Symptom validity in clinical assessments

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Symptom validity in clinical assessments

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The research described in this thesis was performed at the School for Mental Health and Neuroscience, Department of Psychiatry and Neuropsychology, Maastricht University, Maastricht, the Netherlands.

CHAPTER 1

Psychological assessment in a clinical setting

Psychological assessment is used in many different circumstances to help understanding the patient and his needs, and so it increases the quality of clinical decision-making. The data obtained in psychological assessment, however, only yield valid information when the patient adheres to the test requirements, such as applying effort to perform at the best of their abilities on cognitive tests and answering questions accurately and truthfully. The following case vignettes serve to illustrate referrals for psychological assessment in a clinical setting, as well as the questions pertaining to the validity of these assessments.

Case 1.

Mister K. is a 26-year-old man. A year ago a psychiatrist diagnosed him with ADHD and he was prescribed Ritalin. Since several months mister K. complains of episodes of memory loss. He is currently on sick leave from his work. Mister K. wants a second opinion of his psychiatric diagnosis, and his general physician refers him to a mental health care institute.

Case 2.

Miss W. is a 39-year old woman with depressive symptoms, a high level of interpersonal conflicts, and financial problems. She benefits insufficiently from depression treatment. The psychologist refers her for psychological assessment to gain a better understanding of her cognitive functioning and personality traits. During the interview the conversation centres on her conflict with the social security services. Miss W. is currently unemployed and on welfare. She perceives herself as unable to work and has applied for disability benefits, which entails a higher monetary amount than welfare. The social security services, however, have declined her application for disability benefits. She feels that they are mistakenly convinced that she is able to work.

Case 3.

Mister J. is a 60-year old male with a severe mental illness. He lives in an apartment on the premises of a psychiatric hospital. He has been using antipsychotics for more than twenty years. The psychiatrist refers him for a neuropsychological assessment, because he noticed deterioration in daily functioning, and wanted to know whether this could be explained by cognitive deficits.

Case 4.

Miss Z. is a 59-year old lawyer. She is referred by the neurologist to the psychological department in the hospital for neuropsychological assessment. Three months ago a car hit her from behind while she was driving. Since then miss Z. complains of concentration- and memory difficulties, fatigue, and making more grammar and spelling mistakes in her reports. She is still working, though fewer hours. The companion in her law firm represents her in a civil law suit against the person who hit her car.

Four brief descriptions of patients who were referred for psychological assessment for diagnosis and treatment advice. None of these assessments was conducted in a legal context. Can it be assumed that the obtained diagnostic data (i.e., self-reported experienced psychological suffering, account of life history and daily functioning, and scores on cognitive tests) are valid? Or should the validity of the diagnostic data be psychometrically tested? And then in all four cases? Perhaps only case 4 were there is concurrently a civil law suit? Or also, in case 2 were the patient keeps talking about how upset she is with the ruling of the social security services regarding her ability to work? Can we anticipate in which cases tests for the validity would have incremental value?

In all four cases the validity of self-reported symptoms and performance on cognitive measures was tested. In the case 1 the patient performed normal on a performance validity test. On the standard cognitive tests all his scores were within the normal range. However, on a validity test for self-reported symptoms, he scored well above the cut-off, which indicates over-reporting of symptoms. On the standard psychological symptom lists, including ADHD scales, he scored in the psychopathological range. In case 2 the patient performed normal on the validity tests. Her scores on intelligence and cognitive measures were in the above average to high range. The interview and psychological questionnaires were suggestive of a borderline personality disorder. In case 3 only a performance validity test was administered, on which the patient scored well below the cut-off. He obtained abnormal low scores on cognitive measures, such as concentration and memory tasks. When asked whether he was informed about the reason of referral, he exclaimed: “of course I know the reason,

that bloody psychiatrist thinks that I am functioning too well to be allowed to stay my apartment. He wants me to move out to make place for another patient". Then in case 4, the patient failed a performance validity test. On concentration- and memory tests she scored one or two stand deviations below the average norm score. She scored within the below average range on an intelligence measure.

Are these cases exceptional? Stated otherwise, how often is the validity of the psychological assessment in a clinical setting comprised? How do deviant scores on validity tests relate to the scores on the standard cognitive tests and psychological questionnaires? And how do psychologists currently evaluate the validity of their psychological assessment?

Symptom validity assessment

Psychological assessment consists to a large extent of self-report questionnaires and cognitive tests, which are interpreted together with other sources of information (e.g., the medical file). Self-report questionnaires and cognitive tests are assumed to yield accurate information as to a patient's mental capacities, his/her psychological symptoms, and his/her personality characteristics. However, there are many factors that may undermine the accuracy of self-reported symptom information. Good practice in psychological assessment therefore requires that we address the issue of data quality.

One important aspect of data quality pertains to the adherence of the patient to the requirements of testing. In order to obtain valid data, the patient needs to perform to best of his/her abilities and to answer questions accurately and honestly (i.e., symptom validity; Bush et al., 2005). When these requirements are not met, the obtained data are not valid. That is, they are not reflecting the patient's genuine cognitive abilities and experienced psychological suffering.

The term symptom validity assessment refers to the various methods employed to determine the validity of symptom presentations. Tools specifically designed to measure this type of validity are named symptom validity tests (SVTs). These tools can be grouped into two categories. The first category entails tests that intend to measure underperformance on cognitive tests. Cognitive underperformance can be defined as performance below one's true capabilities. Tests in this category are also referred to as performance-based validity tests (PVTs) (Larrabee, 2012). PVTs are presented to the patient as a challenging task (i.e., a memory test), when in fact they are relatively easy and require little cognitive capacity in order to score in a normal range. The second category consists of tests that measure the validity of self-reported symptoms. These are also referred to as self-report validity tests (SRVTs). SRVTs con-

tain items that are based on unlikely presentations (e.g., rare symptoms or symptom combinations) and improbable symptoms (Rogers, 2008).

Both categories of tools involve stand-alone tests specifically designed to detect poor validity and validity indicators that are embedded within standard psychological or cognitive measures. Figure 1 gives an overview. Scoring within a normal range on these tests is typically referred to as passing a symptom validity test. Scoring deviant is termed SVT failure.

Importantly, symptom validity assessment pertains to the credibility of symptom reports, the validity of test results, and the adherence of the examinee to the test requirements. It is silent as to the cause underlying poor symptom validity. The interpretation of failures on SVTs is a second-order inference that requires insight into the intent and motives of an examinee. With regard to intent, the one exception is performance on a PVT that is significantly below chance. The only way for a patient to score in such manner is intentional avoidance of correct answers, which strongly indicates deliberate underperformance (Merten & Mercelbach, 2013). Still, even significant below-chance performance does not answer the question of why the examinee is performing in this way.

Figure 1 Overview of methods to determine symptom validity (Adapted from: Merten, Dandachi-FitzGerald, Hall, Schmand, Santamaría, & González-Ordí, 2013).

Symptom validity and malingering

In the past twenty years the topic of feigning of symptoms, response bias and exerted effort in test performance has attracted a lot of interest in clinical neuropsychology. From 1990 to 2000 the number of articles on forensic neuropsychology in three prominent international neuropsychological journals increased from 4% to 14% (Sweet, King, Malina, Bergman, & Simmons, 2002). This increased interest has continued as illustrated by a Google Scholar search of publications with the term “symptom validity test” from 2000 to 2015 (see Figure 2).

Figure 2 the term “symptom validity test” in publications per year in Google Scholar

One possible explanation for this interest in the validity of diagnostic data is the growing demand for neuropsychological expertise in legal procedures such as disability evaluations, personal injury claims, and criminal justice (Sweet, 2009). In a forensic context, in which major interests are at stake and psychopathology or cognitive disorders might be beneficial, the question whether symptom reports are authentic or not is important. Against this background, the majority of research publications concerned the detection of malingering. Symptom validity tests were developed to assist clinicians in distinguishing between genuine patients and persons deliberately feigning symptoms or cognitive deficits. Although fruitful in the early days, the focus on malingering also created confusion about the concept of symptom validity. Particularly cumbersome has been the equation of the behaviors of underperformance and symptom over-reporting (i.e., failing SVTs) to malingering. Illustrative of this, is the term malingering in several SVTs developed in these early days, such as the Test of Memory Malingering (i.e., TOMM, Tombaugh, 1996), and the Structured Inventory of Malingered Symptomatology (i.e., SIMS; Widows & Smith, 2005).

At least as problematic is the concept of malingering in itself. In the operationalization in the Diagnostic and Statistical Manual (DSM; American Psychological Association, 2000) malingering should be “strongly suspected if any of the following is noted”: medico-legal context of the presentation, marked discrepancy between self-reported stress or disability and objective findings, lack of cooperation during the diagnostic evaluation or with prescribed treatment, or presence of antisocial personality disorder (APA, 2000, p. 739). This view of malingering has conceptually and

practically serious shortcomings (see for an extensive discussion Berry & Nelson, 2010). The DSM definition of malingering has a criminal connotation. As Rogers (1990, p.183) states “the only unifying theme is that of “badness”, namely, a bad person (sociopath) in a bad situation (forensic assessment), who is a bad participant (lack of cooperation)”. Whereas, according to Rogers as well as many other authors, malingering can better be viewed as adaptational behavior. A person in adversarial circumstances with few alternatives perceived to be available, reasons that malingering is the best option (i.e., a cost-benefit analysis). Another important shortcoming is the categorical view of malingering (i.e., a person is malingering or not) while the empirical evidence points towards continuity between feigned and genuine symptom presentations (Merckelbach & Merten, 2012). From a practical viewpoint the classification of malingering requires judgment on the intent and motive of the behavior. However, clinicians have no objective measures to determine whether poor symptom validity is motivated by external (e.g., financial gain) or internal (e.g., seeking medical attention) factors. Moreover, most human behaviors are multi-determined by internal as well as external motivations of which a person often will not be fully aware. So practically, the determination of malingering is based on subjective clinical judgment. Further, when applying the DSM signs for suspecting malingering, Rogers (1990) has found a correct classifications rate of 20%. Thus, the DSM criteria for suspecting malingering are inaccurate.

After the turn of millennium the concept of symptom validity assessment changed from the measurement of malingering to the measurement of behaviors that comprise the validity of test data (see the previous paragraph). Unfortunately, the vast amount of empirical evidence over the last 20 years has not been digested in the recent revision of the DSM. This influential reference guide for mental disorders still disseminates a categorical view of malingering with a connotation of criminal behavior (APA, 2013).

Against this background, it is perhaps not strange that there is a disparity between the attention that symptom validity has drawn in forensic and clinical psychological assessments. Symptom validity in clinical assessments has been understudied. In the first decade of the 21st century a couple of studies focused on patient samples seen for psychological assessments. For example, Locke, Smigelski, Powell, and Stevens (2008) found that 22% of patients with acquired brain damage referred to a rehabilitation centre for outpatient treatment evidenced underperformance during the neuropsychological assessments. Another example is the study of Kemp, Coughlan, Rowbottom, Wilkinson, Teggart, and Baker (2008), who found that in their sample of patients with Medically Unexplained Symptoms, 11% failed more than two validity tests. These early studies suggest that symptom validity cannot be automatically assumed on the grounds that the psychological assessment takes place for clinical purposes.

Aims and outline of this thesis

The main objective of the studies described in this thesis was to gain more insight into poor symptom validity of patients clinically referred for psychological assessment. More specifically, this thesis will address the following research questions:

1. How often does poor symptom validity occur in psychological assessments in clinical settings? (Chapter 2 and 3)
2. How does poor symptom validity relate to patients' symptom reports on standard clinical instruments (e.g., memory tests and psychological symptom questionnaires)? (Chapter 2 and 3)
3. Which background variables (e.g., age and education) are associated with SVT failure? (Chapter 2 and 3)
4. Can symptom validity best be understood as an unidimensional or multidimensional phenomenon? (Chapter 2, 3, and 4)
5. What are the current practices and beliefs of neuropsychologists regarding symptom validity assessment? (Chapter 5 and 6)

The main results, as well as methodological and clinical considerations, and directions for future research, are discussed in Chapter 7.

CHAPTER 2

Cognitive underperformance and symptom over-reporting in a mixed psychiatric sample

B. Dandachi-FitzGerald, R.W.H.M. Ponds, M.J.V. Peters, & H. Merckelbach

The Clinical Neuropsychologist, 2011, 25, 812-828

ABSTRACT

The current study examined the prevalence of cognitive underperformance and symptom over-reporting in a mixed sample of psychiatric patients ($N = 183$). We employed the Amsterdam Short-Term Memory Test (ASTM) to measure cognitive underperformance and the Structured Inventory of Malingering Symptomatology (SIMS) to measure the tendency to over-report symptoms. We also administered neuropsychological tests (e.g., Concept Shifting Task; Rey's Verbal Learning Test) and the Symptom Checklist-90 (SCL-90) to the patients. A total of 34% of them failed the ASTM, the SIMS or both tests. ASTM and SIMS scores were significantly, albeit modestly correlated with each other ($r = -.22$). As to the links between underperformance, over-reporting, neuropsychological tasks, and the SCL-90, the association between over-reporting on the SIMS and SCL-90 scores was the most robust one. The subsample that only failed on the ASTM performed significantly worse on a compound index of memory performance. Our findings indicate that underperformance and over-reporting are loosely coupled dimensions and that particularly over-reporting is intimately linked to heightened SCL-90 scores.

INTRODUCTION

In forensic assessments underperformance on neuropsychological tests and over-reporting of psychiatric symptoms may lead to a more favorable outcome for the examinee (e.g., higher financial compensation or diminished criminal responsibility). With this in mind, experts have developed several methods for assessing effort level and response style in the past two decades (Rogers, 2008). These symptom validity tools are intended to assist clinicians in differentiating between genuine patients and persons deliberately fabricating or exaggerating symptoms in order to obtain an external incentive (i.e., malingering; see *Diagnostic and Statistical Manual of Mental Disorders*; DSM-IV-TR; American Psychiatric Association, 2000). Some of these tools measure underperformance on neuropsychological tests, whereas others measure the tendency to over-report symptoms (see, for examples, Berry, Baer, Rinaldo, & Wetter, 2002; Green, 2007a; Nitch & Glassmire, 2007). In the clinical literature underperformance and symptom over-reporting are often conceptualized as behavioral proxies of malingering, with terms like underperformance, poor effort, symptom exaggeration, response bias, and malingering being used interchangeably. However, as Iverson (2006, p. 81) pointed out, "effort tests do not measure malingering, *per se*, they measure behavior associated with malingering". In the strict sense of the word, malingering refers to the intentional creation of symptoms (American Psychiatric Association, 2000). Because it is difficult, if not impossible, to measure intention, we prefer to use the behavioral terms "underperformance" and "symptom over-reporting" (Berry & Nelson, 2010; Boone, 2007).

Prevalence estimates of cognitive underperformance and symptom over-reporting in forensic settings vary widely, depending on, for example, the symptom validity tests used, the research sample, and the referral question, with most estimates ranging between 20% and 60% (e.g., Hout, Schmand, Weking, & Deelman, 2006; Mittenberg, Patton, Canyock, & Condit, 2002; Schmand et al., 1998). It should be noted, however, that these prevalence rates are rough estimates at best, because they often rely on single diagnostic tools administered to artificially homogeneous samples. Nevertheless, the bottom line of much research on symptom validity in forensic settings is that underperformance explains more variance in cognitive (e.g., memory) test performance than, for example, severity of the brain injury or depressive complaints (Green, 2007b; Rohling, Green, Allen, & Iverson, 2002; Stevens, Friedel, Mehren, & Merten, 2008).

In the past 10 years there has been an increased interest in symptom validity and how it relates to routine neuropsychological testing scores in non-litigant settings.

Clinical studies in this domain have focused on patients with epilepsy (Cragar, Berry, Fakhoury, Cibula, & Schmitt, 2006; Dodrill, 2008), medically unexplained symptoms (Kemp, Coughlan, Rowbottom, Wilkinson, Teggart, & Baker, 2008), acquired brain damage (Joce, Smigajski, Powell, & Stevens, 2008), and students referred for ADHD evaluation (Suh, Hammers, Dobbins-Buckland, Zimak, & Hughes, 2008; Sullivan, May, & Galbally, 2007). In these studies the percentage of patients exhibiting underperformance was found to be in the order of 20–30%. However, research addressing this issue in psychiatric samples is still limited. To the best of our knowledge only one study (Gorrisen, Sanz, & Schmand, 2005) examined underperformance in psychiatric patients and how it affected neuropsychological test scores. The authors of that study demonstrated that 25% of their non-psychotic (mainly affective disorders) patients and 72% of their schizophrenic patients failed the Word Memory Test (WMT; Green, 2003), which is a widely used index of underperformance. Most patients in this study had been referred for routine neuropsychological assessment. Failure on the WMT explained up to 35% of the variance in the neuropsychological test scores, a proportion that accords very well with that reported by Stevens et al. (2008) for their forensic sample. Thus the prevalence estimates of underperformance that have been reported in the forensic domain may also hold true for the clinical, non-litigant setting. This would imply that in both settings, underperformance is a non-trivial phenomenon and *when* it occurs, it affects standard clinical test scores to a considerable degree.

An important limitation of the research that addressed symptom validity in a clinical, non-litigant setting is that most of the studies relied on instruments measuring underperformance. So far only a few studies have looked at both the prevalence of cognitive underperformance and symptom over-reporting in clinical samples. Haggerty, Frazier, Busch, and Naugle (2007) examined cognitive underperformance and symptom over-reporting in a sample of neurological and psychiatric patients. The authors reported significant but modest correlations (i.e., r s < .20) between scores on the Victoria Symptom Validity Test (VSVT; Slick, Hopp, Strauss, & Thompson, 1996) indexing underperformance and scores on the Negative Impression Management (NIM) subscale of the Personality Assessment Inventory (PAI; Morey, 1991) indexing symptom over-reporting. Similarly, Whiteside, Dunbar-Mayer, and Waters (2009) found modest correlations in an outpatient sample (r s < .39) between the NIM subscale of the PAI and the Test of Memory Malingering (TOMM; Tombaugh, 1996) as a measure of under-performance. Importantly, these two studies did not address whether failing on symptom validity tests is related to test performance on routine tasks and scores on clinical self-report instruments.

In sum, the studies conducted so far concur that indices of underperformance and over-reporting are only modestly correlated (Stevens et al., 2008; Ruocco et al., 2008; Nelson, Sweet, Berry, Bryant, & Granacher, 2007). Yet none of the studies cited above looked at how underperformance and over-reporting are related to scores on routine

clinical tests. With these considerations in mind, the aim of this study was twofold. First, we examined the base rate of underperformance and over-reporting of symptoms in a heterogeneous sample of psychiatric patients who had been referred for neuropsychological assessment. Second, we explored to what extent underperformance and symptom over-reporting in this sample predict performance on standard neuropsychological tests and scores on a widely used inventory of self-reported symptoms.

METHODS

Participants

All participants were patients referred for neuropsychological assessment at Psy-Q, a mental health care clinic in Maastricht, the Netherlands. Referrals were received from clinicians or general practitioners. Data were collected between January 2007 and November 2009. Only patients with complete data on the symptom validity tests (see below) were included in the analyses. Ten patients were excluded because of clinically obvious cognitive impairment. In the case of one patient, psychotic symptoms interfered with testing. We excluded four patients who had evident cognitive impairment as a result of chronic alcohol abuse. Two of them were diagnosed with Korsakoff syndrome. Furthermore, we excluded five patients diagnosed with concussion cerebri and/or cerebrovascular accidents. These five patients exhibited serious cognitive impairments and psychiatric comorbidity.

The final sample consisted of 183 patients (122 men). Their mean age was 34.7 years ($SD = 12.52$ range: 17–66). Educational background was quantified with an 8-point scale that is commonly used in the Netherlands for this purpose (De Bie, 1987) and that ranges from primary school (1; fewer than 6 years of education) to university degree (8; 16 years of education or more). The median educational level was 4, which corresponds to medium vocational training. All participants were literate and had (corrected to) normal vision and hearing. Nearly all patients (approximately 9 out of 10) were outpatients at the time of the assessment. A total of 51 patients (28%) were referred for general assessment of cognitive abilities, 79 patients (43%) were referred for a possible diagnosis of Attention Deficit Hyperactivity Disorder (ADHD), 52 patients (28%) for a possible diagnosis of Autism Spectrum Disorder (ASD), and two patients (1%) for a combined diagnosis of possible ADHD and ASD.

Procedure

Patients completed an informed consent form. Next, they completed a neuropsychological test battery (see below). Depending on the referral question, there was some variation in the tests administered, but the majority of patients received the same core test battery. The tests were administered by a certified psychological assistant or by trained clinical psychology master students. They were supervised by a clinical neuropsychologist. Before the data were entered in the SPSS database, the first author checked the record of each patient for missing values and outliers.

Symptom validity measures

We used the Amsterdam Short-Term Memory test (ASTM; Schmand, Sterke & Lindboom, 1999) as a measure of underperformance. The ASTM is presented as a memory test and basically involves a forced-choice recognition procedure. Following Schmand et al. (1999), we used a cut-off score of 85. In the original validation studies, a cut-off of 85 best distinguished between experimental simulators ($N = 57$) and aggregated groups of patients suffering from neurological disorders such as confusion cerebri, multiple sclerosis, and severe epilepsy ($N = 57$), with a sensitivity and specificity of 84% and 90%, respectively. Higher sensitivity and specificity rates (both > 90%) were obtained in experimental simulation studies with healthy simulators and controls (e.g., Bolan, Foster, & Bolan, 2002). Validation studies further showed that the test is not suitable for patients with clinically evident cognitive impairment as in dementia and Korsakoff syndrome. A recent study of Rlenstra, Spaan, and Schmand (2010) demonstrated that children who were 9 years and older all passed the ASTM. In the current study we used a fixed sequence of tests with the ASTM being positioned at the beginning of the test battery.

We employed a Dutch research version of the Structured Inventory of Malingered Symptomatology (SIMS; Smith & Burger, 1997) as a measure of symptom over-reporting. The SIMS is a self-report scale consisting of 75 yes-no items. As with the ASTM, we refer to the manual for more detailed information about this scale (Widows & Smith, 2005). Following the recommendations of Rogers, Hinds, and Sewell (1996), in the current study we used a cut-off score of 16. A study of the Dutch research version of the SIMS (Merckelbach & Smith, 2003) with a group of 298 participants revealed a specificity of 98% and sensitivity of 93% with the cut-off set at 16. Follow-up studies indicated that the SIMS attains high sensitivity rates (>80%; e.g., Clegg, Frenouw, & Mogge, 2009), even in coached simulators (Jelicic, Hessels, & Merckelbach, 2006). In the current study the SIMS was positioned at the end of the test battery.

Clinical measures

In 74 patients intelligence was measured with a validated Dutch language version of the Wechsler Adult Intelligence Scale III (WAIS III; Wechsler, 1997), while in 106 patients the short form of the Groninger Intelligence Test-2 was employed (Luteijn & Barends, 2004). In three patients, no intelligence test was administered.

As an index of processing speed we used the a version of Stroop Color Word Test most commonly used in the Netherlands (SCWT; Stroop, 1935; Van der Elst, van Boxtel, van Breukelen, & Jolles, 2006a). It consists of three stimulus cards: color word naming (I); color naming (II); and naming of color words printed in a different color (inference task III). The time needed to complete each card is scored.

The Concept Shifting Task (CST) was used to measure processing speed and cognitive flexibility (Van der Elst, van Boxtel, van Breukelen, & Jolles, 2006b). It consists of three subtasks (A, B, and C). On each test sheet 16 small circles are grouped into one larger circle. In the smaller circles the test items appear in a fixed random order. In subtask A patients are asked to cross out numbers (1–16) in the right order as quickly and accurately as possible. In part B, the circles contain letters (A–P) that have to be crossed out in alphabetical order. In the third part the card displays both numbers and letters, and patients are requested to alternate between numbers and letters. The time needed to complete each card is scored.

Rey's Verbal Learning Test (VLT) was used to evaluate learning and retrieval capacity (Van der Elst, van Boxtel, van Breukelen, & Jolles, 2005). In the VLT 15 words are presented in a fixed order on a computer screen, one after another, in five trials. After each trial the patient is asked to reproduce the words (immediate recall). Then 20 minutes after the last trial the patient is asked again to reproduce the words (delayed recall). Following the delayed recall a list of 30 words is presented in a fixed order on a computer screen, one after another. Patients have to indicate whether or not the presented word was on the learning list (recognition). Dependent variables were the total number of words recalled on the immediate and delayed recall and the number of correctly recognized items on the recognition trial.

A subsample of 112 patients completed the Dutch version of the Symptom Checklist-90 (SCL-90; Arrindell & Ettema, 2003). The SCL-90 is a 90-item self-report measure that covers a broad range of psychological symptoms (e.g., anxiety, depression). Patients rate on 5-point scales (01/4not at all; 41/4extremely) how much they have experienced these symptoms during the last week. For the purpose of the present study a total raw score was calculated by summing across item.

Data reduction and analysis

Raw test scores were screened for outliers. We decided not to exclude patients with extreme outliers. By excluding them we would potentially obscure the relationship

between symptom validity measures and deviant responding on our clinical measures, since those patients who exhibit poor symptom validity might be inclined to produce outliers. With this in mind we employed another widely used method of handling outliers, namely replacement of outliers by the sample mean plus two standard deviations (e.g., Field, 2005). Less than 8% of the patients had an extreme outlier in their test protocol¹. Raw test scores for related tasks were clustered to yield compound performance indices for three domains: memory, executive control, and speed of information processing (e.g., Stevens et al., 2008; Van Boxtel, Langerak, Houx & Jolles, 1996). This was done so as to reduce the number of dependent variables while improving the robustness of the underlying cognitive construct. Next, test scores were transformed to Z-scores. Following this, the mean of the Z-transformed scores that were included in a compound performance index was calculated for each patient. Thus, a memory score was derived from the Z-transformed immediate recall (IR), delayed recall (DR), and recognition (RC) scores of the VLT. An executive control score was derived from the Z-transformed scores of the SCWT III and CST C. Speed of information processing was calculated from Z-transformed scores of the CST A and B and the SCWT I and II. The sign of the speed scores was inverted such that positive values denote above average performance and negative values denote below average performance.² IQ (population-based, age-corrected normative score) and SCL-90 (raw score) test results were treated as separate variables.

In the first step of the analysis, we determined the base rate of failure on the ASTM and SIMS using the recommended cut-off scores (ASTM < 85 and SIMS > 16). Secondly, Pearson product-moment correlations were calculated between ASTM and SIMS, and also between these two symptom validity tests and age and educational level. As a third step, to explore a potential interaction effect between underperformance and over-reporting, we performed an omnibus repeated-measures 2 x 2 x 5 Analysis of Variance (ANOVA), with underperformance and over-reporting as between-participant variables and clinical tests as repeated measures. Fourth, we formed four groups of patients based on their scores on the ASTM and SIMS: those who passed

¹ A total of 12 patients produced an extreme outlier on only one of the measures (SCWT I: 3 outliers; SCWT II: 1 outlier; CST B: 2 outliers; Rey's VLT recognition: 6 outliers). Only one patient obtained three extreme outliers (SCWT I, CST A, and B).

² Thus, the following formulas were used:

$$\text{Memory (MEMORY)} = (\text{ZVLT_IR} + \text{ZVLT_DR} + \text{ZVLT_RC}) / 3$$

$$\text{Executive control} = -(\text{ZCST-C} + \text{ZSCWT-III}) / 2$$

$$\text{Speed of information processing (SPEED)} = -(\text{ZCST-A} + \text{ZCST-B} + \text{ZSTROOP-I} + \text{ZSTROOP-II}) / 4$$

both tests; those who only failed the ASTM (i.e., underperformance); those who only failed the SIMS (i.e., over-reporting); and those who failed both tests (i.e., underperformance and over-reporting). We performed one-way ANOVAs to examine whether the four groups differed with regard to IQ, compound scores of memory, executive control and speed of information processing, and SCL-90 scores. When there was a significant-group difference, we performed post-hoc Bonferroni tests. Cases with missing data were excluded. Analyses were performed with SPSS version 15.0 for Windows. Alpha was set at $p < .05$ (two-tailed).

RESULTS

Descriptive statistics

Table 1 depicts DSM-IV diagnoses in our sample and the number of patients failing the ASTM and SIMS within each diagnostic category. As can be seen, the most common primary diagnoses were ADHD, mood and anxiety disorders, and ASD. A total of 89 patients (49%) had a comorbid psychiatric diagnosis, the most common of which were mood and anxiety disorders and substance (in the majority of cases: cannabis) abuse or dependence.

