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Article

The Impact of Different Forms of Coaching on the Structured Inventory of Malingered Symtomatology (SIMS)

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ABSTRACT

Background: Psychometric symptom validity instruments (SVTs) can be vulnerable to coaching, which can negatively affect their performance. Our aim was to assess the impact that different types of coaching may have on the sensitivity of the Structured Inventory of Malingered Symptomatology (SIMS). **Methods:** A simulation design was used with 232 non-clinical adults divided into five experimental simulation conditions and 58 patients with anxious-depressive symptomatology derived from a traffic accident. All simulators received a basic scenario and, in addition, the second group was instructed on the symptomatology, the third was warned about the risk of exaggerating the presentation, the fourth received a combination of the two previous groups and the fifth received specific training on SVTs. **Results:** The discriminative ability of the SIMS was higher in the basic and symptom information groups, and it decreased significantly in the specific training group on SVTs. Conclusions: SIMS seems not to be severely impacted by a variety of symptom coaching styles, although test coaching diminished its performance.

El Impacto de Diferentes Formas de Coaching en el Inventario Estructurado de Simulación de Síntomas (SIMS)

Palabras clave:
Inventario Estructurado de Simulación de Síntomas
SIMS
Exageración de síntomas y simulación
Preparación de síntomas
Validez de síntomas

RESUMEN

Antecedentes: Los instrumentos psicométricos de validez de síntomas (SVTs) pueden ser vulnerables a la preparación, lo que puede afectar negativamente a su rendimiento. Nuestro objetivo evaluar el impacto que diferentes tipos de preparación pueden tener en la sensibilidad del Inventario Estructurado de Simulación de Síntomas (SIMS). **Método:** Se utilizó un diseño de simulación con 232 adultos no clínicos divididos en cinco condiciones de simulación y 58 pacientes con sintomatología ansioso-depresiva derivada de un accidente de circulación. Todos los simuladores recibieron un escenario básico y, además, el segundo grupo fue instruido sobre la sintomatología a presentar, el tercero fue advertido sobre el riesgo de exagerar su presentación, el cuarto recibió una combinación de los dos grupos anteriores y el quinto recibió un entrenamiento específico sobre SVTs. **Resultados:** La capacidad discriminativa del SIMS fue más elevada en el grupo de escenario básico e información de síntomas, disminuyendo significativamente en el grupo de entrenamiento sobre SVTs. **Conclusiones:** El SIMS parece no verse afectado severamente por las diferentes formas de coaching, no obstante, la preparación específica sobre el test disminuye su rendimiento.

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Clinical and forensic psychological exam findings are vulnerable to intentional and unintentional distortions in response styles (Czornik et al., 2021). Evaluations made in both contexts are highly dependent on the respondent's presentation of the alleged condition suffered, openness and accuracy in responding, and willingness to make a sincere and sustained effort (Merten & Merckelbach, 2020). Examiners must always consider that there is a possibility that patients may not offer an honest symptom presentation, influenced by goals or motives unrelated to the condition suffered (Sherman et al., 2020). Thus, when faced with a problematic presentation, a number of hypotheses should be considered, including the influence of the sequence of items and tests applied, lack of information about the symptoms suffered, presenting an inattentive response pattern to the instruments, personality traits, defensivness, social desirability, and impression management and/or the possibility of obtaining a benefit, whether due to an internal or external motivation (Merckelbach et al., 2019; Rogers & Bender, 2018).

In clinical and forensic contexts the latter possibility is considered of great importance (Arce et al., 2015; Uiterwijk et al., 2021). In the first context, the respondent may benefit from assuming the patient role, or advantages associated with having a disease, while, in the second, it is possible to acquire certain legal or financial benefits, such as reduced criminal liability or disability compensation disability (Czornik et al., 2021; Merten & Merckelbach, 2020). Consequently, the validity of symptom presentation an the analysis of possible response bias should be carefully checked, and the risk that the patient is feigning symptoms should be controlled (Merten & Merckelbach, 2020; Merten & Rogers, 2017; Shura et al., 2022) as part of all clinical and forensic exams (Sweet et al., 2021).

To assess symptom validity, it is advisable to follow a multimethod approach using several sources of information, including tools with proven efficacy (González Ordí et al., 2012; Puente-López et al., 2021). Among such sources of information, the use of psychometric measures is one of the most common approaches for the assessment of symptom validity (Merten et al., 2022a; Pignolo et al., 2021). These tools are known as symptom validity tests (SVTs) and/or performance validity tests (PVTs), and their main purpose is to assess response style distortion on symptom scales and underperformance on cognitive tests, respectively. Within the category of SVTs, there are multiple instruments available to the practitioner today (e.g., see Giromini et al., 2022). The SIMS is one of the most widely used instruments worldwide in the forensic context (Merten et al., 2022b), and it has proven to be effective in differentiating between honest evaluees and malingerers (van Impelen et al., 2014). Despite its widespread use, evidence indicates that the SIMS has certain limitations (see Shura et al., 2021; van Impelen et al., 2014), and a primary criticisms is the use of infrequent symptoms as a detection strategy, making it vulnerable to coaching (Parks et al., 2017).

