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Symptom and performance validation in patients with subjective cognitive decline and mild cognitive impairment

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ABSTRACT

Nonauthentic symptom claims (overreporting) and invalid test results (underperformance) can regularly be expected in a forensic context, but may also occur in clinical referrals. While the applicability of symptom and performance validity tests in samples of dementia patients is well studied, the same is not true for patients with subjective cognitive decline (SCD) and mild cognitive impairment (MCI). A sample of 54 memory-clinic outpatients with evidence of SCD or MCI was studied. We evaluated the rate of positive results in three validity measures. A total of 7.4% of the patients showed probable negative response bias in the Word Memory Test. The rate of positive results on the Structured Inventory of Malingered Symptomatology was 14.8% while only one participant (1.9%) scored positive on the Self-Report Symptom Inventory using the standard cutoff. The two questionnaires were moderately correlated at .67. In a combined analysis of all results, five of the patients (9.3%) were judged to show evidence of probable negative response bias (or probably feigned neurocognitive impairment). In the current study, a relatively small but nontrivial rate of probable response distortions was found in a memory-clinic sample. However, it remains a methodological challenge for this kind of research to reliably distinguish between false-positive and correct-positive classifications in clinical patient groups.

KEYWORDS

Memory clinic; mild cognitive impairment; neuropsychological assessment; performance validity tests; subjective cognitive decline; symptom validity tests

Introduction

Neuropsychological assessment can be understood as an enhanced approach (in contrast to a basic mental status examination) used in clinical and forensic settings to diagnose cognitive disorders like Alzheimer's disease (AD) or its prodromal stages, mild cognitive impairment (MCI) and subjective cognitive decline (SCD) (cf. McKhann et al., 2011). In most clinical contexts, the validity of test results and questionnaire responses is taken at face value. In accordance with their therapeutic role, health professionals usually do not question the authenticity of claimed symptomatology (e.g., Reuben, Mitchell, Howlett, Crimlisk, & Grünewald, 2005). However, this has been called into question in a number of conditions and referral contexts, especially the forensic arena. Symptom and performance validity assessment has also proven to be useful in clinical and rehabilitation contexts (e.g., Carone, Bush, & Iverson, 2013; Carone & Bush, 2018; Heilbronner, Sweet, Morgan, Larrabee, & Millis, 2009; Kobelt, Göbber, Bassler, & Petermann, 2012).

Validity assessment may also be useful in memory clinics, where the same "hidden agendas" known from psychiatric patient treatment (e.g., Van Egmond, Kummeling, & Balkom, 2005) may be detrimental to the accuracy and validity of clinical diagnoses. In younger patients who present with claims of significant cognitive decline with a doubtful, implausible clinical history and no objective signs of brain damage or psychiatric disease, an accurately performed validity assessment may be of utmost importance. Yet, there are only a few published studies on symptom and performance validity in patients presenting with early stages of dementing diseases. The importance of this issue has grown in light of the trend towards a regular monitoring of preclinical memory patients with SCD or MCI, due to their increased risk of developing dementing diseases such as AD (Dufouil, Fuhrer, & Alpérovitch, 2005).

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The concept of MCI was introduced to characterize an intermediate state between usual aging and dementia (Petersen, 2004, for a review). We may distinguish two types of MCI: amnestic MCI (aMCI) if memory functions are impaired in a predominant way, and nonamnestic MCI (naMCI) if predominant impairment is present in other domains than memory (e.g., Csukly et al., 2016). The concept of SCD depicts the self-experience of cognitive impairment in adults of advanced age before decline on cognitive tests can be observed; it has been recognized as a risk factor of dementia later in life (Schmand, Jonker, Hooijer, & Lindeboom, 1996). Research demonstrates that SCD *may* be the first symptomatic predictor for AD, even before MCI onset (Jessen et al., 2014; Koppara et al., 2015). A major difficulty with the concept of SCD arises from the fact that subjective symptom report is only loosely associated with true cognitive ability (as measured by neuropsychological tests *under full-effort conditions*). In some referral contexts, there may be very low or zero correlations between subjective and objective measures. This may not only be the case in samples of disability-seeking patients, but factors like depression, pain, emotional distress, or unawareness of cognitive impairment in patients with dementing conditions have been discussed as underlying causes (e.g., Armistead-Jehle, Gervais, & Green, 2012; Feher, Larrabee, Sudilovsky, & Crook, 1994; Rohling, Green, Allen, & Iverson, 2002).

Just as in cases of working-age persons seeking benefits, personal injury and other compensation cases, and social welfare or criminal cases, potential secondary gain in patients presenting in memory clinics with reported cognitive symptoms can be identified when a person is seeking support in important social matters (such as housing). While the occurrence of factitious disorder in advanced age is supposed to be low (Yates & Feldman, 2016), significantly distorted symptom presentations may be expected at higher rates in patients with somatoform disorder (or cogniform disorder, *sensu* Delis & Wetter, 2007).

Distorted symptom presentations in psychological evaluations may present either as symptom overreporting or underperformance on cognitive tests, or a combination of both. A large variety of symptom validity tests (SVTs) and performance validity tests (PVTs) are available today to assist the clinician or forensic expert in his or her decision making as to the authenticity of symptom claims. While a substantial body of empirical research addresses the performance of PVTs in true severe cognitive impairment (as in patients with dementing conditions, e.g., Dean, Victor, Boone, Philpott, & Hess, 2009; Rudman, Oyebode, Jones, & Bentham, 2011; Teichner & Wagner, 2004), a minimal amount is known about the performance of PVTs in the early stages of dementia (SCD and MCI), and even less about how far self-report measures (SVTs) are resistant to the presence of authentic cognitive impairment (cf. Carone & Ben-Porath, 2014).