Prevalence of underperformance and over-reporting

Table 2 shows the proportions of patients who passed both tests, patients who failed the ASTM (i.e., underperformance), patients who failed the SIMS (i.e., overreporting), and patients who failed both tests. As can be seen, 62 patients (33.9%) of the sample failed one or both tests. The proportions of the three groups that failed one or both symptom validity test(s) did not differ: $\chi^2(2) = 2.46, p = 0.29$. Table 1 shows these proportions for the separate diagnostic categories. Because developmental disorders in adulthood (notably ADHD and ASD) were over-represented in our sample, we performed separate analyses for these categories and the other diagnostic groups. ADHD or ASD patients passed the SIMS, ASTM, or both measures somewhat more often than patients in other diagnostic categories, a difference that attained borderline significance, $\chi^2(3) = 7.50, p = .06, \phi = .21$.

There were significant, but small correlations between ASTM and age ($r = -.18, p < .05; r^2 = .03$) and between ASTM and educational level ($r = .23, p < .05; r^2 = .05$), with lower scores on the ASTM being associated with higher age and lower educational level. Also, there was a significant, but modest correlation between SIMS and educational level ($r = -.25, p < .01; r^2 = .06$), with higher scores on the SIMS being associated with lower educational level. The correlation between SIMS and age fell short of sig-

nificance ($r = -.02$). The first order Pearson product-moment correlation between ASTM and SIMS was $-.22$ ($p < .05$),³ with poorer performance on the ASTM being associated with higher scores on the SIMS. When controlling for age and educational level, ASTM remained significantly correlated with SIMS, although the size of the correlation was by all standards modest (partial $r = -.17$, $p < .05$), although the amount of explained variance was small ($r^2 = .03$).

³ Because the ASTM scores followed a skewed distribution while SIMS scores did not, we also computed the Spearman rho correlation between both measures: $\rho = -.18$. This value comes close to the Pearson r that we found.

Table 1 DSM-IV-TR diagnoses (percentages between parentheses) in the sample ($N = 183$) and number of patients failing the ASTM and SIMS

	Primary diagnosis		Secondary diagnosis		Fail ASTM		Fail SIMS	
ADHD	56	(30.6 %)	4	(2.2 %)	8	(14%)	8	(14%)
ASD	25	(13.7 %)	1	(0.5 %)	4	(16%)	4	(16%)
Affective disorders	34	(18.6 %)	40	(21.9 %)	8	(24%)	7	(21%)
Psychotic Disorder	8	(4.4 %)	1	(0.5 %)	2	(25%)	3	(38%)
Cognitive disorder NOS	7	(3.8 %)	8	(4.4 %)	4	(57%)	4	(57%)
Personality Disorders	16	(8.7%)	3	(1.6 %)	5	(31%)	6	(38%)
Abuse/Dependence of substances	11	(6.0 %)	14	(7.7 %)	2	(18%)	2	(18%)
Other psychiatric disorders	13	(7.1 %)	18	(9.8 %)	4	(31%)	3	(23%)
Postponed diagnosis	5	(2.7 %)	4	(2.2 %)	2	(40%)	1	(20%)
No diagnosis	8	(4.4 %)	90	(49.2 %)	0	(0%)	0	(0%)

Notes: ASTM = Amsterdam Short Term Memory test; SIMS = Structured Inventory of Malingered Symptomatology; ADHD = Attention Deficit Hyperactivity Disorder; ASD = Autism Spectrum Disorders; NOS = Not Otherwise Specified.

Table 3 Mean scores (SD) on clinical outcome variables of the four groups

Measure	Number of Patients	Group 1 Passed both	Group 2 Failed only ASTM	Group 3 Failed only SIMS	Group 4 Failed both	F	p-value	Eta squared	Significant group comparisons (Bonferroni corrected)
IQ	180	95.60 (16.16)	92.08 (19.81)	84.83 (14.28)	78.86 (14.48)	6.36	.00	.10	3,4 < 1
Compound Memory score	180	.19 (.80)	-.60 (1.00)	-.22 (.81)	-.25 (.85)	6.75	.00	.10	2 < 1
Compound Speed score	161	.14 (.69)	-.21 (.90)	-.31 (.92)	-.46 (1.14)	4.00	.01	.07	n.s.
Compound Executive score	112	1.46 (.83)	-.38 (1.11)	-.32 (.84)	-.23 (.79)	3.48	.02	.06	n.s.
SCL-90 raw total score	112	159.72 (37.73)	186.13 (61.16)	262.85 (71.99)	271.89 (61.54)	28.37	.00	.44	3,4 > 1 3,4 > 2

Table 2 Number of patients (percentages between parentheses) who passed or failed the ASTM and the SIMS

SIMS	ASTM	
	Pass	Fail
Pass	121 (66%)	24 (13%)
Fail	23 (13%)	15 (8%)

N = 183; ASTM = Amsterdam Short Term Memory test; SIMS = Structured Inventory of Malingered Symptomatology.

Relation with clinical instruments

A repeated-measures ANOVA with underperformance and over-reporting as between-participants factors and clinical instruments as repeated variables, indicated that there was no significant interaction between underperformance and over-reporting, $F(1, 94) = .80, p = .77$. The main effect of underperformance remained non-significant, indicating that this factor did not have an overall impact on clinical test outcome, $F(1, 94) = .70, p = .41$. In contrast, the main effect of over-reporting was significant, $F(1, 94) = 45.52, p < .05; \eta^2 = .33$. Thus over-reporting as measured with the SIMS explained a substantial proportion of variance in clinical test results.

As follow-up analyses we carried out one-way ANOVAs with group (1 = pass both, 2 = fail only ASTM, 3 = fail only SIMS, 4 = fail both) as between-participants variable and age, education, IQ, compound indices (i.e., memory, executive control and speed of information processing), and SCL-90 scores as dependent variables. Table 3 summarizes the results of these ANOVAs. Group differences were significant at $p < .05$ for all dependent variables. Post-hoc Bonferroni corrected pairwise comparisons revealed that the group that only underperformed (as measured with the ASTM) was on average older and performed worse on the memory compound score than the group that passed both symptom validity measures. The group that only over-reported symptoms (as measured with the SIMS) and the group that underperformed and over-reported symptoms had significantly lower average IQ scores than the group that passed both symptom validity measures. Furthermore, these two groups reported significantly more psychological symptoms than the group that passed both tests and the group that only underperformed. In terms of effect size (eta squared), the link between over-reporting on the SIMS and heightened SCL-90 levels was the most substantial one.

As a next step we performed analysis of covariance to control for the potentially confounding effects of age and educational background in the relation between group

membership and clinical test outcomes. When controlling for the effects of age and educational level, the group differences remained significant for IQ, the compound memory index, and SCL-90. However, group differences in speed of information processing, $F(3, 155) = 2.04$, $p = .11$, and executive control, $F(3, 155) = 1.33$, $p = .27$, became non-significant.

As covariates both age and educational level were significantly related to IQ, $F(1, 174) = 5.16$, $p < .05$, and $F(1, 174) = 97.40$, $p < .05$, respectively. After adjusting for these demographic variables, group differences remained significant for IQ, $F(3, 174) = 4.34$, $p < .05$. Both covariates were also significantly related to the compound memory score—age: $F(1, 174) = 8.91$, $p < .05$; educational level: $F(1, 174) = 10.63$, $p < .05$. However, group differences for the memory compound score remained significant after controlling for age and educational level, $F(3, 174) = 3.31$, $p < .05$. Neither age, $F(1, 106) = .02$, $p = .88$, nor educational level, $F(1, 106) = .78$, $p = .38$, was significantly related to the SCL-90. Groups continued to differ significantly in their report of psychological symptoms after controlling for both covariates, $F(3, 106) = 26.10$, $p < .05$.

DISCUSSION

The purpose of this study was to examine the base rate of underperformance on cognitive tests and symptom over-reporting in a mixed psychiatric, non-litigant sample. We also wanted to know how these phenomena are related to routine clinical measures. Almost 34% of the patients in our sample failed the ASTM, the SIMS or both tests. This suggests that even outside the forensic domain, underperformance on cognitive tests and/or symptom over-reporting are not unusual among psychiatric patients. Our finding that 21% of the patients in a standard clinical setting failed the ASTM (i.e., underperformed) concurs with the findings of previous studies in various clinical settings that 20–30% of the patients underperform on symptom validity tests during neuropsychological assessment (Gorissen et al., 2005; Kemp et al., 2008; Locke et al., 2008). Furthermore, our finding that almost 21% of the patients failed the SIMS (i.e., over-reported symptoms) is in accordance with other clinical studies. For example, using a taxometric analysis of the MMPI-2 infrequency scales, Strong, Greene, and Schinka (2000) found a base rate of 27% for symptom over-reporting in a large sample of psychiatric inpatients. Likewise, using the SIMS, Beijen, Griffioen, Gross, and Leenders (2009) demonstrated that 23% of their patients with medically unexplained neurological complaints over-reported symptoms.

Although we found that SIMS and ASTM were significantly correlated, even when the influence of age and education was partialled out, this correlation was by all standards, small. Apparently both instruments measure related but different dimensions. The few studies that looked at both underperformance and over-reporting in

clinical (Haggerty et al., 2007; Whiteside et al., 2009) and legal settings (Nelson et al., 2007; Ruocco et al., 2008; Stevens et al., 2008) came to a similar conclusion, although it should be added that different measures were used in these previous studies. Taken together, these findings provide strong support for Iverson's (2006) point that symptom over-reporting and underperformance on cognitive tests may occur independently of each other. The implication of this for clinical practice is that both dimensions should be addressed during neuropsychological testing. Our findings also illustrate that the two dimensions have domain-specific correlates when it comes to clinical test results. That is to say, failing the SIMS had its strongest link with heightened levels of symptom reporting on the SCL-90 (33% explained variance). On the other hand, failing the ASTM seemed to have more limited effects and was primarily, although modestly, related to poor memory performance.

Symptom validity measures, almost by definition, do not intend to measure cognitive abilities or variables strongly related to these abilities. Therefore we were surprised to find that lower scores on the ASTM were associated with lower educational levels and higher age. Although the original validation studies on the ASTM (Schagen, Schmand, de Sterke, & Lindeboom, 1997; Schmand et al., 1999) did not find a relationship with age or educational level, Stulemeijer, Andriessen, Brauer, Vos, and Van der Werf (2007) also reported that patients failing the ASTM had significantly lower educational levels. Their study relied on a homogeneous sample of patients with mild traumatic brain injury. Unlike our study, the authors did not observe a significant age difference between patients passing and failing the ASTM. Clinical studies relying on other instruments than the ASTM to measure underperformance yielded mixed results, with some studies finding small yet significant correlations with educational level and/or age (Haggerty et al., 2007; Kemp et al., 2008), whereas others found no significant associations (Gorissen et al., 2005; Locke et al., 2008). This inconsistency may have to do with the homogeneity of the samples used. It may well be the case that only in samples that are mixed with regard to psychiatric background, educational level, and age, significant correlations between symptom validity measures and these demographic variables emerge. Small correlations ($\leq .20$) with demographic variables may not be unusual for instruments like the ASTM: even though they are simple, they require some minimum level of cognitive functioning (e.g., reading skills, working memory). The more important question is whether age and education correlate with the proportion of false positives on these instruments. This issue warrants future studies in which instruments like the ASTM are administered to large samples that are highly diverse with regard to age and education.

We found that patients failing only the ASTM performed worse on the compound memory score than the group passing both tests. After adjusting for age and education, this difference remained significant, although failing the ASTM explained only a small proportion of the variance in memory scores (i.e., 5.4% after partialling out age

and education). Thus, in contrast to previous studies, we were unable to show that a substantial overlap exists between ASTM failure and poor memory performance. This discrepancy might have to do with differential sensitivity of symptom validity instruments to cognitive impairment. For example, Merten, Bossink, and Schmand (2007) studied the lower-bound reliability limits of several instruments and concluded that the TOMM is more robust against genuine cognitive impairment (e.g., a result of dementia or other neurological conditions) than the ASTM. These authors also found that the ASTM was most strongly related to neuropsychological tests measuring working memory, a cognitive function that is often impaired in various neuropsychiatric conditions (Alloway & Gathercole, 2006). On the basis of the Merten et al. (2007) study, and the results of the current study, it appears that the ASTM is not the most suitable test for detecting underperformance in neuropsychiatric samples. The more general point here is, of course, that just because a symptom validity instrument may have proven its validity in, for example, a medico-legal setting or with a specific disorder (e.g., mild traumatic brain injury), this does not imply that it can also be administered with the same empirically established cut-off scores to other settings and disorders.

The most robust relationship in the current study was that between the SIMS and the SCL-90. Patients failing the SIMS reported more psychological symptoms than the group that only failed the ASTM and the group passing both tests. At first glance this suggests that the SIMS is correctly identifying those patients who are exaggerating their symptoms. There was, however, also a modest relationship between the SIMS and intelligence, such that patients failing the SIMS obtained a lower IQ score. Furthermore, higher scores on the SIMS were associated with lower educational levels. A plausible interpretation of this constellation is that less-intelligent and less-educated patients may have a preference for more blatant forms of symptom exaggeration, while more-intelligent patients might exhibit a more subtle style of symptom over-reporting (Solomon, Boone, Miora, & Skidmore, 2010). Another possibility is that persons with higher IQ are more likely to see through the rationale of the SIMS. However, there is little empirical support for this interpretation. For example, Jellic et al. (2006) demonstrated that students who were instructed to simulate and received coaching still failed on the SIMS. A third possibility is that the links between SIMS scores, IQ, and education reflect cognitive abilities. Thus, less-intelligent persons may answer more items positively because they do not fully grasp the questions. Although the manual of the SIMS recognizes that "In some cases, a respondent may exhibit genuine cognitive incapacity, such as mental retardation, and be unable to complete the SIMS" (Widows & Smith, 2005, p. 5), it does not specify the minimum intelligence level for a reliable administration of the SIMS. This issue is important because Graue et al. (2007) did indeed find a reduced specificity of the SIMS in persons with mild mental retardation ($IQ \leq 70$). While the average IQ level in our sample was higher than 70,

our findings highlight the need to further examine the relationship between SIMS and intelligence levels in order to establish appropriate cut-off scores to maintain adequate specificity.

A limitation of the current study is that we did not explore external incentives in our sample. Although all patients were seeking treatment, we cannot rule out the possibility that some of them had external incentives. In a sample of Dutch psychiatric outpatients ($N = 166$) Van Egmond, Kummeling, and Balkom (2005) found that 42% of their patients fostered expectations of gaining specific benefits from being in therapy other than getting better (e.g., they wanted help with obtaining a disability status, leave of absence from work, or a new accommodation). Interestingly, in most cases the clinician was unaware of these expectations. Furthermore, patients with these expectations showed less improvement during treatment than patients without these expectations. Whether such expectations may drive underperformance and over-reporting is an important issue that deserves systematic study. Meanwhile, we agree with Berry and Nelson (2010, p. 297) that it seems likely that "most behaviors are driven by both intrinsic and extrinsic factors" and that is notoriously difficult to dis-criminate between these factors.

Our finding that failing the ASTM or the SIMS is related to poor memory and heightened symptom levels, respectively, is silent about the causal direction that underlies these associations. It might be the case that intentional feigning is the driving force behind these associations, but another possibility is, of course, that genuine pathology interferes with performance and symptom reporting. Whatever the interpretation, these associations do show that clinicians cannot take clinical test outcomes at face value when patients fail symptom validity instruments.

In conclusion, our results strongly support the notion that underperformance and over-reporting can be viewed as "separate but related aspects of the broader construct of symptom exaggeration" (Haggerty et al., 2007, p. 926). They imply that a thorough assessment of symptom validity needs to take both dimensions into account, also during routine neuropsychological evaluation in a psychiatric setting. Particularly, the SIMS seems to be of value in evaluating the validity of symptom reporting. Our study also demonstrates that only establishing the base rates for failing symptom validity tests in various groups is not sufficient to understand the consequences and origins of underperformance and symptom over-reporting.

CHAPTER 3

**Poor symptom and performance
validity in regularly referred hospital
outpatients: Link with standard clinical
measures and role of incentives**

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ABSTRACT

We investigated the frequency of symptom validity test (SVT) failure and its clinical correlates in a large, heterogeneous sample of hospital outpatients referred for psychological assessment for clinical purposes. We studied patients ($N = 469$), who were regularly referred for assessment to the psychology departments of five hospitals. Background characteristics, including information about incentives, were obtained with a checklist completed by the clinician. As a measure of over-reporting, the Structured Inventory of Malingered Symptomatology (SIMS) was administered to all patients. The Amsterdam Short-Term Memory Test (ASTM), a cognitive underperformance measure, was only administered to patients who were referred for a neuropsychological assessment. Symptom over-reporting occurred in a minority of patients, ranging from 12% to 19% in the main diagnostic patient groups. Patients with morbid obesity had a low rate of over-reporting (1%). The SIMS was positively associated with levels of self-reported psychological symptoms. Cognitive underperformance occurred in 29.3% of the neuropsychological assessments. The ASTM was negatively associated with memory test performance. We found no association between SVT failure and financial incentives. Our results support the recommendation to routinely evaluate symptom validity in clinical assessments of hospital patients. The dynamics behind invalid symptom reporting need to be further elucidated.

INTRODUCTION

Psychology departments at hospitals routinely conduct psychological assessments to better understand patients' needs and to assist in clinical decision-making (Meyer et al., 2001). Psychological assessments largely consist of self-report scales and cognitive tests, which are thought to yield reliable information as to a patient's mental capacities, his/her psychological symptoms, and his/her personality characteristics. However, assessment information will only be valid when patients answer questionnaire items honestly and perform to the best of their abilities on cognitive tasks (Bush et al., 2005). When these conditions are not met, the obtained data are invalid because they do not reflect patients' genuine abilities and experienced suffering.

Dedicated tools have been developed to assess symptom validity. Broadly, there are two types of validity tests: Symptom Validity Tests (SVTs) that measure over-reporting of symptoms and Performance Validity Tests (PVTs) that cover underperformance on cognitive tests (Larrabee, 2012).

Most studies on symptom validity have focused on forensic samples, where a strong relation between financial compensation (e.g., seeking compensation for inability to work or claiming compensation for personal injury) and neuropsychological test outcome has been repeatedly found (e.g., Bianchini et al., 2006; see for an overview Boone, 2013). In forensic samples between 20 and 50% of patients fail on SVTs (Boone, 2013). Furthermore, forensic studies have made clear that failing SVTs implies invalidity of all other test data (Rohling et al., 2002; Green, 2007b; Stevens et al., 2008; Merten et al., 2009; Fox, 2011; Boone, 2013). The robust scientific evidence on the prevalence and impact of poor symptom validity have led to the consensus that in forensic assessments validity tests need to be incorporated (Bush et al., 2005; Heilbroner et al., 2009).

Compared with forensic studies on validity test failure, relatively few studies have looked into symptom validity within the (non-forensic) outpatient hospital setting. One exception is a study that examined symptom validity in patients diagnosed with medically unexplained neurological symptoms who were treated at an ambulant neurology department of a hospital; 23% of them failed on an SVT (Van Beilen et al., 2009). In line with this, percentages of PVT failure in patients clinically referred for neuropsychological assessment at medical centers have been found to be in the order of 10-30% (Van Hout et al., 2006; Kemp et al., 2008; Heintz et al., 2013; Johnson-Greene et al., 2013). Notably, these studies examined symptom validity in specific and relatively small patient groups, primarily with medically unexplained symptoms.

With this limitation in mind, we investigated the frequency of validity test failure in a large, heterogeneous sample of hospital patients referred for psychological or neuropsychological assessment. Our main reason for this study was to examine whether validity testing (SVTs and PVTs) should be standardly incorporated in a clinical assessment as a check for the validity of obtained data. Based on the above mentioned clinical studies, we hypothesized that a substantial minority (i.e., 10-20%) of patients would fail validity testing. Furthermore, we expected that SVT failure would be positively associated with symptom reports on psychological questionnaires and that PVT failure would be negatively associated with performance on cognitive tests. Importantly, SVT failures can be caused by various reasons, including irrelevant responding due to unwillingness to undergo the examination, yeah-saying, and feigning of psychopathology driven by factitious motives (e.g., to gain sympathy and care that comes with the patient role) or by external motives (i.e., malingering). Unraveling the reason for SVT failure was not the primary objective of this study. However, based on previous studies on SVT failure in forensic assessments, we anticipated a relation between validity test failure and the presence of external incentives, such as receiving social security benefits and being involved in a legal procedure.

METHODS

Sample

We used a cross-sectional design. The study sample consisted of patients, who had been regularly referred for diagnostic assessment between July 2012 and May 2013 to the Psychology Departments at five Dutch hospitals. These hospitals were: Maastricht University Medical Centre (MUMC), Maastricht, Atrium hospital, Heerlen, Elkerliek hospital, Helmond, St. Elisabeth hospital, Tilburg, and Orbis Medical Centre (OMC), Sittard. The vast majority of patients referred for psychological assessments to the Psychology Departments of these five hospitals are outpatients.

Patients who had obvious cognitive impairment were excluded from participation. To this end, we used the operational definition given in the manual of the Amsterdam Short-Term Memory Test (ASTM): "Clinically obvious symptoms" are symptoms that are obvious during informal contact with the patient or during history taking, without there being a necessity to use formal cognitive tests to provoke these symptoms" (p. 7) (Schmand and Lindeboom, 2005). Examples of conditions with obvious cognitive symptoms include moderate-severe Alzheimer's disease and acute psychosis. As a general rule, whenever a standard psychological exam was deemed possible, patients were included. As inclusion criteria, the general criteria for administration of psychological questionnaires and cognitive tests (i.e., minimum visual acuity, minimum hear-

ing, and sufficient proficiency of Dutch) were applied. In addition, the patient had to be mental competent to consent for participation. Some hospitals pre-excluded specific patient groups, either because they already participated in another study or because the current study would require too much adaptation of the test battery that was routinely used. Specifically, the MUMC Maastricht and the Atrium hospital Heerlen excluded patients with Parkinson's disease. The OMC Sittard excluded patients with multiple sclerosis. Patients who met inclusion criteria but who were not willing to participate in the study often indicated that they found the testing procedure burdensome enough. We estimated this group to be approximately 24% of the total group of eligible patients. The number of eligible patients who consented during the study period constituted the final sample size. The research protocol was reviewed and approved by the Medical Ethical Committee of Maastricht University Medical Centre.

Measures

Symptom validity tests

We used a Dutch research version of the Structured Inventory of Malingered Symptomatology (SIMS) as a measure of symptom over-reporting (Smith and Burger, 1997; Merckelbach and Smith, 2003). The SIMS is a 75-item self-report questionnaire addressing bizarre and/or rare symptoms that are rated on a dichotomous (yes-no) scale (Widows and Smith, 2005). A study of the Dutch research version of the SIMS with a group of 298 participants revealed a specificity of 98% and sensitivity of 93% with the cut-off set at 16. However, concern has been raised about the low specificity in clinical samples (Van Impelen et al., 2014). Therefore, following the recommendations of a recent meta-analysis of the SIMS, we used in our clinical sample a cut-off of 19. The meta-analysis combined 17 samples of non-over-reporting patients ($N=742$) and found a weighted mean SIMS raw score of 16.1 with a 95% CI from 13.4 to 18.9 (Van Impelen et al., 2014).

As a measure of underperformance, we employed the Amsterdam Short-Term Memory test (ASTM). The ASTM is a forced choice word recognition procedure (Schmand et al., 2005). We used a cut-off score of 82. In the original validation studies, that compared between experimental malingerers ($N=84$) and aggregated groups of patients suffering from neurological disorders such as moderate to severe cerebral contusion, advanced Parkinson disease, stroke, multiple sclerosis, and severe epilepsy ($N=206$), this cut score was associated with a specificity of 98% and a sensitivity of 77% (Schmand et al., 2005).

Clinical measures

Self-reported psychological problems were measured using the Brief Symptom Inventory (BSI) (Derogatis, 1975; De Beurs, 2011). The BSI consists of 53 items that pertain to various symptom domains such as anxiety, depression, and cognitive problems. The patient has to indicate on a 5-point Likert scale (0 = not at all; 4 = extremely) to what extent he or she experienced the symptom in the past seven days. We used the mean BSI item score, which is obtained by averaging across items (range: 0.0 – 4) (De Beurs, 2011).

Rey's Verbal Learning Test (VLT) was used to evaluate memory performance (Van der Elst et al., 2005; Strauss et al., 2006). Our version of the VLT consisted of a fixed ordered list of 15 nouns that were presented five times orally or on a computer screen. After each presentation, the patient had to recall the words in any order. After a 20-minute delay, the patient was first asked to recall the words and then to recognize the words from the list with 30 items (15 foil items). As indices of memory performance, we used the total number of words recalled over the five learning trials (IR) and delayed recall (DR).

Clinician's checklist

The clinician was asked to complete a checklist after their interview with the patient that preceded the testing session. The checklist contained the following background variables: age, gender, education, referring specialist, diagnosis upon referral, medication, social situation, employment status, type of income, and current involvement in legal proceedings. Incentives were defined as being either fully or partially on disability benefits (yes/no) and being currently involved in legal proceedings (yes/no).

PROCEDURE

Before testing started, patients received an information letter regarding the current study and were asked for informed consent to anonymously use their test data for this study. The research protocol only included the SIMS and BSI when the diagnostic referral question was about the possible presence of psychological problems, whereas it included SIMS, BSI, ASTM, and VLT when patients were referred for neuropsychological assessment. Tests were administered by a certified psychological technician or by trained clinical psychology doctoral students working under the supervision of a certified psychologist.

Data Analysis

Data were checked for errors, missing data, outliers, and score distributions. For the SIMS, there were nine (1.9%) missing records, for the BSI mean item score 20 (4.3%),

for the ASTM 8 (2.7%), and for the VLT 12 (4.1%). Missing item scores on the SIMS were imputed with the mean item score of that person when there were no more than 15 item scores in total and no more than 3 items scores per subscale missing (Widows and Smith, 2005). There were four extreme outliers on the ASTM (all scores at chance level), one extreme outlier on the SIMS extrapolated total score, and one extreme outlier on the BSI. These three variables were not normally distributed. Descriptive statistics and the percentage of participants failing the SIMS were calculated. With Chi-squares we compared the frequency of SIMS failures in the main diagnostic categories. Passers and failers on the SIMS were compared with either t-test for independent samples (age), Mann-Whitney test (BSI mean item score) or Chi square tests (education, incentives). Binary logistic regression analyses were performed to test the power of incentives in predicting the odds of symptom over-reporting. For this analyses we log transformed the BSI mean item score. For the group of patients who received the ASTM, we additionally compared passers and failers on the ASTM with t-tests for independent samples, Mann-Whitney test, or Chi-square tests with regard to the SIMS, demographics (age, education), BSI mean item score, and the VLT IR and DR scores. We performed separate binary logistic regression analyses to examine the power of incentives in predicting the odds of cognitive underperformance. For this analyses we used log transformed BSI mean item score and log transformed SIMS total score. Because of the high correlation between the VLT IR and DR scores, we created a compound memory score (i.e., [(IR/5 + DR)/2] for the binary logistic regression analyses. Finally, the sample contained a large subgroup of morbid obese patients referred for psychological screening to determine eligibility for gastric bypass surgery. This subgroup had an incentive to appear psychologically normal in order to be eligible for gastric bypass surgery. In order to account for this special subgroup, we constructed a scale to operationalize incentives. The scale consisted of four categories: screening for gastric bypass surgery, no incentive, receiving benefits or being involved in a legal procedure, and receiving benefits and being involved in a legal procedure. Analyses were performed with IBM® SPSS® Statistics version 22.

RESULTS

Demographics

The sample consisted of 469 patients (52.7% women) with a mean age of 47.7 years ($SD = 14.0$, range: 17-78) (see Table 1). Two hospitals were involved in psychological screening for the determination of eligibility for gastric bypass surgery, which explains the high number of patients with Morbid obesity in our sample. Additional

information on diagnosis upon referral and on referring specialist is provided online in a supplementary file.

