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Discriminant validity of the Structured Inventory of Malingered Symptomatology (SIMS) under conditions of simulating symptoms

Diskriminativna validnost Strukturiranog inventara simuliranih simptoma (*Structured Inventory of Malingered Symptomatology* – SIMS) u uslovima simuliranja simptoma

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Abstract

Background/Aim. The Structured Inventory of Malingered Symptomatology (SIMS) is a self-report measure to be used with adults, which may be utilized to assess the potential malingering of psychosis, neurologic impairment, amnesia, low intelligence, or affective disorder. The aim of the study was to examine the discriminant validity of SIMS under conditions of simulating symptoms of neurological and memory disorders, in response to a hypothetical situation, after watching a recording of an actual car accident in which a motorcycle rider sustained head injuries. **Methods.** The study involved 94 students (35 men and 59 women) from the University of Criminal Investigation and Police Studies in Belgrade and the Faculty of Medicine – Special Education and Rehabilitation in Novi Sad, aged 20–26 [arithmetic mean = 20.69; standard deviation (SD) = 0.80], divided into two groups (n = 47), malingerer and control. The malingerer group was instructed to identify with the motorcycle rider hit by the car and malinger symptoms related to neurological difficulties and amnesia in order to obtain greater reimbursement from the insurance company. The control group had instructions to honestly assess the probability of occurrence of the symptoms. **Results.** The results of the multivariate one-way analysis of variance suggested that the effect of experimental manipulation was statistically significant [F (88, 5) = 91.21, $p < 0.001$; $\eta 2p = 0.838$]. Univariate effects were also statistically significant for all five scales. Participants in the malingerer group scored higher on all five scales than participants in the control group. The magnitudes of the effects support the largest differences between the malingerer and control groups on the scales of Memory Disorders and Neurological Disorders, which was also the basic instruction for simulating symptoms given to the participants in the malingerer group. **Conclusion.** The obtained results support the discriminant validity of the SIMS questionnaire in the situation of simulating symptoms of neurological disorders and memory disorders.

Key words:
accidents, traffic; forecasting; insurance, liability; models, theoretical; surveys and questionnaires.

Apstrakt

Uvod/Cilj. Strukturisani inventar simuliranih simptoma – *Structured Inventory of Malingered Symptomatology* (SIMS) je mera samoprocene koja se koristi kod odraslih osoba, a može biti korišćena za procenu potencijalnog razvoja psihoze, neurološkog oštećenja, amnezije, niske inteligencije ili afektivnog poremećaja. Cilj rada bio je da se ispita diskriminativna validnost SIMS-a u uslovima simuliranja simptoma neuroloških oštećenja i poremećaja pamćenja u odgovoru na hipotetičku situaciju, nakon gledanja snimka realne saobraćajne nezgode u kojoj je vozač motocikla zadobio povrede glave. **Metode**. U istraživanju su učestvovala 94 studenta (35 muškaraca i 59 žena) Kriminalističko-policijskog univerziteta u Beogradu i Medicinskog fakulteta – smer Specijalna edukacija i rehabilitacija u Novom Sadu, starosti od 20–26 godina [aritmetička sredina = 20.69; standardna devijacija (SD) = 0.80)], koji su bili podeljeni u dve grupe (n = 47), kontrolnu grupu i grupu ispitanika koji su simulirali simptome. Grupa ispitanika koji su simulirali simptome imala je zadatak da se poistoveti sa motociklistom kojeg je udario automobil i da simulira neurološke simptome i amneziju, sa ciljem da dobiju više novca od osiguravajuće kompanije. Kontrolna grupa imala je zadatak da iskreno proceni koji simptomi bi mogli nastati nakon saobraćajne nesreće. **Rezultati.** Rezultati multivarijatne jednosmerne analize varijanse su pokazali da je efekat eksperimentalne manipulacije bio statistički značajan [$F(88, 5) = 91.21$, $p < 0.001$; $\eta^2p = 0.838$]. Univarijatni efekti su takođe bili statistički značajni za svih pet skala. Ispitanici iz kontrolne grupe postizali su niže skorove na svih pet skala u odnosu na ispitanike iz grupe koja je sim

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ulirala simptome. Veličine efekata govore u prilog najvećih razlika između grupe koja je simulirala simptome i kontrolne grupe na skalama Poremećaji pamćenja i Neurološka oštećenja, što je ujedno i bila osnovna instrukcija za simuliranje simptoma kod te grupe ispitanika. **Zaključak.** Dobijeni rezultati idu u prilog diskriminativne validnosti upitnika SIMS u situaciji simuliranja simptoma neuroloških oštećenja i poremećaja pamćenja.