Loring et al. (2016) reported unacceptably high false-positive rates of embedded PVTs such as the Reliable Digit Span (RDS; Greiffenstein, Baker, & Gola, 1994) when using the widespread cut score of 7 or measures derived from the Auditory Verbal Learning Test (AVLT; Rey, 1941) in amnestic MCI and early Alzheimer's patients. Also, a logistic regression model based on two AVLT embedded measures showed insufficient specificity in both clinical groups, but acceptable specificity in a group of cognitively intact controls. Zenisek, Millis, Banks, and Miller (2016) studied a sample of older adults presenting in an outpatient memory disorders clinic and found that 30% of them scored below 8 and 13% scored below 7 on the Reliable Digit Span. (For a recent review on PVT research in samples with dementia and MCI, see McGuire, Crawford, & Evans, 2019).

While embedded measures of performance validity should be expected, by their very nature, to be more vulnerable to the presence of authentic cognitive impairment (cf., Davis, 2018, for recent critical studies; Erdodi & Lichtenstein, 2017), stand-alone PVTs should be more resistant and produce a much lower rate of false positives. In line with this, Walter, Morris, Swier-Vosnos, and Pliskin (2014) found Trial 2 of the Test of Memory Malingering (TOMM; Tombaugh, 1996) to produce a 21% false-positive rate in nonlitigant outpatients with moderate to severe dementia, but also a 10% failure rate in participants with MCI. These numbers were comparable to those reported by Tombaugh (1997), with a 27% failure rate in patients with dementia and 9% in patients with milder cognitive impairment. Green, Montijo, and Brockhaus (2011) studied a group of Spanish-speaking memory-clinic patients, 60 of which were classified as having "possible mild cognitive impairment" and 65 presented with mild or moderate dementia. While 41 dementia patients (63%) failed the primary performance validity indicators of the Word Memory Test (WMT, Green, 2003), this was also the case for 13 patients of the MCI group (22%). However, the majority of the patients were classified as presenting with a possible dementia profile in a subsequent profile analysis. Only two of the MCI patients and none of the dementia patients violated the test's Genuine

Memory Impairment Profile (GMIP) and could be classified as false positives. Another PVT, the Medical Symptom Validity Test (MSVT; Green, 2004) was given to a subgroup of the dementia patients ($n = 23$). All patients either passed the primary performance validity indicators of the test or presented with a GMIP. A case report of a patient previously diagnosed with MCI and failing performance validity testing has recently been published by Roor, Dandachi-FitzGerald, and Ponds (2016).

The compelling and complex question when evaluating such presentations is whether they are true or false positives. The true prevalence of exaggerated or invented symptom presentations in memory-clinic patient populations is unknown. From a survey performed by Mittenberg, Patton, Canyock, and Condit (2002), about 8% of clinical referrals should be expected to show malingered or exaggerated symptom presentations. The only study known to the authors that specifically tried to determine the rate of non-credible symptom presentations in a memory-clinic sample was performed by Rienstra, Groot, et al. (2013). The authors examined the relationship between hippocampal volume and memory test performance in patients who were evaluated for the presence of mild cognitive impairment or beginning dementia. In the total sample of 170 patients, 7% presented with noncredible symptoms as measured by the WMT and the TOMM. In the subgroup of patients below the age of 65, the percentage of non-credible performance was 13%. The increased rate in the younger patient group may be explained by a higher probability of presenting at a memory clinic while following a hidden agenda (as previously described), such as early retirement.

Whether a positive result in a PVT (or a series of PVTs) should be treated as a false positive (implying true cognitive impairment while the validity check falsely signaled an invalid test performance) or a true positive (implying a lack of authentic cognitive impairment that could fully explain PVT failure) can be answered neither by performance validity test scores, nor by a profile analysis signaling *possible* genuine impairment. This problem has to be solved on the basis of information from different sources, or as Rienstra, Klein Twennaar, and Schmand (2013) put it: "To conclude that a dementia profile implies genuine severe impairment, clinical correlation is required. For example, mild head injury cannot cause failure on the easy subtests of the WMT and so even if the profile looks like a dementia profile, poor effort would be concluded" (p. 467). In the end, a plausibility and consistency check has to be performed outside neuropsychological testing itself, with clinical expertise to play a major role. This introduces a component of clinical judgment of uncertain reliability and validity into the diagnostic process. This component of clinical judgment, however, has been part of symptom validation for a long time, as becomes clear from a number of Slick criteria (e.g., criterion D, compatibility of PVT failure with a known pathological or developmental condition; criteria B and C which relate to a discrepancy analysis, such as discrepancy between test data and observed behavior, between test data and background history, etc.; cf. Slick, Sherman, & Iverson, 1999).