Coaching refers to the use of different strategies - such as providing symptom information, warning about the possibility of detection, or tests instruction - with a goal of increasing the quality of individuals' performance in the symptom validity assessment (Boskovic et al., 2022; Gorny & Merten, 2006). As indicated by Chafetz (2022) and Crisan et al. (2021), different coaching strategies generate a negative impact on the diagnostic efficacy of the psychometric tests applied, especially the SVTs. Specific to the SIMS, multiple studies show that, although it appears to be relatively resistant to different forms of preparation, coaching aids the ability of feigners to evade detection on SIMS, by generating a significant decrease in its sensitivity (Boskovic et al., 2022; Grant et al., 2022; Jelicic et al., 2006, 2007, 2011). Such an effect leads to errors with severe consequences in the clinical and forensic context (Aparcero et al., 2021), hence, it is important to closely evaluate the resistance of common SVTs to different forms of coaching in different contexts and types of symptomatology/conditions. To date, the available evidence is limited, and a further investigation is necessary.

In the light of the above, the present study aims to evaluate the impact that different types of preparation can have on the sensitivity of the SIMS. For this purpose, we developed a simulation study with a clinical sample of patients suffering from anxious-depressive symptomatology after a traffic accident (control group) and five experimental groups that were administered different levels of symptom coaching.

Method

Participants

Power analysis was conducted with G*Power (Faul et al., 2007). In order to detect an effect of $\eta^2_p = .25$ with 90% power in a one-way between-subjects ANOVA (six groups, alpha = .05), G*Power indicated approximately 45 participants in each group ($N = 270$). Taking into account the possibility of discarding some participants due to the application of the selection criteria, a total of 290 participants were recruited. From those, 58 were outpatients with anxiety-depressive symptoms suffered after a traffic accident (clinical control group) and 232 were non-clinical adults. Non-clinical adults were randomly divided (simple random sampling using SPSS random number function) into five simulation groups: 1) experimental simulators with basic scenario (naïve group); 2) experimental simulators who obtained symptom information (informed group); 3) experimental simulators who obtained a warning (warned group); 4) experimental simulators who obtained both symptom information and warning (informed plus warned group); 5) experimental simulators with specific SVT preparation (coached group).

For the control group, the following inclusion criteria were used: i) Being of legal age (≥ 18); ii) Sign the informed consent; iii) Being in psychological treatment for having suffered anxiety-depressive symptoms as a result of suffering a motor vehicle accident. Also, the following exclusion criteria were used: 1) Not being involved in a financial compensation or litigation process; 2) Having no other cause that explains the presence of anxiety-depressive symptoms; and 3) Having no external incentive that could motivate feigning anxious-depressive symptoms. Similarly, the following inclusion criteria were used for the five simulating groups: i) Were of legal age (≥18); ii) Signed the informed consent; iii) Passed the pre manipulation check (all questions answered correctly; $n = 5$ did not pass); iv) Passed the post manipulation check (no item with a score higher than 3; $n = 3$ did not meet); v) Provided complete answers on all administered instruments.

After applying the exclusion criteria, 8 experimental simulators were discarded. The final sample consisted of 282 participants: 58 clinical patients (51.7% women; $M_{age} = 40.9$, $SD = 11.6$); 45 naïve simulators (82.2% women; $M_{age} = 20.7$, $SD =$

4.0); 45 informed simulators (77.8% women; M_{age} = 20.1, *SD* = 2.58); 44 warned simulators (84.1% women; M_{age} = 20.7, *SD* = 5.51); 45 informed plus warned simulators (68.9% women; M_{age} = 21.1, *SD* = 5.0); 45 coached simulators (53.3% women; M_{age} = 22.9, *SD* = 5.2). No significant differences were found according to sex (p = .67), but the age of the clinical group differed significantly from the experimental simulator groups [$F(5,276) = 85$, $p < .01$]. No significant differences in age were found between the experimental groups.

