



## Content validity of SIMS low intelligence scale

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### Abstract

**Objective:** The Structured Inventory of Malingered Symptomatology (SIMS) is a test widely used by psychologists when testifying in insurance litigation. We evaluated the content validity of SIMS Low Intelligence scale (LI).

**Method:** Three clinical psychologists with more than 35 years of experience each rated the content validity of all items of SIMS LI scale with respect to their capacity to separate malingerers from persons with genuinely impaired cognitive functioning after motor vehicle accidents (MVAs). Post-MVA factors endured by the latter such as post-concussion syndrome, persistent pain, pain related insomnia, and fatigue interfere with attentional focus and other aspects of cognitive performance.

Furthermore, scores on the LI scale of 23 survivors of high impact MVAs were evaluated to estimate the rates of false positives.

**Results:** The 3 raters concluded that none of the 15 items of SIMS LI scale appears suited to differentiate malingerers from real patients. Most of its items seem sensitive to post-MVA impairments such as the post-concussion syndrome and fatigue. Patients with more extensive cognitive impairment are likely to obtain higher scores on the LI scale and thus, falsely diagnosed as “malingerers” than those less impaired. Average LI score (4.8 points, SD=4.4) of the 23 injured survivors of high impact MVAs was within the “malingering” category and 65.2 %, were classified by SIMS LI scale as “malingerers.” It seems more plausible that their elevated LI scores reflect their post-concussion syndrome, chronic fatigue from pain, and pain related insomnia.

**Conclusions:** None of SIMS LI items appears to have an adequate capacity to differentiate malingerers from real patients. Patients with post-MVA cognitive impairment are likely to be misclassified as “malingerers.”

**Keywords:** malingering, cognitive impairment, low intelligence, content validity, criterion validity

### 1. Introduction

The Structured Inventory of Malingered Symptomatology (SIMS) <sup>[1,2]</sup> is often used by psychologists contracted by car insurance companies to examine whether an insurance claimant is feigning post-accident medical symptoms. The SIMS consists of 5 scales with 15 items each: Psychosis, Affective Disorders, Neurological Impairment, Amnesic Disorder, and Low Intelligence.

Recent content analyses of four of these five SIMS scales by teams of doctoral level clinicians with more than 35 years of experience each in psychiatry showed that these scales do not have reasonable capacity to differentiate malingerers from real patients with legitimate medical symptoms. Thus, the content analysis of SIMS Psychosis scale showed that all its items describe legitimate symptoms reported by some acutely ill psychotic patients <sup>[3]</sup> and content analysis of SIMS Affective Disorder scale showed that all its 15 items represent legitimate symptoms of depression or those associated with depression <sup>[4]</sup>. These two scales cannot differentiate acutely psychotic or depressed patients from malingerers.

Another recent study focused on the content of SIMS scales of Neurologic Impairment and of Amnesic Disorders: experienced clinicians and neuroscientists determined that these two scales list only various legitimate neuropsychological symptoms <sup>[5]</sup>, especially those within the post-concussion and whiplash spectrum as commonly encountered after high impact car

accidents. Furthermore, statistical analyses of SIMS data from patients injured in high impact MVAs confirmed that

1. The more memory difficulties, neurological symptoms, and depressive symptoms are legitimately endorsed by a patient on the SIMS, the higher are these patients' SIMS scores of “malingering,” and the more likely is the SIMS to misclassify the patient as a malingerer <sup>[4,5]</sup> and that
2. Legitimate post-MVA patients do not differ significantly in their SIMS scores from healthy persons instructed to feign such medical symptoms: both groups may report similar numbers of depressive or neurological symptoms on the SIMS<sup>[4,5]</sup>.

This indicates that the SIMS is not a viable measure of malingering. It is a pseudopsychological test that has never been properly validated according to test construction standards of the American Psychological Association <sup>[6]</sup> and should never be used in professional psychology <sup>[3, 4, 5]</sup>.

The only SIMS scale that has not yet undergone a thorough content analysis by expert clinicians is its Low Intelligence scale. The present study evaluates the content validity of SIMS Low Intelligence Scale, in particular with respect to its capacity to differentiate malingerers from persons legitimately injured in MVAs. The symptom profile of survivors of high impact MVAs normally includes various forms of cognitive impairment as usually listed within the concept of post-concussion syndrome,

see lists of symptom frequencies in Cernovsky, Ferrari, and Mendonca [7] and also in the study by Gutierrez’s team [8].