The central goal of the current study was to collect information about the rate of positive PVT and SVT scores (and, thus, possibly distorted symptom presentations) in memory-clinic patients with SCD and MCI. In order to allow for a possible distinction between true and false positives, a PVT was selected that allowed for a secondary analysis of memory profile plausibility. This was the WMT. Furthermore, two self-report measures were included as SVTs. It was hypothesized that a relatively small, but nonnegligible proportion of memory-clinic patients (comparable to the 8% estimate of the Mittenberg et al., 2002, survey and the 7% estimate of the Rienstra, Groot, et al., 2013, study) would show evidence of significant response distortions in their test results.

Methods

The current data were gathered in the context of a larger research project, the Vienna Conversion to Dementia Study (VCD-Study). The VCD is a prospective cohort study encompassing consecutive referrals of community dwelling clinical patients complaining of cognitive problems. The study protocol was approved by the Ethical Committee of the Medical University of Vienna. Written informed patient consent to perform this study was obtained from all participants.

Participants

All patients were referred to the memory outpatient clinic for the assessment of possible cognitive impairment. All patients underwent a complete neurological examination, standard laboratory blood tests, and psychometric testing. In most cases, a magnetic resonance imaging (MRI) scan of the brain was available. For the detection of significant cerebrovascular disease,

both neuroimaging and clinical patient features were used. All participants completed the Neuropsychological Test Battery Vienna (NTBV) comprising measures of attention, executive functioning, language, and memory while yielding *z* scores for each domain (see Lehrner, Maly, Gleiß, Auff, & Dal-Bianco, 2007; Lehrner et al., 2017; for details of the NTBV and the Vienna diagnostic approach).

After completion of the evaluation, the cognitive status of the patients was determined according to established criteria (Jessen et al., 2014; Petersen & Morris, 2005). The diagnosis of dementia (and specifically of Alzheimer's dementia) was based on the criteria of the Diagnostic and Statistical Manual of Mental Disorders-Fourth Edition (DSM-IV; Sass, Wittchen, Zaudig, & Houben, 2003) and the National Institute of Neurological and Communicative Disorders and Stroke and the Alzheimer's Disease and Related Disorders Association (NINCDS-ADRDA) criteria (McKhann et al., 2011). For the diagnosis of MCI, a cut score of 1.5 standard deviations below age and education corrected norms was used. SCD was diagnosed when no *z* scores on any portion of the battery fell below the threshold of 1.5 standard deviations. A test profile was classified as aMCI if the patient scored below 1.5 standard deviations on at least one memory test; naMCI was classified if the patient scored below that threshold on at least one test in a domain other than the memory.

The initial sample for this study consisted of 70 patients who were tested for neurological diseases and cognitive impairment at the Department of Neurology, Medical University Vienna, Austria, between January 2016 and March 2017. For the purpose of this study, all patients with incomplete data were excluded. Additionally, patients with the final clinical diagnosis of Parkinson's disease and early stage of an Alzheimer's disease were excluded from the analyses. Thus, the final sample comprised 54 patients diagnosed with SCD, naMCI or aMCI. The distribution of the diagnoses (made as a result of history and neuropsychological test interpretation) is given in Table 1.

The age of the final sample of 26 males (46%) and 28 females (54%) ranged from 45 to 89 years ($M = 66.8$; $SD = 9.9$). On average, the patients had 12.5 years of education ($SD = 4.2$). They were either referred by general practitioners, neurologists or psychiatrists, or contacted the memory clinic on their own initiative. Information about possible secondary gain was not available.

Table 1. Means, standard deviations, and failure rates on the symptom and performance validity tests.

		MMSE	WMT (Means of IR, DR, and CNS)				SIMS total score			SRSI endorsed pseudosymptoms			
		M (*SD*)			IR, DR, and/or							Failed screening	Failed standard
Group	*N*	Range	*M*	*SD*	CNS failed	Final failed[a]	*M*	*SD*	Failed	*M*	*SD*	cut score	cut score
SCD	12	29.0 (0.74)	96.7	4.9	1	1	7.5	6.1	1	0.9	2.3	1	0
		28–30											
aMCI	14	27.8 (1.37)	92.0	9.1	3	1	9.6	5.7	2	1.9	3.8	1	1
		26–30											
naMCI	28	28.1 (1.44)	95.5	7.1	2	2	9.5	5.2	5	1.2	2.0	1	0
		25–30											
Total	54	28.2 (1.35)	94.9	7.4	6	4	9.1	5.5	8	1.3	2.6	3	1
		25–30											

Note. MMSE = Mini-Mental State Examination; WMT = Word Memory Test; IR = immediate recognition, DR = delayed recognition; CNS = consistency; GMIP = Genuine Memory Impairment Profile; SIMS = Structured Inventory of Malingered Symptomatology; SRSI = Self-Report Symptom Inventory; SCD = subjective cognitive decline; aMCI = amnestic mild cognitive impairment; naMCI = nonamnestic mild cognitive impairment.

[a]After profile analysis (GMIP or not) and plausibility check.

For the questionnaire results, data of a comparison group from the same institution collected between August 2014 and December 2015 will be presented. The results of this group (first published in Merten, Giger, Merckelbach, & Stevens, 2019) were included to demonstrate the stability of the SVT results (SIMS and SRSI) in a memory-clinic population. All patients ($N = 106$) were referred to the memory clinic for comprehensive assessment of claimed memory impairment. The age of the 52 men and 54 women varied from 27 to 89 ($M = 67.5$; $SD = 11.5$). The final clinical diagnoses of this group were: 63.6% MCI, 18.7% SCD, 14.0% Parkinson's Disease, 2.8% Alzheimer's Disease, and 0.9% Semantic Dementia.