In the clinical control group, the participants on average received two months of treatment (*M* = 58.27 days; *SD* = 8.54), and approximately five months have passed since the traffic accident (*M* = 147.27 days; *SD* = 37.17). All claimed to suffer from anxiety-depressive symptoms, originated from a traffic accident. The vast majority (96%) had met the DSM-5 diagnostic criteria for acute stress disorder (APA, 2013), while the remaining 4% presented significant anxiety symptoms, but did not meet the diagnostic criteria for this condition. The presence of a relevant external incentive was not identified in any participant (see procedure section). All patients had finished the litigation procedure related to the traffic accident, and had reached an agreement on obtaining a financial incentive with the private insurance company involved. Thirty-two patients (55%) had already received financial compensation, while the rest were still waiting. All patients paid for therapy with their own money and stated that they were fully aware that both the results obtained in therapy and those obtained in the study would not have had any impact on the financial compensation for the accident.

Instruments

36-Item Short Form Survey (SF-36; Ware, 2000). The SF-36 is a 36-item self-reported instrument that assesses health-related quality of life (HRQoL). The instrument is divided into the following subscales: Physical Function (ability to perform physical tasks), Physical Role (ability to fulfill the physical role), Body Pain, General Health, Vitality (energy/fatigue), Social Function (ability to perform social activities and tasks), Emotional Role (role limitations due to emotional problems), and Mental Health. Each subscale produces a score from 0 to 100, with higher scores indicating better quality of life. Cronbach Alpha is α = 0.85 for all dimensions except for social functioning (α = 0.75). For our sample, the Spanish version was used and Cronbach's Alphas were: Physical Function, 0.84; Physical Role, 0.87; Body Pain, 0.81; General Health, 0.79; Vitality, 0.89; Social Function 0.80; Emotional Role, 0.91, and Mental Health, 0.87.

Beck Depression Inventory in its second version (BDI-II; Beck et al., 1996). The BDI-II is a self-report inventory that measures the presence and severity of depression with a range of scores from 0 (minimal depression / no depression) to 63 (severe depression). It consists of 21 items rated 0 to 3 based on separate anchors for each item. Respondents choose the phrase that best describes their situation during the prior two weeks. Reliability for the Spanish version of Sanz et al. (2003) was α = 0.86. For our sample, the Spanish version was used with α = 0.89.

Beck Anxiety Inventory (BAI; Beck et al., 1988). The BAI is a self-reported inventory that measures the presence and severity of anxiety with a range of scores from 0 (minimal anxiety / no anxiety) to 63 (severe anxiety). It is comprised of 21 multiple-response items in which the respondent chooses the phrase that best describes their situation during the prior two weeks. Reliability per Beck et al. (1988) was α = 0.93. For our sample, the Spanish version was used with α = 0.90.

Structured Inventory of Malingered Symptomatology (SIMS; Widows & Smith, 2005). The SIMS is a self-reported SVT of 75 true/false items that assesses the probable feigning of neurological and psychiatric symptoms. It offers a result that indicates probable symptom overreporting and also has five subscales (Psychosis [P], Neurological Impairment [NI], Amnestic Disorders [AM], Low Intelligence [LI], and Affective Disorders [AF]) that provide information on the specific area in which the feigning may be ocurring. Higher scores are indicative of endorsement of unlikely symptomatology. The recommended cut-off scores are > 14 and > 16 (van Impelen et al., 2014). The SIMS has been identified as the most commonly-used, stand-alone SVT in both Europe (Merten et al., 2022b). The Spanish version of the scale, adapted by González-Ordi and Santamaría (2009), was used (α = 0.94). For our sample, reliability was α = 0.93.

Procedure

The study was conducted from 2019 to 2021 and followed a simulation design in which healthy participants were instructed to simulate certain complaints. For the control group, a sample of genuine patients was recruited at a multidisciplinary medical center in Spain. The psychologist at the clinic who agreed to participate in the study verified that his patient mets the inclusion criteria and invited them to participate. Patients who agreed to participate signed the consent and were evaluated by one of the authors. Special emphasis was placed on the anonymous nature of the study, and it was indicated that under no circumstances would the information provided in the framework of the investigation be provided to third parties, especially their therapist. The possible presence of external incentives was assessed with an ad hoc semi-structured interview in which information about socioeconomic status, social, financial, and family context factors, work history, current conflicts and legal issues was analyzed and subsequently verified with the information available to the psychologist evaluating the patient.