Over-reporting

Prevalence

Of the 460 patients who completed the SIMS, 65 (14.1%) scored above the SIMS cut-off. Due to the small number of patients in the subgroup Medical conditions with cognitive complaints, we restricted further analysis to the five main diagnostic categories. A Chi-square analysis revealed that SIMS failure was not evenly distributed over diagnostic categories (χ^2 (4) = 18.56, $p < 0.01$). The SIMS failure rates were as follows: 18.9% of the patients with Neurological conditions, 1% of the patients with Morbid obesity, 16.9% of the patients with Medically Unexplained Symptoms (MUS), 19.4% of the patients with Psychiatric disorders, and 11.6% of the patients with Cognitive complaints not further specified. A second Chi-square analysis without patients with Morbid obesity revealed no difference in SIMS failure rates between the four remaining diagnostic categories; χ^2 (3) = 2.03, $p = 0.57$.

Relationship with demographic and clinical parameters

Table 2 gives the comparison between passers and failers on the SIMS with regard to demographic variables, incentives, and the BSI.

The group patients that failed the SIMS was significantly older, lower educated, and obtained a higher median score on the BSI than the group that passed the SIMS. Also, the two groups differed regarding incentives. The most noticeable difference between the SIMS pass en fail groups was found in the incentive ‘screening for gastric bypass’. Patients screened for gastric bypass surgery, had a very low failure rate.

Table 1 Demographics

	% sample	N
Diagnostic category upon referral		
Neurological conditions	24.1	113
Morbid obesity	20.5	96
Medically Unexplained Symptoms	18.1	85
Psychiatric disorders	15.8	74
Cognitive complaints not further specified	15.1	71
Medical conditions with cognitive complaints	3.2	15
Other	2.8	13
Missing	0.4	2
Type of assessment		
Psychological	37.7	177
Neuropsychological	62.3	292
Gender (female)	52.7	247
Medication		
None	25.4	119
Somatic drugs only	36.2	170
Psychotropic drugs only	13.0	61
Both somatic/psychotropic drugs	16.8	79
Missing	8.5	40
Employment status		
Paid employment	30.7	144
Sick leave	22.8	107
Incapacitated for work (full or partial)	17.3	81
Unemployed	7.0	33
Retired	13.2	62
Student	4.1	19
Other (e.g. housewife)	3.4	16
Missing	1.5	7
Receiving benefits (sickness or disability)		
No	55.9	262
Yes (full or partial)	43.3	203
Missing	0.9	4
Currently involved in legal proceedings*		
None	83.2	390
Medico-legal assessment in context of disability benefits	10.0	47
Personal injury claim	5.1	24
Other	1.9	9
Missing	0.4	2

Notes: * three patients were involved in two legal procedures

Table 2 Comparison of the group patients that pass and fail on the SIMS

	SIMS pass	SIMS fail	<i>p</i>
Age ^a	<i>Mean (sd)</i> 46.9 (13.9)	51.3 (13.8)	0.02
BSI mean item score ^b	<i>Median</i> 0.51	1.44	0.00
Education ^b	<i>% (n)</i> 77.2 (95)	22.8 (28)	0.00
Low	87.8 (195)	12.2 (27)	
Medium	91.1 (102)	8.9 (10)	
High	<i>% (n)</i> 98.9 (94)	1.1 (1)	0.00
Incentives ^c	84.0 (142)	16.0 (27)	
Screening eligibility for gastric bypass MO	84.7 (116)	15.3 (21)	
None			
Receiving benefits <u>or</u> involved in legal proceedings	73.2 (41)	26.8 (15)	
Receiving benefits <u>and</u> involved in legal proceedings			

Notes: SIMS = Structured Inventory of Malingered Symptomatology; BSI = Brief Symptom Inventory; MO = Morbid Obesity; ^a t-test independent samples; ^b Mann-Whitney U test; ^c χ^2 ; * Low = at most primary education; medium = junior vocational training; and high = senior vocational or academic training (Van der Elst et al., 2005).

Role of incentives

Binary logistic regression was performed to test the power of incentives in predicting the odds of failing the SIMS (i.e. over-reporting) (see Table 3). The Hosmer and Lemeshow Test revealed adequate model fit. In step 1, we entered age, education, and incentives. The overall model was statistically significant, $\chi^2(6) = 40.20$, $p < 0.001$, indicating that the model was able to distinguish between patients who passed the SIMS and patients who failed the SIMS. However, the overall model only explained between 9% (Cox & Snell R squared) and 16% (Nagelkerke R squared) of the variance of over-reporting. The model correctly classified 86.4% of the cases. As portrayed in table 3, the incentive 'screening for gastric bypass', and education made a unique statistically significant contribution to the model. The group patients with morbid obesity who were referred for screening for gastric bypass surgery had an 18.87 smaller odds to score deviant on the SIMS than those who were referred with no incentive, controlling all other factors in the model. Although, not significant, the group patients who received benefits and were involved in a legal procedure, had an odds of 1.99 to score deviant on the SIMS than the group patients who had no incentive.

In a second step, information on the performance on the BSI was added to the model. The second overall model was statistically significant, $\chi^2(7) = 104.88$, $p < 0.001$. The model correctly classified 87.1% of the cases and explained between 21% (Cox & Snell R squared) and 39% (Nagelkerke R squared) of the variance of over-reporting. The second model significantly better predicted pass and fail on the SIMS than the first model, $\chi^2(1) = 64.67$, $p < 0.001$. In the second model, performance on the BSI, the in-

centive 'screening for gastric bypass', education and age made a unique statistically significant contribution to the model. With regard to the incentives, patients seen for screening for gastric bypass surgery had a 9.26 smaller odds to over-report symptoms than patients who had no incentives.

Table 3 Binary logistic regression predicting the odds of symptom over-reporting

	B (SE)	95% CI for Exp b			<i>p</i> -value
		Lower	Exp b	Upper	
Step 1					
Age	0.015 (0.011)	0.99	1.02	1.04	0.18
Education	Reference				
Low	-0.63 (0.33)	0.28	0.53	1.02	0.06
Medium	-1.30 (0.45)	0.11	0.27	0.66	0.00
High					
Incentives	Reference				
None	-2.95 (1.04)	0.01	0.05	0.40	0.01
Screening for gastric bypass	-0.10 (0.35)	0.46	0.91	1.78	0.77
On disability benefits					
<u>Or</u> involvement in a legal procedure	0.65 (0.40)	0.88	1.92	4.19	0.10
On disability benefits <u>and</u> involvement in a legal procedure					
Constant	-1.84 (0.71)		0.16		0.01
Step 2					
Age	0.03 (0.01)	1.00	1.03	1.06	0.03
Education	Reference				
Low	-0.43 (0.37)	0.31	0.65	1.35	0.25
Medium	-1.33 (0.51)	0.10	0.27	0.72	0.01
High					
Incentives	Reference				
None	-2.22 (1.07)	0.01	0.11	0.88	0.04
Screening for gastric bypass	-0.45	0.29	0.64	1.38	0.26
On disability benefits					
<u>Or</u> involvement in a legal procedure	-0.13 (0.48)	0.34	0.88	2.23	0.78
On disability benefits <u>and</u> involvement in a legal procedure					
Constant	0.01 (0.001)	1.01	1.01	1.01	0.00
BSI mean item score log transformed * 1000	-5.14 (0.97)		0.06		0.00

Notes: Step 1: $R^2 = 0.09$ (Cox & Snell), 0.16 (Nagelkerke); Model $\chi^2(6) = 40.20$, $p < 0.001$; Step 2: $R^2 = 0.21$ (Cox & Snell), 0.39 (Nagelkerke); Model $\chi^2(7) = 104.87$, $p < 0.001$.

Underperformance

Prevalence

Of the 284 patients, 85 (29.9%) evidenced underperformance on the ASTM. A Chi-square analysis did not show a significant difference of ASTM failure over diagnostic categories ($\chi^2(4) = 2.82, p = 0.59$). The ASTM failure rates were as follows: 15.9 % of the patients with Neurological conditions, 36.7% of the patients with Medically Unexplained Symptoms (MUS), 33% of the patients with Psychiatric disorders, 29.4% of the patients with Cognitive complaints not further specified, and 36% of the patients with medical conditions with cognitive complaints. Of the 276 patients, who received the SIMS and the ASTM, 63.4% passed both SVTs, and 11.2% failed both tests (see Table 4).

Table 4 Number (Percentages) of patients seen for neuropsychological assessment ($N = 276$) that passed or failed the ASTM and the SIMS

	ASTM	
	Pass	Fail
SIMS	Pass 175 (63.4%)	50 (18.1%)
	Fail 20 (7.2%)	31 (11.2%)

Notes: ASTM = Amsterdam Short-Term Memory test; SIMS = Structured Inventory of Malingered Symptomatology

Relationship with demographic and clinical parameters

Table 5 shows the comparison of passers and failers on the ASTM with regard to the demographic variables, incentives, SIMS score and clinical measures (i.e., BSI, VLT IR and DR). The two groups did not differ in incentives¹. Also, age was not different in the two groups. The two groups did differ regarding education. Also, the groups differed in their performance on the clinical measures. The group that failed the ASTM performed lower on memory (IR and DR) and obtained a higher median score on the BSI and the SIMS.

¹ The assessment for gastric bypass surgery contains only the SIMS and psychological questionnaires.

Table 5 Comparison of the group patients that pass and fail on the ASTM

	ASTM pass	ASTM fail	p
Age ^a	Mean (sd) 49.4 (14.5)	52.8 (12.9)	0.06
VLT IR ^a	44.5 (11.6)	36.0 (12.2)	0.00
VLT DR ^a	8.8 (3.8)	6.4 (3.4)	0.00
BSI mean item score ^b	Median 0.60	0.91	0.01
SIMS total score ^b	9.00	15.20	0.00
Education ^c	Median % (n)		0.02
Low	58.9 (43)	41.1 (30)	
Medium	72.3 (94)	27.7 (36)	
High	76.3 (61)	23.8 (19)	
Incentives ^d			0.11
None	71.1 (106)	28.9 (43)	
Receiving benefits <u>and</u> involved in legal proceedings	76.3 (71)	23.7 (22)	
Receiving benefits <u>and</u> involved in legal proceedings	57.9 (22)	42.1 (16)	

Notes: ASTM = Amsterdam Short-Term Memory test; VLT = Verbal Learning Test; IR = Immediate Recall; DR = Delayed Recall; BSI = Brief Symptom Inventory; SIMS = Structured Inventory of Malingered Symptomatology; ^a t-test independent samples; ^b Mann-Whitney U test; ^c χ^2 ; Low = at most primary education; medium = junior vocational training, and high = senior vocational or academic training (Van der Elst et al., 2005).

Role of incentives

Binary logistic regression was performed to assess the extent to which incentives had power in predicting the odds of failing the ASTM (i.e., underperformance) (see Table 6). The Hosmer and Lemeshow Test revealed adequate model fit. In the first step, we entered age, education, incentives. The overall model was statistically significant, $\chi^2(5) = 13.69, p < 0.05$, indicating that the model was able to distinguish between patients who passed the ASTM and patients who failed the ASTM. However, the overall model explained a small amount, between 5.4% (Cox & Snell R squared) and 7.9% (Nagelkerke R squared), of the variance of underperformance. The model correctly classified 74.8% of the cases. As portrayed in table 7, age and education made a unique statistically significant contribution to the model, whereas incentives did not. However, although not significant, the group patients who received benefits and were involved in a legal procedure, had an odds of 2.01 to score deviant on the ASTM than the group patients who had no incentive.

In the second step, we entered the performance on the other clinical measures. We entered the compound measure of the Verbal Learning Test, the log transformed SIMS total score, and the log transformed BSI mean item score. The second overall model was statistically significant, $\chi^2(8) = 54.56, p < 0.001$. The model correctly classified 77.6% of the cases and explained between 20% (Cox & Snell R squared) and 29% (Nagelkerke R squared) of the variance of underperformance. The second model significantly better predicted pass and fail on the ASTM than the first model, $\chi^2(3) = 40.87, p < 0.001$. In the second model, performance on the SIMS and on the Memory

compound made a unique statistically significant contribution to the model. Again, incentives did not uniquely contribute to the model.

Table 6 Binary logistic regression predicting the odds of cognitive underperformance

	B (SE)	Lower	95% CI for Exp b	Upper	p-value
Step 1					
Age	0.02 (.01)	1.00	1.02	1.05	.06
Education	Reference				
Low	-0.66 (0.36)	0.26	0.52	1.04	.06
Medium	-0.99 (0.42)	0.16	0.37	0.85	.02
High					
Incentives	Reference				
None	-0.08 (0.35)	0.47	0.92	1.82	.81
On disability benefits					
Or involvement in a legal procedure	0.72 (0.42)	0.90	2.01	4.70	.09
On disability benefits					
And involvement in a legal procedure	-1.68 (0.73)		0.19		.02
Constant					
Step 2					
Age	-0.01 (0.01)	0.97	1.0	1.02	.74
Education	Reference				
Low	-0.29 (0.39)	0.35	0.75	1.61	.46
Medium	-0.26 (0.47)	0.31	0.77	1.94	.58
High					
Incentives	Reference				
None	-0.53 (0.40)	0.27	0.59	1.28	.18
On disability benefits					
Or involvement in a legal procedure	0.55 (0.47)	0.69	1.73	4.32	.24
On disability benefits					
And involvement in a legal procedure					
BSI mean item score	-0.001 (0.002)	1.0	1.0	1.0	.49
transformed * 1000					
SIMS log transformed	3.61 (1.00)	5.19	36.91	262.35	.00
Memory	-0.23 (.07)	0.70	0.80	0.91	.00
Constant	-2.44 (1.43)		0.09		.09

Note Step 1: $R^2 = .05$ (Cox & Snell), .08 (Nagelkerke), Model $\chi^2(5) = 13.69$, $p < .05$; Step 2: $R^2 = .20$ (Cox & Snell), .29 (Nagelkerke), Model $\chi^2(8) = 54.56$, $p < .0$

DISCUSSION

We examined the frequency of SVT failure and its clinical correlates in a heterogeneous sample of hospital patients who had been regularly referred for psychological or neuropsychological assessment. Our main findings can be summarized as follows.

Firstly, SVT failure occurred in a considerable minority of referrals. The percentages of symptom over-reporting in the various main diagnostic groups ranged between 12% and 19%. Importantly, our findings show that symptom over-reporting is not only found in patients with MUS, but in other diagnostic categories as well. A striking exception to this was the group patients with Morbid obesity: In this group, symptom over-reporting occurred in only 1 % of the patients. In the subsample of patients who were seen for a neuropsychological assessment 29.9% failed the ASTM. There was no difference in failure rate between the diagnostic categories. In this subsample, who were administered two SVTs, approximately one out of three patients over-reported symptoms, underperformed on cognitive tasks or failed both types of validity tests. This proportion falls well within the range found in homogeneous patient groups (i.e., 10-30%) (Van Hout et al., 2006; Kemp et al., 2008; Van Bellen et al., 2009; Heintz et al., 2013; Johnson-Greene et al., 2013).

Secondly, we found robust correlations between performance on the validity tests and standard clinical measures. Failure on the SIMS was associated with higher levels of self-reported psychological symptoms on the BSI. Admittedly, our study was correlational in nature, and this precludes causal interpretations of the logistic regression outcomes. However, although it is conceivable that patients with genuine psychopathology have elevated scores on the SIMS, it is less likely that genuine psychopathology accounts for failure on the SIMS. A recent meta-analysis did find that certain SIMS items might be susceptible to genuine psychopathology (Van Impelen et al., 2014). This study found the weighted mean score on the SIMS to be 16.1 [95% CI 13.4-18.9] for honest patient groups. Note, though, that this score is below the cut-off of 19 that we used to determine the prevalence of symptom over-reporting in our patient sample. Arguably, the elevated SIMS scores in our sample suggest over-reporting of symptoms. With this in mind, one might as well argue that SIMS failure is the driving force behind elevated symptomatology levels rather than vice versa. Thus, patients who endorse many bizarre symptoms will most likely also endorse more common psychological symptoms (Lanyon, 2003). Unfortunately, our cross sectional design does not allow for determining how genuine psychopathology and over-reporting might influence each other. Clearly, such causal pathways should be the focus of future studies. Importantly, a score above the cut-off on the SIMS does not necessarily mean that the patient is malingering. As mentioned before, besides malin-

gering there are several other reasons possible for symptom over-reporting (e.g., yeah-saying, factitious disorder).

On a related note, in the subsample of patients who underwent a neuropsychological assessment, the group patients that failed the ASTM scored lower on the VLT memory indices (IR and DR) than the group patients that passed the ASTM. The VLT memory compound uniquely predicted ASTM failure. Still, this logistic regression analysis does not imply a causal pathway from memory performance to ASTM performance. Although patients with reduced memory capacities may make more mistakes on the ASTM, it is unlikely that in our sample scores below the cut-off of 82 were caused by genuine memory deficiencies. In general, there is robust evidence that performance-based SVTs are easy for genuine patients, even those with neurological impairment (Larrabee, 2012). Only in cases of severe cognitive impairment (e.g., dementia), the false positive failure rate of performance SVTs, including the ASTM, has been found to be unacceptably high (Merten et al., 2005; Dean et al., 2008). For this reason, we excluded patients with clinically obvious cognitive impairment.

Thirdly, in line with previous findings, our results support the notion that symptom over-reporting and cognitive underperformance are related, yet distinct behavioral dimensions of symptom validity (Nelson et al., 2007; Dandachi-FitzGerald et al., 2011). The SIMS total score contributed uniquely to the prediction of ASTM failure. However, only memory performance, but not the level of self-reported psychopathology, was uniquely associated with ASTM failure.

Fourthly, contrary to our hypothesis, we failed to find an association between validity test failure and the presence of external incentives. Whether patients received social security benefits or whether patients were involved in legal proceedings was not associated with validity test performance. Similarly, a recent study with a sample of patients with psychogenic non-epileptic seizures failed to find an association between financial incentives and validity test failure (Williamson et al., 2012). Other studies, however, did find an association between validity test failure and financial incentives in clinical samples (Webb et al., 2012; Johnson-Greene et al., 2013). Importantly, several other factors have been found to be related to validity test failure, such as self-reported mood, exaggerated displays of behavior, and a diagnosis of psychotic illness (Webb et al., 2012). Although the operationalization of external incentives in our study has several limitations (see below), these findings at a minimum suggest that SVT failure in clinical samples is not restricted to those patients who might have obvious financial benefits.

One important and novel aspect of the current study is our finding that patients with Morbid obesity obtained lower SIMS scores than the other diagnostic subgroups. In our morbid obese patient group there was a direct link between the psychological assessment and the decision whether or not the patient was considered to be eligible for gastric bypass surgery. Therefore, these patients had an incentive to appear psy-

chologically healthy. Patients with Morbid obesity experience clinical levels of psychological distress (Kalarchian et al., 2007). However, a substantial percentage of morbidly obese patients downplay their distress in pre-surgical psychological assessments (Ruchinskas et al., 2006). This is well in line with the low SIMS failure rate we found in this subgroup. Unfortunately, we did not specifically address the other side of response bias – symptom underreporting – in our study. More generally, tendencies to deny psychopathology in psychological assessments in hospital patients have not been well studied. Our findings call for more research that identifies conditions in which reporting psychopathology may be unfavorable.

Several limitations of our study need to be mentioned. A substantial number of patients were not willing to participate in the study. Given that non-cooperative behavior is a key feature of malingering, we believe that our failure to include all eligible patients is likely to underestimate the associations that we found (American Psychiatric Association, 2013). Further, in addition to not taking symptom underreporting into account, we narrowly focused on external and financial incentives as an explanatory factor for validity test failure. Additionally, we relied solely on self-reports to determine the presence of a financial incentive. Collateral information, such as whether the diagnostic report is requested by patients or third parties, might give a more complete determination of incentives. More importantly, our operationalization of external, financial incentives was coarse. We did not establish whether patients viewed the psychological assessment relevant for the pursuit or maintenance of the incentive. We also did not know whether the external benefits regarded the medical condition for which the patient was referred for psychological assessment. It would have been better if we had collected more in-depth information on incentives. Thus, even though we failed to find an association between incentives and validity test performance, on the basis of this study an association can certainly not be ruled out, especially when considering the strong evidence for incentives found in forensic studies where there is a direct link between the assessment and the incentive (e.g., Bianchini et al., 2006). Still, the financial benefits perspective on validity test failure is most likely to be too simplistic for understanding poor symptom validity in patients seen for clinical assessments. To gain more insight into the role of incentives, it is important to not only collect more objective information, but also study more thoroughly the expectations of patients regarding the possible advantages and disadvantages of the psychological assessment. More thorough studies on the motives and mechanisms operating behind validity test failure are clearly needed because the few experimental studies conducted indicate that deliberate feigning may set a pathological process into motion by which the feigned symptoms might become real to the person (Merkelbach and Merten, 2012).

In conclusion, our findings underline the importance to include validity tests in clinical assessment of patients, without obvious, severe cognitive impairment, in a

hospital setting. Self-reported symptoms need to be checked for both over- and underreporting distortions. Failure to assess the validity of the assessment raises the risk that diagnostic conclusions and treatment advice are founded on unreliable information in a substantial minority of patients. Future studies should focus on the underlying dynamics of symptom presentation distortions.

Supplementary file: diagnostic information upon referral	
Diagnostic information upon referral	Number (% sample)
Neurological conditions	113 (24.1%)
Vascular brain disease (CVA, TIA, white matter lesions)	42
Brain tumor	14
Traumatic Brain Injury	12
Epilepsy	9
Movement disorders	9
Normal pressure hydrocephalus	8
Multiple sclerosis	8
Brain injury – not traumatic (meningitis, post anoxic encephalopathy)	8
Other	3
Morbid obesity	96 (20.5%)
Medically Unexplained Symptoms (MUS)	85 (18.1%)
Somatiform disorders / conversion	15
Whiplash associated disorder	15
Pain (headache, low back pain)	12
Mild traumatic head injury (commotion cerebri / trauma capitis)	11
Burn-out	9
Sleep disorders (OSAS)	6
Chronic Fatigue Syndrome	3
Fibromyalgia	3
Lyme disease	3
Irritable bowel syndrome & abdominal complaints not otherwise specified	7
Other	1
Psychiatric disorders	74 (15.8%)
Depression	34
Anxiety	13
Bipolar	9
Psychotic	8
Personality	4
Attention Deficit Hyperactivity Disorder	2
Other	4
Cognitive complaints not further specified	71 (15.1%)

Supplementary file: diagnostic information upon referral continued	
Medical conditions with cognitive complaints	15 (3.2%)
Heart failure	2
HIV infection	2
Cancer	3
Other	8
Other	13 (2.8%)
Missing	2 (.4%)
Referring specialist	% sample
Neurologist	32.6
Psychiatrist	26.9
Surgeon	18.1
Rehabilitation specialist	8.5
General Practitioner	5.8
Neurosurgeon	2.6
Internal Medicine	1.9
Other	2.3
Missing	1.3

CHAPTER 4

Feigning ≠ feigning a memory deficit: The Medical Symptom Validity Test as an example

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ABSTRACT

The Medical Symptom Validity Test (MSVT) is a widely used memory test with three built-in effort measures that intend to detect feigning. We evaluated its merits as a broad screening tool for symptom validity. In study 1, we interviewed participants ($N = 54$) about the symptoms they would and would definitely not feign. Non-specific somatic symptoms and depression were mentioned most frequently. Almost 10 % of the participants said they would certainly not feign memory problems. In study 2, we compared the diagnostic accuracy of the MSVT and a broad index of symptom exaggeration, i.e., the Structured Inventory of Malingering Symptomatology (SIMS), in experimental malingerers ($N = 42$) who were free to choose the disorder they wanted to feign. Although both tests attained 100% specificity (i.e., correctly identified all honest controls), the SIMS surpassed the MSVT in correctly identifying experimental malingerers (91% versus 45%). In study 3, we explored the overlap between MSVT effort parameters and SIMS scores of psychiatric patients ($N = 21$). Only one MSVT parameter (Delayed Recognition) was significantly related to SIMS scores ($\phi = -.52$, $p < .05$). Our results indicate that memory-oriented symptom validity tests like the MSVT may be useful to detect feigned memory deficits, but perform less well as a screening tool for other types of feigned psychopathology.

INTRODUCTION

Individuals who feign symptoms in order to obtain financial or legal benefits (i.e., malingering; see Diagnostic and Statistical Manual of Mental Disorders: DSM-IV-TR; American Psychiatric Association, 2000) may obscure forensic evaluations, clinical diagnostics, and even research data. Although prevalence rates of feigning vary widely, depending on, for example, the setting (e.g., forensic evaluations versus routine clinical screening), most estimates range between 20 and 60% (e.g., Ardolf, Denney, & Houston, 2007; Schmand, Lindeboom, Schagen, Heijt, Koene, & Hamburger, 1998; Mittenberg, Patton, Canyock, & Condit, 2002). Indeed, prevalence rates of feigning are sufficiently high to support the inclusion of so called Symptom Validity Tests (SVTs) in psychological assessments of patients (e.g., Rohling, Larrabee, Greiffenstein, Ben-Porath, Lees-Haley, Green, & Greve, 2011). Several studies demonstrated that failing such SVTs explains more variance in cognitive test performance than, for example, severity of brain injury or depressive complaints (Green, 2007b; Rohling, Green, Allen, & Iverson, 2002; Stevens, Friedel, Mehren, & Merten, 2008). The non-trivial prevalence of feigning and its huge impact on test outcome, have contributed to the widely voiced view that a forensic or neuropsychological assessment is flawed when symptom validity – defined as “the accuracy or truthfulness of the examinee’s behavioural presentation, self-reported symptoms or performance on neuropsychological measures” – is not assessed (Bush, Ruff, Tröster, Barth, Koffler, Pliskin et al., 2005; p. 420).

Against this background, the need for new, safe (i.e., low false positive rates), effective, and easy to administer tools to assess symptom validity is broadly felt among clinicians and researchers. Briefly, two types of tools have been designed to meet this need: symptom lists that intend to measure over-reporting of symptoms and effort tests that intend to capture intentional underperformance on cognitive tests. Many clinicians conceptualize feigning in a monolithic way and, by implication, assume that when people over-report symptoms they also underperform on cognitive tasks (Berry & Nelson, 2010). Another widespread assumption is that malingerers have a preference for feigning memory disorders. Both assumptions are far from self-evident. Thus, recent studies show that over-reporting and underperformance in psychiatric patients are two partially independent dimensions (e.g., Dandachi-FitzGerald, Ponds, Peters, & Merckelbach, 2009). Also, while there is some support for the idea that experimental malingerers preferably feign memory deficits, the evidence may be an artefact of the way that research participants were instructed (e.g., to feign symptoms of head injury resulting from a car accident; e.g., Tan, Slick, Strauss & Hultsch, 2002). Even so, the two assumptions appear in many publications and test manuals as well-founded prin-

ciples. A case in point is the Medical Symptom Validity Test (MSVT; Green, 2004), a verbal memory test with build-in effort measures. The idea that the MSVT is sensitive to a broad domain of feigned symptoms and deficits is implicitly conveyed by its name. According to its manual: "MSVT effort test failure implies probable exaggeration or self-reported memory problems *and other symptoms*" (Green, 2004, p. 5; *italics ours*).

It is true that the MSVT attained impressively high rates of sensitivity and specificity in experimental studies that compared controls with malingers instructed to feign memory problems. For example, Merten, Green, Henry, Blaskewitz, and Brockhaus (2005) recruited healthy volunteers and asked half of them to perform to the best of their abilities on the MSVT, while the other half was instructed to feign memory impairment in a credible way. All experimental malingerers failed the MSVT, whereas all participants instructed to do their best passed the MSVT, suggesting a perfect diagnostic accuracy. Validation data from a Brazilian study that was conducted along similar lines yielded sensitivity and specificity rates that exceeded 95% (Green, 2004, Appendix B; Green, Flaro, & Courtney, 2009). Blaskewitz, Merten, and Karthmann (2008) administered the MSVT to 6–11 years olds who were either instructed to perform as good as they could or to underperform (i.e., make some mistakes without performing too badly). These authors found a sensitivity of 90% along with a specificity of 98% (only one out of 51 children in the control group failed the MSVT).

Given the impressive accuracy statistics that experimental studies found for the MSVT, it comes as no surprise that this test is employed as a screening tool for symptom exaggeration in clinical groups that do not present with memory deficits as their main complaint. For instance, Richman, Green, Gervais, Flaro, Merten, Brockhaus, and Ranks (2006) administered the MSVT to patients with fibromyalgia, chronic pain, and soft tissue injuries. In that study, the MSVT was the only measure that was employed to assess symptom validity. We do not know, however, how the MSVT fares in groups without manifest memory complaints. Much the same can be said of other SVTs that capitalize on memory performance so as to detect feigning in several symptom domains.