Research by the neuropathologist Bennet Omalu [9, 10] indicates that cerebral concussions occur even without visible external head injuries and even in lesser physical impacts such as those experienced by football or hockey players. Phenomena such as microvascular trauma or so called axonal shearing with subsequent neurotoxicity are involved while the gray and white layers of the brain slide over each other during the sudden acceleration or deceleration of the skull, in the coup and contrecoup injury. Such neurological damage results in cognitive deficits or impairments that are, to some extent, comparable to “low intelligence,” with respect to slow speed of thinking, impaired concentration, impaired memory, and frequent errors on easy arithmetic or logical tasks.

If SIMS Low Intelligence (LI) scale contains items unduly sensitive to these deficits, then legitimately injured post-MVA patients would be misclassified as “malingering low intelligence” (an obvious misnomer).

The content analysis is an important part of the test validation process. As explained in the 2014 *Standards for Educational and Psychological Testing* [6] of the American Psychological Association on page 14, “Important validity evidence can be obtained from an analysis of the relationship between the content of a test and the construct it is intended to measure.” This key construct, with respect to SIMS LI scale, is the “malingering” of cognitive impairment.

**2. Method**

Three clinical psychologists, each with more than 35 years of clinical experience in psychiatric hospitals, private practice, and in scientific research in psychopathology, rated all 15 items of SIMS Low Intelligence scale (see the full list in Table 1) with respect to their capacity to separate malingerers from persons with impaired cognitive processing due to the post-concussion syndrome as well as due to pain-related symptoms of insomnia, distractibility or inability to adequately focus due to an unrelenting pain, and related depressive apathy. Low intelligence per se was also to be considered as a factor. For each SIMS item, the question to the raters was formulated as follows: “Could this item be legitimately endorsed *in the incorrect direction*, by persons with a post-concussion syndrome, or those extensively debilitated by chronic pain, or by individuals with low IQ?”

When the SIMS is administered to the patients, they are instructed to choose “True” or “False” as a response to each of these 15 items. When responding with True to items followed by a “T” in Table 1, the patient obtains one point towards the malingering score. When responding with False to items followed by an “F”, the patient obtains one point towards the malingering score. The SIMS manual [1] stipulates that LI scores > 2 points indicate malingering.

In our evaluation process of this scale, its items were tentatively classified into a category representing cognitive tasks of arithmetic or logical nature, another category dealing with historical or geographic facts or general knowledge, and a category of items with inadequate, potentially ambiguous, or imprecise wording that could make the item psychometrically useless.

**Table 1:** Items of the Low Intelligence scale of the SIMS

<b>Items comprising the Low Intelligence scale of the SIMS:</b>	<b>Symptoms or deficits that could cause a patient to respond in the incorrect direction</b>	<b>Responses in the direction of “malingering,” by our 23 patients:</b>
4. If your shadow points to the southeast, the sun is in the northeast corner of the sky. T	Fatigue, impaired concentration.	39.1 %
7. Gold and silver are alike because they're both metals. F	Fatigue, impaired concentration. Semantic ambiguity.	43.5 %
11. The capital of Italy is Hungary. T	Low level of general knowledge, low IQ.	26.1 %
14. The United States has 55 states. T	Low level of general knowledge (especially patients outside USA).	43.5 %
21. There are six days in a week. T	Semantic ambiguity. This item is strictly logically correct.	17.4 %
41. I cannot count backwards from 20 to 1 without making a mistake. T	Fatigue, impaired concentration.	26.1 %
46. Candles are made of wax. F	Low level of general knowledge, low IQ.	21.7 %
56. A judge and a lawyer are alike because they are both part of the legal system. F	Fatigue, impaired concentration. Semantic ambiguity.	30.4 %
58. A door and a gate are alike because they are both openings. F	Fatigue, impaired concentration. Semantic ambiguity.	30.4 %
63. Washington was our first President. F	Low level of general knowledge (especially patients outside USA).	43.5 %
67. If you have \$1.50 and I take away fifty cents, you will have 75 cents left. T	Fatigue, impaired concentration.	17.4 %
68. In the series -- 1 12 123 -- the next response would be 456. T	Fatigue, impaired concentration.	47.8 %
70. The major problem I am having is that things are hard for me to understand. T	Legitimate symptom of the post-concussion syndrome or of low IQ.	26.1 %
73. A man had 56 apples and a neighbor gave him 37 more. He now has 83. T	Fatigue, impaired concentration.	43.5 %
75. In the series -- 11 22 33 -- the next correct answer would be 44. F	Fatigue, impaired concentration.	17.4 %