For the simulator groups, students at the university of one of the authors were recruited. Students enrolled in the study via e-mail and were randomly assigned to one of the 5 experimental conditions. Subsequently, they were invited to come to the university, were provided with instructions according to their role and were asked to complete the battery of tests. All participants, regardless of assigned condition, received a basic scenario about a person who had suffered a traffic accident and were asked to assume the role of the protagonist and to prepare for a forensic evaluation. They were told that after the traffic accident, the participant had developed anxiety-depressive symptoms that had improved over time. They were asked to imagine that, since the legal procedure to obtain compensation had been delayed for a long time, their symptoms had been significantly mitigated, but they felt entitled to receive compensation for the discomfort and severe limitations. So they decided to pretend that the symptoms persisted and that they were still intense. The Naïve group received only this basic scenario, while the remaining four groups obtained this scenario plus additional information. The Informed group

received information on the usual clinical presentation of anxious and depressive symptoms; the Warned group received warning elements indicating that it should not overdo its presentation or it could be detected by an expert evaluator; and the Informed plus warned group received both instructions (information on symptoms and warning). Finally, for the Coached group, detailed information was offered on the operation of the principles of symptom validity testing. In the informed consent, this group was expressly told that all the test information explained was highly sensitive and confidential.

To ensure understanding of the roles (verification of pre-experimental manipulation), a 15-item questionnaire with three response options, where only one is correct, was administered. All the questions were related to the scenario that the participants had read beforehand: Naive answered 3 questions; Informed, 6 questions; Warned, 9 questions; Informed plus warned, 12 questions; and Coached, 15 questions. An example of questions included in this questionnaire would be "What kind of difficulties did you experience after the accident: (a) Sleep paralysis; (b) Sadness, anxiety and fear of getting into a car; (c) Epileptic seizures". Failure to answer all questions correctly meant exclusion from the study. At the end of the the study, participants completed an exit experimental manipulation check where, with a score of 1 (indicating high levels) to 5 (indicating low levels), memory, understanding, compliance with instructions, effort, and motivation were assessed. Participants who obtained scores indicative of low levels (4 or 5) on any of the questions were excluded from the experiment. As a positive incentive, all the groups were offered an extra point on the final course grade; as a negative incentive, failure was penalized (i.e., only those who completed the scales according to the assigned role would receive the bonus). Condition instructions and experimental checks can be obtained by requesting the corresponding author.

This study was approved by the Research Ethics Committee of the authors' University and followed the ethical considerations proposed by the American Psychological Association (2002, 2010).

Data analysis

We analyzed the differences between the groups with the analysis of variance of one factor (ANOVA) with Tukey test post hoc contrasts. Partial eta-squared and Cohen's d statistic were used for effect size, with the d range proposed by Rogers et al. (2003) (Moderate ≥ 0.75; Large ≥ 1.25; Very large ≥ 1.50). Sensitivity and specificity of the SIMS were evaluated using the recommended cut-off points (>14 & >16; van Impelen et al., 2014). Given that the other instruments included in the assessment battery (BDI, BAI and SF-36) do not have updated cut-off points prepared for the target population, their scores were analyzed descriptively. All analyses were performed with IBM Statistics SPSS version 25.

Results

Exit Manipulation Check

The scores of the exit manipulation check can be seen in the Table 1. All groups achieved moderate-high scores, and no significant differences were found between them in terms of understanding and compliance with instructions, effort, or motivation. Significant differences were found in the memory variable, where the coached group obtained higher scores than the rest (M =1.91, SD = 0.70, p = 0.011).

Scale Scores and Comparison Between Groups

Table 2 shows the mean scores obtained on the battery of instruments for each of the groups included, as well as the comparison between them. The effect sizes of the comparisons between experimental and control groups are shown in the Table 3.

For the BDI and BAI scores, the overall effect of groups was significant for the two instruments, [$F(5,276) = 23.3$, $p < .01$; $F(5,276) = 32.6$, $p < .01$]. The post hoc tests indicated that the naïve had the highest scores on both (M = 23.7, SD = 12.3 and M = 32.2, SD = 11.3 respectively). The coached group presented the lowest severity profile (M = 6.9, SD = 5.4 and M =1 6.9, SD = 5.7 respectively), well below the scores of the control group (M = 20.9, SD = 8.1 and M = 24.8, SD = 7.7 respectively). Regarding the alterations in the quality of life (SF-36), overall, the groups obtained significantly different scores in all subscales ($Fs > 6.4$, $ps < .01$). Specifically, the coached group presented the least severe profile, not significantly different from that of the control group on all the SF-36 variables ($ps > .39$), and the naïve and informed groups had the highest scores on all subscales.

Finally, the results on SIMS revealed significant different scores between groups in the Total score [$F(5,276) = 24.0$, $p < .01$], and the five subescales of the instrument ($Fs > 4.9$, $ps < .01$). Specifically, the control means did not reach any of the SIMS cut-off points (14 and 16, M = 8.7, SD = 4.0), but high scores were observed in this group in the Affective Disorders subscale (M = 4.9, SD = 2.8). Regarding the experimental simulators, all the groups obtained an average score higher than the two recommended cut-off points, with the Affective Disorders and Low Intelligence subscales having the highest scores in them. The informed group was the only one that has obtained a higher score in Low Intelligence than in Affective Disorders. The naïve and informed group presented the most severe scores of the entire sample, identifying significant differences between these two groups only in the Total score of the SIMS (SIMS-TS, p = .02). Affective Disorders, and Low Intelligence subscales (SIMS-AF and SIMS-LI, p <.005).