We conducted three studies. In the first study, we wanted to know to what extent instructed malingerers prefer memory complaints. In the second study, we tested the accuracies of the MSVT and an instrument that measures symptom over-reporting - the Structured Inventory of Malingered Symptomatology (SIMS) - when experimental malingerers were free to choose the symptoms they would feign. The third study explored the overlap between the MSVT and the SIMS in a sample of psychiatric outpatients.

STUDY 1

Only two studies have looked at the type of symptoms that instructed malingerers prefer. Both asked participants to imagine a scenario of traumatic head injury following a car accident. Specifically, Iverson (1995) instructed experimental malingerers ($N = 160$) to feign memory impairments and then interviewed them about their strategies. Feigning total amnesia was the most frequently reported strategy. Tan and co-workers (2002) did not explicitly instruct experimental malingerers ($N = 27$) to feign memory impairment, but they did ask them to demonstrate realistic impairments associated with head injury. As said, these authors noted that memory problems were the most often reported feigned symptoms, followed by slow response rates. An important limitation of both studies is that they relied on a single type of scenario (i.e., head injury) and did not ask instructed malingerers what symptoms they would avoid. We tried to remedy these limitations in study 1.

METHOD

Participants and procedure

A total of 55 undergraduate students of the faculties of Psychology and Law participated in the study. One questionnaire was not filled out properly and therefore excluded from the analysis. The final group consisted of 54 students (40 women, 14 men) with a mean age of 22 years ($SD = 2.1$).

Participants first read a vignette about either a criminal ($n = 28$) or a civil ($n = 26$) case scenario. Participants who had the criminal case scenario were asked to imagine that they had caused a fatal car accident. They had never been involved in an accident before and had not drunk alcohol. On the other hand, the victim had been drinking and had suddenly crossed the street. As part of the criminal investigation, they would have to undergo a forensic evaluation. Participants were asked to imagine that they would fabricate symptoms during the evaluation in an attempt to reduce their criminal responsibility.

Participants who had the civil case scenario were asked to envision that they were a loyal employee, who had been working for ten years for the same company. They had always worked hard with working weeks of more than 50 hours. Then, a new and arrogant manager arrived with whom they instantly had a dispute. The new manager threatened to fire them and they decided to call in sick. Next, they were visited by a medical doctor who wanted to assess their health status and determine their entitlement to work-related compensation money. They were asked to imagine that they would feign symptoms so as to obtain the money. Both case vignettes may be obtained from the second author.

After reading the vignette, participants were interviewed about the symptoms they would feign and the symptoms they would certainly not feign, how they would prepare themselves for the evaluations, and whether they would feign symptoms that they had experienced in real-life.

RESULTS AND DISCUSSION

Table 1 shows the frequencies of the various symptoms that participants would feign. Frequencies are given for the total sample and for the subsamples. Symptoms are included in Table 1 when they had been endorsed by at least two participants in the total sample. For the total sample, the top four of feigned symptoms were headache, stress/burn-out, depression, and fatigue. For the subsample instructed with the civil case scenario a similar top four emerged, although the rank order was slightly different, with fatigue being mentioned most often. The criminal case scenario subsample, however, showed a different picture. Black-out / dissociation ranked second, while stress / burn-out and fatigue were at the bottom of the ranking. Memory disorders were not included in the top 4 and this was also true for participants instructed with the criminal case scenario. Closer analysis revealed that these participants mentioned amnesia only two times while forgetfulness was also mentioned two times. Table 1 also gives the frequencies of symptoms that participants said they would definitely avoid. Here too, symptoms were only included if they were endorsed by at least two participants. Psychotic hallucinations and delusions were the most frequently mentioned symptoms. There were, however, differences between participants instructed with a civil case scenario and those who had had a criminal case scenario. For example, participants who had been given the criminal case scenario mentioned substance abuse and personality disorders, while participants who had had the civil case scenario never mentioned these categories. On the other hand, a number of civil case scenario participants said they would avoid fever as a feigned symptom, but none of the criminal case participants said so. Memory complaints were mentioned five times as symptoms that one should definitely avoid, most often so by criminal case scenario participants.

Table 1 Frequency of preferred and avoided symptoms in the total sample (N = 54) and in participant-instructed with a civil case vignette (n = 28) and a criminal case vignette (n = 26).

	Total sample	Civil case vignette	Criminal case vignette
<i>Preferred</i>			
Headache	14	6	8
Stress/burn-out	13	10	3
Depression	12	7	5
Fatigue	12	11	1
Sleep difficulties	7	3	4
Dizziness/nausea	7	3	4
Black-out/dissociation	6	0	6
Back pain	5	5	0
Concentration difficulties	5	3	2
Memory disorders	4	0	4
Psychosis	3	0	3
Vision problems	3	0	3
Anxiety disorders	2	1	1
<i>Avoided</i>			
Psychosis	10	4	6
Fever	5	5	0
Memory disorders	5	1	4
Psychological disorder	5	4	1
Substance abuse	5	0	5
Pain complaints	4	3	1
Personality disorders	3	0	3
Epilepsy	2	0	2

With respect to how they would prepare for a forensic assessment, most participants (78%) indicated that they would search the internet and read about symptoms and tests. Fifteen participants (28%) said they would worsen their symptom presentation, for example, by sleep deprivation. When specifically asked, 20 participants (36%) said that they would imitate symptoms that they had experienced previously (e.g., migraine).

Of course, study 1 relied on a relatively small sample that is not representative of the general population. Also, it looked at people's self-reports about feigned symptoms and did not directly examine actual behaviour. Notwithstanding these limitations, the findings do suggest that memory problems are not omnipresent in cases of feigned disorders and might even be actively avoided by some individuals. This contradicts earlier studies that found memory deficits to be the most prominent targets for feigning (Iverson, 1995; Tan et al., 2002). One could counter, however, that although memory complaints were not often mentioned explicitly, the symptoms that were chosen frequently (e.g., headache, fatigue, depression, stress/burnout) are often accompanied by self-reported memory difficulties. Furthermore, even when memory difficulties are not reported initially, malingers may feign cognitive deficits when a cognitive test is part of the forensic investigation. As they stand, the results of study 1 do not cast doubts on the usefulness of the MSVT. Thus, whereas the assumption underlying the MSVT about the omnipresence of feigned memory disorders may be ill-founded, the MSVT might still have impressive accuracy statistics.

STUDY 2

Using an experimental approach, we tested the diagnostic accuracy of the MSVT when instructed malingers were free to choose the to-be-feigned symptoms. We compared the accuracy of the MSVT under this condition with a widely used self-report instrument that taps into the tendency to over-report symptoms in several domains (e.g., psychosis, mood disorders, and neurological deficits).

METHOD

Participants

Sixty-two undergraduate psychology students (14 men, 48 women) participated in the study. Their mean age was 22 years ($SD = 3.7$; range 18-40 years). Participants were randomly assigned to one of three conditions: an honest control group ($n = 20$), a malinging group instructed with a civil case vignette ($n = 21$), and a malinging group instructed with a criminal case vignette ($n = 21$). Students received course credits for their participation. The study was approved by the standing ethical committee of the Faculty of Psychology and Neurosciences of Maastricht University.

Measures

Medical Symptom Validity Test (MSVT). The Dutch version of the MSVT (Green, 2004) was used. The MSVT is a verbal memory test with build-in effort measures. It is com-

puterized, which makes it easy to administer. Also, the MSVT takes only 5 min to complete. Basically, the MSVT consists of 10 word pairs referring to semantically related objects (e.g., ballpoint-pen). Word pairs are presented two times on a computer screen. During the Immediate Recognition trial (IR) that follows, the participant is required to choose the target words from 20 new word pairs (e.g., ballpoint from ballpoint-bicycle). After 10 min, a Delayed Recognition trial (DR) is administered that is similar to the IR except that different foil words are presented (e.g., ballpoint-house). The computer software not only calculates IR and DR correct scores, but also determines how consistent the participant chooses correct and incorrect items on IR and DR. IR and DR scores and the consistency Score (CNS) are thought to reflect effort. Green (2004) recommends a cut-off score of 85% correct for IR, DR, and CNS. Following the DR, two additional trials are administered: the Paired Associates (PA) trial, in which the participant is cued with the first word from each word pair and has to reproduce the second word (e.g., ballpoint-?), and the Free Recall (FR) trial, in which the participant has to recall as many words as possible from the original list. An additional set of criteria is proposed to determine post-hoc whether failure on the effort parameters is indeed reflective of poor effort (i.e., Poor Effort Profile) or possibly due to genuine severe cognitive impairment (i.e., Dementia Profile). A minimum of 20-points advantage of the mean score of the 'easy subtests' (IR, DR, and CNS) over the mean score of the 'hard subtests' (PA and FR) is assumed to reflect possible dementia.

The Structured Inventory of Malingered Symptomatology (SIMS). Participants also completed a Dutch research version of the SIMS (Smith & Burger, 1997; Merckelbach & Smith, 2003). Basically, the SIMS consists of 75 true-false items describing low-frequency symptoms and experiences. There are five subscales, each containing 15 items: amnesia (e.g., "More than three times a day I find myself getting up to get something only to forget what it was"), neurologic impairment (e.g., "There is a constant ringing in my ears"), psychosis (e.g., "The voices that I hear, have never stopped since they began"), affective disorders (e.g., "As the day progresses my mood gets worse"), and low intelligence (e.g., "I cannot count backwards from 20 to 1 without making a mistake"). After recoding some items, yes-answers are summed to obtain a total SIMS score, with higher scores indicating more symptom over-reporting. Following the recommendations of Rogers, Hinds, and Sewell (1996), we used a cut-off score of 16 to identify feigning. A study of the Dutch research version of the SIMS (Merckelbach & Smith, 2003) with a group of 298 participants revealed a specificity of 98% and sensitivity of 93% with the cut-off set at 16. Follow-up studies indicated that generally, the SIMS attains high sensitivity rates ($\geq 80\%$; e.g., Clegg, Fremouw, & Mogge, 2009), even in coached simulators (Jelicic, Hessels, & Merckelbach, 2006).

Manipulation Check. After the experiment proper, participants were given an additional manipulation check questionnaire to verify role commitment and to examine which symptoms they had tried to feign.

Procedure

Participants were tested individually in a teaching room at the faculty building. Participants in the honest control group were instructed to do their best on the MSVT and to fill out the SIMS honestly. Participants in the civil and the criminal scenario group first read a one-page scenario. In short, the criminal scenario concerned a real Dutch court case about a person who is looking out of his kitchen window and sees that his nephew is approached by a known child molester. As the paedophile makes inviting gestures, the person cannot help but run out of the house and stab the potential child molester so as to protect his nephew. The paedophile dies in the hospital and the person is charged with manslaughter. Participants were asked to identify with the suspect and to feign in a credible way, psychological symptoms in order to minimize criminal responsibility. The civil scenario was about a person, who is looking out of his kitchen window and sees that his nephew gets struck by a car. A man known for fast driving runs with his car over the child, that later dies in the hospital. The driver who caused the accident got away with it without having to fear any consequences for his doings. The witness decides to feign symptoms in order to claim compensation in a civil law suit against the driver. Participants were asked to identify with the witness in the story and to feign in a credible way psychological symptoms that would support the compensation claim. Both scenarios may be obtained from the second author. Honest controls and instructed malingers first completed the learning trials and the IR test of the MSVT. During the delay period of 10 min, they completed the SIMS. Afterwards, the second part of the MSVT (DR, PA, and FR) was administered. In addition, the instructed malingers completed the manipulation check questionnaire.

RESULTS AND DISCUSSION

For the total sample, the Spearman rho correlation between MSVT effort parameters and SIMS was $-.29$ for IR, $-.49$ for DR, and $-.47$ for CNS (all p 's $< .05$), with poorer performance on the MSVT effort parameters being associated with higher scores on the SIMS.

We performed one-way Analyses of Variance (ANOVA's) with group as independent variable and the MSVT effort parameters (i.e., IR, DR, CNS) and the SIMS total score as dependent variables. Table 2 summarizes the results of these ANOVAs. There were significant group differences for DR and CNS [$F(2, 59) = 6.39, p < .05; \eta^2 = .42$ and $F(2, 59) = 5.58, p < .05; \eta^2 = .40$, respectively], whereas the group difference for IR reached only borderline significance [$F(2, 59) = 2.67, p = .08; \eta^2 = .29$]. As can be seen in Table 2, honest controls had overall higher scores on the effort parameters than the two instructed malingers groups that did not differ from one another on any of the parameters [all t 's (40) $< .85$, all p 's $> .43$]. Furthermore, the groups differed with respect to their SIMS scores [$F(2, 59) = 69.77, p < .05; \eta^2 = .84$]. Post-hoc Sheffé's comparisons

revealed the expected pattern in that honest controls scored lower on the SIMS than both instructed malingers groups [all p 's $< .05$]. The civil and criminal case scenario groups did not differ from each other with respect to the SIMS ($p = .64$).

Table 2 Mean scores (SD) on the MSVT effort parameters (IR, DR and CNS) and the SIMS in the three groups

Measure	Group 1 Honest Controls ($n=20$)	Group 2 Malingers, civil ($n=21$)	Group 3 Malingers, criminal ($n=21$)	F	p - value	Eta squared	Sheffé post-hoc group- com- parison
MSVT IR	99.0 (2.1)	92.4 (3.7)	90.7 (15.5)	2.67	.08	.29	-
MSVT DR	99.8 (1.1)	87.4 (17.7)	82.9 (20.2)	6.39	<.05	.42	1 > 2,3
MSVT CNS	99.3 (1.8)	85.0 (21.9)	82.6 (19.7)	5.58	<.05	.40	1 > 2,3
SIMS	4.5 (3.5)	27.9 (7.7)	30.1 (10.3)	69.77	<.05	.84	1 < 2,3

Notes: MSVT = Medical Symptom Validity Test; IR = Immediate Recognition; DR = Delayed Recognition; CNS = Consistency Score; SIMS = Structured Inventory of Malingered Symptomatology

Table 3 Number (percentages) of participants in the honest control group ($n = 20$) and the civil ($n=21$) and criminal ($n=21$) experimental malingers groups, correctly classified by the MSVT and SIMS

	Honest Controls	Malingers, civil	Malingers, criminal
MSVT	20 (100%)	9 (43%)	10 (48%)
SIMS	20 (100%)	19 (91%)	19 (91%)

Notes: MSVT = Medical Symptom Validity Test; SIMS = Structured Inventory of Malingered Symptomatology

Table 3 shows the number (percentages) of participants in the three groups correctly classified by the MSVT and SIMS when using the recommended cut-offs. Chi-square tests revealed significant differences between honest controls and malingers in the number of participants who failed the SIMS [$\chi^2(1) = 43.0, p < .01$] and the MSVT [$\chi^2(1) = 11.0, p < .01$]. Again, neither the detection rate (i.e., sensitivity) of the SIMS nor that of the MSVT differed as a function of the civil and criminal malingers scenario [both χ^2 's (1) $< .05$, both p 's $> .75$]. Results indicated that both tests are save. That is, all honest responders were correctly classified resulting in a specificity of 100%. Most importantly, in terms of sensitivity, the SIMS surpassed the MSVT, correctly identifying 91% of the experimental malingers (38 out of 42) against 45% (19 out of 42) correctly identified by the MSVT [$\chi^2(1) = 17.68, p < .0105$].

With respect to the type of symptoms feigned, 19 (45 %) instructed malingers said that they had tried to feign depression, 14 (33%) said they had feigned memory im-

pairment, and 10 (24 %) said they had endorsed psychotic symptoms. Chi-square tests revealed that the two malingering groups did not differ in the types of symptoms (i.e., depression, memory impairment, and psychotic symptoms) that they had tried to feign [all χ^2 's (1) < .87, all p 's > .05]. Of the 14 instructed malingerers who stated that they had feigned memory impairments, only 9 (64%) failed the MSVT. Of the 28 instructed malingerers who did not report they had feigned memory impairment, 10 (36%) failed the MSVT.

Surprisingly enough, 10 out of the 19 instructed malingerers who failed the MSVT met the criteria for a "Dementia Profile". That is to say, taking this profile seriously would reduce the sensitivity of the effort parameters to 21% (9 out of 42).

In conclusion, our findings indicate that the MSVT is a safe test, but it does attain disappointingly low sensitivity in the detection of feigned symptoms other than memory problems. The impressive sensitivity that previous simulation studies reported for the MSVT (e.g., Merten et al., 2005) is probably inflated by the instruction to feign memory disorders. However, as said before, the MSVT is recommended as an instrument capable to detect feigning in several domains. Our results casts doubts on this ambition. The SIMS does a better job as a broad screening tool for symptom validity. Furthermore, our results do not support the criteria for the Dementia Profile. Applying these criteria to healthy students who are instructed to feign resulted in an unacceptable high false positive rate of the Dementia Profile. The point is important because research on the accuracy of this profile is limited. In a study of Singhal, Green, Ashaye, Shankar, and Gill (2009) on institutionalized patients with severe dementia the Dementia Profile was found to be highly specific. That is, all 10 dementia patients in that study obtained a Dementia Profile, as did 25 of the 30 patients with advanced dementia (83%) in an unpublished study by Brockhaus (cited in Green, 2004). However, Axelrod and Shutte (2010) have questioned the usability of the Dementia Profile. In their mixed clinical sample, patients with a Dementia profile on the MSVT did not perform more poorly on standard memory tests than patients who failed the MSVT without having such profile.

To sum up, the results of study 2 suggest that the MSVT is not particularly effective in detecting feigning when it is administered to participants who are free to feign their symptoms. One could counter, though, that study 2 relied on intelligent and healthy students who were asked to play the role of a malingerer. With this limitation in mind, we conducted study 3.

STUDY 3

In study 3 we explored the relation between the MSVT and SIMS scores in psychiatric patients. If the MSVT is effective in detecting exaggeration in various domains of psy-

chopathology, one would expect a considerable overlap between MSVT parameters and SIMS scores.

METHOD

Participants

Participants were psychiatric outpatients, who had been referred for standard neurological assessment at mental health care institute Mondriaan, Maastricht, the Netherlands. The sample consisted of 21 consecutive referrals (13 men, 8 women), with patients having a mean age of 33 years ($SD = 11.8$, range 19-55 years). Fourteen patients were referred for a possible diagnosis of Attention Deficit Hyperactivity Disorder (ADHD) and 6 for a possible diagnosis of Autism Spectrum Disorder (ASD). One patient receiving treatment for an anxiety disorder was referred because cognitive deficits were suspected possibly reflecting mild dementia. We focused on these groups of patients because there are indications that here, secondary gain issues (including psycho stimulant medication and academic or work accommodations) may motivate patients to misrepresent their symptoms (e.g., Sullivan, May, & Galbally, 2007). Patients were asked to volunteer in the current study and signed an informed consent. The standing ethical committee of the Faculty of Psychology and Neurosciences, Maastricht University approved the study.

Measures

As part of the neuropsychological testing (see below), patients completed the MSVT and the SIMS.

Procedure

Patients completed an informed consent form. Next, in two individual sessions, they completed a standard neuropsychological test battery that included the SIMS. Additionally, patients were given the MSVT. Tests were administered by a certified psychological assistant or by trained clinical psychology master students, supervised by a clinical neuropsychologist. The MSVT was positioned at the beginning of the first test session. During the delay period of 10 min, patients filled out the SIMS.

RESULTS AND DISCUSSION

Table 5 gives the mean scores of the MSVT effort parameters and the SIMS. Neither the MSVT effort parameters (IR, DR, and CNS), nor the SIMS correlated with age (all ϕ 's < .29, all p 's > .05). The Spearman rho correlation between the DR subtest of the MSVT and the SIMS ($\phi = -.52$, $p < .05$) was significant, with lower scores on the DR

being associated with higher scores on the SIMS. However, the SIMS was not significantly associated with the two other effort parameters, IR ($p = .29$, $p = .20$) and CNS ($\varphi = .31$, $p = .17$).

Table 5 Mean scores (SD) and range of MSVT effort and SIMS scores in the psychiatric patient sample ($N = 21$)

	Mean	Range
MSVT IR	93.6 (9.4)	65-100
MSVT DR	90.7 (11.4)	65-100
MSVT CNS	88.1 (15.4)	50-100
SIMS	13.4 (11.8)	2-39

Notes: MSVT = Medical Symptom Validity Test; IR = Immediate Recognition; DR = Delayed Recognition; CNS = Consistency Score; SIMS = Structured Inventory of Malingered Symptomatology

The modest association between MSVT and SIMS is also apparent when one looks at how often both tests agreed and disagreed. The results are summarized in Table 6. A Chi-square test revealed no significant difference in failure rate of the MSVT (6 out of 21 patients) and the SIMS (8 out of 21 patients) [$\chi^2(1) = 0.29$, $p = .59$]. However, of the 8 patients failing the SIMS, only five (62.5%) also failed the MSVT. On the other hand, of the 6 patients failing the MSVT, five (83.5%) also failed the SIMS. Furthermore, the patient who failed the MSVT effort parameters, but not the SIMS was diagnosed with beginning dementia during a follow-up diagnostic examination (including neuro-radiology) in the academic hospital of Maastricht University. This patient did exhibit a Dementia Profile on the MSVT. However, two further patients who exhibited a Dementia Profile did not have severe cognitive impairments consistent with dementia. Interestingly, these two patients did score above the cut-off of the SIMS. Thus, in these two patients the Dementia Profile produced false negatives.

Two limitations of study 3 deserve comment. First and foremost, we don't know the ground truth of symptom validity in this clinical sample and therefore, the diagnostic accuracy of both instruments remains uncertain. Second, our patient sample was small and therefore this study should be considered as explorative in nature. However, what can be concluded with some confidence is that the overlap between MSVT and SIMS is modest at best. Only one MSVT effort parameter (i.e., DR) correlated significantly with the SIMS. Also, MSVT and SIMS disagreed in 19% of the patients about failing or passing the SVT. However, when the patient with the early signs of dementia was excluded, failing the SIMS perfectly overlapped with failing the MSVT, implying that the MSVT has no additional predictive value. In sum, then, the SIMS predicts poor

effort on the MSVT, but poor effort on the MSVT does not predict over-reporting of symptoms on the SIMS. This asymmetry has probably to do with the narrow focus of the MSVT on memory performance.

Table 6 Number of patients (percentages between parentheses) who passed or failed the MSVT effort parameters and the SIMS ($N = 21$)

MSVT effort parameters			
	Pass	Fail	
SIMS		12 (57%)	1 (5%)
	Pass		
	Fail	3 (14%)	5 (24%)

Notes: MSVT = Medical Symptom Validity Test; SIMS = Structured Inventory of Malingered Symptomatology

GENERAL DISCUSSION

The current studies evaluated the merits of the MSVT as a broad screening tool for feigned psychopathology. The main results can be catalogued as follows. To begin with, unlike the suggestions that one comes across in the literature (e.g., Iverson, 1995), we found that memory is not necessarily the top favourite target of people who consider to feign symptoms. In contrast, headaches, stress/burnout, depression, and fatigue are the top favourite symptoms for feigning. This top four is likely to be an echo of the conditions with which people are familiar. Moreover, nearly 10% of our participants stated they would certainly not feign memory impairments. In line with this, only a minority (i.e., 33%) of the participants in study 2 reported that they had tried to feign memory problems. This point is important because the MSVT and a range of other widely-used tests like the Test of Memory Malingering (TOMM; Tombaugh, 1996) and the Amsterdam Short-Term Memory test (ASTM; Schmand & Lindboom, 2005) capitalize on suboptimal effort within the context of memory performance, thereby assuming that this type of effort is a marker of broadly defined feigning. Our findings cast doubts on this assumption.

Secondly, the results of the first study replicate previous research in that they suggest that there exist subtle differences between malingers instructed with a civil case vignette and those instructed with a criminal case vignette (Merckelbach, Smeets, & Jelicic, 2009; Peace & Masliuk, 2011). Note, however, that study 2 failed to find differences between the civil and criminal malingers group in MSVT and SIMS failure rates. One explanation for this discrepancy might be that study 2 relied on case vignettes that were highly similar in content (i.e., both centered on a person watching his nephew being in danger) and that both malingers groups were instructed to feign

psychological symptoms. Peace and Masliuk (2011) determined in their simulation study that feigning motivated by revenge or compensation resulted in higher symptoms levels than feigning motivated by a need for attention. The results of our study 1 and those of Peace and Masliuk (2011) reinforce the general point that apart from individual preferences for feigning certain symptoms, there is a non-trivial influence of the type of case scenario on the behaviour of experimental malingerers. This is very much in tune with the idea that malingering is a strategic response to aversive circumstances (e.g., Rogers, 2008). The methodological bottom line is that the diagnostic qualities of tasks like the MSVT should be tested in simulation studies that involve a whole spectrum of scenario's and motives. Just telling participants that they have to feign a memory disorder is more a tautological operation than a strict test of the diagnostic merits of an SVT.

Thirdly, our results clearly demonstrate that underperformance on the MSVT cannot be equated with exaggeration of symptoms in other domains. In study 2, the MSVT attained a disappointingly low sensitivity in instructed malingerers who were free to choose which symptoms they would feign. While MSVT and SIMS were safe (i.e., all honest controls passed both tests), we found the SIMS to be a better screening tool for symptom validity. The most likely reason for this is that the SIMS taps into a broad range of neurological and psychological symptoms, while the MSVT focuses on memory. In accordance with this, we found in the patient group of study 3 a far from perfect correlation between the MSVT effort parameters and the SIMS. Richman et al. (2006, p. 304) employed the MSVT as an index of effort "and, by implication, symptom exaggeration" in a series of 106 cases undergoing an independent medical examination. Our results do not justify such an operationalization of symptom exaggeration. At a minimum, they show that in the assessment of symptom validity, it is wise to combine the MSVT, or any other memory-oriented effort test for that matter, with a self-report measures like the SIMS for determination (see also Dandachi-FitzGerald et al., 2011; Rogers & Payne, 2006; Rogers & Correa, 2008).

Another practical implication of our findings has to do with test development. To date, the main target of effort test designing has been the detection of underperformance during a simple memory task, with little attention given to feigning in other cognitive domains (e.g., attention, motor behaviour, abstraction, language). Rogers (2008) rightly argued that this is a problematic research trend and he advised clinicians "to utilize methods appropriate to the purported deficits" (Rogers, 2008, p. 23). Our results concur with his point: they show that there are feigned symptoms other than memory complaints that fly under the radar of the MSVT.

Future research can further our understanding of feigning by systematically interviewing experimental malingerers about why they prefer to feign certain symptoms and why they avoid others. Also, more parametric research is needed looking into the diagnostic accuracy of memory-oriented tests like SVTs in people who prefer to feign

certain symptoms and try to avoid others. In particular, research on the detection of feigned somatic complaints (e.g., fatigue, pain) seems warranted. To date, research on chronic pain and fatigue mainly employs effort tests to detect potential feigning (e.g., Greve, Etherton, Ord, Blanchini, & Curtis, 2008). Our findings call for rigorous testing of the sensitivity of these effort measures in these notoriously difficult to diagnose conditions, along with the development of tools specifically targeting feigned somatic health problems.

CHAPTER 5

**Neuropsychologists' ability to predict
distorted symptom presentation**

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ABSTRACT

Objective. We explored to what extent experienced neuropsychologists can predict distorted symptom presentation of clinically referred hospital outpatients. **Method.** Using clinical files and interview results, 31 neuropsychologists made predictions as to how 203 patients would perform on two response validity tests. Their predictions were matched against actual passing or failing two such tests, of which one measured over-reporting of symptoms and the other underperformance on cognitive tests. **Results.** Clinical predictions and test outcomes agreed in 76% of the cases, with Cohen's kappa being .26, 95% CI [.08-.44]. Of the 152 patients for whom neuropsychologists had predicted non-distorted symptom presentations, 14 patients (9.2%) failed both response validity tests. Of the 51 patients for whom neuropsychologists had predicted problematic response validity, 35 patients (68.6%) passed both tests. **Conclusions.** Clinical prediction of distorted symptom presentation is far from perfect. Our findings show that response validity tests have incremental value in that they may correct initial clinical judgment.