Instruments

Following medical history taking, the *Mini-Mental State Examination* (MMSE; Folstein, Folstein, & McHugh, 1975) was given. This is a very rough estimate of cognitive impairment which is in widespread use in cases of suspected and confirmed dementia. In research, the MMSE scores are often reported to give a rough and easy-to-communicate picture of the general level of cognitive impairment of the samples studied.

Word Memory Test

The WMT (Green, 2003; German version by Brockhaus & Merten, 2004) is a computerized PVT that combines memory assessment with cognitive symptom validity measures. It combines primary validity indicators with a profile analysis. In cases of diagnosed Genuine Memory Impairment Profile, an informal plausibility check was performed to determine whether other information about the patient in question (such as clinical presentation or activities of daily living) was compatible with the claimed severe cognitive impairment. Hence, a determination can be made whether or not the person's test profile reliably reflects the test person's true cognitive ability. Participants have to learn 20 related simple word pairs (e.g., "dog – cat") in two learning trials. In the Immediate Recognition (IR) trial, each of the targets is presented with a foil; the patients have to try and recognize the respective target word in a forced-choice format. After a time lapse of about 30 minutes, the Delayed Recognition (DR) is performed with new foil words. These two primary performance validity scores (or main effort measures) are complemented by a third, which is the Consistency (CNS) between IR and DR. For some statistical analyses, the three main effort measures were combined into one number (mean of IR, DR, CNS; cf. Green, 2007).

The WMT is completed by a multiple choice task (MC) and the subtests paired associates (PA), free recall (FR), and long delayed free recall (LDFR). The latter was not included in the study protocol.

Noncredible performance is concluded if a patient scores below 85% on one or more of the main effort measures (IR, DR, and CNS). However, as such relatively low scores are compatible with the presence of an authentic substantial cognitive impairment (as known, for instance, from patients with dementia), a subsequent profile analysis is performed. If primary effort measures have been failed, then the *easy-hard-difference* is computed. This is the difference between the mean of the easy subtests (IR, DR, and CNS) and the mean of the hard subtests (MC, PA, and FR). If this score is 30 points or higher, a profile is classified as possible genuine neurocognitive impairment (also known as a dementia profile or Genuine Memory Impairment Profile, GMIP). In a subsequent step, the compatibility of this profile with true cognitive impairment (as observable in clinical presentation or deducible from reliable sources of information) has to be checked.

Structured Inventory of Malingered Symptomatology

The SIMS (Smith & Burger, 1997) appears to be the stand-alone SVT most commonly used both in Europe and North America (Dandachi-FitzGerald, Ponds, & Merten, 2013; Martin, Schroeder, & Odland, 2015). It is a 75-item questionnaire designed for the detection of symptom overreporting. The questionnaire consists of five subscales (neurological impairment, amnestic disorders, psychosis, low intelligence, and affective disorders), summed up to a total score. The items relate to atypical, extreme, or bizarre symptoms which ostensibly fit into broad psychopathological domains (e.g., "I cannot remember whether or not I have been married," item no. 40, amnestic pseudosymptom). For every question, the subjects are asked to decide between *yes* or *no*. In the current study, the cut score for the German version (Cima et al., 2003) was used (endorsement of more than 16 pseudosymptoms). A comprehensive review and meta-analysis of the SIMS has more recently been published by Van Impelen, Merckelbach, Jelicic, and Merten (2014).

Self-Report Symptom Inventory

The SRSI (Merten, Merckelbach, Giger, & Stevens, 2016; Merten et al., 2019) is a new instrument for the assessment of symptom overreporting. The 107-item questionnaire combines five self-report scales of potentially genuine symptoms (cognitive symptoms, depressive symptoms, pain symptoms, nonspecific somatic symptoms, and posttraumatic stress disorder/anxiety symptoms) with five pseudosymptom scales (cognitive pseudosymptoms, motor neurological pseudosymptoms, sensory neurological pseudosymptoms, pain pseudosymptoms, and anxiety/depression pseudosymptoms). Similar to the SIMS, the items of the SRSI pseudosymptom scales describe atypical, bizarre, or extreme symptom claims. The items have a dichotomized response format (*true* or *false*). An example for an item on the pain pseudosymptom scale is: "On a scale from 0 (without pain) to 10 (maximum pain) my pain is nearly always at 10." An example for genuine pain symptoms is the statement "I sometimes take pain killers." From the subscale scores, both a total genuine symptoms score and a total pseudosymptoms score are computed.

The SRSI professional manual (Merten et al., 2019) recommends two cut scores for the number of endorsed pseudosymptoms. For screening purposes (i.e., with an accepted maximum false-positive rate of 10%), a more liberal cut score of 7 or more endorsed pseudosymptoms points at possible overreporting, while the standard cut score (with a maximum false-positive rate of 5%) was set at 10 or more pseudosymptoms. In addition, the ratio between the number of endorsed pseudosymptoms and endorsed genuine symptoms can be used as another indicator of non-credible symptom report, with an empirically established screening cut score at 0.288 (with a maximum 10% false-positive rate). The ratio was not included in the current analyses.