Table 1.
Mean, standard deviation and ANOVA of the exit manipulation check.

	Naive	Informed[2]	Warned[3]	Informed + Warned[4]	Coached	
	M(SD)	M(SD)	M(SD)	M(SD)	M(SD)	$F_{(5,276)}$
Memory	2.27(0.68)	2.42(0.69)	2.18(0.72)	2.31(0.73)	1.91(0.70)	3.33*
Understanding	2.00(0.60)	1.84(0.67)	1.68(0.56)	1.76(0.71)	1.84(0.73)	1.44
Compliance with instructions	2.44(0.72)	2.33(0.76)	2.32(0.70)	2.38(0.80)	2.44(0.81)	0.27
Effort	1.84(0.70)	1.96(0.56)	1.98(0.69)	1.93(0.58)	1.82(0.53)	0.55
Motivation	1.98(0.69)	2.20(0.58)	2.14(0.46)	2.18(0.57)	2.04(0.47)	1.23

Notes: *p < .05

Table 2.
Mean, standard deviation, ANOVA, and Post-Hoc test for the groups' scale scores (N = 282).

	Naive[1]	Informed[2]	Warned[3]	Informed + Warned[4]	Coached[5]	Control[6]		Tukey test
	M(SD)	*M(SD)*	*M(SD)*	*M(SD)*	*M(SD)*	*M(SD)*	*F (5,276)*	
BDI	23.7(12.3)	22.5(8.7)	16.8(8.0)	15.1(8.0)	6.9(5.4)	20.9(8.1)	23.3*	1-3*, 1-4*, 1-5*, 2-3*, 2-4*, 2-5*, 3-5*, 3-6*, 4-5*, 4-6*, 5-6*
BAI	32.2(11.3)	30.4(8.6)	18.6(6.2)	17.9(5.7)	16.9(5.7)	24.8(7.7)	32.6*	1-3*, 1-4*, 1-5*, 1-6*, 2-3*, 2-4*, 2-5*, 2-6*, 3-6*, 4-6*, 5-6*
SF-36-PF	42.5(22.5)	38.5(18.8)	35.5(13.8)	39.1(14.6)	62.3(18.0)	65.3(17.9)	26.4*	2-5*, 2-6*, 3-5*, 3-6*, 4-5*, 4-6*
SF-36-RP	51.4(20.9)	47.0(23.0)	40.2(8.3)	37.3(10.9)	58.4(16.0)	61.3(15.2)	17.6*	1-3*, 1-4*, 1-5*, 1-6*, 2-4*, 2-5*, 2-6*
SF-36-RE	22.7(20.6)	25.0(21.5)	35.9(18.6)	38.7(15.9)	37.0(22.0)	40.0(21.7)	6.4*	1-3*, 1-4*, 1-5*, 1-6* 2-3*, 2-4*, 2-5*, 2-6*
SF-36-VT	30.1(20.5)	27.6(20.5)	44.7(15.6)	48.7(14.0)	48.1(19.8)	50.9(19.1)	14.2*	1-3*, 1-4*, 1-5*, 1-6*, 2-3*, 2-4*, 2-5*, 2-6*
SF-36-MH	34.0(20.3)	36.2(22.8)	48.7(21.6)	52.9(19.8)	56.0(23.4)	56.6(24.1)	9.4*	1-3*, 1-4*, 1-5*, 1-6*, 2-3*, 2-4*, 2-5*, 2-6*
SF-36-SF	36.9(22.6)	36.3(23.9)	51.4(17.0)	48.1(19.3)	60.0(20.2)	62.0(19.7)	13.7*	1-3*, 1-4*, 1-5*, 1-6*, 2-3*, 2-4*, 2-5*, 2-6*, 3-6*, 4-5*, 4-6*
SF-36-BP	47.2(28.8)	39.4(19.2)	53.7(18.0)	56.3(17.2)	72.5(26.2)	75.5(24.7)	18.6*	1-5*, 1-6*, 2-3*, 2-4*, 2-5*, 2-6*, 3-5*, 3-6*, 4-5*, 4-6*
SF-36-GH	24.0(19.7)	27.2(22.1)	24.7(13.9)	27.3(15.5)	30.9(13.8)	40.8(15.0)	9.0*	1-4*, 1-6*, 2-5*, 2-6*, 3-5*, 3-6*, 4-5*, 4-6*
SIMS-TS	22.0(10.9)	18.6(2.8)	19.0(8.2)	19.7(8.1)	16.6(4.1)	8.7(4.0)	24.0*	1-2**, 1-3**, 1-5*, 1-6*, 2-1**, 2-6*, 3-5*, 4-6*, 5-6*