INTRODUCTION

Several studies have found that neuropsychologists are not very good at detecting distorted symptom presentations in their patients. For example, Heaton, Smith, Lehman, and Vogt (1978) provided ten neuropsychologists with cognitive test profiles of instructed feigners and head-injured patients. The neuropsychologists had to determine whether profiles reflected genuine impairment or feigning. Their accuracy was far from perfect and ranged from chance level to 20% above chance. Similar results were reported by Faust, Hart, Guilmette, and Arkes (1988) and Faust, Hart, and Guilmette (1988). These authors found that the majority of neuropsychologists seemed to believe that the cognitive test profiles of adolescents and children instructed to feign reflected cortical dysfunction. Without forewarning on the base-rate of malingering, none of the experts indicated feigning as a plausible explanation of the test results.

These older studies are, however, not without limitations (see for a critical review, Garb & Schramke, 1996). They were carried out in an era when distorted symptom presentation was under-researched and clinicians had only few tools to screen for it (e.g., Merten et al., 2013). Since the early nineties, there has been a steady increase in empirical and meta-analytic studies evaluating the diagnostic accuracy of tools designed to identify distorted symptom presentation (e.g., Sweet & Guidotti Breting, 2013). In keeping with the terminology of other authors (Larrabee, 2012; Van Dyke, Millis, Axelrod, & Hanks, 2013), we will use response validity tests as an overarching term for these tools. Broadly speaking, there are two types of response validity tests: 1) self-report symptom validity tests (SVTs) that intend to measure over-reporting of symptoms, and 2) performance validity tests (PVTs) that assay underperformance on cognitive tests (Greve, Bianchini, & Brewer, 2013).

Major professional organizations in neuropsychology have issued policy statements that stress the routine use of SVTs and PVTs (National Academy of Neuropsychology, Bush et al., 2005; American Academy of Neuropsychology, Heilbrunner et al., 2009). These developments reflect neuropsychologists' increased sensitivity to the diagnostic option of distorted symptom presentation and how it can be evaluated with specific tests. Indirect support for this increased awareness comes from a study by Trueblood and Binder (1997), who provided their experts with protocols of clinical cases of feigning rather than protocols of experimental (i.e., instructed) simulators. These protocols included SVT and PVT results. The authors found that the percentage of false negatives (i.e., missed feigned test protocols) across experts varied between 0 and 25% (Trueblood & Binder, 1997). Although, neuropsychologists in this study were better able to detect symptom distortion than were experts in older studies (e.g., Faust, Hart, Guilmette, & Arkes, 1988), Trueblood and Binder (1997) relied on strongly distorted test profiles (e.g., below chance performance on a PVT), when in

practice less extreme cases are more common and usually the cases of greatest concern. Accordingly the potential of false negatives might be higher than 25%. Still, even if one would accept 25% as an upper bound estimate of false negatives, there is room for considerable improvement.

Can neuropsychologists accurately predict distorted symptom reporting prior to the administration of any SVTs and/or PVTs? This is an important question whenever response validity tests are not incorporated in test batteries per default. In a recent survey among European neuropsychologists (Dandachi-FitzGerald, Merten, & Ponds, 2013), only 12% of the respondents indicated that they included response validity tests in every or nearly every clinical neuropsychological assessment. Thus, many European neuropsychologists will be regularly confronted with the question whether or not they should add response validity tests to their test battery. Yet, can neuropsychologists reliably predict on the basis of their clinical impression whether SVTs/PVTs have incremental value? Our study addressed this issue. We anticipated that neuropsychologists would not be particularly accurate in predicting the outcome of these tests, and more specifically that they would underestimate poor response validity. After all, the limited accuracy of clinical judgment was the primary reason to develop psychometric approaches to detect distorted symptom presentation (Wedding & Faust, 1989). Thus, we examined how well experienced neuropsychologists can predict the outcome of response validity testing in a heterogeneous group of general hospital outpatients referred for neuropsychological evaluation.

METHOD

Participants

This study is part of a larger research project on SVT/PVT failure in clinically referred hospital outpatients and how such failure relates to performance on standard clinical instruments and external incentives (Dandachi-FitzGerald, Van Twillert, Van de Sande, Van Os, & Ponds, 2016). In total, 31 neuropsychologists in five hospitals in the southern part of the Netherlands participated in the study. At the end of the Dandachi-FitzGerald et al. (2016) study, clinicians received an exit questionnaire (see below) that asked for additional background information. All in all, 29 (94%) experts returned the questionnaire. Table 1 gives background information about this group. On average, clinicians had ten years of experience and more than two thirds of them were certified clinical psychologist / neuropsychologist or certified psychologist (i.e., psychologists with two-year postgraduate clinical training).

TABLE 1 Background of neuropsychologists

	Mean (range)
Age	36.0 (27-62)
Years of work experience	10.4 (1.5-35)
Number of annual neuropsychological assessments	69.1 (5-230)
Increased sensitivity to symptom distortion due to taking part in this study (0-10)	5.9 (1-9)
Sex (female)	% sample 79.3
Professional title	
Certified clinical psychologist / neuropsychologist	20.6
Clinical psychologist / neuropsychologist trainee	13.7
Certified psychologist (two-year postgraduate training)	34.5
Psychologist trainee	24.1
Psychologist (only university degree)	6.9
Conducting forensic evaluations (mean number of forensic evaluations in the past year; range)	41.4 (1.4; 0-4)
Administration of response validity tests prior to start study:	
- standard	24.1
- only certain situations	72.4
- never	6.9
Indications for administration of response validity tests*:	
- symptom reports during interview	95.5
- presentation of the patient during the interview	100
- diagnosis upon referral*	31.8
- on request of referral party	22.7
- when incentives are present (e.g. legal procedures, disability claims)	90.9
- other**	18.2

Note. N = 29, * there were seven missing responses for this question, % are based on 22 responses; * type of diagnosis upon referral that led to inclusion of SVTs: conversion, functional symptoms, whiplash associated disorders, chronic fatigue syndrome, comotion cerebri, and personality disorder; ** other indications: inconsistency in scores noticed during testing; impression of the technician during testing; behavioral presentation during testing; stagnation of treatment.

The initial sample consisted of 469 patients (52.7% women) with a mean age of 47.7 years (*SD* = 14.0, range: 17-78), who were referred for (neuro)psychological evaluation on the basis of medical considerations. Patients with severe cognitive impairment (e.g., moderate – severe Alzheimer’s disease, post-traumatic amnesia) were excluded. The main five diagnostic categories upon referral were: neurological conditions (24.1%), morbid obesity (20.5%), medically unexplained symptoms (MUS; 18.1%), psychiatric disorders (15.8%), and cognitive complaints not further specified (15.1%). A total of 203 patients (43.1%) received social security benefits (full or partial) and 77 patients (16.4%) were involved in legal proceedings at the time of the assessment. Of the initial sample, 292 patients (62.3%) were referred for neuropsychological evaluation between July 2012 and May 2013 and it is this subgroup that is considered below. All diagnostic assessments were conducted for clinical purposes.

Detailed information about the patient sample is given in Dandachi-FitzGerald et al., 2016.

Only protocols that contained data on clinicians' predictions and the outcomes of two response validity tests – the ASTM and the SIMS (see below) – were included in the final analyses. There were eight cases with missing data on the ASTM, eight cases with missing data on the SIMS, and five cases with missing prediction data. These 21 assessments were excluded, leaving 271 cases for the final analysis.

In patient samples seen for clinical assessment, the base rate of poor symptom validity is estimated to be around 10% (Mittenberg, Patton, Canyock, & Condit, 2002; Dandachi-FitzGerald et al., 2013). With such a relatively low frequency, aggregating results across multiple response validity indicators reduces the probability of false positives (Larrabee, 2008)¹. Given a base rate of 10%, the post-test probability of poor response validity when both SIMS and ASTM are failed is .93. The post-test probability of valid responding when both SIMS and ASTM are passed is .99. With this in mind, two groups were selected from the pool of 271 cases: A group of patients who passed both response validity tests ($n=173$), and a group of patients who failed both response validity tests ($n=30$)². The characteristics of these two groups are given in Table 2.

As can be seen, the majority of patients in both groups had been diagnosed upon referral with a neurological condition, medically unexplained symptoms, or a psychiatric disorder.

The research protocol was reviewed and approved by the Medical Ethical Committee of Maastricht University Medical Centre.

¹ This is only true when indicators are relatively independent of one another. In the current study, the shared variance (R^2) between SIMS and ASTM was 16% (for the total sample, $N = 271$).

² Information on neuropsychologists' prediction versus test performance for the subsample of patients who failed one of either test is given in the supplemental file

TABLE 2 Characteristics of patients who passed or failed both response validity tests

	Patients who failed both tests ($n = 30$)	Patients who passed both tests ($n = 173$)
Age	Mean (range)	Mean (range)
Education ¹	54.6 (32-71)	48.6 (17-77)
SIMS total score	3.57 (1-8)	4.56 (1-8)
ASTM total score	26.7 (19.3 - 41)	8.85 (0 - 19)
	74.8 (60 - 81)	86.5 (82 - 90)
Sex (female)	% sample	% sample
	43.3	43.9
Main diagnostic categories		
- Neurological conditions	30.0	38.7
- Medically unexplained symptoms	20.0	17.0
- Psychiatric disorders	23.3	11.0
- Cognitive complaints not further specified	16.7	25.4
- Medical conditions with cognitive complaints	3.3	4.0
- Other	6.7	2.9
- Missing	0	1.2

Note: $N = 203$. SIMS = Structured Inventory of Malingered Symptomatology; ASTM = Amsterdam Short-Term Memory Test. ¹ Education was quantified with an eight-point scale that ranges from primary school (1; fewer than six years of education) to university degree (8; 16 years of education or more) (De Bie, 1987).

Measures

Symptom Validity Test (SVT)

Structured Inventory of Malingered Symptomatology (SIMS). Test protocols included a Dutch research version of the SIMS (Merckelbach & Smith, 2000), which is a self-report scale that consists of 75 true-false items pertaining to rare and/or improbable symptoms. Endorsed items are summed to obtain a total SIMS score with higher scores indicating stronger tendencies to over-report. A recent meta-analysis combined 17 samples of non-over-reporting patients ($N=742$) and found for this group a weighted total SIMS score of 16.1 with a 95% CI from 13.4 to 18.9 (Van Impelen, Merckelbach, Jelicic, & Merten, 2014). Following the recommendations of this meta-analysis, we employed a cut-off of 19. In the initial sample ($N = 469$), the rates of over-reporting on the SIMS (i.e., > 19) ranged between 12% and 19% for the main diagnostic subgroups, with a significantly lower failure rate of 1% in the morbid obesity subsample. However, morbidly obese patients were never seen for neuropsychological evaluation and therefore this diagnostic category is not represented in the current study.

Performance Validity Test (PVT)

Amsterdam Short-Term Memory Test (ASTM). The ASTM is a measure of cognitive underperformance and involves a forced-choice word recognition procedure (Schmand,

& Lindeboom, 2005). The number of correct recognitions are summed (range 0-90), with lower scores reflecting poorer performance. We used a cut-off score of 82. In the original validation studies that compared 84 experimental malingerers and 206 patients suffering from neurological conditions such as cerebral contusion, advanced Parkinson disease, stroke, multiple sclerosis, and severe epilepsy, this cut score was associated with a specificity of 98% and a sensitivity of 77% (Schmand, & Lindeboom, 2005). In the initial sample, 29.9% of the patients failed on the ASTM (i.e., < 82). The four main diagnostic subgroups did not differ with regard to failure rates on the ASTM (range: 25% – 37%).

Clinician checklist

Clinicians completed a checklist after their interview with the patient and after they had seen the patient files, but before the test session took place. Probing symptom distortion was not part of the interview and patient files rarely contained information directly addressing diagnostic options such as feigning or malingering. Files could contain information about previous neuropsychological assessments including SVT/PVT results. However, for the vast majority of the neuropsychological assessments, such prior information was not available.

The checklist addressed the following patient variables: age, gender, education, referring doctor, diagnosis upon referral, medication, social situation, employment status, type of income, and current involvement in legal proceedings. The final item asked clinicians to predict on a 3-point Likert scale (i.e., unproblematic – somewhat problematic – problematic) the outcome of subsequent response validity testing. Experts endorsed the problematic option only four times and therefore we combined the problematic and somewhat problematic categories. The checklist may be obtained from the first author upon request.

Exit questionnaire for clinicians

The exit questionnaire focused on the following items: name, age, function, years of work experience, estimated number of diagnostic assessments in the past year, type of diagnostic assessment (neuropsychological, psychological or both), and experience with forensic evaluations and if so, the number of forensic evaluations in the past year. Clinicians were queried about how often they included response validity tests in their test batteries (i.e., always, in certain situations, never). When they said they incorporated SVTs/PVTs only under certain conditions, they were asked to tick one or more options that listed potential conditions (e.g., when the patient is involved in litigation). Furthermore, clinicians indicated on a 10-point Likert scale (0 = not at all; 10 = very strongly) whether participating in this study had sensitized them to distorted symptom presentation during their interview with the patient.

Procedure

Prior to testing, patients received an information letter about the current study and they gave informed consent to use their anonymised test data for this study. The information letter contained a brief description of what a psychological assessment entails. The letter explained that in order to obtain valid diagnostic data, it is important that patients exert optimal effort at the cognitive tests and fill out the psychological questionnaires as accurately as possible. Next, the letter explained that sometimes patients do not succeed in this, and that the study addressed the question of how this can be measured. When the hospital's standard test battery did not include the SIMS and/or ASTM, these tests were added to the protocol. Tests were administered by either a certified psychological technician or by trained clinical psychology doctoral students working under the supervision of a certified psychologist. All of them were familiar with the SIMS and the ASTM and had experience with administering these tests.

RESULTS

Clinicians' prediction of response validity

For 152 cases (74.9%), clinicians predicted that the response validity would be unproblematic while for 51 cases (25.1%), they predicted it to be (somewhat) problematic. Table 3 shows how clinicians' predictions relate to passing or failing both SIMS and ASTM. Of the 152 patients who were expected to produce unproblematic response validity test scores, 14 patients (9.2%) failed both tests. Of the 51 patients who were anticipated to produce at least somewhat problematic SVT/PVT test results, 35 patients (68.6%) passed both tests. For 16 out of the 30 patients (53.3%) who failed both tests, clinicians predicted correctly that distorted symptom presentation might be an issue. Overall, clinical prediction and test outcome agreed in 76% of the cases. The corresponding Cohen's kappa was .26 ($p < .001$, 95% CI [.08-.44]), which according to widely used standards would be qualified as fair (Landis, & Koch, 1977). However, given the severe consequences of misclassifications in this type of clinical decision making, and considering the fact that clinicians were only right about half of time in their prediction of the 30 cases of distorted symptom presentation, we would evaluate this level of agreement as poor.

TABLE 3 Neuropsychologists' prediction versus test performance

Neuropsychologists' prediction	SIMS and ASTM			N
	Pass both	Fail both		
Unproblematic	138	14	152	
(Somewhat) problematic	35	16	51	
<i>n</i>	173	30	203	

Note: *N* = 203. SVT = Symptom Validity Test; SIMS = Structured Inventory of Malingered Symptomatology; ASTM = Amsterdam Short-Term Memory Test

Clinicians' use of response validity tests in clinical assessments

The majority of the clinicians (i.e., 72.4%) stated that only in certain situations they would add SVTs/PVTs to their test battery (see Table 1). The most frequently reported situations were: how symptoms are presented by patients (100%), certain types of symptoms reported during the interview (95.5%), and the presence of incentives (90.9%). Taking part in this study led to an increased alertness to the issue of distorted symptom presentation (mean score of 5.9; range 1-9).

DISCUSSION

We had anticipated that neuropsychologists would not be particularly accurate in their prediction of distorted symptom presentation. Agreement between neuropsychologists' predictions and actual test outcome was, indeed, far from perfect, as indicated by a relatively low Cohen's kappa. For patients who failed both SIMS and ASTM, clinicians' predictions were at chance level (i.e., hit rate of 53.3%). Furthermore, we expected that neuropsychologists would underestimate the occurrence of poor response validity. Contrary to this, however, neuropsychologists overestimated the frequency of distorted symptom reports. That is, 14.7% of the patients failed both SIMS and ASTM, whereas a (somewhat) problematic outcome was predicted for 25.1% of the assessments. This pattern deviates from those of Faust and colleagues (Faust, Hart, Guilmette, 1988; Faust, Hart, Guilmette, & Arkes, 1988), who found that clinicians underestimated the occurrence of distorted symptom reports. It may well be that our study sensitized clinicians to the topic and that this was conducive to over-prediction of symptom distortion. Indeed, on the exit questionnaire, neuropsychologists often indicated that participation in the study had made them more aware of the diagnostic option of distorted symptom presentation. When clinicians are alerted to the possibility of poor response validity, this may lead them to question genuine symptoms (e.g., Rosenhan, 1973). For example, compared with earlier studies (Faust, Hart, Guilmette, 1988; Faust, Hart, Guilmette, & Arkes, 1988), Trueblood and Binder

(1997) found relatively low levels of false negatives (i.e., missing cases of distorted symptom presentation). However, three out of twenty-six clinicians (11.5%) in that study generated false positives (i.e., misclassifying genuine cognitive impairments as a form of distorted symptom presentation). Thus, clinicians' increased sensitivity to distorted symptom presentation may come with the price of misclassifying genuine symptom reports as not valid.

In our study, 9.2% of the patients failed on both the SIMS and the ASTM, when neuropsychologists had expected in their cases a non-distorted symptom presentation. This percentage illustrates the risk of relying too much on clinical judgment: clinicians may decide not to include SVTs and/or PVTs in their test batteries, which means that they miss an opportunity to provide themselves with critical feedback on their incorrect initial impression.

In line with previous survey findings (Dandachi-FitzGerald et al., 2013), the majority of neuropsychologists reported that prior to participation in this study, they did not administer SVTs and/or PVTs routinely in clinical assessments. Rather, they added response validity tests to their test battery when certain features were present. These features were related to clinicians' perception of how patients present their problems and so they were intrinsically subjective. The present results show that clinicians are well advised not to lean too much on such impressions. Relatedly, clinicians said that the presence of incentives served as an important cue for the decision to include SVTs and/or PVTs. However, patients might not wish to inform their clinicians about their anticipation of financial or legal advantages (Van Eegmond, Kummeling, & Aan Balkom, 2005). Thus, making the decision to include response validity tests contingent on information about such incentives is an imperfect rule of thumb. More generally, it is illogical to use a less accurate method (i.e., subjective judgment) to decide whether or not to employ a more accurate method.

Older studies on clinical prediction of distorted symptom presentation (Heaton et al., 1978; Faust, Hart, Guilmette, 1988; Faust, Hart, Guilmette, & Arkes, 1988) were criticized for being too artificial (Schmidt, 1989; Bigler, 1990; Garb & Schramke, 1996). Critics pointed out that clinicians do not solely rely on test data to determine the presence of cognitive impairment or psychopathology. Rather, they would consider psychometric data along with information from the medical history, the clinical interview, and the observations. However appealing and intuitively plausible this point might seem, there is little evidence that judgment accuracy increases as clinicians consider more sources of clinical data (e.g., Wedding & Faust, 1989; Garb, 2005). In fact, several studies have found the opposite: the more information clinicians try to take into account, the less accurate their judgment becomes (e.g., Sawyer, 1966; Wedding, 1983; Ágisdóttir et al., 2006). In the current study, we tried to stay close to the daily practice of diagnostic assessment in a hospital setting. Thus, neuropsychologists did have all the clinical data at their disposal to inform their opinion (i.e., the medical

file, their interview, observational data). Nonetheless, their predictions about distorted symptom presentation were wrong in 24% of the cases.

Several limitations of the current study deserve comment. Firstly, although they came from five different hospitals, our group of neuropsychologists was relatively small. This limits the generalizability of our findings. Also, neuropsychologists participated on a voluntary basis and the procedure sensitized them to the issue of distorted symptom presentation. Thus, our findings may underestimate how poor clinical prediction of distorted symptom prediction really is.

Secondly, although we did include outcomes from two different response validity tests - one SVT and one PVT - our study relied on only two response validity tests. Results might have been different, had we used a whole battery of such tests. Clearly, this issue warrants further study. Thirdly, we used a 3-point Likert scale (i.e., unproblematic - somewhat problematic - problematic) to index clinicians' predictions of response validity test outcome. The problematic option, however, was only endorsed four times. Considering that clinicians were asked to make a prediction without having neuropsychological test results at their disposal, it is conceivable that they felt more comfortable to predict a "somewhat problematic" than a "problematic" outcome of response validity testing. Thus, the distinction between these two categories may reflect more the degree of confidence that clinicians placed in their suspicion of distorted symptom presentation than the number of indications that pointed in the direction of symptom distortion. In retrospect, it would have been better if we would have used a dichotomous index of poor response validity (yes / no) and additionally would have asked clinicians to rate the confidence they placed in their judgments.

We focused on clinicians' predictions of distorted symptom presentation in a hospital setting, a setting where the base rate of distorted symptom presentation will be lower than in the forensic context (Mittenberg et al., 2002; Dandachi-FitzGerald et al., 2013). Given the relatively low base rate of distorted symptom presentation, a good decisional strategy in a hospital setting would be to anticipate non-distorted symptom presentation, and to include response validity tests as a check on this assumption. Of course, this is only true to the extent that clinicians are sensitive to the psychometric information provided by response validity tests, notably their positive and negative predictive power. The issue of clinicians' prediction of response validity test outcomes warrants further research, in particular research in which purely clinical cases are compared with cases that have a forensic dimension.

Taken together, our results support the notion that it is important to routinely test for distorted symptom presentation (Bush et al., 2005; Heilbronner et al., 2009). Yet, our findings are silent about how clinicians will integrate response validity test scores in their diagnostic conclusions. What happens when their a priori predictions do not match tests results? Does this, indeed, lead to a correction of their prediction or do clinicians cling to their first impressions? Clearly, this too is an important topic for future research.

Supplementary file: Neuropsychologists' prediction versus test performance for the subsample of patients who failed one of either response validity test

	ASTM pass, SIMS fail	ASTM fail, SIMS pass	<i>n</i>
Neuropsychologists' prediction	12	30	42
(Somewhat problematic)	7	19	26
<i>n</i>	19	49	68

Notes: *N*=68. ASTM = Amsterdam Short-Term Memory Test; SIMS = Structured Inventory of Malingered Symptomatology

CHAPTER 6

Symptom validity and neuropsychological assessment: A survey of practices and beliefs of neuropsychologists in six European countries

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ABSTRACT

During the last decades, symptom validity has become an important topic in the neuropsychological and psychiatric literature with respect to how it relates to malingering, factitious disorder, and somatoform complaints. We conducted a survey among neuropsychologists ($N = 515$) from six European countries (Germany, Italy, Denmark, Finland, Norway, and The Netherlands). We queried the respondents about the tools they used to evaluate symptom credibility in clinical and forensic assessments and other issues related to symptom validity testing (SVT). Although the majority of the respondents demonstrated technical knowledge about symptom validity, a sizeable minority of the respondents relied on outdated notions (e.g., the idea that clinicians can determine symptom credibility based on intuitive judgment). There is little consensus among neuropsychologists on how to instruct patients when they are administered SVTs and how to handle test failure. Our findings indicate that the issues regarding how to administer and communicate the SVT results to patients warrant systematic research.

INTRODUCTION

The scientific knowledge on symptom validity in neuropsychological assessments has increased rapidly during the last decades (Sweet & Guidotti Breting, 2013). As a result, dedicated detection methods, which are referred to as symptom validity tests (SVTs), have been developed (for an overview, see Boone, 2007). In the context of this paper, the term "SVT" is used broadly to include stand-alone performance validity tests, embedded indicators of symptom validity, and self-report measures of negative response bias. SVTs enable neuropsychologists to understand the prevalence of non-credible symptoms in various settings (e.g., injury claims and work-related disability claims) and their impact on standard psychological tests and questionnaires (e.g., Röhling, Green, Allen, & Iverson, 2002; Iverson, 2006; Boone, 2013). It is now widely acknowledged that non-credible symptoms occur on a non-trivial scale in forensic assessments, with estimates ranging from 25 to 45% depending on the context (i.e., criminal vs. civil litigation), the sample studied, and the SVTs used (e.g., Gervais, Röhling, Green, & Ford, 2004; Van Hout, Schnaud, & Wekking, 2006; Chafetz, Prentkowski, & Rao, 2011; Miele, Gunner, Lynch, & McCaffrey, 2012).

One of the major tasks of neuropsychologists is to determine the objective presence of cognitive deficiencies. Consequently, most SVTs focus on the credibility of cognitive test performance. Studies on SVTs have demonstrated that cognitive underperformance (i.e., performing below one's cognitive abilities) has a substantial impact on the scores obtained from standard cognitive tests (e.g., memory tests; Röhling et al., 2002; Meyers, Volbrecht, Axelrod, & Reinsch-Boothby, 2011; Fox, 2011). In a sample of 1307 patients with various disorders (e.g., mild traumatic brain injury, multiple sclerosis, and stroke) who were evaluated using a medico-legal assessment, Green (2007b) noted that SVT failure explained more of the variance in the test scores than the severity of the sustained brain injury. Bianchini, Curtis, and Greve (2006) observed a similar relationship between the monetary incentive at stake in a litigation procedure and the frequency of SVT failure. If a higher amount of money was to be gained from the legal procedure, a higher number of examinees exhibited a non-credible test performance.

Traditionally, research on the detection and prevalence of non-credible symptoms has focused on forensic evaluations in which external gains were obvious. However, we recently observed a shift toward non-credible symptoms in clinical (i.e., non-forensic) assessments. For example, Locke, Smigajski, Powell, and Stevens (2008) reported that up to 22% of patients who had acquired brain injury and were referred for outpatient treatment in a rehabilitation center failed an SVT. In their sample of patients who had medically unexplained symptoms and were referred for consult to a neurology department, Kemp, Coughlan, Rowbottom, Wilkinson, Teggart, and Baker

(2008) noted that 11% of these patients had failed at least two of six SVTs. Similarly, Dandachi-FitzGerald, Ponds, Peters, and Merckelbach (2011) found that 8% of a large sample of psychiatric outpatients failed two SVTs.

The accumulated body of SVT research has led to an influential position paper by the National Academy of Neuropsychology (NAN) that states the following: "The assessment of symptom validity is an essential part of a neuropsychological evaluation. The clinician should be prepared to justify a decision not to assess symptom validity as part of a neuropsychological evaluation" (Bush, Ruff, Tröster, Barth, Koffler, Pliskin, et al., 2005, p. 421). Several survey studies have addressed the subject of whether and how neuropsychologists adopt this position as they perform a neuropsychological assessment. Mittenberg, Paton, Canyock, and Condit (2002) were the first authors in a well-cited study that specifically addressed the estimates from 144 neuropsychologists of the base rates of non-credible symptoms across various settings (i.e., personal injury litigation, disability or worker's compensation claims, criminal assessments, and medical or psychiatric assessments not involving litigation) and across a range of different diagnoses (e.g., mild head injury, fibromyalgia or chronic fatigue, and depressive disorders). The authors collected information on the methods that the neuropsychologists used to substantiate their diagnostic impression of non-credible symptoms. The neuropsychologists reported high base rates for non-credible symptoms in forensic settings (i.e., 30% personal injury cases, 33% disability or worker's compensation claim, and 23% criminal cases) and lower rates in clinical settings (i.e., 8% medical or psychiatric cases).

Slick, Tan, Strauss, and Hultsch (2004) surveyed 24 neuropsychologists with expertise in civil litigation (e.g., financial compensation claims and personal injury litigation) and found that the majority of experts (approximately 79%) reported using at least one dedicated SVT in every assessment. The Test of Memory Malingering (TOMM; Tombaugh, 1996) and the Rey Fifteen Item Test (FIT; Rey, 1958) were the most frequently employed SVTs. In cases that were highly suspicious of exaggeration or malingering, most experts indicated that they often or always adapted the routine of the assessment by encouraging the examinees to provide their best effort (88%). In their professional communication, nearly half of the experts (46%) stated they often or always used the term "malingering" in suspected cases of exaggerated or malingered deficits. The majority of experts reportedly communicated that the test data were invalid (92%) and inconsistent with the severity of the injury (96%).