Neuropsychological Test Battery Vienna

The NTBV is a standardized and validated test battery for the assessment of patients with suspected dementia, developed in Austria (Lehrner et al., 2007; Pusswald et al., 2013). The battery consists of a variety of subtests tapping cognitive abilities like attention, memory, language, and executive functioning. In the planning phase of the study, it was intended to include a comparison of neuropsychological test performance in patients who passed validity testing with those who failed, but due to a low number of patients with reliable PVT/SVT failure, these analyses were not performed.

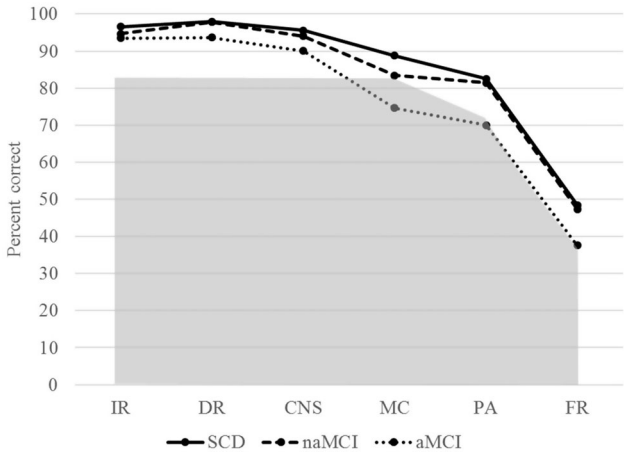

Figure 1. Average Word Memory Test (WMT) scores of patients with subjective cognitive decline (SCD, $n = 12$), non-amnestic mild cognitive impairment (naMCI, $n = 28$), and amnestic mild cognitive impairment (aMCI, $n = 14$). The gray area marks the abnormal performance area. IR = immediate recognition; DR = delayed recognition; CNS = consistency; MC = multiple choice task; PA = paired associates task; FR = free recall; SCD = subjective cognitive decline. Adapted from Green (2003). *Green's Word Memory Test. User's Manual*. Edmonton, Canada: Green's Publishing. Printed with kind permission from Paul Green.

Results

The final sample comprised 54 patients who met the criteria for SCD, naMCI, and aMCI both in their history and the NTBV results. The Mini-Mental scores of the total sample varied between 25 and 30, with a mean score of 28.2 ($SD = 1.35$). The results of the patient groups in the performance and symptom validity assessment are summarized in Table 1.

Performance Validity Test results

The average WMT scores of the SCD, naMCI, and aMCI group are presented in Figure 1. Out of the 54 patients, 48 passed all primary effort measures (IR, DR, and CNS). Six patients (11.1%) failed at least one of these effort measures, which required a more elaborate analysis of their test profiles (cf. detailed results in Table 1). Due to a genuine memory impairment profile in combination with clinically obvious cognitive deficits, two of those six participants (both belonging to the aMCI group) were classified as presenting with an authentic test performance. Two patients violated the WMT severe impairment profile and two had a GMIP profile but did not clinically present with corresponding significant impairment or functional deficits. Thus, the cognitive performance of four (7.4%) patients was classified as invalid.

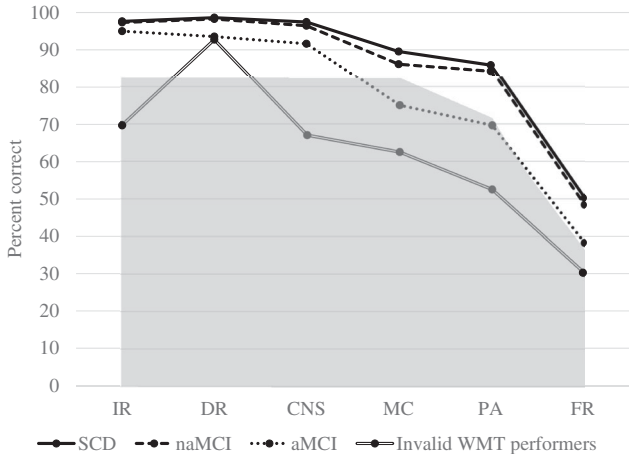

Figure 2. Average Word Memory Test (WMT) scores of patients with subjective cognitive decline (SCD, $n = 11$), nonamnestic mild cognitive impairment (naMCI, $n = 26$), and amnestic mild cognitive impairment (aMCI, $n = 13$) patients showing valid test performance and patients with invalid test performance ($n = 4$). The gray area marks the abnormal performance area. IR = immediate recognition; DR = delayed recognition; CNS = consistency; MC = multiple choice task; PA = paired Associates task; FR: Free Recall; SCD: Subjective cognitive decline; naMCI: nonamnestic mild cognitive impairment; aMCI: amnestic mild cognitive impairment. Adapted from Green (2003). *Green's Word Memory Test. User's Manual*. Edmonton, Canada: Green's Publishing. Printed with kind permission from Paul Green.

Two of the patients with apparently noncredible performance belonged to the naMCI group, one each to the aMCI and the SCD groups. The average easy-hard difference of the total group was 33.3. Mean scores of the WMT scales for patients with valid and invalid test performance are displayed in Figure 2.

Symptom Validity Test results

On the SIMS, the patients scored on average 9.1 points ($SD = 5.5$; range from 3 to 25). Using the established cut score for the German version (Cima et al., 2003), eight patients (14.8%) scored above 16 (i.e., beyond the cut score) indicating possible overreporting.