Notes: *p < .01; ** p < .05; BDI = Beck Depression Inventory; BAI = Beck Anxiety Inventory; SF-36-PF= Subscale Physical function; SF-36-RP= Subscale Physical role; SF-36-RE= Subscale Emotional role; SF-36-VT= Subscale Vitality; SF-36-MH= Subscale Mental health; SF-36-SF= Subscale Social functioning; SF-36-BP= Subscale Body pain; SF-36-GH= Subscale General health; SIMS – TS = Structured Inventory of Malingered Symptomatology total score.

Table 3.
Effect sizes of the comparisons between experimental and control groups (N = 282).

	η^2	95%CI		*Na-Ct d[1]*	95%CI		*Si-Ct d[2]*	95%CI		*Wa-Ct d[3]*	95%CI		*SiWa-Ct d[4]*	95%CI		Co-Ct d[5]	95%CI	
BDI	0.29	0.21	0.35	0.27	-0.13	0.66	0.19	-0.20	0.58	-0.51	-0.90	-0.11	-0.72	-1.11	-0.30	-2.03	-2.50	-1.54
BAI	0.37	0.28	0.42	0.77	0.35	1.17	0.69	0.28	1.08	-0.89	-1.29	-0.47	-1.02	-1.43	-0.59	-1.17	-1.58	-0.73
SF-36-PF	0.32	0.24	0.38	-1.12	-1.53	-0.69	-1.46	-1.89	-1.01	-1.86	-2.32	-1.38	-1.60	-2.04	-1.14	-0.17	-0.56	0.23
SF-36-RP	0.24	0.16	0.29	-0.54	-0.94	-0.14	-0.73	-1.13	-0.32	-1.72	-2.17	-1.25	-1.81	-2.26	-1.34	-0.19	-0.58	0.21
SF-36-RE	0.10	0.04	0.14	-0.82	-1.22	-0.40	-0.69	-1.09	-0.29	-0.20	-0.59	0.19	-0.07	-0,46	0.32	-0.14	-0.53	0.26
SF-36-VT	0.20	0.12	0.25	-1.05	-1.46	-0.62	-1.18	-1.59	-0.74	-0.36	-0.75	0.04	-0.13	-0.52	0.26	-0.14	-0.54	0.25
SF-36-MH	0.14	0.07	0.19	-1.01	-1.42	-0.59	-0.87	-1.27	-0.45	-0.35	-0.74	0.05	-0.17	-0.56	0.23	-0.03	-0.42	0.37
SF-36-SF	0.19	0.12	0.25	-1.18	-1.60	-0.75	-1.17	-1.59	-0.74	-0.58	-0.97	-0.17	-0.71	-1.11	-0.30	-0.10	-0.49	0.29
SF-36-BP	0.25	0.17	0.30	-1.05	-1.46	-0.63	-1.63	-2.07	-1.17	-1.01	-1.42	-0,58	-0.90	-1.31	-0.48	-0.12	-0.51	0.28
SF-36-GH	0.14	0.07	0.19	-0.96	-1.37	-0.54	-0.72	-1.12	-0.31	-1.11	-1.53	-0.68	-0.89	-1.29	-0.47	-0.69	-1.08	-0.28
SIMS-TS	0.30	0.22	0.35	1.62	1.16	2.06	2.87	2.29	3.40	1.60	1.13	2.03	1.72	1.25	2.17	1.95	1.46	2.41

Notes: Na= Naïve group; Si= Informed group; Wa= Warned group; SiWa= Informed and warned group; Co= Coached group; Ct= Control group; d= effect size Cohen´s d; 95% CI= Confidence interval of 95%; BDI = Beck Depression Inventory; BAI = Beck Anxiety Inventory; SF-36-PF= Subscale Physical function; SF-36-RP= Subscale Physical role; SF-36-RE= Subscale Emotional role; SF-36-VT= Subscale Vitality; SF-36-MH= Subscale Mental health; SF-36-SF= Subscale Social functioning; SF-36-BP= Subscale Body pain; SF-36-GH= Subscale General health; SIMS – TS = Structured Inventory of Malingered Symptomatology total score.