Based on the surveys conducted by Mittenberg et al. (2002) and Slick et al. (2004), Sharland and Gfeller (2007) surveyed a general sample of 188 neuropsychologists. Compared with the results reported by Mittenberg et al., Sharland and Gfeller found a lower estimated base rate of malingering in civil litigation procedures (i.e., median of 20%) and a comparable estimated base rate for malingering in non-litigation evaluations (i.e., median of 5%). The respondents used an SVT in their assessment (25% always) less frequently than the experts surveyed by Slick et al. (2004). There was no

distinction between the use of SVTs in clinical and forensic assessments. In agreement with Slick et al. (2004), the TOMM and FIT were the most frequently used measures for the determination of cognitive underperformance. Additionally, Sharland and Gfeller included two validity scales for the MMPI-2 (i.e., F-K ratio and FBS scale), which were highly used as measures for the detection of non-credible symptoms. Similar to the survey conducted by Mittenberg et al. (2004), Sharland and Gfeller found that most respondents relied on subjective impressions to determine symptom validity. In both surveys, the severity of the cognitive impairments and the inconsistency in cognitive test performance were the most frequently reported indicators of non-credible symptoms.

In a more recent study, McCarter, Walton, Brooks, and Powell (2009) surveyed the practices and beliefs of 130 neuropsychologists in the United Kingdom. In contrast to previous surveys, these authors made a distinction in the use of SVTs between forensic and clinical neuropsychological assessments and gathered information on the arguments that were presumed valid for using or not using SVTs. Expectedly, SVTs were more frequently used in forensic assessments (59% always) than in clinical assessments (15% always). The most used stand-alone SVTs were the TOMM, the FIT, and the Word Memory Test (WMT; Green, 2003). The most frequently endorsed reasons for the use of SVTs were evidence from the scientific literature and the necessity to validate other test results. One third of the respondents, however, stated that they saw no need to administer SVTs because non-credible symptoms were obvious in the standard test results and the presentation of the examinee.

Apart from the survey conducted by McCarter et al. (2009) and as far as SVTs are concerned, information on the practices and beliefs of European neuropsychologists is lacking. Given that differences may exist between the Anglo-Saxon countries and the continental Western European countries with regard to how neuropsychologists practice their profession and their expert role in legal proceedings, we cannot extrapolate the findings of previous surveys and apply them to the practices and beliefs of Western European neuropsychologists.

Thus, we conducted a survey among neuropsychologists in six European countries. The aim of the survey was to gain insight into how neuropsychologists systematically address the issue of non-credible symptoms in forensic and clinical assessments, what type of tests and methods they employ, how they address non-credible symptoms during the assessment, and how they describe non-credible symptoms in their professional communications. Similar to the survey conducted by McCarter et al. (2009), we aimed to determine the arguments that neuropsychologists offer in favor of and against the use of SVTs in their assessments.

METHOD

Procedure

The chairs of the European Societies of Neuropsychology were contacted during the second meeting of the Federation of the European Societies of Neuropsychology (FESN) in September 2010 in Amsterdam or by email. They were asked whether they were willing to forward an email with a link to an online survey to the members of their respective societies. In total, twelve societies were contacted. Six societies either did not respond or considered the study not feasible. Six societies agreed to cooperate: the German, Finnish, Danish, Norwegian, Italian, and Dutch neuropsychological societies. We provided all chairs with the concept for an introductory email that they might adapt for their societies. The survey was formulated in four languages, namely, German, English, Italian, and Dutch. The chairs of the Scandinavian societies (Finland, Denmark, and Norway) indicated that their members are sufficiently fluent in English such that a translation of the questionnaires to their native language was unnecessary. We collected data between December 2010 and May 2012. We analyzed the data from the total sample and separately for each society. We focused on the patterns evident in the total sample. We will briefly discuss those instances in which there were salient differences between the societies and how they responded to the items.

Survey

We based most of our questions on previous survey research on SVTs to facilitate comparisons (e.g., Mittenberg et al., 2002; Slick et al., 2004; Sharland & Gfeller, 2007; McCarter et al., 2009). The survey contained 30 questions that addressed five areas: (1) background information of the respondents (7-9 items); (2) how often the respondents used specific SVTs, the type of SVTs employed, the instructions given to examinees before administering SVTs, and how SVT failures were handled during the assessments (8-11 items); (3) how often the respondents believed that they had encountered non-credible symptom reports and malingering in their own assessments in 2010 and how often they thought non-credible symptom reports and malingering had occurred in clinical and forensic assessments (4-6 items); (4) how the respondents communicated SVT failures in their reports (2 items); and (5) the arguments that the respondent believed were valid for administering or not administering SVTs (2 items). The respondents took approximately 20 minutes to complete the survey. A copy of the questionnaire can be obtained from the first author.

Respondents

In total, 807 respondents started the survey. Of these, 292 participants (36.2%) did not complete the questionnaire. We obtained complete records from 515 respondents and included these in the analyses. The response rate of the six societies was as follows: 6% in Denmark ($n = 20$), 12% in Finland ($n = 53$) and Norway ($n = 38$), 14% in Germany ($n = 211$), 16% in the Netherlands ($n = 144$), and 25% in Italy ($n = 49$).

RESULTS

Work-related background information of survey respondents

Table 1 shows the demographic characteristics of the survey respondents. Almost all of the respondents were psychologists (96.3%), and most of the psychologists had more than 10 years of work experience (57.9%). The four highest ranked work settings were rehabilitation center (45.5%), somatic health care (37.9%), research (31.3%), and mental health care (26.6%), and most respondents worked in a median of two settings.

Almost all of the respondents (95.5%) had conducted clinical neuropsychological assessments in 2010 with a median of 70 assessments (range 1-1200). Of those respondents that had conducted clinical neuropsychological assessment in 2010, the majority (95.3%) had conducted 5 or more assessments in 2010. In 2010, 55.0% of the respondents had conducted forensic neuropsychological assessments, with a median of 10 assessments (range 1-200) and a median of 10 years of experience in performing forensic evaluations (range 0-36 years). Most forensic assessments involved work-related disability claims (86.2%), followed by civil forensic procedures (e.g., personal injury claim; 55.8%). Only 11.7% of the forensic assessments were conducted in the context of a criminal forensic procedure, and 14.1% of the forensic assessments involved other contexts, such as the determination of mental competency. Two-thirds of the respondents conducted the testing themselves. In addition, 23% of the respondents performed the psychological testing assisted by a technician. Only a few respondents indicated that the testing was conducted by a technician only.

Table 1 Demographics of respondents (N=515)

Professional title*	% respondents
- Psychologist	96.3
- Physician	3.7
- Other	0.6
Years of work experience	% respondents
- 0-5 years	18.3
- 5-10 years	23.9
- > 10 years	57.9
Work setting	% respondents
- Rehabilitation centre	45.4
- Somatic health care	37.9
- Research	31.3
- Mental health care	26.6
- Own practice	25.6
- Teaching	24.9
- Forensic setting	20.8
- Other	6.2
- Nursing home	5.0
Neuropsychological assessments in 2010	Number of respondents (%)
- Clinical	492 (95.5%)
- Forensic	283 (55.0%)
Estimated number of neuropsychological assessments in 2010**	Median (range)
- Clinical (n=492)	70 (1-1200)
- Forensic (n=283)	10 (1-200)
Context medico-legal assessments	% respondents
- Criminal forensic	11.7
- Civil forensic	55.8
- Work-related disability claim	86.2
- Other	14.1
Who does the testing	% respondents
- You alone	65.6
- You & psychology assistant	22.5
- Psychology assistant only	11.8

* Three respondents held both a medical and psychological degree. Therefore the percentages do not add up to 100.
** calculated over those respondents who conducted at least one assessment in 2010

Methods used to determine symptom validity

As expected, the use of SVTs is mainly determined by the context in which the assessment takes places (see Table 2). A few respondents reported using an SVT often (8.7%) or always (11.8%) in clinical assessments, whereas a narrow majority reported using an SVT often (14.1%) or always (44.9%) in forensic assessments. Table 2 highlights the considerable differences in the use of SVTs between the respondents in the six countries. The majority of the Dutch and Norwegian respondents (70 and 69%, respectively) indicated that they always included an SVT in a forensic assessment. This result is more in line with that of the experts in the survey conducted by Slick et al. (79%). In contrast, only a minority of the respondents of the remaining four neuropsychological societies reported always using an SVT in forensic assessments with remarkably low frequencies in Italy (22%) and Finland (14%). This finding is surprising because it is long recognized that the symptom validity in forensic assessments must be formally assessed (e.g., Bush et al., 2005).

As in the previous surveys conducted by Mittenberg et al. (2002) and Sharland and Gfeller (2007), the respondents could list all of the methods they used to determine symptom validity (see Table 3; a comparison of the three surveys is shown in Table 4). The most frequently used methods were discrepancies between records, self-reporting, and observed behavior; severity of cognitive impairment inconsistent with the condition; and a pattern of cognitive impairment inconsistent with the condition. SVTs were used by a minority of the respondents. Stand-alone SVTs were used often to always by 4.2% of the respondents, scores below empirical cut-offs on embedded measures were often to always used by 22% of the respondents, and validity scales on objective personality tests were often to always used by 19% of the respondents. Although the rank order varied slightly, the similarity between the methods reported in the survey conducted by Sharland and Gfeller and those found in this survey was noticeable. In both surveys, the first five methods all relied on subjective clinical judgment, whereas the more objective SVTs ended last. The same finding was obtained by Mittenberg et al., with the exception that the method of scores below empirical cut-offs on forced choice tests ranked third in their survey.

These results appear to imply that neuropsychologists give more weight to their own subjective judgment despite scientific evidence that this impression is insufficiently reliable for the detection of non-credible symptoms.

Table 2 Frequency of inclusion of symptom validity tests in clinical and forensic assessments for the total sample and each country separately

	In every case or almost every case (> 95%)	In a majority of the cases (> 50%)	In a Fair minority of the cases, between 20-50%	In less than 20% of the cases	Very rarely, < 5%	Never
Total sample						
Clinical (n=492)	11.8	8.7	11.4	17.5	33.5	17.1
Forensic (n=283)	44.9	14.1	9.2	9.5	12.7	9.5
Germany						
Clinical (n=198)	7.6	5.6	9.6	16.7	44.9	15.7
Forensic (n=155)	44.5	16.8	7.6	9.7	12.9	5.8
The Netherlands						
Clinical (n=138)	13.8	12.3	21.7	23.2	21.0	8.0
Forensic (n=47)	70.2	10.6	4.3	6.4	6.4	2.1
Italy						
Clinical (n=49)	6.1	4.1	2.0	16.3	26.5	44.9
Forensic (n=32)	21.9	15.6	9.4	9.4	12.5	31.3
Norway						
Clinical (n=37)	29.7	24.3	8.1	10.8	21.6	5.4
Forensic (n=16)	68.8	18.8	0	0	6.3	6.3
Finland						
Clinical (n=53)	13.7	5.9	0	11.8	35.5	33.3
Forensic (n=22)	13.6	0	9.1	22.7	31.8	22.7
Denmark						
Clinical (n=19)	15.8	5.3	15.8	15.8	42.1	5.3
Forensic (n=11)	36.4	9.1	27.3	9.1	9.1	9.1

Table 3 Methods used to determine symptom validity

	Percentage of respondents (N=515)				
	Never	Rarely	Some-times	Often	Always
Discrepancies between records, self-reports, or observed behaviour	2.5	8.5	19.	29.	39.4
Severity of cognitive impairment inconsistent with condition	3.7	10.	20.	28.	36.9
Pattern of cognitive test performance inconsistent with condition	4.3	8.7	22.	27.	37.1
Implausible self-reported symptoms in interview	6.0	13.	23.	27.	29.3
Implausible changes in test scores across repeated examinations	8.5	21.	26.	22.	21.0
Stand-alone symptom validity tests	23.	19.	15.	17.	24.3
Scores below empirical cutoffs on embedded measures of effort	3	8	0	7	
Scores on empirically derived discriminant function analyses indicative of poor effort	23.	25.	20.	13.	8.3
Validity scales on objective personality tests	32.	2	8	4	
Scores on empirically derived discriminant function analyses indicative of poor effort	35.	28.	17.	12.	7.2
	1	2	3	2	
	58.	19.	11.	5.6	4.9
	8	0	7		

Table 4 Comparison of indicators of symptom invalidity between the current survey, Mittenberg et al. (2002), and Shartrand and Gfeller (2007)

Current survey	Mittenberg et al.	Shartrand and Gfeller
<i>Indicator (most frequently used to least frequently used)</i>		
1. Discrepancies among records, self-report, and observed behavior	1. Severity of cognitive impairment inconsistent with condition	1. Severity of cognitive impairment inconsistent with condition
2. Severity of cognitive impairment inconsistent with condition	2. Pattern of cognitive test performance inconsistent with condition	2. Pattern of cognitive test performance inconsistent with condition
3. Pattern of cognitive test performance inconsistent with condition	3. Scores below empirical cutoffs on forced choice tests	3. Discrepancies among records, self-report, and observed behavior
4. Implausible self-reported symptoms in interview	4. Discrepancies among records, self-report, and observed behavior	4. Implausible self-reported symptoms in interview
5. Implausible changes in test scores across repeated examinations	5. Implausible self-reported symptoms in interview	5. Implausible changes in test scores across repeated examinations
6. Stand-alone symptom validity tests	6. Scores below empirical cutoffs on other malingerer tests	6. Scores below empirical cutoffs on forced choice tests
7. Scores below empirical cutoffs on embedded measures of effort	7. Implausible changes in test scores across repeated examinations	7. Scores below empirical cutoffs on measures specific to the assessment of effort/malingering (e.g., Validity Indicator Profile)
8. Validity scales on objective personality tests	8. Scores above validity scale cutoffs on objective personality tests	8. Validity scales on objective personality tests (e.g., MMPI-2)
9. Scores on empirically derived discriminant function analyses indicative of poor effort	9. Scores below chance on forced choice tests	9. Scores below empirical cutoffs on embedded measures of effort
		10. Scores on empirically derived discriminant function analyses indicative of poor effort

As shown in Table 5, the top four stand-alone SVTs are the Amsterdam Short-Term Memory Test (ASTM; Schnaud & Lindeboom, 2005), the Rey FIT, the TOMM, and the WMT (Green, 2003). Approximately one in five respondents indicated never using a stand-alone SVT (20.6%). The analyses per country revealed some minor variations. First, in Germany, a German-language SVT, which is called the Testbatterie für

Forensische Neuropsychologie (TFBN), ranked first. Second, in Italy and the Scandinavian countries, the ASTM is rarely mentioned because this test is not available in their native languages.

Table 5 Frequency of use of tests and procedures to determine symptom validity

	Entire Sample (N=515)
<i>Stand-alone symptom validity tests</i>	
None	% 20.6
Amsterdam Short-Term Memory Test	32.4
Rey Fifteen-Item Test	30.7
Test of Memory Malingering	30.3
Word Memory Test	24.1
Testbatterie zur Forensischen Neuropsychologie	16.9
Dot Counting Test	7.2
Aggravations- und Simulationstest	6.6
Medical Symptom Validity Test	2.5
Coin-in-the-Hand Test	2.3
Portland Digit Recognition Test	1.4
Non-Verbal Medical Symptom Validity Test	1.4
b-test	1.4
Victorian Symptom Validity Test	1.2
Morel Emotional Numbing Test	1.0
Computerized Assessment of Response Bias	0.6
Validity Indicator Profile	0.2
<i>Embedded indicators within standard tests</i>	
None	% 21.0
Auditory Verbal Learning Test	52.4
Trail Making Test	48.3
Rey Complex Figure Test and Recognition Trial	38.6
Stroop Color Word Test	38.3
Wisconsin Card Sorting Test	31.7
Raven Progressive Matrices	24.5
California Verbal Learning Test	23.1
Concentration Endurance Test d2	20.6
Reliable Digit Span	15.0
Line Orientation Test	8.7
Reliable Spatial Span	6.4
<i>Validity questionnaires and scales</i>	
None	% 57.7
Minnesota Multiphasic Personality Inventory-2	28.7
Structured Inventory of Malingered Symptomatology	13.2
Personality Assessment Inventory	3.3

We asked the respondents which standard tests with adapted procedures or cut-offs (embedded indicators) they used. The Auditory Verbal Learning Test (AVLT), the Trail Making Test (TMT), and the Rey Complex Figure Test and Recognition Trial (RCFT-

RT) were named as the most frequently used tests. Finally, the MMPI-2 validity scales and the Structured Inventory of Malingered Symptomatology (SIMS; Widows & Smith, 2005) were most often named as the scales that were used to detect the over-reporting of symptoms (28.7 and 13.2%, respectively). More than half of the respondents (57.7%) indicated that they had never used any scale for the detection of non-credible symptoms.

Estimated base rates of non-credible symptoms and malingering

The respondents estimated that 10% of the examinees they had seen in clinical assessments in 2010 and 15% of the examinees they had seen in the forensic assessments in 2010 made an insufficient effort for whatever reason (e.g., unwilling to undergo the assessment, wanting to adapt the patient role, and malingering). Only in 4% of the clinical assessments and in 10% of the forensic assessments did the respondents believe that the insufficient effort was due to malingering. In general, the respondents estimated that malingering occurred in 10% of the clinical assessments and 20% of the forensic assessments. Surprisingly, this is a higher number than the estimates of malingering in their own practice.

Management and professional communication of SVT failure

The respondents were queried how they instruct examinees before testing. As shown in Table 6, the vast majority of the respondents encouraged examinees to provide their best effort (76% often or always in clinical assessments and 83% often or always in forensic assessments). There appears to be a consensus that the examinees who are evaluated in clinical assessment are not warned in advance that measures for the detection of non-credible symptoms are included (69% very rarely or never). The respondents, however, were split evenly as to whether or not they warn their forensic examinees. One quarter of the respondents warned (almost) every examinee, whereas almost one quarter of the respondents never warned their examinees beforehand.

Subsequently, the respondents were asked to consider only those cases in which they were highly suspicious or certain that an examinee was exaggerating or feigning cognitive deficits and to indicate on a 5-point Likert scale (ranging from never to always) how often they had endorsed a certain action. Approximately two-thirds of the respondents stated that they had encouraged the examinee to provide their best effort, and half of them stated that they had administered additional SVTs in such cases (see Table 7). Almost 40% directly confronted or warned the examinee to provide their best effort. One-third reportedly continued the assessment with no change in routine.

Table 6 Instructing examinees in clinical and forensic assessments before commencing testing

	Percentage responding					
	In almost every case (> 95%)	In a majority of the cases (> 50%)	In a fairly minority, 20% of the cases	In less than 20% of the cases	Very rarely, < 5%	Never
Prior to commencing testing, do you specifically encourage examinees to give their best effort?	In clinical assessments 51.2	24.8	9.1	6.9	6.3	1.6
Prior to commencing testing, do you give examinees any type of warning regarding the fact that psychological tests may be sensitive to poor effort, exaggeration or faking of deficits?	In clinical assessments 6.7	5.7	8.3	10.0	31.1	38.2
	In forensic assessments 25.4	12.0	9.2	11.0	18.0	24.4

A few respondents indicated that they had terminated the examination earlier than planned. As can be seen in Table 8, the rank order of endorsed actions largely corresponded to that reported by the survey conducted by Slick et al. (2004). The main exception was that the experts in the survey conducted by Slick et al. more frequently continued the examination without any change in routine. A possible explanation may be that the survey conducted by Slick et al. focused more narrowly on experts and their forensic practice. We posed the question of handling non-credible symptoms in a general way, and we did not distinguish between the clinical and forensic practices of the respondents. It appears likely that neuropsychologists give special attention to the potential for non-credible symptoms in forensic practice (for example, in the selection of their test battery and *a priori* strategy in response to SVT failure). In other words, neuropsychologists might handle non-credible symptoms more in forensic compared with clinical routines. When looking at the proportion of respondents endorsing a statement, the statement 'encourage the examinee to give good effort' was less frequently endorsed in our survey; 68% as opposed to 88% in the Slick et al. survey (Fisher's exact $p < .05$). The same holds true for the statement 'continue the examination without any change in routine' (Fisher's exact $p < .01$).

Table 7 provides information on how the respondents communicate non-credible symptoms professionally. The most frequently used phrases are the following: 'the

test results are inconsistent with the severity of the injury', 'no firm conclusions can be drawn', and 'the test data are invalid'. Most respondents indicated that they rarely or never used the terms "exaggeration" or "malingering" in their reports.

Table 7 Handling of examinees with evidence of or suspected exaggeration or malingering of cognitive deficits

	Percentage of respondents				
	Never	Rarely	Sometimes	Often	Always
<i>Considering only those cases you where highly suspicious or certain that an examinee was exaggerating or feigning cognitive deficits, how often did you:</i>					
Encourage examinee to give good effort	6.2	7.8	18.1	36.5	31.5
Administer additional SVTs	22.1	10.7	15.9	26.6	24.7
Directly confront or warn to give good effort	17.1	18.4	25.4	27.6	11.5
Continue with no change	29.3	23.7	16.9	16.5	13.6
Terminate earlier than planned	35.5	31.3	26.4	6.2	0.6
<i>When examinees obtain test results indicative of exaggerated deficits or malingering, how do you express this opinion in a report or professional communication? How often do you say that:</i>					
Test results are inconsistent with severity of injury	Never	Rarely	Often	Always	
	11.8	21.9	50.3	15.9	
No firm conclusions can be drawn	8.2	31.5	44.3	16.1	
Test data are invalid	18.8	31.6	36.2	13.5	
Test results suggest or indicate malingering	29.3	32.6	28.5	9.5	
Test results suggest or indicate exaggeration	34.4	28.5	27.0	10.1	

Note: the answer option 'Test data are invalid' was erroneously not given in the German survey ($n=211$)

Table 8 Ways to handle noncredible symptoms during an assessment, comparing the current survey with the survey of Slick et al. (2004)

Current survey	Slick et al. (2004)
Most frequently often or always endorsed to least frequently endorsed	
1. Encourage examinee to give good effort (68%)	1. Encourage examinee to give good effort (88%)
2. Administer additional symptom validity tests (51%)	2. Continue the examination with no change in routine (75%)
3. Directly confront or warned examinee to give good effort (39%)	3. Administer additional symptom validity tests (71%)
4. Continue the examination with no change in routine (30%)	4. Directly confront or warned examinee to give good effort (25%)
5. Terminate the examination earlier than planned (7%)	5. Terminate the examination earlier than planned (17%)

Table 9 Comparison of communication of suspect test results between the current survey, Slick et al. (2004) and Sharland and Gfeller (2007)

Current survey	Slick et al. (2004)	Sharland and Gfeller (2007)
Rank order of most frequent endorsed communication statements		
1. Test results are inconsistent with severity of injury (66%)	1. Test results are inconsistent with severity of injury (96%)	1. Test results suggest or indicate exaggeration (91%)
2. No firm conclusions can be drawn (60%)	2. Test data are invalid (92%)	2. Test results are inconsistent with severity of injury (85%)
3. Test data are invalid (50%)	3. Test results suggest or indicate exaggeration (83%)	3. No firm conclusions can be drawn (66%)
4. Test results suggest or indicate malingering (38%)	4. No firm conclusions can be drawn (58%)	4. Test data are invalid (59%)
5. Test results suggest or indicate exaggeration (37%)	5. Test results suggest or indicate malingering (46%)	5. Test results suggest or indicate malingering (29%)

Note: the answer option 'Test data are invalid' was erroneously not given in the German survey ($n=211$)

Table 9 provides an overview of the responses to this question in the surveys conducted by Slick et al. (2004) and Sharland and Gfeller (2007) and in the current survey. The broad outline appears to indicate that the majority of the respondents reportedly communicated that the test results were inconsistent with the severity of injury, whereas a minority of the respondents endorsed the statement that the test results suggested or indicated malingering. In contrast, there is disagreement with regard to the statement that the test results suggested exaggeration. Whereas 91% of the respondents in the survey conducted by Sharland and Gfeller and 83% of the respondents in the survey conducted by Slick et al. indicated that they often or always made this statement, only 37% did so in the current survey (Fisher's exact $p < .05$). Another notable difference is that the rates of the most endorsed communication statements were lower in this study compared with the previous studies. For example, 66% of the respondents in the present survey stated that they often or always reported that the test results were inconsistent with the severity of the injury, whereas 96% of the respondents in the study conducted by Slick et al. and 85% of the respondents in the study conducted by Sharland and Gfeller endorsed this statement (Fisher's exact $p < .05$). In fact, applying the Fisher's exact test, the proportion of respondents endorsing a communication statement was significantly higher in both the Slick et al. survey and the Sharland & Gfeller survey than in our survey. Two exceptions being that there was no statistical difference in the proportion of respondents endorsing the statement that 'test results suggest or indicate malingering' between the current survey and that of Slick et al. (Fisher's exact $p = .52$) and in the proportion

of respondents endorsing the statement that 'no firm conclusions can be drawn' between the current survey and the surveys of both Slick et al., and Sharland & Gfeller (both Fisher's exact p 's > .10). There is no obvious explanation for this finding. However, this difference does suggest that the respondents in the current survey were more divided on how to best communicate information on non-credible symptoms.

Table 10 Arguments thought valid for administering or not administering symptom validity tests, comparing the current survey with that of McCarter et al. (2009)

	Current survey ($N=515$) % respondents	McCarter et al. ($N=130$) % respondents	Z
<i>Arguments for</i>			
My reading of the literature	63	73	2.20*
Necessary to validate other test results	59	60	.12*
Recommendation from professional bodies	59	53	1.07
My own experience of people exaggerating deficits or symptoms	56	58	.44
Many claimants exaggerate deficits or symptoms	34	30	.94
To cover my back	31	18	3.06**
Because I might be criticized if I didn't do it	20	31	2.59**
Many clinical patients exaggerate deficits or symptoms	11	15	1.43
Because lawyers insist on it	6	3	1.25
None	2	n/a	-
<i>Arguments against</i>			
In case of obvious severe cognitive impairment an SVT is not valid	47	n/a	-
Exaggeration / poor effort is usually obvious in the pattern of traditional test scores	25	29	.88
Clinical cases rarely exaggerate or malingering so it is not necessary in that setting	23	26	.68
Exaggeration / poor effort is usually obvious in their presentation	23	29	1.55
None	21	n/a	-
Insufficient time	19	27	2.04*
Too many genuine patients or claimants are wrongly classified by these tests	15	13	.65
SVTs are unreliable	15	22	2.02*
Cost of effort testing	8	9	.40
Identification of low effort might jeopardize your relationship with a patient	8	7	.47
So few people exaggerate or malingering that it is not worthwhile testing for it	6	5	.43
It is not the psychologists' role to determine malingering or veracity	2	0	1.52

* $p < .05$, ** $p < .01$

Arguments for and against the administration of SVTs

Comparable to the study conducted by McCarter et al. (2009), we asked the respondents to list all of the arguments they felt were valid for and against the use of SVTs (see Table 10). The most important arguments in favor of the use of SVTs are the following: reading of the literature, necessity to validate other test results, recommendations from professional bodies, and personal experiences with patients who exaggerate symptoms or deficits. The findings are fairly similar to those found in the survey conducted by McCarter et al. (2009). Applying the two sample Z test for proportions, the proportion of respondents in the McCarter et al. survey endorsing the statements 'my reading of the literature' and 'because I might be criticized if I didn't do so' is significantly higher than in the current survey study (both Z 's > 2, both p 's < .05). The opposite holds true for the statement to cover my back ($Z=3.06$, $p < .01$).

The most endorsed argument for not using SVTs is the presence of obvious severe cognitive impairment. This is not an argument against the use of SVTs per se but rather an argument that advocates against the uncritical use of empirically determined cut-off points. Other arguments against SVTs that were mentioned relatively often in the survey relate to the notions that clinical cases rarely exaggerate or malingering, that exaggeration is usually obvious in the other test results or in the presentation of the examinee, and that there is insufficient time to incorporate an SVT in the assessment. These notions are difficult to maintain in light of the current scientific database on the clinical judgment in general and symptom validity assessment in particular. Compared to the current survey, a significantly higher proportion of respondents in the McCarter et al. survey endorsed the arguments of 'insufficient time' and 'SVTs are unreliable' for not using SVTs (both Z 's > 1.96, both p 's < .05).