Ključne reči:
udesi, saobraćajni; predviđanje; osiguranje, odgovornost; modeli, teorijski; ankete i upitnici.

Introduction

According to the Diagnostic and Statistical Manual of Mental Disorders (DSM-5), malingering is defined as "the intentional production of false or grossly exaggerated physical or psychological symptoms, motivated by external incentives" [1]. The symptoms of malingering are under voluntary control, with the emphasis placed on the awareness that the malingerer has in his/her presentation of malingering [2–3]. Therefore, malingering is based on understanding the symptoms of the disease, condition, and disorder rather than actual physical or psychological symptoms [4–5]. There is a significant difference between malingering psychopathology and neuropsychological deficiencies because, in the case of psychopathology, a person has to act out symptoms that are not present, and in organic deficits, one has to negate their ability and make deliberate mistakes [6].

Although malingering is not a mental disorder, it has strong implications for both clinical and forensic practice. From the perspective of forensic practice, it is most common to malinger cognitive deficits, amnesia, as well as psychiatric, psychological, or physical symptoms [7]. In this context, malingering may aim to exclude liability for a crime [8], through the exclusion of guilt, to obtain benefits through the payment of damages caused by a crime, or to avoid formal duty or responsibility [1, 9]. In the first case, the malingerer malingers all those symptoms that, in their opinion, should portray them as unaccountable, both at the time of the crime (schizophrenia, epilepsy, etc.) and after the crime (melancholy, mania, symptoms of concussion, etc.). In the latter case, malingerers simulate some physical disabilities that do not prevent them from performing certain actions. The forensic practice also encounters the simulation of amnesia, which usually occurs after the commission of violent criminal offenses, such as murder.

Regarding the basic rate of malingering, the results of the studies in Anglo-Saxon countries show that the frequency of malingering in forensic conditions is significant and ranges from 15.7% [10] to 45% [11], where as many as 20%–30% of cases involve malingering of personal injury [12–14]. In criminal proceedings, malingering is present in about 19% of all cases [15], out of which 20%–45% of cases involve defendants claiming amnesia related to the murder crime [16–19].

For malingering assessment, several instruments have been developed, such as structured interviews, general psychological or cognitive instruments, and questionnaires specifically designed to identify malingering have also been constructed [20].

The Structured Inventory of Malingered Symptomatology (SIMS) is a multidimensional questionnaire designed to evaluate the symptoms of "false" psychopathology and cognitive function deficits and includes five scales [21]. The Psychosis (P) scale consists of 15 items that maintain the degree to which the respondent reports bizarre or unusual psychotic symptoms that are typically not present in actual psychiatric patients. The Neurological Impairment (NI) scale consists of 15 items that assess the degree to which the subject states illogical or very atypical neurological symptoms. The Memory Disorders (MD) scale consists of 15 items that indicate the degree to which the respondent lists symptoms of memory impairment that are not in line with the patterns of disorders found in injuries or brain dysfunction. The Low Intelligence (LI) scale consists of 15 items that assess the degree to which the respondent is trying to pretend to have general cognitive impairment or intellectual deficit. Finally, the Affective Disorders (AD) scale consists of 15 items that reflect the degree to which the respondent states atypical symptoms of depression or anxiety. The purpose of developing this inventory was to construct a psychometrically valid and cost-effective malingering assessment tool across domains applicable in clinical and forensic settings. The first stage of the development of this inventory involved the development of items that would be categorized into different categories of pathology, while the second stage involved psychometric improvement of the instrument [22]. The final version of the SIMS was empirically verified on a nonclinical sample of 476 students who joined the research voluntarily [22]. The results of this study indicated thresholds of $P > 1$, $NI > 2$, $MD > 2$, $LI > 2$, and $AD > 5$ as values that optimally differentiate non-malingering from malingering participants on each of the scales. Subsequently, these results were repeated using a cross-validation sample. It was concluded that the scores on the individual SIMS scales, as well as the overall score on the SIMS, had a high level of success (94.54%) in distinguishing the persons who engaged in malingering from those who responded genuinely. In other words, it has been found that respondents with a score higher than 14 were to be considered malingerers, and further assessment should be carried out given the large number of atypical, unlikely, inconsistent, or illogical symptoms reported by the malingerers [21].