On the SRSI, the patients endorsed on average 16.5 potentially genuine symptoms ($SD = 8.6$; range from 2 to 39) and only 1.3 pseudosymptoms ($SD = 2.6$; range from 0 to 15). Using the cut score for screening purposes, three of the patients (5.6%) tested positive, indicating possible overreporting in their symptom claims. However, when the standard cut score recommended for routine clinical use was used, only one of the patients (1.9%) scored positive.

In the comparison patient group examined between 2014 and 2015 in the same memory clinic, the patients reported between 0 and 43 potentially genuine symptoms ($M = 16.0$; $SD = 9.2$) and between 0 and 9 pseudosymptoms ($M = 1.4$; $SD = 2.2$). Only six patients (5.7%) affirmed a number of pseudosymptoms above the screening cut score and no patient scored above the standard cut score. SIMS scores ($M = 9.4$; $SD = 6.3$) correlated at .68 with the number of SRSI pseudosymptoms. In contrast to the SRSI, a higher percentage of patients scored positive ($n = 14$, 13%) suggesting possible distortions in patients' symptom report. With the choice of a higher cut score of 21 for the SIMS (cf. Van Impelen et al., 2014), the number of positives was still elevated ($n = 8$, 7.5%).

A more detailed analysis of the SVT results, broken down by genuine symptoms and pseudosymptoms subscales, is available from Table 2. The table contains the results of both the current sample and the comparison sample.

Correlations between years of education and SVT/PVT measures as well as genuine symptom report (SIMS, SRSI pseudosymptoms, mean of WMT IR, DR, and CNS, SRSI genuine symptom report) were all nonsignificant. Furthermore, no significant differences were found between subjects with valid and invalid test performance with respect to age, sex, or education (Wilcoxon rank-sum tests).

The intercorrelations between the different measures of performance and symptom validity are presented in Table 3. A high correlation of .67 between the two measures of overreporting (SIMS and SRSI pseudosymptoms) was obtained, whereas there was a significant, medium-sized correlation between performance and symptom validity measures.

Correlations with age were all nonsignificant and ranged from −.04 (WMT mean IR, DR, and CNS score) to .17 (with SIMS total score). Likewise, no effects were found for gender (t test statistics all nonsignificant) in the genuine symptom report, in the pseudosymptom endorsement, and the WMT performance validity measures.

Agreement between invalid cognitive performance and potentially invalid symptom report, final clinical decisions: The agreement between the three validity measures was relatively low, with only one participant scoring positive on all three measures (and, in addition, not presenting with a GMIP). This was the only patient who also scored above the SRSI standard cut score. Due to the low number of positives on the WMT and SRSI pseudosymptoms, no formal statistics of classification agreement were performed.

Only two patients scored positive on both SIMS and SRSI. One of them was the patient mentioned in

Table 2. SIMS and SRSI scores broken down by subscales.

	Total sample ($n = 54$)		Comparison group ($n = 106$)	
	M (*SD*)	Range	*M* (*SD*)	Range
Self-Report Symptom Inventory (SRSI)				
Cognitive symptoms	5.6 (2.9)	0–10	5.5 (3.1)	0–10
Depressive symptoms	1.7 (1.8)	0–7	1.8 (1.9)	0–8
Pain symptoms	2.2 (2.5)	0–10	2.7 (3.1)	0–10
Unspecific somatic symptoms	4.8 (2.6)	0–10	4.3 (2.7)	0–10
Anxiety symptoms	2.2 (1.7)	0–7	1.8 (1.5)	0–9
Total genuine symptoms	16.4 (8.6)	2–39	16.1 (9.2)	0–43
Cognitive pseudosymptoms	0.5 (1.1)	0–5	0.4 (0.9)	0–4
Motor pseudosymptoms	0.1 (0.6)	0–4	0.3 (0.7)	0–3
Sensory pseudosymptoms	0.3 (0.7)	0–3	0.3 (0.6)	0–4
Pain pseudosymptoms	0.2 (0.6)	0–3	0.2 (0.5)	0–3
Mental pseudosymptoms	0.2 (0.4)	0–2	0.2 (0.6)	0–4
Total pseudosymptoms	1.3 (2.8)	0–15	1.4 (2.2)	0–9
Structured Inventory of Malingered Symptomatology (SIMS)				
Neurological impairment	1.9 (1.6)	0–7	2.4 (1.9)	0–9
Affective disorder	3.2 (2.4)	0–11	3.1 (2.5)	0–14
Psychosis	0.8 (1.1)	0–6	0.7 (1.3)	0–6
Low intelligence	1.2 (1.1)	0–4	1.0 (1.0)	0–4
Amnestic disorder	2.0 (1.9)	0–7	2.2 (2.3)	0–11
Total SIMS	9.1 (5.5)	3–25	9.4 (6.3)	1–32

Table 3. Intercorrelations between different measures of symptom and performance validity.

	SIMS	SRSI pseudosymptoms	WMT[a]
SIMS	1	.67**	−.35*
SRSI pseudosymptoms	.67**	1	−.35*
WMT	−.35*	−.35*	1

SIMS = Structured Inventory of Malingered Symptomatology; SRSI = Self-Report Symptom Inventory; WMT = Word Memory Test.
[a]Means of immediate recognition, delayed recognition, and consistency.
*$p < .05$. **$p < .01$.

the previous paragraph. Figure 3 contains a chart of the how PVT and SVT results were distributed throughout the sample as well as the final clinical decisions based on the complete sets of diagnostic information about the patients.