Responses to the SIMS LI scale were available for 23 survivors of high impact MVAs in which their vehicle was damaged so extensively that it was subsequently deemed not worthy of repair. This sample of 23 patients includes also 16 whose data on SIMS Affective Disorder scale were already analysed and reported in another, earlier study<sup>[4]</sup>. Since that study, SIMS data on more survivors of high impact MVAs have become available, now increasing the sample size to 23. The sample presently includes 23 patients: 8 males and 15 females, age 19 to 60 years (mean age=38.0 years, SD=12.8), with education from 10 to 18 years (mean=14.1 years, SD=1.9). The age of their vehicle was known in 12 cases: the average was 6.2 years (SD=5.0). All were diagnosed with whiplash pain, the post-concussion syndrome, and insomnia.

The physical nature of their accident (high impact, with the car damaged to the extent of being deemed not worthy of repair) makes the accusation of malingering less plausible, even though some injured patients may emphasize or catastrophize their symptoms in the fear of otherwise receiving no treatments or help from their car insurance.

### 3. Results

As already mentioned, the LI items are listed in Table 1, see the left column.

The middle column lists symptoms or cognitive deficits which, in the opinion of the 3 raters, could cause a person to respond incorrectly, that is, in a direction that allegedly, according to SIMS manual<sup>[1]</sup>, indicates malingering.

#### 3.1 LI Scale Responses of the 23 Survivors of High Impact MVAs

The column on the right side of Table 1 lists the proportion of persons, from our sample of 23 survivors of high impact MVAs, who endorsed each item in the direction that allegedly indicates malingering. These frequencies range from 17.4% to 47.8% (see Table 1).

As already mentioned, the SIMS manual<sup>[1]</sup> stipulates the cutoff at > 2 points. Thus, patients who endorse 3 or more items are classified as “malingering low intelligence.” The LI scores of our 23 patients ranged from 0 to 15 with the average at 4.8 (SD=4.4). The cutoff point stipulated by the SIMS manual<sup>[1]</sup> classifies this average score as indicative of “malingering of low intelligence.” Fifteen of these 23 patients, i.e., 65.2 %, were thus classified by SIMS (in its idiosyncratically problematic manner) as malingerers, with respect to “low intelligence.” This appears to be an unduly high rate of false positives, i.e., of presumably legitimate patients misclassified as “malingerers.” It seems more plausible that their elevated LI scores may reflect the post-concussion syndrome and chronic fatigue from pain and pain related insomnia.

#### 3.2 Ratings and Comments by the Three Raters

The raters agreed that, per se, none of the 15 items of the SIMS Low Intelligence scale could be an adequate indicator of malingering. The agreement in this respect was 100%, and so no interrater agreement statistics were calculated. Factors such as genuinely low IQ, or the post-concussion syndrome, or chronic fatigue caused by post-accident pain, combined with pain related severe insomnia, would excessively interfere with the capacity of these 15 items to “detect fakers.”

The perusal of Table 1 shows that several items are simple reasoning or arithmetic tasks (see Items 4, 67, 68, 73, 75, i.e. 33.3% of the scale) that are easy for persons in good health and with normal intelligence, but on which errors could be made by legitimate post-MVA patients due to concentration impaired by unrelenting pain, fatigue, and the post-concussion syndrome.

Another set of items are essentially logical tasks (see Items 7, 21, 56, and 58 in Table 1, i.e., 26.7% of the scale), however, their wording may appear semantically inadequate if considering that, in colloquial usage of English, some members of the general population consider statements such as the Item 7 “Gold and silver are alike because they’re both metals” as inherently false because “gold is far more expensive.” Such responses are obviously given without any intent to malingering. Almost a half of our 23 post-accident patients endorsed the Item 7 as “false” (see the right column of Table 1).