In the studies conducted mainly in the Netherlands, in which the respondents were mostly students [22–27], the general conclusion was that the SIMS could provide valid data on the probable presence of malingering, indicated by thresholds greater than 14 or 16 [28].

In studies conducted mainly in the United States and some European countries, a design with well-known groups was applied. The samples consisted of respondents involved in legal proceedings, claimants, defendants, or inmates of a penal institution [27, 29–33]; the SIMS was found to be valid in

the process of discriminating between malingerers and those who answered the questions in the questionnaire honestly. The results of these studies suggest that the cut-off value ranged from > 14 and > 16 [28], while in the studies of Clegg et al. [34], it ranged from > 19, and in Wisdom et al. [35], it was > 24.

The results of some research [35–40] conducted in real-world settings (clinical, forensic) support the constructive validity of the SIMS and the usefulness of its application in clinical and forensic settings. Yet it has been particularly emphasized that the SIMS should not be used as a stand-alone measure in clinical and forensic settings but rather in combination with other instruments covering different domains of symptomatology.

In the scientific work that follows, the main goal was to examine the discriminant validity of the SIMS questionnaire in the situation of malingering symptoms in experimental conditions. The importance of this research problem is reflected in the fact that there are no studies at the national level that test the validity of this questionnaire. The survey seeks to answer two questions (1) whether this inventory can identify respondents prone to malingering and (2) to what extent the SIMS questionnaire is sensitive to malingering symptoms. The answers to these questions are an important step in verifying the validity of this instrument, but may also indicate the usefulness of its application in national research as well as practical work (clinical or forensic assessment) because it is a relatively new measuring instrument that has only recently become available in Serbian.

Methods

Sample and procedure

The study involved 94 students (35 male and 59 female) from the University of Criminal Investigation and Police Studies in Belgrade and the Faculty of Medicine – Special Education and Rehabilitation in Novi Sad, Serbia, aged 20–26 [arithmetic mean = 20.69; standard deviation (SD) = 0.80]. The participants were divided into two groups (n = 47), malingerer and control, according to the criterion that every other participant was classified as a control group. The groups were uniform in relation to the faculty at which the participants study [χ^2 (1) = 2.31, $p > 0.05$] as well as in terms of age [t (92) = 0.128, $p > 0.05$] and gender [χ^2 (1) = 3.49, $p > 0.05$]. The research was conducted in March 2019 in Belgrade and Novi Sad. The test conditions were identical for both groups, who individually completed the SIMS questionnaire after receiving the same instructions and after watching a recording of a real-life car accident in which a motorcycle rider sustained head injuries. The students of the University of Criminal Investigation and Police Studies first completed the questionnaire on the premises of the University of Criminal Investigation and Police Studies, while the students of the Faculty of Medicine completed the questionnaire on the premises of the Faculty of Medicine. The control group was instructed to independently evaluate the answer that was correct for them, that is, to honestly answer all the items from the SIMS questionnaire. The malingerer group was instructed to identify with the motorcycle rider and malinger symptoms related to neurological difficulties and amnesia in order to obtain greater reimbursement from the insurance company.

Research design

The research design can be characterized as a one-factor multivariate experimental design without repetition. The independent variable has two levels: malingerer and control group. The advantage of applying the experimental design in the context of this research was reflected in the possibility of applying different instructions to respondents from both groups. In other words, if experimental manipulation exerts a significant effect on dependent variables, the discriminant validity of the SIMS inventory is confirmed directly. The dependent variables in this study represented five scales of the SIMS questionnaire: NI, AD, P, LI, and MD.

Instrument

SIMS [21] is a multidimensional questionnaire consisting of 75 items with a binary answer format (Yes/No) and items comprising five scales. NI scale includes 15 questions, α = 0.945, and contains items related to illogical or atypical neurological impairment. AD scale includes 15 questions, α = 0.846, and covers questions related to malingering atypical symptoms of anxiety or depression. P scale includes 15 questions, α = 0.912, and measures the presence of bizarre or unusual symptoms that are not typically present in psychiatric patients. LI scale contains 14 questions, α = 0.620, and includes items designed to assess the degree to which a respondent simulates general cognitive disability or cognitive deficit. Finally, the MD scale contains 15 questions, α = 0.973, and includes items that relate to symptoms of certain memory problems and difficulties, that is, symptoms typical of head injuries. The translation and license for the application of this inventory were provided by Synapse Edition [41]. The translation of the inventory into Serbian was done using the standard back translation method. The translated version of the inventory was proofread and approved by two independent reviewers.