DISCUSSION

We conducted a survey among neuropsychologists in six European countries to gain insight into the beliefs and practices of continental Western European neuropsychologists. Before discussing the findings, we must address several limitations. First, not all of the Western European neuropsychological societies participated in our survey. The results obtained are representative of the six European countries that did participate (Germany, Italy, Denmark, Finland, Norway, and The Netherlands). Second, the response rate in our survey was low, although the high number of total responses ($N = 515$) exceeded the numbers described in previous surveys (Mittenberg et al., $N = 144$; Slick et al., $N = 24$; Sharland & Gfeller, $N = 188$; McCarter et al., $N = 130$). We can likely partly attribute the low response rate to our approach. We elected to approach all of the members of the neuropsychology associations in the six countries. Not all of the members of these societies engage in neuropsychological assessments. A low re-

response rate harbors the risk of non-response bias, and this negatively affects the representativeness of the data for the whole target group, which in this case includes the neuropsychologists in the six countries. Although a non-response bias will occur only when respondents differ from non-respondents, we have no means to determine whether this is the case in our survey and to what extent non-response bias affects the results. To counter this drawback and to place our data into perspective, we made comparisons wherever possible with the data obtained from similar surveys conducted in the United Kingdom, the United States, and Canada.

With these limitations in mind, we will discuss the main patterns that emerged from the data. The results showed that Western European neuropsychologists exhibited an awareness of the occurrence of non-credible symptom reports in both forensic and clinical assessments. The general estimate of the prevalence of malingering (10% in clinical assessments and 20% in forensic assessments) corresponded broadly to the data from empirical studies (e.g., Kemp et al., 2008; Dandachi-FitzGerald et al., 2011; Gervais et al., 2004; Miele et al., 2012; Boone, 2013), although the estimate found in forensic studies was at the lower end of the range found in empirical studies.

Our survey did reveal an interesting discrepancy between these general estimates of malingering and the estimates in the respondents' own practices (4% in clinical assessments and 10% in forensic assessments). The respondents appeared to believe that their colleagues encountered examinees that malingers. One possible explanation for this finding is that neuropsychologists are inclined to believe what examinees say during the interview and show in their presentation and test scores; thus, neuropsychologists overestimate their own malingering detection abilities. Clinicians' overestimation of *their own* ability to detect fraudulent communication (i.e., their estimation is better than that of their colleagues) has been previously documented (cf. Hall & Pritchard, 1996). Another explanation is that malingering is a term with strong dichotomous (present vs. absent) and negative (honest vs. fraudulent; authentic patient vs. malingerer) connotations, although neuropsychologists often attempt to maintain a more nuanced view of their own patients. Greater nuances in the conception of malingering compared with the current definition in the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR; American Psychiatric Association, 2000) appears to be more appropriate for the description of the complex nature of deceitful behavior (Berry & Nelson, 2010; Merckelbach, Jelicic, & Pieters, 2011; Merckelbach & Merten, 2012).

The high estimates of non-credible symptom reports advocate the use of a systematic determination of the validity of the obtained diagnostic data in neuropsychological assessments. However, comparable to the findings in the earlier studies conducted by Mittenberg et al. (2002) and Sharland and Gfeller (2007), we found a discrepancy between the acknowledgment of the occurrence of non-credible symptoms in a sizeable minority of the examinees and the use of objective detection methods. Thus, most respondents indicated that they based their judgements on discrepancies

between records, self-reports, and observed behavior and on the finding that the severity of the cognitive impairment was inconsistent with the condition, whereas only a minority of the respondents systematically based their judgment on SVTs. The lack of use of SVTs in forensic assessments (i.e., in the total sample, only 44.9% always included an SVT) is particularly troublesome. The body of knowledge on symptom credibility has grown to such a degree that the reliance on subjective judgment alone is incompatible with evidence-based practice. In particular, in forensic assessments, one must base a determination of symptom credibility on objective information or at least be able to substantiate the clinical impression with objective information.

In line with the previous surveys, the TOMM, FIT, and WMT were among the most widely used stand-alone SVTs. In contrast to the surveys conducted in other continents, the ASTM ranked high in our survey. The difference in the use of this particular verbal SVT can most likely be attributed to the Dutch origin of the test; an English translation did not become available until 2005. Remarkably, the FIT shows up in every survey as one of the most widely used SVTs, even though research has shown that this test has a high specificity but low sensitivity (Nitch & Glassmire, 2007). A number of factors, such as familiarity with the test (being one of the oldest SVTs), ease of administration and scoring, and free availability, might play a role in the popularity of this test.

Another striking finding is that less than one of every four respondents stated that they often or always used embedded indicators to determine the validity of the obtained test scores. Although research shows that embedded measures are often less sensitive than stand-alone SVTs for the detection of underperformance (e.g., Miele et al., 2012), acceptable sensitivity and specificity rates (84% and 94%, respectively) have been found by Victor, Boone, Serpa, Buehler, and Ziegler (2009) when using a "two-failure rule" (any pairwise failure of two embedded indicators of underperformance). Moreover, embedded measures have certain advantages over stand-alone SVTs. The first and obvious benefit is that these measures do not require additional time or money, i.e., these are automatically available. Another reason for the use of embedded indicators is that these measures appear to be less sensitive to the effects of preparation and coaching (Suh & Gunstad, 2000).

The problem of coaching is not a trivial point, as was illustrated by two surveys conducted among attorneys who dealt with personal injury and work-related compensation claims. Wetter and Corrigan (1995) found that almost half of the attorneys considered it their duty to inform their clients of the validity scales within a neuropsychological evaluation. In the survey conducted by Essig, Mittenberg, Petersen, Strauman, and Cooper (2001), the majority of attorneys (75%) reported spending on average 15 minutes to one hour preparing their clients for a neuropsychological evaluation. Unsurprisingly, searching the Internet appears to be a common strategy for finding information about symptoms and information on deception detection measures (Bauer & McCaffrey, 2006; Dandachi-FitzGerald & Merckelbach, 2013).

In addition, more than half of the respondents indicated never using symptom validity measures for indexing the over-reporting of symptoms. The empirical evidence, however, shows that non-credible symptom reports are not a one-dimensional phenomenon (e.g., Dandachi-FitzGerald & Merckelbach, 2013; Nelson, Sweet, Berry, Bryant, & Granacher, 2007). Some claimants over-report psychological symptoms and simultaneously performing to the best of their cognitive abilities on neuropsychological tests, and vice versa. Consequently, to determine the validity of the symptoms reported and the cognitive test scores, both types of SVTs should be included in the assessment.

Regarding the administration of SVTs, the survey depicts controversy among the respondents on whether or not they warn their patients in advance during forensic assessments. This observation is not surprising given the debate in the published literature. The argument most frequently maintained against warning is that this warning might lead to more subtle malingering attempts (Youngjohn, Lees-Haley, & Binder, 1999). However, the published empirical studies exhibit divergent results on the effects of warning. Although several researchers found that warning and coaching has an effect, particularly on stand-alone SVTs (e.g., Subr & Gunstad, 2000), others have reported that validity measures are robust against coaching (e.g., Jelicic, Ceunen, Peeters, & Merckelbach, 2011). These different empirical results may be explained by differences in the type of instrument under investigation and by the nature and intensity of the coaching and warning. An important argument in favor of warning is that, from an ethical standpoint, the examinees should be well informed such that they can provide full consent for their evaluation (e.g., Iverson, 2006). In conclusion, more research on the question of to what extent examinees should be informed without jeopardizing detection strategies for a negative response bias appears warranted. In the end, both ethical considerations and the potential deterrent effects of warning should be weighted.

With regard to the overall results of the current study, the following broad conclusion appears justified: although Western European neuropsychologists acknowledge the occurrence of non-credible symptoms and are knowledgeable of the various SVTs, they place too much weight on subjective clinical judgment. Consequently, the empirically validated methods are insufficiently used. As McCarter et al. (2009, p. 1057) stated, "the results suggest a lack of appreciation of the demonstrated increase in accuracy obtained when an objective assessment is used in conjunction with experience." There is still a gap between the scientific consensus that SVTs should be included in every forensic assessment (Bush et al., 2005; Helbronner, Sweet, Morgan, Larrabee, Millis, & Conference Participants, 2009) and the actual practice of neuropsychologists in Western Europe. In our opinion, an important step in bridging this gap between science and practice is to ensure that symptom validity assessment becomes an integral part of neuropsychology training.

A factor that may also hamper a more systematic use of SVTs can be observed by the answers to the question of how to best respond in cases in which the patients failed the SVTs and how to communicate the results to the patients. First recommendations have been published (e.g., Carone, Iverson, & Bush, 2010). It seems vital that scientific progress in the field of symptom validity should not be limited to improving the techniques used to detect non-credible symptoms but should also encompass conceptual issues to provide meaning to the non-credible symptoms (i.e., self-deception vs. other-deception; e.g., Merckelbach & Merten, 2012) or to determine the best way to provide feedback and treatment advice to patients who present a negative response bias in an examination. Scientific data on these topics are emerging (e.g., Suchy, Cellune, Franchow, & Thorngussen, 2012) and will hopefully lead to more practical concrete guidelines for the practice of neuropsychologists.

CHAPTER 7

General Discussion

INTRODUCTION

Clinicians conduct psychological assessments to gain a better understanding of their patients' needs and to inform clinical decision-making. Psychological assessments largely consist of self-report scales and cognitive tests, which are thought to yield useful information as to a patient's mental capacities, psychological symptoms, and personality characteristics. However, assessment information will only be valid when patients answer questionnaire items honestly and perform to the best of their abilities on cognitive tasks (i.e., symptom validity; Bush et al., 2005). When these conditions are not met, the obtained data are compromised because they do not reflect patients' genuine abilities, personality traits, and experienced suffering. It is therefore of utmost importance to determine the validity of the psychological assessment before drawing conclusions. Symptom validity tests (SVTs) are specifically designed for this purpose. In the current thesis, the term SVTs is used as a superordinate term covering all methods that measure negative response bias. It encompasses tests that measure underperformance on cognitive tests as well as tests that measure the over-reporting of symptoms (Greve, Bianchini, & Brewer, 2013; Merten, Dandachi-FitzGerald, Hall, Schmand, Santamaría, & González-Ordí, 2013).

The main objective of the studies described in this thesis was to gain more insight into poor symptom validity of patients clinically referred for psychological assessment. More specifically, this thesis addressed: 1) the frequency of poor symptom validity in clinical settings; 2) the relationship between SVT failure and background variables; and scores on standard clinical tests; 3) symptom validity as a multidimensional phenomenon; and 4) the practice of neuropsychologists regarding symptom validity assessment. In this chapter, the main findings and conclusions of the studies are discussed, followed by a consideration of methodological issues, and clinical implications. We conclude with some recommendations for future research.

1. The frequency of cognitive underperformance and symptom over-reporting in psychological assessments of clinically referred patients.

Symptom validity research traditionally focused on forensic psychological assessments in which there are incentives at play. The few studies that were conducted outside the criminal and civil forensic domain focused on homogeneous patient samples with difficult to diagnose symptoms (e.g., chronic toxic encephalopathy, late whiplash syndrome, and pseudo-epileptic seizures). With our thesis, we wanted to explore on how often poor symptom validity occurs in patients who are clinically referred for

psychological assessment. We addressed this issue in two studies. We looked at the frequency of SVT failure in a naturalistic, heterogeneous sample of primarily outpatients clinically referred for psychological assessment in a mental health care institution (Chapter 2) and in a hospital setting (Chapter 3), respectively. In both studies, only patients with severe cognitive impairment (e.g., moderate-severe Alzheimer's disease, Korsakov syndrome, and acute psychosis) were excluded. To gauge symptom validity, we employed two well-validated SVTs, namely the Amsterdam Short-Term Memory Test (ASTM) that is sensitive to cognitive underperformance and the Structured Inventory of Malingering Symptomatology (SIMS) that intends to tap into symptom over-reporting.

Taking the findings of the two studies together, we found rates of 14% - 26% for failure on a single SVT (either the ASTM or the SIMS) and failure rates of 8% - 11% for two SVTs simultaneously (ASTM and SIMS). Together with findings of other studies that examined poor symptom validity in clinical, non-forensic samples, our results make clear that the SVT failure rates vary widely. For example, Kemp, Coughlan, Rowbottom, Wilkinson, Teggart, and Baker (2008) found a SVT failure rate of 11% in their sample of patients with Medically Unexplained Symptoms (MUS) seen at a neurology hospital department. In contrast, Williamson, Holzman, Chaytor, Miller, and Drane (2012) reported a percentage of 35% in patients with psychogenic nonepileptic seizures.

There are several explanations for this variation in rates of SVT failure. First, across studies, different SVTs have been used to determine symptom validity. While most SVTs have a high specificity (i.e., $\geq .90$), they differ widely with regard to their sensitivity (e.g., Gervais, Rohling, Green, & Ford, 2004; Green, 2007a). Obviously, the sensitivity to detect poor symptom validity determines the upper-bound estimates of SVT failure. Related to this, studies use different cut-offs (e.g., SIMS cut-off of 16 or 19) to determine poor symptom validity, with liberal cut-offs generating more SVT failure cases than stringent cut-offs.

Further, studies differ in the homogeneity of their samples, with some patient samples having a higher a priori chance of poor symptom validity than other patient samples. For example, the frequency of poor symptom validity has been found to be substantially lower in a sample of breast cancer patients than in a sample of patients with late whiplash syndrome (Wefel, Kornet, & Schagen, 2014; Schmand, Lindeboom, Schagen, Heijl, Koene, & Hamburger, 1998).

Finally, studies differ with regard to how many SVTs are administered and how many SVTs need to be failed for a classification of poor symptom validity. Arguably, this affects the number of cases that researchers can detect. This point can be illustrated by examining the failure rates in our studies. In the mixed psychiatric sample, 33.9% of the patients failed at least one of the two SVTs (Chapter 2). In the subsample of hospital patients who underwent neuropsychological assessment, this percentage was 36.6% (Chapter 3). These percentages are more than three times higher than the

percentage of patients who failed both tests in these samples (i.e., 8% - 11%, respectively). The question of whether one should rely on one SVT failure or more to determine poor symptom validity is still debated. As mentioned already, the cut-off of most SVTs is set at a high specificity of $\geq .90$. However, this still implies a false positive classification of 10% of poor symptom validity. Indeed, research - including the studies in this thesis - shows that a single SVT failure is not uncommon in patient samples (Meyers & Volbrecht, 2003; Larrabee, 2003). The scientific consensus converges towards the so-called two-test failure rule, a criterion that entails that any pairwise failure of SVTs is indicative of invalid test performance (Victor, Boone, Serpa, Buehler, & Ziegler, 2009).

Germane to the issue of applying one or more SVTs in diagnostic assessments in clinical settings is the base rate of poor symptom validity (Rosenfeld, Sands, & Van Gorp, 2000). The post-test probability that a positive test result is due to invalid responding depends on the base rate. In the survey study among neuropsychologists the median estimate of poor symptom validity in clinical assessments was 10% (Chapter 6). So, if we assume a base rate of 10% in clinical samples, a patient scoring positive on one SVT with a specificity of 90% and a sensitivity of 50%, will yield a post-test probability that this score is due to invalid responding of only .36 (Larrabee, 2008). Therefore, relying on a single SVT failure in a clinical sample would result in an unacceptable high percentage of false positives (i.e., misclassification of valid responding as invalid responding).

Note that the post-test probability is highly dependent on the base rate. If the base rate in a sample is high, even a single SVT failure can be associated with significant decrements in neuropsychological test performance. For example, Proto, Pastorek, Miller, Romesser, Sim, and Linck (2014) examined failures on multiple SVTs in a sample of veterans with a reported history of mild Traumatic Brain Injury (mTBI). They found a significant difference in neuropsychological test performance between the group that never failed an SVT and the group that failed one SVT, with the no-failures group obtaining higher scores. Contrastingly, there was no group difference in neuropsychological test performance between the one SVT failure and the two SVT failure groups. Strict adherence to the two-test failure rule in this sample would have substantially lowered the hit rate (i.e., percentage of correctly classified valid and nonvalid assessments).

An interesting, new approach that addresses the base rate problem is the method of using multiple, independent SVTs and chaining the Likelihood Ratios (LRs; Larrabee, 2008; Larrabee, 2014; Meyers et al., 2014). In a sample with a low base rate of 10%, the posterior probability of invalid responding increases via chaining LRs from .36 (failing one SVT) to .73 when two SVTs are failed, and even up to .99 when 3 SVTs are failed. In specific samples (e.g., patients with whiplash syndrome or mTBI), a heightened base rate of poor symptom validity might be expected and here even a single SVT failure should raise concern about the validity of obtained test data. Taking

the study of Proto et al. (2014) as an example, their sample consisted of veterans with self-reported mTBI, a condition that is not associated with substantial neurological deficits. Percentages of poor symptom validity in mTBI patients who are seen in a forensic context, is estimated to be around 40% (Larabee, 2003; Boone, 2013). With a base rate of 40%, failing a single SVT in this sample, would already be associated with a post-test probability of invalid responding of .78. Thus, instead of relying on a fixed rule, SVT failure criteria need to be defined with consideration of a priori base rate information and the setting of the assessment. In the studies described in this thesis, we applied SVT testing in a naturalistic heterogeneous sample of patients who were referred for clinical purposes and in whom neurological deficits could not be ruled out beforehand. Therefore, the application of the two-test failure rule as a criterion of invalid symptom reports seems appropriate.

In conclusion, the frequency estimates in our studies are rough estimates at best. However, even the most conservative estimate of 8-11% suggests that in a non-trivial minority of clinical referrals the results of the psychological assessment cannot be taken at face value. Note that SVT failure in itself is silent about the underlying cause (intention and motive of the behavior). At a minimum, our results indicate that the frequency of failing SVTs is high enough to justify standard inclusion of psychometrically testing symptom validity in a clinical assessment.

2. The relationship between SVT failure, demographics, incentives, and performance on standard clinical tests

The relationship between SVT failure and scores on standard clinical tests

Our second goal was to study the relationship between SVT failure and patients' performance on tests that are widely used in clinical settings so as to evaluate their diagnostic status. We found a straightforward relationship between performance on the SVTs on the one hand, and scores on cognitive tests, and psychological questionnaires on the other hand. In both samples described in this thesis (i.e., patients seen in a mental health care institution and patients seen in a hospital setting), we observed that the patient group who failed the SIMS reported significantly more symptoms on a psychological questionnaire than the patient group who passed the SIMS (Chapters 2 and 3).

Similarly, the group of patients who scored deviant on the ASTM attained lower scores on the Verbal Learning Task (VLT) memory indices. These findings suggest that when patients fail SVTs, their scores on commonly used cognitive tests and psychological questionnaires cannot be interpreted as accurately reflecting their true cognitive abilities and psychological symptoms. The relationship between SIMS and symptom reporting was the most robust one. For example, in the mixed psychiatric sample, failing the SIMS explained 44% of the variance of the raw score on the SCL-90 (Chapter

ter 2). The link between failing the ASTM and memory performance was modest in terms of the association strength, i.e., explained variance. However, this modest link may be attributed to our research rather than indicating that the relation between symptom validity and cognitive test performance is truly weak. That is, we administered the ASTM to a heterogeneous sample that also included patients with neurological deficits. They probably exerted optimal effort to perform at the best of their abilities, yet had true mild to moderate memory deficits. The fact that we nevertheless found a significant relationship between symptom validity test failure and memory performance in this sample, underscores the impact that SVT failure has on test performance.

As discussed in Chapter 3, the design of both studies was cross-sectional which precludes causal interpretations of how SVT failures relate to test performance on common clinical instruments. Patients with genuine pathology might obtain higher scores on the SIMS. In fact, a recent meta-analytic study did find that certain SIMS items were sensitive to genuine psychopathology (Van Impelen, Merckelbach, Jelicic, & Merten, 2014). That study found a weighted mean of 16.1 [95% CI 13.4 – 18.9] for the SIMS total score in patient groups. This has probably led to some false positive classifications in the first study of this thesis (Chapter 2), in which we used the cut-off of 16 as originally recommended in the manual (Widows & Smith, 2005). However, of the total sample ($N=183$), only 11 patients scored between 16 and 20 on the SIMS (i.e., 6% of the total sample). In our second clinical study (Chapter 3), we used a cut-off of 19, which is above the high end of 95% CI interval described in Van Impelen et al.'s meta-analytic study. Arguably then, raised SIMS scores in our studies reflected true symptom over-reporting and this might be the driving force behind elevated symptomatology rather than vice versa. In a similar vein, patients with reduced memory capacities may make more mistakes on the ASTM. In fact, in patients with dementia and neurological disorders, ASTM performance is associated with working memory capacities (Merten, Bossink, & Schmand, 2007), while working memory is often impaired in neuropsychiatric conditions (Alloway & Gathercole, 2006). In the first study we used the cut score that distinguished best between a group of experimental malingerers and an aggregated group of patients with neurological disorders as specified in the manual (Schmand & Lindeboom, 2005). However, because of doubts concerning the specificity of this cut-off in groups with neurological and psychiatric disorders, we chose to raise the threshold for determination of failure on the ASTM in the second study (Chapter 3).

Background variables associated with SVT failure

We were also interested in background variables associated with SVT failures. For this purpose, we examined how demographics (i.e., age and education), clinical diagnosis upon referral, and the presence of incentives were related to SVT performance.

As for demographics, lower scores on the ASTM were associated with higher age and lower educational levels (Chapters 2 and 3). These associations had small effect sizes. Other studies yielded mixed results, with some studies finding associations between demographic background variables and SVT performance whereas others did not. These conflicting findings may have to do with the different levels of homogeneity of the samples. Since SVTs still require a minimum of cognitive ability (e.g., reading skills, working memory), it is not strange to find small correlations with age and education in heterogeneous samples. Importantly, in the logistic regression analysis age and education did not significantly contribute to the prediction of ASTM failure (Chapter 3). We did, however, find a link between educational level and the SIMS. Lower educational levels were associated with higher SIMS scores (Chapter 2), and educational levels did significantly contribute to the prediction of SIMS failure (Chapter 3). A plausible interpretation of this association is that less educated patients might over-report symptoms in a more blatant way, whereas more intelligent and educated patients might have a more subtle style of over-reporting (e.g., Solomon, Boone, Miora, & Skidmore, 2010). Another possibility is that less intelligent and educated people might answer more SIMS items positively because they do not fully grasp the question. The link between intelligence and SIMS warrants further study such that both possibilities can be tested. In the meanwhile, heightened SIMS score of patients with low educational levels should be interpreted cautiously, without, however, dismissing over-reporting as an explanation right away.

Contrary to our expectations, we failed to find a significant relation between SVT failure and self-reported external, financial incentives. Whether patients said they received social benefits and/or said they were involved in legal proceedings at the time of the diagnostic assessment was not associated with SVT failure (Chapter 3). The role of incentives in clinical samples is understudied. The studies that have addressed incentives in clinical samples produced different results. A study with a sample of psychogenic epileptic patients also found no relation between SVT failure and self-reported financial incentives (Williamson et al., 2012). However, two other clinical studies did find an association between SVT failure and financial incentives (Webb, Batchelor, Mearns, Taylor, & Marsh, 2013; Johnson-Greene, Brooks, & Ference, 2013). In the studies described in this thesis, we only addressed incentives in one study and here our operationalization of incentives had several restrictions (for a discussion, we refer to the paragraph on limitations). Therefore, on the basis of our study, a relation between SVT performance and external benefits cannot be ruled out, especially when considering the strong evidence for how incentives shape poor symptom validity that is found in studies on forensic assessments, particularly in mTBI and PTSD (e.g., Bianchini, Curtis, & Greve, 2006; Kunst & Winkel, 2015).

A novel finding was that patients with morbid obesity failed the SIMS at far lower rates than the other diagnostic groups. Only one out of the 95 patients with morbid obesity failed the SIMS. All patients in this subsample were referred for psychological

assessment as part of a screening procedure to determine the eligibility for gastric bypass surgery. Therefore, these patients had an incentive to appear psychologically healthy. Considering that patients with morbid obesity have been found to experience high levels of psychological distress (Kalachian et al., 2007), the low SIMS failure rate points to a tendency to under-report psychological problems. Therefore, the validity of symptom reporting needs to be evaluated, before reaching conclusions of absence of psychopathology or even interpreting low scores on symptom lists as reflective of a deficit in the ability to mentalize in patients with morbid obesity (Himnen, van der Veer, & Bruin, 2015).

In research a strong link between somatoform disorders and symptom validity is assumed. Most studies on symptom validity in clinical assessments have focused on specific patient samples with Medically Unexplained Symptoms (i.e., MUS), such as patients with psychogenic non-epileptic seizures, chronic fatigue syndrome, mild traumatic brain injury, whiplash syndrome, and chronic toxic encephalopathy. However, apart from the subsample of patients with morbid obesity, we failed to find an association between diagnosis upon referral and SVT failure rates. In particular, patients with a MUS diagnosis did not fail SVTs at higher rates than patients with other conditions (i.e., psychiatric disorders, neurological conditions, and cognitive complaints not otherwise specified), who were referred for psychological assessment. So, at least in our sample SVT failure is not uniquely associated with a diagnosis of MUS upon referral. Consequently, the diagnosis upon referral does little to inform the decision whether or not to include SVTs in the diagnostic test battery.

Summary

The studies in this thesis underscore the importance of symptom validity in diagnostic assessments in a clinical setting. When patients fail on SVTs, it significantly impacts performance on cognitive tests and scores on self-report complaint inventories. Therefore, when SVTs are failed, the diagnostic data obtained with standard psychological tests and questionnaires cannot be taken at face value. Not taking the validity of the diagnostic assessment into account comes with the potential costs of erroneous diagnosis and wrong treatment advice. Although we did not measure external incentives in this thesis well enough to justify firm conclusions, a purely financial benefits perspective on poor symptom validity in clinical assessments is most likely too simplistic. Furthermore, under-reporting of psychological symptoms might be favorable in terms of attaining a wanted medical treatment. Therefore, intentional denial of symptoms also needs to be checked in diagnostic assessments by administering SVTs that measure under-reporting of psychopathology (e.g. the Supernormality Scale; Cima et al., 2003).

In general, there is still little known about the dynamics behind symptom validity test failure in clinical samples. Neither diagnosis upon referral, nor basic information

about financial benefits and involvement in legal proceedings sufficiently inform a decision to formally measure symptom validity. Therefore, clinicians are well advised to routinely test the symptom validity in their diagnostic assessments.

3. Symptom validity as a multidimensional phenomenon

Many researchers and clinicians conceptualise symptom validity one-dimensional. They assume that when persons are biased in their responding, they both over-report symptoms and underperform on cognitive tests. Further, in the development of symptom validity measures the focus has been mainly on memory complaints, implying that persons who feign have a strong preference for feigning memory deficits. Both assumptions, however, have not been given sufficient scientific scrutiny. For example, the clinical studies in our thesis (Chapter 2 and 3) as well as other studies (Nelson, Sweet, Berry, Bryant, & Granacher, 2007; Ruocco et al., 2008) have found that symptom over-reporting and underperformance are only loosely coupled dimensions. In our patient samples there was a negative correlation between the SIMS and the ASTM, after partialling out the effect of age and education. However, the strength of the association was small (i.e., 3% shared variance, Chapter 2) to medium (i.e., 16% shared variance, Chapter 3). Furthermore, the two SVTs differentially impacted test performance. The SIMS was strongly related to symptom reporting on psychological questionnaires, whereas the ASTM was related to verbal memory test performance. While one could argue that these differential effects can be methodologically explained (i.e., type of method employed, tests versus questionnaires), our simulation study findings support a multidimensional concept of symptom validity (Chapter 4). When expert-mental malingers instructed with two case vignettes (i.e., a criminal forensic and a civil forensic vignette) were queried about their symptom preference, memory disorders did not rank in the top four of symptoms to feign. Moreover, nearly 10% of the participants indicated that they would certainly not feign memory impairments. These findings challenge the assumption that memory deficits are omnipresent in persons who feign to obtain certain benefits. In our study a wide variety of psychological symptoms were reported as potential targets for feigning without consistency between preferred and avoided symptoms across participants. Additionally, there were differences in the preferred and avoided symptoms between two case vignettes. For example, fatigue was most often as preferred symptom in the civil case scenario, whereas it ranked at the bottom of preferred symptoms in the criminal case scenario. These findings indicate that besides individual preferences for certain symptoms, persons who malingering have certain ideas on which symptomatology will or will not benefit them in a particular situation. This lends support to the expected utility model of malingering, in which malingering is viewed as a strategic response to aversive circumstances (Rogers, 2008). When instructed malingerers were free to choose which symptoms they would feign, the MSVT, a memory-oriented SVT only correctly

identified 45% of the experimental malingerers. The SIMS correctly identified 91% of the experimental malingerers. A plausible explanation for this difference is that the SIMS is not restricted to memory complaints, but assesses non-credible symptom reporting in five domains of psychopathology. Notably, the MSVT has attained very high rates sensitivity in studies on simulation of feigned memory deficits ($>=90$; e.g., Green, 2004). This implies that although memory-oriented SVTs such as the MSVT may be highly sensitive to feigned memory deficits, this does not automatically mean that they are effective in detection of feigned psychopathology outside the memory domain.