Detection rate

In Table 4, we present the sensitivity and specificity values on two SIMS cutoff points (14 and 16) obtained on our sample. The informed group was the most often detected one using both cutoff points (97% and 88.9%, respectively), whereas the coached group had the lowest detection rates (77.8% and 57.8%, respectively). The global classification capacity of the SIMS has been 85.3% with the first cut-off point and 70.5% for the second. The specificity reached with the indicated cut-off points was 82% and 89.7%, respectively.

Table 4.
Range of SIMS Total score, sensitivity in experimental groups, specifity in the control and overall classification percentage of the experimental groups

	Naive	Informed	Warned	I+W	Coached	Control	% Oc
SIMS TS - SR	9-67	13-27	8-42	10-48	7-30	2-22	-
N SIMS >14 (Sens)	40 (88.9%)	44 (97.8%)	36 (81.8%)	36 (80.0%)	35 (77.8%)		191 (85.3%)
N SIMS > 16 (Sens)	35 (77.8%)	40 (88.9%)	26 (59.1%)	31 (68.9%)	26 (57.8%)		158 (70.5%)
N SIMS <14 (Spec)						48 (82%)	
N SIMS <16 (Spec)						52 (89.7%)	

Notes: SIMS TS-SR= Structured Inventory of Malingered Symptomatology Total Score score ranges; Sens= Sensitivity; Spec= Specificity; % Oc= Overall classification percentage.

Discussion

This study examined the vulnerability of the SIMS to various forms of coaching. This is the first investigation carried out to date in Spain to study the effect of different types of preparation in the SIMS sensitivity, and one of the few to include a clinical control sample.

As expected, the clinical control group exhibited an anxious-depressive symptom profile and moderate to severe changes in quality of life. Specifically, genuine patients reported being more impaired in the domains of emotional role (limitations in the ability to exercise their role due to personal or emotional problems), vitality, mental health (understood as emotional well-being), and perception of general health. These results are consistent with other studies conducted on this topic with similar samples (Malik et al., 1999; Pagotto et al., 2015; Shiner et al., 2011; Tøien et al., 2011). The average SIMS score of this clinical control group was lower than the two typically employed cut-off values, i.e., 14 and 16, and the SIMS yielded a specificity of 82% and 89%, respectively. These specificity values are higher than those reported in the work of Van Impelen et al. (2014), but lower than recommendations that the specificity of an instrument integrated into a psychometric battery should be at least 90% (Sweet et al., 2021).

Regarding the instructed malingerers group, three severity profiles emerged. The first profile was with the naïve and informed groups, reaching significantly higher symptom severity scores than those shown by both the rest of the experimental and control groups. This finding fit well with previous studies where it was observed that the groups assigned to the naïve group (also known as basic or no preparation condition), present a higher severity profile than the rest (Gorny & Merten, 2006; Jelicic et al., 2006, 2007, 2011; Merckelbach & Smith, 2003). The second profile identified, corresponding to the warned and informed plus warned groups, is characterized by a moderate-high severity presentation of symptoms, less severe than the profile of the naïve and informed group. Compared to the control group, this profile included fewer symptoms of depression and anxiety but significantly higher scores on qualtity of life alteration and overreporting (SIMS). The third profile corresponded with the coached group; scores were significantly lower than the control group in terms of depression and anxiety, and higher regarding overreporting. However, the scores indicative of alterations in life quality were similar to those of the control group.

The SIMS cut-off of > 14 provided better sensitivity than the >16 cutoff, coinciding with similar studies (e.g., Parks et al., 2017). The simulator groups obtained a range of total score from 16.6 to 22.0, which is lower than the range of 23.3 to 35.8 recorded by van Impelen et al. (2014). These differences may be due to the type of condition they were asked to simulate and the warnings they received. In our case, they were specifically asked to simulate anxiety-depressive symptoms caused by a traffic accident and were told, both in the presentation of the experiment and in the explanation prior to carrying it out, that they need to adequately perform the assigned role. Hence, it is possible that the specifics of our instructions together with previous warnings made the participants more careful in responding. Although they retained the tendency to over-report, some of the SIMS items, especially those of the Psychosis subscale, can be considered suspicious and thus avoided, as they are identified as incoherent in relation to what has been asked to be feigned (Puente-López et al., 2021).

Related, the SIMS scores in the naïve simulators group, which did not receive the warning, were significantly higher, leading to the sensitivity of 90% with the cut-off point of 14. These results fit well with the findings reported by Van Impelen et al. (2014), who observed a sensitivity range from .87 to 1.00 for naïve simulators, and by Shura et al. (2021), who reported a range from .52 to .98 in simulation studies.