Discussion

The present study aimed to investigate the occurrence of positive symptom and performance validity test results in a sample of memory-clinic outpatients. While the influence of dementing conditions on PVT performance has been widely studied, there is a minimal amount of substantial data available about MCI and SCD patient groups. An eligible PVT should be resistant against the effects of true cognitive impairment (e.g., Hartman, 2002), but the switch from below-chance performance patterns as a safe indicator for cognitive profile invalidity to the widespread use of empirically based cutoff scores has made PVTs vulnerable to producing false positives. This is especially true for embedded validity indicators (Erdodi & Lichtenstein, 2017). The dilemma arising when special patient populations are studied is that it is difficult to distinguish between true or false positives.

The problem is even more pronounced with questionnaire-based SVTs. Limits of applicability in patient populations with cognitive impairment are not well studied. For populations with claimed mental disorders, it is much more difficult to define bona-fide patients. Hidden agendas and diagnoses based primarily on symptom report are widespread. The same appears to be partly true for younger patients in memory-clinic contexts. As a consequence, clinical psychologists and neuropsychologists should, at a minimum, be aware of possible veiled patient motives. If present, they may not only impede correct diagnosis, but also adversely affect treatment outcome. A careful and comprehensive examination of socioeconomic status, social, financial, and family context factors, work history, current conflicts, legal issues, and expectations from psychological assessment and/or treatment can facilitate the identification of secondary gain motives.

The problems outlined above also pose a major limitation to the present study. No systematic data on possible hidden motives (like intended early retirement or ongoing litigation) could be gathered and we had little systematic and reliable objective data on patients' history. Due to the limited data base available, a full analysis based on the criteria of Slick et al. (1999) could not be performed. However, the data allowed for the classification of some participants as possible and probable invalid symptom presentations (Figure 3).

In the current study, we included only results from memory-clinic patients diagnosed with either MCI

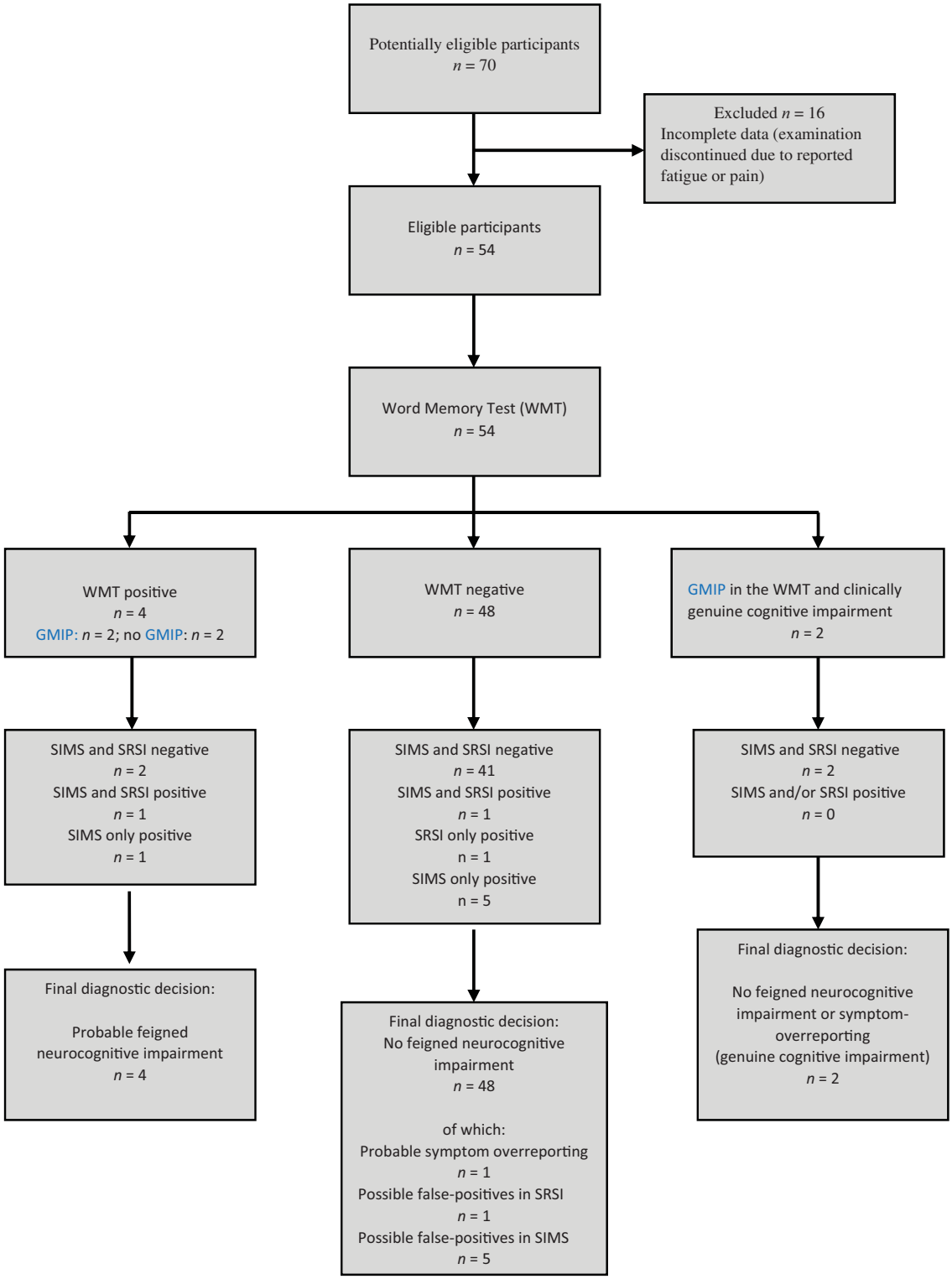

Figure 3. Accordance between WMT, SIMS, and SRSI results, and final diagnostic evaluation of the results. WMT = Word Memory Test; SRSI = Self-Report Symptom Inventory; SIMS = Structured Inventory of Malingered Symptomatology.