Results

The results of descriptive statistics for the whole sample as well as for both groups are presented in Table 1. Arithmetic means and SD were consistently higher in the malingerer group for all five scales of the SIMS questionnaire. The largest deviations from the normal distribution (conventionally acceptable values in the range of ± 1.5 [42]) were noticeable on the P scale at the whole sample level, as well as on LI and MD scales in the case of the control group. Concerning the distribution of scores within the malingerer group, all scales were normally distributed, which was expected given the instruction given to the respondents before completing the questionnaire.

Table 1

Descriptive statistical parameters for the whole sample and both groups separately

Scales	Whole sample				Control group				Malingerer group			
	M	SD	SK	KU	M	SD	SK	KU	M	SD	SK	KU
NI	5.39	4.99	0.62	-1.20	1.32	0.96	1.63	4.57	9.47	3.93	-0.48	-0.77
AD	5.20	3.12	0.62	-0.52	4.04	2.17	0.83	0.79	6.36	3.50	0.07	-1.14
P	2.36	3.57	2.01	3.23	0.96	0.91	0.81	0.08	3.77	4.58	1.04	-0.22
LI	5.64	1.88	-0.14	-0.21	4.60	1.65	0.02	-0.91	6.68	1.48	-0.05	1.54
MD	6.39	5.52	0.30	-1.71	1.47	1.06	2.49	7.13	11.32	3.30	-1.39	1.42

NI – neurological impairment; AD – affective disorders; P – psychosis; LI – low intelligence; MD – memory disorders; M – arithmetic mean; SD – standard deviation; SK – skewness; KU – kurtosis.

Correlations of all five scales of the SIMS inventory, for the whole sample as well as for both groups, are presented in Table 2. A consistent pattern of correlation was observed between AD and P scales, and this correlation is moderate, positive, and statistically significant. The correlation between the P and LI scales is significant across the sample as well as the groups, but the direction of correlation in the control group is negative, while in the remaining cases, it is positive, with a correlation moderate and significant statistically. Speaking generally, the correlations of the SIMS questionnaire scales are higher within the malingerer group.

The results of the multivariate one-way analysis of variance suggest that the multivariate effect, i.e., the effect of experimental manipulation, was statistically significant [$F(88, 5) = 91.21$, $p < 0.001$; $\eta 2p = 0.838$]. Univariate effects were also statistically significant for all five scales: [NI: $F(93, 1) = 190.43$, $p < 0.001$, $\eta 2p = 0.674$; AD: $F(93, 1) = 14.93$, $p < 0.001$, $\eta 2p = 0.140$; P: $F(93, 1) = 17.01$, $p < 0.001$, $\eta 2p = 0.156$; LI: $F(93, 1) = 41.68$, $p < 0.001$, $\eta 2p = 0.312$; MD: $F(93, 1) = 380.01$, $p < 0.001$, $\eta 2p = 0.805$]. Participants in the malingerer group scored higher on all five scales than participants in the control group. Concerning the criteria for interpreting effect sizes proposed by Cohen [43], all effects can be characterized as large. The largest differences between the malingerer and control groups were identified on the scales of MD and NI. The sum scores of both groups on all five scales of the SIMS questionnaire are presented in Figure 1. Due to deviations of individual scales from the normal distribution (Table 1), differences between groups on scales of the SIMS questionnaires were also tested using the Man-Whitney test (Table 3). The outcome of the application of parametric and nonparametric analysis is identical; the

Table 2

Relationship between Structured Inventory of Malingered Symptomatology (SIMS) questionnaire scales across the whole sample and both groups

Scales	Whole sample				Control group				Malingerer group			
	NI	AD	P	LI	NI	AD	P	LI	NI	AD	P	LI
AD	0.253*				0.077				-0.136			
P	0.315**	0.580**			0.291*	0.366*			-0.032	0.563**		
LI	0.578**	0.275**	0.342**		-0.150	-0.074	-0.360*		0.431**	0.204	0.323*	
MD	0.846**	0.266**	0.319**	0.562**	0.128	0.379**	0.383**	-0.014	0.459**	-0.283	-0.119	0.267

NI – neurological impairment; AD – affective disorders; P – psychosis; LI – low intelligence; MD – memory disorders. * < 0.05; ** < 0.01; * < 0.001.**

