingements, the MRI should be used more frequently as it provides unequivocal evidence of spinal stenosis or herniated discs. The MRI evidence could avoid lengthy litigations frustrating both to the patients and to insurance clerks. The typical subjective symptoms of nerve impingement and herniated discs within the cervical

or upper thoracic spine are the tingling, numbness, or some loss of feeling in the arms and hands, or also muscle weakness. These same symptoms, but felt in the legs, also occur with nerve impingement and herniated discs within the lumbar and sacral spine [24]. In some patients, the damage at the lower spine causes problems with bladder control and potentially more widespread neurological symptoms within the pelvis, see discussion by Hernández-Aguilar and Mateos-Moreno in Cernovsky et al. [8], page 52. MRI investigations of spinal stenosis or herniated discs should be more frequently used as evidence in insurance disputes involving post-MVA patients. The PMNS scale items that involve problems with tingling, numbness, loss of feeling in the limbs, or instances of impaired muscle control over limbs could serve as a screening tool to decide if the MRI should focus on cervical-upper thoracic or on the lumbo-sacral spine or on both.

Conclusions

More than a half of SIMS items are consistent with post-MVA neuropsychological symptoms as listed in the Rivermead and PMNS scales and with the psychological concept of persistent post-concussive and whiplash syndrome. A psychological review of the other SIMS items suggests that they also could be legitimately endorsed by persons with real medical symptoms, i.e. some of these items are very consistent with acute psychosis and some other items are likely to be endorsed by persons with low intelligence. The SIMS is not a valid indicator of malingering: the SIMS has never been appropriately validated according to standards of the American Psychological Association to demonstrate that it satisfactorily differentiates malingerers from legitimate post-MVA patients across sufficiently varied clinical populations and age groups. Its widespread use as a test of malingering may be conceived as malpractice, even on other clinically similar populations such as war veterans.

Acknowledgement

We thank Abe Cernovsky, BA, for his editorial assistance on the drafts of this article.

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Citation: **Zack Zdenek Cernovsky, John Jack Remo Ferrari, James Dominic Mendonça**. *Pseudodiagnoses of Malingering of Neuropsychological Symptoms in Survivors of Car Accidents by the Structured Inventory of Malingered Symptomatology. Archives of Psychiatry and Behavioral Sciences. 2019; 2(1): 55-65.*