or SCD. The Mini-Mental score range of the sample was compatible with that expected from a patient population failing diagnostic criteria for dementia. In this sample, we found a rate of positive validity test results to range between 14.8% for the SIMS and only 1.9% for the SRSI (when the standard cut score of the SRSI was applied; or 5.5% if the screening cut score was used). Thus, the SIMS was found to be either more vulnerable to the presence of genuine symptoms or more sensitive to overreporting, or a combination

of both. However, without knowing the true base rate of feigned symptom presentations in memory-clinic patients, it appears impossible to decide among these alternatives.

A similar discrepancy between SRSI and SIMS classification was obtained from the comparison group of previously studied patients of the same institution. This larger group (which was not limited to MCI and SCD patients, but also included a number of patients diagnosed with dementia) not only yielded similar classification results, but subscale and total SIMS and SRSI scores were largely equivalent to those obtained from the current sample of 54 patients. At the group level, the patients reported few SRSI pseudosymptoms, but the same was *not* true for SIMS items. Actually, the SRSI pseudosymptom report was comparable to that of healthy control persons (Merten et al., 2019). In both samples, the genuine symptom report was dominated by cognitive and unspecific somatic symptoms.

In a previous study, Dandachi-FitzGerald, Ponds, Peters, and Merckelbach (2011) discussed the same dilemma of not being able to clearly distinguish between false and true positives when studying clinical patient groups. In their study, symptom and performance validity tests were investigated in a mixed sample of psychiatric patients. The authors found a failure rate of 21% on a PVT (the Amsterdam Short-Term Memory Test) and 21% on the SIMS; 8% of the patients scored positive on both measures.

In our study, 7.4% of the participants scored positive on the WMT indicating underperformance (excluding another two participants with a GMIP and a clinical picture of genuine memory impairment). Another participant scored extraordinarily high on the SIMS (25 points) and also highest of all participants on the SRSI pseudosymptom score such that significant response distortions (overreporting) were judged to be highly probable even though WMT scores were unremarkable. This would result in a rate of 9.3% of probable negative response bias (or probable feigning) in this sample of memory-clinic patients. The number of WMT failures in our study was very well in line with that found by Rienstra, Groot, et al. (2013) who studied memory-clinic patients in the Netherlands and found a rate of 7% failing performance validity tests.

SIMS and SRSI scores correlated at .67 in this study. This correlation, although relatively high and indicating both instruments measure similar constructs, was lower than reported by most studies. Combining studies from different contexts (analogue studies, clinical patients, forensic cases), Merten et al. (2019) reported a correlation of .82 between SIMS and SRSI pseudosymptom scores. Limited variability in both SVTs in this clinical sample appears to be the most likely explanation for the difference in correlations.

The medium-size correlation between SVT and PVT measures (WMT vs. SIMS/SRSI) found in the current study was comparable with numbers reported in other studies (e.g., Dandachi-FitzGerald, van Twillert, van de Sande, van Os, & Ponds, 2016; Merten, Thies, Schneider, & Stevens, 2009; Ruocco et al., 2008; Stevens, Friedel, Mehren, & Merten, 2008). It is indicative of a relatively loose co-occurrence of overreporting and underperformance known from different contexts. In fact, underperformance on neuropsychological tests and symptom overreporting are two different strategies sometimes, but not necessarily, occurring at the same time.

Despite its relatively low sample size and an incomplete data set concerning patient history and possible hidden agendas, the current study points at a relatively low, but nontrivial occurrence of negative response bias in clinical memory-clinic populations. Invalid test performance and overreporting in clinical samples remains under-investigated in the literature. As a rough estimate for its occurrence, the Mittenberg et al. (2002) survey is often cited. The current data are well in line with the number of about 8% invalid test results in the Mittenberg study. In other clinical contexts, the rate may be higher. Horner, van Kirk, Dismuke, Turner, and Muzzy (2014) found 20.3% of patients referred for outpatient neuropsychological assessment to be classified as exerting inadequate effort on the Word Memory Test and/or the Test of Memory Malingering. These patients also had more emergency department visits, and more and longer inpatient hospitalizations. Also, in psychosomatic rehabilitation contexts, the percentage of noncooperative patients may be much higher than in other clinical contexts (e.g., Kobelt et al., 2012). However, such studies are also haunted by the problem of differentiating false and correct positives in validity measures. The question of how this can reliably be done in specific target populations and/or context conditions will continue to challenge researchers and clinicians alike.

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Compliance with ethical standards/conflict of interest

There was no third-party funding of the study. The second author developed the Self-Report Symptom Inventory and wrote the manual for this test, which has been published for commercial distribution in 2019. He also coauthored the authorized German version of the Word Memory Test, with no financial implications.

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