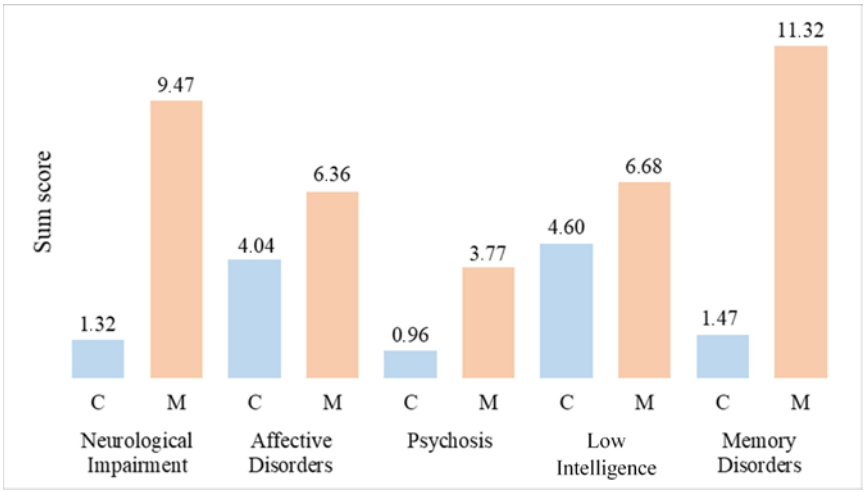

Fig. 1 – Differences between control and malingerer groups on Structured Inventory of Malingered Symptomatology (SIMS) questionnaire scales. C – control group; M – malingerer group.

Table 3

Differences between the control and malingerer groups tested by the Mann-Whitney *U* test

Scale	Group	MR	Z	*p*
Neurological impairment	C	25.40		
	M	69.60	-7.98	0.000
Affective disorders	C	38.66		
	M	56.34	-3.17	0.002
Psychosis	C	41.69		
	M	53.31	-2.14	0.032
Low intelligence	C	32.66		
	M	62.34	-5.36	0.000
Memory disorders	C	24.77		
	M	70.23	-8.33	0.000

C – control group; M – malingerer group; MR – mean ranks.

participants in the malingerer group achieved significantly higher scores than the control group on all five scales. In terms of percent of participants who simulated symptoms, results were very similar. In malinger group, 97.9% of participants simulated symptoms on the total SIMS score, 97.9% on the P scale, 95.7% on the NI scale, 97.9% on the MD scale, 100% on the LI scale, and 61.7% on the AD scale. In the control group, 23.4% of participants simulated symptoms on the total SIMS score, 21.3% on the P scale, 6.4% on the NI scale, 12.8% on the MD scale, 91.5% on the LI scale, and 25.5% on the AD scale.

Discussion

The main objective of this study was to determine the discriminant validity of the SIMS questionnaire in the malingering of neurological symptoms and amnesia. Symptoms of those two scales best represent symptoms that may occur after the traffic/car accident. The results indicate that the most pronounced differences between the control and malingerer participants were on the mentioned scales. This finding is expected since it stems directly from an experimental manipulation and speaks directly in favor of the discriminatory validity of the SIMS inventory, which is consistent with the results of foreign research [22, 26, 35, 36, 38, 44]. In other words, the SIMS adequately differentiates honest respondents from those who malinger neurological symptoms and memory deficits. The high sensitivity of this inventory is also supported by the magnitude of the effects of differences between the groups, which are very high for the two scales mentioned.

On the other hand, the malingerer and control groups also differ on the remaining three SIMS scales – LI, AD, and P, with effects ranging from moderate to high. The results obtained were not expected because of the instruction given to the participants in the malingerer group and can be explained in several ways. On the one hand, the results obtained can be explained by the ignorance of the symptoms included in the specific scales of the SIMS inventory on the part of the students who participated in this research, especially when it comes to students of the University of Criminal Investigation and Police Studies. In other words, the formal education of students does not include comprehensive training in clinical psychology, which made it impossible for the respondents in the malingerer group to precisely identify which symptoms relate to scales of MD and ND and which do not relate to the scales mentioned. Another potential explanation is the tendency towards over-generalization and reporting of different symptoms, as indicated by the results of previous studies [43–46]. The third alternative explanation for the results obtained relates to the subjective beliefs of the respondents regarding which symptoms can be malingered after a road traffic accident, with the conclusion that these symptoms do not necessarily relate to the scales mentioned. Furthermore, the differences obtained on the remaining three SIMS scales (AD, P, LI) can be understood as a very high discriminant validity/sensitivity of the SIMS questionnaire, which is also an advantage of this inventory, as it can identify subtler, i.e., less pronounced forms of malingering.