For SIMS sub-scales, although the informed group's scores on the AF subscale were lower and their scores on LI and AM were higher than those of the naïve group, the sensitivity of the SIMS in the informed group reached 98% with the cut-off score of 14. This coincides with previous findings where it was observed that knowledge about psychopathology does not decrease the sensitivity of SIMS (Van Impelen et al., 2014), or other SVTs (Edmundson et al., 2017; Gorny & Merten, 2006). Hence, it is possible that symptom information may make simulators pay more attention to items that specifically correspond to the symptoms they have been informed about, but does not affect their tendency to exaggerate.

In the the warned and informed plus warned groups, participants' presentation improved, offering a somewhat more moderate profile. Sensitivity of the SIMS was significantly reduced to approximately 80%, which is consistent with previous studies where it was observed that the warning improved the ability of the simulators to present the assigned profile (Gorny & Merten, 2006; Suhr & Gunstad, 2000; Sullivan & Richer, 2002; Van Impelen et al., 2014; Youngjohn et al., 1999). Of note, Van Impelen et al. (2014) observed in the studies that included a group with combined warning instructions and symptom information that "(…) clinical knowledge interacts significantly with forewarning, but in a counterintuitive way. That is, knowledge about psychopathology reduces the sensitivity-undermining effect

of forewarning by approximately one third" (p. 8). In our study, such negative impact on sensitivity was not observed, but the absence of significant differences between the two groups on practically all the scales would indicate that it is the warning that influences the presentation of the symptoms of the participants, and that the knowledge of psychopathology has little effect. Interestingly, in these groups the mean scores on the BDI and BAI are lower than those of the control, suggesting that the warning has a deterrent effect on the participants, who adopt a more conservative approach when submitting the prepared condition.

Regarding the coached group, the sensitivity of the SIMS decreased to 78% and 58% for the 14 and 16 cut-offs respectively. These values are similar to the 80% recorded by Jelicic et al. (2006), but lower than the 86% recorded in Jelicic et al. (2011) and 90% in Jelicic et al. (2007). As in the previous groups, an improvement in the ability to present a more "realistic" profile was observed. These results are consistent with other studies carried with coached simulators, where a similar "effect of improvement" was found, both on SIMS and other SVTs (Aparcero et al., 2021; Edmundson et al., 2017; Gorny & Merten, 2006; Jelicic et al., 2006, 2007, 2011; Van Impelen et al., 2014; Weinborn et al., 2012). However, although the ability to present a more realistic profile improved, coached simulators were unable to achieve the profile of the clinical patients, as they overendorsed items on SIMS and underendorsed items pertaining to depression and anxiety. It seems that the coached participants adopted a conservative approach when presenting the condition. This approach could allow them to recreate realistic profiles on some instruments, but it could also cause them to underestimate true symptom severity.

Overall, our results are consistent with those indicated by Van Impelen et al. (2014) or Jelicic et al. (2006), and the SIMS appears resistant to different forms of preparation while maintaining high sensitivity. However, it should be noted that this different forms of preparation can undermine its sensitivity by approximately 10%. A recent AACN position paper highlights both the need for test security and the issues related to coaching (Boone et al., 2022), especially in forensic contexts where attorneys commonly coach their clients in preparation for neuropsychological evaluations (Lippa, 2018). However, it is important to note that even in clinical settings, patients might have hidden agendas, such as disability or litigation with possible attorney coaching present, which were not made apparent to clinicians (Merten & Merckelbach, 2020; van Egmond et al., 2005).Therefore, from a practical stand-point, the most relevant implication of our findings is the support for the use of SIMS with respect to coaching. However, if coaching is suspected or probable in a real-world setting, lowering the cutoff to the more liberal manual-recommended cutoff of > 14 might be considered, as sensitivity increased in our coached group. Despite the fact that the present research followed recommendations for simulation studies, such as the use of pre and post-manipulation check, use of positive and negative incentives, and comparison with a sample of genuine clinical patients without identifiable external incentive, the results obtained should be interpreted based on a series of limitations. First, there is a significant age difference between the groups of experimental simulators and clinical patients that can affect the presentation of the results. Second, there has been a significant time limitation in the assessment of clinical patients, which made it necessary to design a battery that did not have a second instrument that could be used as SVT. The administration of these additional SVTs together with the SIMS would have allowed the analysis of the present study to be extended by using a criterion measure for comparison. Third and last, although we tried to objectively establish the absence of an external incentive, it could not be guaranteed that participants disclosed all of the potentially relevant information during the (brief) semi-structured interview. However, the main objective of the present publication was to evaluate the impact of different forms of preparation on the sensitivity of the SIMS, and the presence of possible incentives in the control group does not affect this statistic. Despite these limitations, the current study adds to the growing literature supporting the utility of the SIMS as part of symptom validity assessment, and it provides evidence on the importance of considering the impact of preparation and coaching on the assessment of distorted symptom presentation.

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