The ambiguity or semantic inadequacy of the SIMS Item 21 (see Table 1) was expertly discussed already by van Impelen, Merckelbach, Jellicic, and Merten<sup>[11]</sup> in 2014, on page 1353: the “item 2 is strictly speaking logically correct reasoning, although endorsing it would count as an indication for feigning. This item is of the *there-are-living-100-people-in-the-US* type.” Van Impelen’s team<sup>[11]</sup> suggested that a better way of formulating such items would be “There are exactly 100 people living in the US”.

Another group of problematic items in the Low Intelligence scale are those related to general level of knowledge (see Items 11, 14, 46, and 63, i.e., another 26.7% of the scale). In our sample of 23 post-accident patients, 26.1% agreed that the capital of Italy is Hungary (Item 11). It is unclear if their response was a clerical error caused by a lack of concentration or if it indicated a genuine lack of geographic knowledge.

The SIMS is used widely in Canada. Not surprisingly, 43.5% of our 23 Canadian patients presumably did not know how many states constitute the USA (see Item 14 in Table 1) and also

43.5 % perhaps did not know if Washington was the first US president (see Item 63 in Table 1), though their incorrect responses could also result from excessive fatigue with impaired concentration. It should be noted in this context that any such incorrect response falsely brings the patient closer to being classified by the SIMS manual as “malingering low intelligence” because the cutoff for this scale is > 2 points and each response counts one point.

The problematic nature of Item 46 (see Table 1) is obvious because, in the justifiable opinion of some persons, candles are ‘not made of wax only, an ignitable wick is equally essential.’ In our Canadian sample, 21.7% marked that item as “False.”

Some readers might suspect that such “nitpicky” responses might be given by persons with (pathologically) oppositional tendencies, yet it is important to recall that irritability is one of the most common post-concussion symptoms (reported by 97.0% of post-MVA patients in a recent study by Gutierrez’s team<sup>[8]</sup> and by 92.0% in the study by Cernovsky, Ferrari, and Mendonca<sup>[7]</sup>). The irritability alone could account for an “oppositional response style” of some patients to semantically ambiguous SIMS items.

The problematic nature of the SIMS is also obvious from items 41 and 70 in Table 1 (i.e., 13.3% of the 15 item scale): when the patient legitimately complains about impaired concentration and difficulties understanding “things,” he or she already obtains 2 points towards the diagnosis of malingering (as mentioned, the

cut-off for this scale is  $> 2$ ). This is not methodologically acceptable.

Briefly, the LI scale lacks in content validity and should never be used on real patients.

#### 4. Discussion

When used on post-MVA patients, the LI scale seems to have unacceptably high rate of false positives. Its items appear to have no content validity, i.e., no reasonable capacity to differentiate malingerers from legitimate patients.

The reasoning or arithmetic tasks (i.e., Items 4, 67, 68, 73, 75) in this scale obviously cannot and do not differentiate malingerers from individuals with intellectual deficits, or from patients with transient cognitive impairment, e.g., as defined in the concept of the post-concussion syndrome, as well as from persons suffering from extreme fatigue who cannot adequately focus on clerical tasks. Furthermore, Items 41 and 70 represent potentially very legitimate subjective complaints about impaired concentration and difficulties “understanding things.” It is absurd to claim that these items always or usually indicate malingering.

Similarly, items dealing with US history and US or European geography (Items 11, 14, 63) have no power to differentiate malingerers from persons with legitimately low intelligence, intellectual deficits, or extreme fatigue, or transient cognitive impairments such as by cerebral concussion.

Mental alertness is known to decrease with fatigue, sleep deprivation, or also depression and this could contribute to errors on arithmetic or reasoning tasks. Furthermore, the logical reasoning tasks represented by SIMS items 7, 21, 56, and 58 as well as, to some extent, Item 21 (“There are six days in a week”) and Item 46 (“Candles are made of wax”) cannot be used in a malingering test in their present form because common colloquial English usage allows for alternative semantic interpretations that defy the academic logical rules.

It is also very important to consider that persons differ in their cognitive styles. Some persons may entrench themselves in an argumentative stance such as “candles must also have a flammable wick” or “a judge and a lawyer are not alike because they have different functions.” Some individuals focus in their cognitive style more on differences among items in their environment so as to highlight their uniqueness or particular value. Some other persons assume implicitly that differences exist, but they pay more attention to similarities: their particular cognitive approach might have certain advantage in problem solving in some situations, such as in social leadership tasks in which it is of value to verbally emphasize similarities of group members to encourage their constructive cooperation. This is not surprising given Gardner’s [12] theory of Multiple Intelligences, the concept of “intelligence” being more complicated than usually assumed. Gardner postulated that the “logical-mathematical” intelligence (favoured by academic psychologists) is only one out of 8 other possible varieties.