Limitations and guidelines for future research

The scenario used in the research is considered an experimental malingering model. Thus, in experimental conditions, certain symptoms of the malinger participants responded to a hypothetical rather than a realistic situation [22]. Against this background, a guideline for future research is to test the validity of the SIMS inventory in the general population under realistic malingering conditions to examine the ecological validity of this inventory. The importance of the abovementioned proposal for further research is reflected in the fact that, despite the existing studies that have applied the design with known groups, there is still a need for a more precise determination of the ecological validity of the SIMS questionnaire.

Although most simulation studies assume that the respondents will have appropriate motivation [42], such an assumption needs to be verified in prospective studies. In other words, the assumption that respondents behave credibly [43] in a malingering situation as well as in a real situation should be verified by empirical methods.

As the malingerer and control groups differ on all scales of the SIMS questionnaire, the recommendation for future research is to provide malingerers with sufficient time and information to familiarize themselves with the symptoms of specific scales and to test the malingerers' knowledge of the symptoms they have to malinger. In this way, alternative in-

terpretations of the results obtained can be avoided. Additional limitations of this research are the small sample size and lack of information on whether the respondents or their relatives had experience with traffic accidents.

Recommendations to practitioners

In line with the results of previous studies, it was found that the SIMS questionnaire has satisfactory validity in the situation of malingering the symptoms of neurological damage and memory impairment. Given the above, as well as the fact that its administration and interpretation [28] are easy, the SIMS questionnaire could be used in practice as a very convenient screening instrument [22]. Although the assumption of sincerity may be unfounded, especially in the forensic context, the burden of proof regarding the existence of malingering is still on the experts who will use this instrument [28, 47]. The high overall score on the SIMS, as well as the high limit values on the individual SIMS scales, do not satisfy the burden of proof but should be an incentive for further evaluation regarding the presence of malingering [28].

When using the SIMS inventory in practice, it is important to emphasize the possible occurrence of two types of errors: false-positive errors, in which a person is classified as a simulant, while being a real patient, and false-negative errors, in which a person is classified as a *bona fide* patient, while being a simulant [6]. In the case of a false positive, it could result in a violation of civil rights, that is, a conviction and imposition of an unjustified prison sentence if the individual is found guilty. There are also other implications, such as not getting the necessary psychiatric help, disability benefits, etc. In the case of a false negative, a person may receive unnecessary psychiatric or medical assistance or unjustified financial compensation or compensation for damage. Finally, as with any clinical method or procedure, the usefulness and validity of the SIMS depend on the qualification and competence of the professionals using this instrument.

The use of the SIMS in combination with other instruments such as the Symptom Validity Tests (SVTs) or Performance Validity Tests (PVTs) [28] in the context of a comprehensive evaluation is consistent with Hutchinson's [48] recommendation that malingering disorders should be determined multiple times and that they require a multidimensional discovery strategy. At the same time, using the SIMS in combination with other tests designed to detect malingering allows a significant reduction in false-positive errors since the subject must "fail" at least two tests in order to qualify as a simulant [45]. Thus, it is essential that symptom validity assessment involves multiple measures covering different domains of symptomatology during different stages of evaluation [48, 49].

We also believe that the SIMS questionnaire should be supplemented by conducting a structured interview, even though this method is time-consuming and requires a trained assessor. This is also the recommendation of some researchers [49–52] who have dealt with the problem of disorder assessment and malingering symptoms. That would reduce or eliminate possible evaluation errors previously noted in making diagnostic decisions [51]. When conducting an interview, the examiner should pay particular attention to the exaggeration and dramatic presentation of symptoms [9], inconsistencies regarding psychiatric diagnosis, and reporting of rare, atypical, or extreme symptoms [6].

Conclusion

The main contribution of this study could be divided into two important aspects. First, this is the very first study that aimed to validate the SIMS inventory in our country prior to our knowledge. Second, our results show that the SIMS inventory can detect the simulation of different symptoms in a hypothetical situation. Altogether, results from previous studies and this study indicate that the SIMS inventory can be used for detecting the simulation of different symptoms in both real and hypothetical situations. In addition, our study has shown that this instrument can be used in practice as a reliable measure of the simulation of symptoms in our country.

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