While the 15 items of SIMS LI scale certainly appear to examine cognitive functioning, for all the reasons given above they are devoid of an adequate capacity to differentiate malingerers from post-MVA patients or persons with low IQ. Briefly, the content of LI items does not seem to match the construct of malingering, as would be required by test validation principles postulated by

the American Psychological Association [6]. All LI items represent cognitive tasks on which patients with post-concussive symptoms and concentration problems due to persistent pain would perform more poorly and be misdiagnosed as malingerers. The more errors are legitimately made by the injured or low IQ patient on the tasks in the LI scale, the higher is the LI “malingering score, and the more likely the LI scale misclassifies the patient as a “malingerer.”

Furthermore, the LI scale also includes semantically inadequate or logically flawed items that can be answered even by some healthy and relatively intelligent persons in good faith in the direction falsely scored as malingering.

#### 5. Conclusions

The Low Intelligence scale of the SIMS lacks in content validity as a measure of malingering: its items are mainly arithmetic and logical tasks and also tasks evaluating general knowledge. Such tasks have no capacity to properly differentiate post-MVA patients from malingerers. Furthermore, the LI scale also includes some semantically or logically flawed items that might be answered even by intelligent persons in good faith in the direction falsely scored as malingering.

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#### 7. References

1. Widows MR, Smith GP. Structured Inventory of Malingered Symptomatology - Professional Manual. Lutz, FL: PAR Inc, 2005.
2. Smith GP, Burger GK. Detection of malingering: Validation of the Structured Inventory of Malingered Symptomatology (SIMS). *Journal of the American Academy on Psychiatry and Law*. 1997; 25:180-183.
3. Cernovsky Z, Mendonça JD, Oyewumi LK, Ferrari JR, Sidhu G, Campbell R. Content Validity of the Psychosis Subscale of the Structured Inventory of Malingered Symptomatology (SIMS). *International Journal of Psychology and Cognitive Science*. 2019; 5(3):121-127.
4. Cernovsky ZZ, Mendonça JD, Ferrari JR, Sidhu G, Velamoor V, Mann SC, *et al.* Content Validity of the Affective Disorder Subscale of the SIMS. *Archives of Psychiatry and Behavioral Sciences*. 2019; 2(2):33-39.
5. Cernovsky Z, Bureau Y, Mendonça J, Velamoor V, Mann S, Sidhu G, *et al.* Validity of the SIMS Scales of Neurologic Impairment and Amnesic Disorder. *International Journal of Psychiatry Sciences*. 2019; 2(1):13-19.
6. American Educational Research Association, American Psychological Association, and National Council on Measurement in Education. *The Standards for Educational and Psychological Testing*. Washington, D.C.: AERA Publications, 2014.
7. Cernovsky ZZ, Ferrari JJR, Mendonça JD. 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.

8. Gutierrez J, Nosonova V, Cernovsky Z, Fattahi M, Tenenbaum S. Gutierrez Questionnaire for Assessments of Patients after Car Accidents. *Archives of Psychiatry and Behavioral Sciences*. 2019; 2(2):10-21.
9. Omalu BI, DeKosky ST, Minster RL, Kamboh MI, Hamilton RL, Wecht CH. Chronic traumatic encephalopathy in a National Football League player. *Neurosurgery*. 2005; 57:128-134.
10. Omalu BI, DeKosky ST, Hamilton RL, Minster RL, Kamboh MI, Shakir AM, and Wecht CH. Chronic traumatic encephalopathy in a National Football League player: Part II. *Neurosurgery*. 2006; 59:1086-1092.
11. Van Impelen A, Merckelbach H, Jelicic M, Merten T. The Structured Inventory of Malingered Symptomatology (SIMS): a systematic review and meta-analysis. *The Clinical Neuropsychologist*. 2014; 28(8):1336-1365. DOI: 10.1080/13854046.2014.984763
12. Gardner H. *Frames of Mind: The Theory of Multiple Intelligences*. New York, NY: Basic Books, 1983.