In conclusion, the studies of this thesis support a multidimensional concept of SV. Distortion of symptoms in a particular domain (i.e., mood) does not automatically mean distortion of symptoms in a different domain (i.e., memory functioning). Therefore, the sensitivity of memory-oriented SVTs to the validity of mental disorders and medical complaints, as well as complaints in other cognitive domains cannot be assumed but must be empirically tested. Meanwhile over-reliance on memory-oriented SVTs is not warranted. Instead validity tests should be used that specifically target the symptoms or condition that is being evaluated.

4. The practice of neuropsychologists regarding symptom validity assessment

The National Academy of Neuropsychology in the United States has issued an influential position paper on symptom validity assessment, which states that ‘the assessment of symptom validity is an essential part of a neuropsychological evaluation. The clinician should be prepared to justify a decision not to assess symptom validity as part of a neuropsychological evaluation’ (Bush et al., 2005, p.421). Our survey study, however, showed that this position is currently not generally adopted in the practices among neuropsychologists in Western Europe (Chapter 6). Respondents estimated that poor symptom validity occurred in 10% of the clinical neuropsychological assessment they had conducted in the past year. Despite this nontrivial estimated percentage, only few respondents systematically relied on SVTs to determine the validity of the diagnostic assessment. Clinicians’ based their decision whether or not to include SVTs on subjective impressions (e.g. presentation of the patient during the interview and symptom reporting during the interview) (Chapter 5). Also, the evaluation of the symptom validity relies heavily on subjective judgment (such as discrepancies between records, self-reports, and observed behaviours or inconsistency between severity of the cognitive impairment and the condition) (Chapter 6). The over-reliance on subjective, intuitive impressions, is undesirable since clinicians’ – as all human beings – are afflicted with biases in their judgmental reasoning that hinder correct appreciation of gathered information (Garb, 2005; Kahneman, 2011). We found that clinicians cannot accurately

ly predict which patient will fail symptom validity testing (Chapter 5). Additionally, preliminary findings from a follow-up study suggest that SVT failure is not given appropriate consideration by clinicians (Dandachi-FitzGerald, 2015). In this follow-up study, we obtained the professional reports of the neuropsychological assessments after we finished the data collection on the neuropsychologists’ ability to predict symptom validity. Qualitative analysis of the neuropsychological assessments with clear evidence of poor symptom validity (i.e., failure on two SVTs), suggests that SVT failure is not given sufficient elaboration (data presented at the 4th SVA conference in Maastricht, 2015). In the survey study a majority of respondents indicated to communicate poor symptom validity by mentioning that the ‘test results are inconsistent with the condition’, ‘no firm conclusions can be drawn’, and / or ‘test data are invalid’. In only about a quarter of the small subsample of clinicians’ professional reports of invalid assessments the test data were not interpreted due to the failures on SVTs. Often abnormal low scores on neuropsychological tests were interpreted as reflective of cognitive deficits or were attributed to psychological factors. These preliminary findings indicate that when SVTs are administered, failure on these tests is not given sufficient attention and elaboration.

In conclusion, there seems to be an increased awareness among neuropsychologists that poor symptom validity occurs in clinical assessments compared to a few decades ago when neuropsychologists’ believed the issue of symptom invalidity was virtually non-existent (Merten et al., 2013). This increased awareness has not (yet) led to a systematic use of SVTs. Clinicians still heavily rely on subjective, impressionistic methods to inform their decision on the inclusion of SVTs as well as to evaluate the validity of their assessment.

Methodological considerations

Each study in this thesis has its own strengths and limitations. In this general section we will highlight several methodological considerations without being exhaustive.

Strengths

Several strengths of this thesis deserve mentioning. Whereas most clinical studies on symptom validity focused on artificially homogenous patient samples (e.g., patients with late whiplash syndrome), we examined symptom validity in a naturalistic setting in several health institutions (i.e., one mental health care institute and five hospitals). Participants were referred because of a wide variety of reasons and exhibited a wide variety of symptomatology. All patients were clinically referred for psychological assessment. Across studies and settings, only patient with obvious cognitive impairment were excluded. It is self-evident that the patients in our samples are not representative of a specific condition, since only a selection of patients with a particular disorder

will be referred for psychological assessment. However, it is exactly this selection that clinicians typically encounter in their practice. The resulting heterogeneity within the sample grants these studies greater external validity.

Further, we used different study designs, methodologies and perspectives to examine the overarching topic of poor symptom validity in clinical assessments. This thesis includes three cross-sectional studies (Chapters 2, 3, and 5), an analogue simulation study (Chapter 4), and a survey study (Chapter 6). This broad approach provides a more balanced understanding of symptom validity in the clinic. Limitations inherent to a certain methodological design are often the strength of another methodological design. An important limitation in our clinical studies is the lack of a golden standard to determine the symptom validity (see limitations). In contrast, in our simulation study, we obtained greater internal validity (i.e., two distinct groups of healthy participants randomly assigned to the two conditions – feign symptoms or respond honestly – with standard instructions and manipulation checks). However, compared to the clinical studies the external validity is weaker. The converging evidence from the different study designs in this thesis strengthens the confidence that can be placed in a multidimensional concept of symptom validity.

Also, as opposed to the majority of SV studies, we employed two SVTs that rely on a different methodology and that tap into different domains of symptom validity. One SVT follows a forced choice recognition procedure and intends to measure underperformance on cognitive tests. The other SVT is a true-false questionnaire that intends to measure symptom over-reporting with items that tap into five domains of disorders (i.e., neurological impairment, memory deficits, depression, low intelligence, and psychotic symptoms).

A final strength of this thesis is that we took the beliefs and practices of clinicians regarding symptom validity into account. In order to successfully disseminate the knowledge gathered through research to the clinical practice, it is vital to obtain a clear picture of the practices and beliefs of clinicians. And vice versa, insights into the clinical practice often generate meaningful new research questions.

Limitations

An important limitation is the lack of a golden standard to measure poor symptom validity. So, in the clinical studies there will be diagnostic uncertainty and consequently inevitably some classification errors. This is not a mere limitation for the clinical studies in this thesis, but for the field in general.

Another limitation is the low response rate in the survey study, which we contribute in part to our approach of mailing all members of the neuropsychological societies, of which probably a substantial number will not engage in neuropsychological assessments. However, the main patterns that emerged from our data fit quite well with the main patterns found in similar surveys in Northern America and the United King-

dom. Perhaps more importantly, there might be quite a difference between what neuropsychologists say that they do and what they actually do. Concerning the professional communication, we have addressed this limitation in a follow-up study in which we have collected the actual professional reports (Dandachi-FitzGerald, 2015) (see paragraph on the practice of neuropsychologists). Although we did use one performance validity test and one self-report validity test, one could counter that it is still not sufficient for a multi-method, multi-strategy approach to SV. Although it is certainly not always feasible to administer more stand-alone SVTs, there are several embedded indicators that could have been considered when performance validity is assessed. Additionally, we did not check for the other side of response bias: under-reporting of psychological symptoms. This will not be an issue for the cognitive measures; one cannot fake good on a cognitive test. Self-report of symptoms and daily functioning, however, can be distorted by denial of psychological problems.

Although it was not a main goal of this thesis, we did take incentives into account in one study. In this study we operationalized incentives too coarse. We narrowly focused on external financial benefits, which we measured via self-report. Relatedly, when incentives were present, we did not know whether the patient viewed the psychological assessment relevant to the pursuit of these incentives. Thus, although we failed to find an association between financial incentives and validity test performance, a relationship cannot be ruled out.

Clinical considerations

From this thesis the following considerations for clinical practice can be distilled. First, systematic evaluation of the validity of the diagnostic assessment is warranted. Given the relatively low base rate of poor symptom validity and the inability of clinicians in determining on forehand which patient will evidence poor validity, a good decisional strategy in a clinical setting would be to anticipate a valid symptom presentation, and to include SVTs as a check on this assumption. When assessing symptom validity a multi-method, multi-strategy approach is called for. Whenever possible, SVTs for the purported psychopathology need to be used (e.g., memory-based validity tests in the case of self-reported memory deficits). Self-reports need to be checked for both under- and over-reporting distortions. When interpreting SVT performance it seems more appropriate to define a deviant – borderline – and normal range of scores on an SVT than rigidly adhering to cut-off scores. For example, in a clinical setting with patients without substantial neurological burden or acute psychiatric disorder, a borderline range could be defined as scores between > 16 and < 24 on the SIMS. In this borderline range, the clinician should look for available information, such as the presence of objective brain injury, consistency between the information from the interview, observation, and neuropsychological test results, information from third parties, and information on daily functioning (Bigler, 2014).

However, when SVTs are failed, this finding should not be dismissed lightly. Even when the assumed base rate is low, the likelihood that positive scores on two SVTs are not due to invalid responding is rare. When failure on two or more SVTs is do to genuine disability, the primary inference is that the disorder is severe (e.g., moderate-severe dementia or severe TBI). If not, then failing the two SVTs allows only one other interpretation: the diagnostic data (the patients self-report on life history, symptoms and current functioning, performance on cognitive tests) can not be taken at face value whatever the underlying reason may be. As Boone phrases “as clinical neuropsychologists our mandate is to determine whether patients have objective verified cognitive dysfunction ...The core issue is symptom credibility; the reason for the lack of credibility may be a moot point” (Boone, 2007, p. 37). When the validity of the obtained diagnostic data is not taking into account, erroneous diagnostic conclusions may be reached and consequently inappropriate treatment recommendations given (e.g., Roor, Dandachi-FitzGerald, & Ponds, 2016). The reason for poor symptom validity is a second order inference, for which additional evidence is needed. Clinicians should be careful to not simply use a clinical psychopathological reason (e.g., depression, anxiety, or the ill-defined concept of ‘cry for help’) as a stock standard inference to explain poor symptom validity. An explanation of poor symptom validity should be based on clear and converging evidence (Iverson, 2006). It is naïve to assume that patients seen in a clinical setting only seek help to ameliorate their experienced psychological suffering. For example, Van Egmond and Kummeling (2002) found that around 40% of their samples of patients who seek mental health treatment for the first time, fostered expectations of gaining specific benefits from being in therapy other than getting better (e.g., they wanted help with obtaining a disability status, leave of absence from work, or a new accommodation). Also, patients with these expectations showed less improvement during treatment than patients without these expectations. In general, the view that behaviours are either internally or externally motivated is too simplistic. Behaviours are multiple-determined by intrinsic as external factors, of which the patient will often not be fully aware. When patients are aware of external incentives influencing their symptom reporting, they may choose not be open about this. Thus, the patient may not be able or willing to tell what are the driving forces behind their behaviour of overstated psychopathology. Therefore, it will be often difficult if not impossible to gain insight in why a patient behaves in a certain way. However, even though the clinician will often not know the driving forces behind the behavior of distorted symptom presentation, intervention is needed. Patients who fail symptom validity testing are more likely to make a greater use of healthcare (Horner, van Kirk, Dismuke, Turner, & Muzzy, 2015), while they also have an increased risk to drop out of treatment (Greene, 1988; Goedendorp, van der Werf, Blijenberg, Tummers, & Knoop, 2013). Thus, distorted symptom presentation is not merely a complication of the diagnostic assessment, as it may also impact the effectiveness of therapeutic interventions. Exaggeration of symptoms or disabilities in

daily functioning harbours the risk that patients will come to believe in their over-reported symptoms, will understand themselves more than necessary as a ‘patient’ and behave accordingly (Merckelbach & Merten, 2012). Therefore, distorted symptom presentations should be a focus of clinical attention. The clinician, who has a blind spot for poor symptom validity or explains it standardly with a clinical psychopathological reason, may potentially reinforce the patient’s maladaptive illness behavior.

Directions for future studies

The intention of this thesis was to gain more insight into poor symptom validity of patients clinically referred for psychological assessment. From the studies of this thesis a standard approach of psychometrically testing SV in a clinical assessment is recommended with the use of validity tests that specifically target the symptoms or condition that is being evaluated. However, at this point in time validity tests for somatic symptoms and conditions such as fatigue and pain are lacking. Also, development of built-in validity measures in self-report questionnaires for specific conditions (e.g., ADHD, depression, autism) and cognitive tests is much needed. Ideally, in the future all instruments will have built-in validity measures. Embedded indicators like the Reliable Digit Span (Greiffenstein, Baker, & Gola, 1994) and the ration between the active recall and recognition measures of the Auditory Verbal Learning Test (Schmand & Ponds, 1997) have several advantages. The first and obvious benefit is that these measures do not require additional time or money, i.e., these are automatically available. Another reason for the use of embedded indicators is that these measures appear to be less sensitive to the effects of preparation (e.g., searching the internet for information on feigning symptoms and deception detection measures) and coaching (Suh & Gunstad, 2000). Notably, Dutch researchers have recently undertaken several endeavours addressing this issue. Van Leeuwen and colleagues are constructing a Dutch version of the Assessment of Depression Inventory (ADI), a depression questionnaire with built-in validity scales (Van Leeuwen, 2015). Bouman and colleagues have examined embedded indicators in the Dutch version of the Wechsler Memory Scale – Fourth Edition (WMS-IV) (Bouman, Hendriks, Schmand, Kessels, & Aldenkamp, 2016). Finally Meyer and colleagues are examining the usefulness of built-in validity indicators in the Visual Association Test (Meyer, 2015).

Besides development of new detection measures and strategies, more fundamental research on the concept of symptom validity is needed. The dynamics operating behind symptom validity are poorly understood. It is notoriously difficult to distinguish between fabricated and genuinely experienced symptoms that cannot be fully medically explained. From early on, researchers have remarked the similarities between malingering and MUS conditions. As Jones and Llewellyn (1917) wrote: “*nothing, it may be said, resembles malingering more than hysteria; nothing hysteria more*

than *malinger*ing. In both alike we are confronted with the same discrepancy — between fact and statement, between objective sign and subjective symptom” (p. 117; italics in the original. As cited in Merckelbach & Merten, 2013). The term *hysteria* can nowadays be substituted with Medically Unexplained Symptoms (MUS). In fact, over time many researchers have proposed that instead of a sharp demarcation between fabricated and genuine illness, there is a fluid continuum of self- and other deception (e.g., Boone, 2007). *Malinger*ing, which involves an intentional en conscious attempt to deceive others is on one end of the continuum (i.e., other-deception), whereas somatoform presentations in which people deceive themselves into experiencing symptoms is on the other end (i.e., self-deception). Several lines of research on deception have shown that persons who start with simulating may gradually become to believe in their feigned symptoms (e.g., Merckelbach, Jelicic, & Peters, 2011; Polage, 2012). In their essay on hysteria Jureidini & Taylor (2002) explain that patients might be involved in pretending to be sick while forgetting at the same time that one is involved in make-believe (see also Merten and Merckelbach, 2012). The fluidity between feigned and genuine symptoms implies that poor symptom validity is not mere a condition that needs to be ruled-out before neuropsychological data can be interpreted. It is a phenomenon that warrants intervention of clinicians, because of its potential to escalate into genuinely experienced symptoms.

Recently, research has started to address possible mechanisms behind the shift from other deception to self-deception. Cognitive dissonance has been proposed as a potential psychological mechanism (Merckelbach & Merten, 2012). In short, the cognitive dissonance theory entails that persons strive for consistency in their cognitions (Festinger, & Carlsmith, 1959). Dissonance will occur when one cognitive element (e.g., the view of themselves as being an honest person) conflicts with another cognitive element (e.g., the act of pretending to be sick) (Bayer, 1985). Dissonance is an uncomfortable state, which motivates a person to actively eliminate the dissonance. One way to eliminate the dissonance is to change one of the conflicting cognitive elements. Thus a person who sees himself as an honest person while he feigns symptoms, might reduce the dissonance by deceiving himself into believing that he is genuinely experiencing the symptoms. As Bayer argues, cognitive dissonance will occur when a patient feels responsible for his behavior and when the incentive of their dishonest behavior is not very obvious. So, perceived responsibility for dishonest behavior and a need to justify their dishonest behavior are fueling factors for cognitive dissonance. From this perspective, subjecting the patient to more diagnostic procedures (e.g., another medical interview, assessment) in which he needs to justify his complaints will raise the experienced cognitive dissonance and thereby harbours the risk of feigned symptom experience.

One intervention when patients evidence poor symptom validity that may potentially reduce the self-deception is feedback. One would expect that a diplomatic formu-

lation of symptom exaggeration without holding the person accountable for their behaviour might reduce cognitive dissonance. A model that addresses feedback in a non-accusatory tone has been articulated, yet needs to be empirically tested (Carone, Iverson, & Bush, 2010).

Also, making the incentives explicit might serve as a de-escalating intervention. Many patients hold expectations of external gain when seeking treatment for their psychological symptoms (Van Egmond, & Kummeling, 2002). These expectations are probably not given sufficient attention in the patient-clinician encounter. Van Egmond and Kummeling anonymously queried patients about their external gain expectations. They found that although little over 40% of the patients held these benefits, only 9% of the clinicians were informed. In a thesis study on symptom validity and external gain in an adult patient sample seen for diagnosis of ADHD ($N=80$), we used the same questionnaire as Van Egmond and Kummeling but in our study the clinician openly filled out the questionnaire as part of their interview with the patient. We found a percentage of 48.8% of patients that expected help of their clinician with dealing with third parties, mostly with their work and social security instances (Smets, 2012). So perhaps it is more a blind spot of clinicians than unwillingness on the part of the patients to talk about their expected benefits.

Other possible mechanisms for escalation of symptom reporting have been proposed. For example, misinformation in anxious persons may lead to worsening of symptoms. A recent survey has found that symptoms are commonly experienced in the general population. When queried about symptoms in the past week only 10.6% of the respondents indicated that they had not experienced any symptoms. The median number of symptoms reported was five with back pain, fatigue, headache, runny of stuffy nose and joint pain being the most common symptoms (Petrie, Faasse, Chrichton, & Grey, 2014). When these symptoms are not normalized it may lead to unnecessary health worries. For example, Chrichton and Petrie (2015) have found that a nocebo response to non-specific symptoms can be created through social discourse and media reports. They exposed healthy participants to sub-audible windfarm sound (infrasound) after watching a presentation integrating media warnings about purported health risks posed by infrasound, which led to an increase in symptom reporting and worsening of mood scores compared to baseline level. Then the participants were divided into two experimental groups. One group received a biological explanation of possible symptoms, whereas the other group received information on how nocebo responding could explain symptom reporting, followed by a second exposure session. Explaining the nocebo response led to a normalization of symptom reporting to baseline levels, whereas a biological explanation maintained the level of symptom reporting and mood worsening. Such findings have important implications for the interventions of poor symptom validity. Drawing a parallel to neuropsychological assessment then it seems important that poor symptom validity is not standardly explained with psychopathological mechanisms such as depression or anxiety. Offer-

ing a psychopathological explanation of poor symptom validity has a potential iatrogenic effect. Although patients might at first feel relieved that there is a reason for their complaints, in the long run explaining the commonality of symptoms and the nocebo response to symptom reporting might prove to be more beneficial to their health. In conclusion, cognitive dissonance as well as the nocebo response bear relevance to the issue of poor symptom validity and have important clinical implications, and therefore call for further scientific scrutiny.

In conclusion

Overall, the topic of symptom validity in clinical assessments does not seem to be such a taboo as it was a couple of decades ago. The majority of Dutch neuropsychologists acknowledge cognitive underperformance and symptom over-reporting as threats to the validity of the obtained data. While most Dutch neuropsychologists use SVTs in forensic assessments, only a minority currently systematically evaluates SV in clinical assessments. The findings of this thesis, however, call for standard testing of the validity of diagnostic data in clinical assessments. The first order inference when SVTs are failed, is that the obtained diagnostic data can not be interpreted as these data do not validly reflect a person's cognitive abilities and experienced suffering. The preliminary analysis of professional reports of clinical assessments in which two SVTs were failed, suggest that clinicians struggle with this first-order inference and are inclined to interpret invalid test data. The second order inference of SVT failure seems to be even more controversial for clinicians. What do the behaviors of cognitive underperformance and symptom over-reporting mean? The idea that symptom invalidity can arise from deceitful behavior of the examinee still seems to be a taboo. However, the view of an examinee as being either a genuine patient or a malingerer is too simplistic and not beneficial for the patient. Empirically validated interventions of dealing with SV in clinical practice are lacking. Therefore, more studies addressing the practical issues of symptom validity in clinical assessments, such as studies on interventions aimed at preventing that patients engage in symptom magnification and studies on how to best provide feedback are needed.

Summary

The research described in this thesis focuses on poor symptom validity of patients clinically referred for psychological assessment. The main objectives of this thesis were to gain more insight into the frequency of poor symptom validity in clinical assessments, how it relates to patients' symptom reports on standard clinical instruments (e.g., memory tests and psychological symptom questionnaires), whether symptom validity is an uni- or multidimensional phenomenon, and the current practices and beliefs of neuropsychologists regarding symptom validity assessment. These aims are addressed in the five studies of this thesis.

Chapter 1 provides a general introduction on the topic of symptom validity. This chapter addresses the definition of symptom validity, methods to measure symptom validity, and the overlap and demarcation with the concept of malingering. The chapter ends with the aims and outline of this thesis.

Chapter 2 describes a cross-sectional study on symptom validity in a sample of 183 patients with various psychiatric diagnoses seen in a mental health care institution. All patients were referred for neuropsychological assessment for treatment purposes. A validity test that measures cognitive underperformance and a validity test that measures symptom over-reporting were part of the test battery. In total, 13% of the sample evidenced either underperformance or symptom over-reporting. In 8% of the assessments both validity tests were failed. Underperformance and symptom over-reporting were only modestly correlated. Symptom over-reporting was strongly, positively related to the score on a psychological symptom list. The subsample that only failed the performance validity test (PVT), performed worse on memory tests. These results show that poor symptom validity occurs frequently, and that underperformance and over-reporting are only loosely coupled dimensions. The relation between over-reporting and the score on a psychological symptom list was the most robust.

Chapter 3 presents a study with the same design as in Chapter 2 but executed in a hospital setting. The Psychology departments of five hospitals participated in this study. The medical specialist referred patients for psychological assessment. With the exception of patients with evident cognitive deficits, clinicians administered the Structured Inventory of Malingered Symptomatology (SIMS), a validity test that targets over-reporting of symptoms. In neuropsychological assessments the Amsterdam Short-Term Memory Test (ASTM), a validity test for cognitive underperformance, was also administered. In total, the data of 469 assessments were analyzed. Background variables, such as age, education, diagnosis upon referral, and involvement in litigation, were taken into account. The sample comprised five main diagnostic groups: neurological conditions, morbid obesity, medically unexplained symptoms (MUS), psychiatric disorders, cognitive complaints not otherwise specified, and medical conditions with cognitive complaints. Symptom over-reporting occurred in 12%-19% of the main diagnostic groups. An exception being the group of morbidly obese patients. These patients were all referred for psychological assessment a part of a screening to determine the eligibility for a gastric by-pass surgery. In this group only one patient

scored deviant on the SIMS. The SIMS score was positively associated with the score on a self-report psychological symptom list. In 29.3% of the neuropsychological assessments the score on the ASTM indicated underperformance. The score on the ASTM was negatively associated with memory performance. Our study did not find an association between poor symptom validity and the presence of financial incentive, such as receiving disability benefits or involvement in litigation. These study findings underscore the importance of symptom validity testing in clinically referred assessments. More research is needed to advance our understanding of which factors contribute to poor symptom validity.

Chapter 4 describes three studies with the central question of whether symptom validity can best be understood as an uni- or multidimensional concept. Many clinicians conceptualize symptom validity monolithically, and by implication assume that when people over-report symptoms, they also underperform on cognitive tests. Another wide-spread assumption is that malingerers have a preference for feigning memory disorders. In fact, most validity tests are memory-oriented PVTs. These PVTs are also used to determine symptom validity in psychological assessments of patients that do not present with memory disorders as their primary complaint. We wanted to test both assumptions. In the first study participants read a case-vignette and were interviewed about the symptoms that they would and would certainly not feign. Non-specific somatic symptoms and depression were mentioned most frequently as preferred symptom to feign. Almost 10% of the sample indicated that they would certainly not feign memory deficits. In study 2, participants were asked to read a case-vignette and subsequently perform a short assessment in which the Medical Symptom Validity Test (MSVT; a memory-oriented PVT) and the SIMS, a broad index of symptom over-reporting, were administered. The participants were free in their choice of feigned symptomatology. The SIMS correctly identified 91% of the experimental malingerers, whereas the MSVT only identified 45% correct. In study 3, both tests were administered in a small sample of 21 psychiatric patients. Only one of the three parameters of the MSVT was correlated to the score on the SIMS. Our findings indicate that that memory-oriented PVTs like the MSVT may be useful to detect feigned memory deficits, but perform less well as a screening tool for other types of feigned psychopathology. The clinical implication is that validity tests aimed at the specific symptoms that a patient reports need to be administered.

Chapter 5 investigates clinicians' ability to predict distorted symptom presentation. This is an important topic since validity tests are not per default incorporated in test batteries. This study is part of the larger research project described in Chapter 3. In total, 31 neuropsychologists predicted - after their interview but before testing started - the outcome of subsequent validity testing. In this study we focused on the neuropsychological assessments, because in these assessments two validity tests - the ASTM and the SIMS - were administered. We matched the prediction of the clinician (i.e., unproblematic versus somewhat problematic) against the cases that either pas-

sed or failed both tests. Only in 76% of the cases the clinical prediction agreed with the validity test outcome. Of the 152 patients for whom neuropsychologists had predicted non-distorted symptom presentations, 14 patients (9.2%) failed both validity tests. Of the 51 patients for whom neuropsychologists had predicted at least somewhat problematic validity, 35 patients (68.6%) passed both tests. These findings support the notion that it is better to routinely test for distorted symptom presentation. Validity tests have incremental value in that they may correct initial clinical judgment.

Chapter 6 focuses on the practices and beliefs of neuropsychologists with respect to symptom and performance validity. We conducted a survey among neuropsychologists ($N = 515$) from six Western European countries: Germany, the Netherlands, Italy, Norway, Finland, and Denmark. We queried the respondents about the tools they used to evaluate symptom credibility in clinical and forensic assessments and other issues related to response validity testing. The majority of the respondents demonstrated technical knowledge about validity testing. However, only a minority of the respondents systematically based their validity judgment on validity tests (i.e., in the total sample, only 45% always included a validity test in forensic assessments, and only 12% did so in clinical assessments). There were notable differences between the countries. For example, in the Netherlands 70% of the respondents always included a validity tests in forensic assessments, whereas in Finland only 14% of the respondents did so. Also, a sizeable minority of the respondents relied on outdated notions (e.g., the idea that clinicians can determine the validity of obtained data based on intuitive judgment). There is little consensus among neuropsychologists on how to instruct patients when they are administered validity tests and how to handle test failure. Our findings indicate that the issues regarding how to administer and communicate the validity test results to patients warrants systematic research.

Chapter 7 provides a general discussion of the results of the studies described in this thesis. The clinical implications are discussed, and recommendations for future research are made. A key implication is that validity of diagnostic data in clinical assessments should be standardly tested. The first order inference when validity measures are failed, is that the obtained diagnostic data cannot be interpreted as these data do not validly reflect a person's cognitive abilities and experienced suffering. For the future, it is important to develop response validity measures for physical symptoms, such as pain and fatigue. Ideally, in the future all self-report questionnaires and cognitive tests will have built-in validity measures.

However, besides development of new detection measures and strategies, more fundamental research on the concept of symptom validity is needed. The dynamics operating behind symptom validity are poorly understood. It is notoriously difficult to distinguish between fabricated and genuinely experienced symptoms that cannot be fully medically explained. Several lines of research on deception have shown that persons who start with simulating may gradually become to believe in their feigned symptoms.

The fluidity between feigned and genuine symptoms implies that poor symptom validity is not mere a condition that needs to be ruled-out before psychological data can be interpreted. It is a phenomenon that warrants intervention of clinicians, because of its potential to escalate into genuinely experienced symptoms. More studies addressing the practical issues of response validity in clinical assessments are needed, such as studies on interventions aimed at preventing that patients engage in symptom magnification and studies on how to best provide feedback.

Samenvatting

Het onderzoek beschreven in dit proefschrift richt zich op de validiteit van (neuropsychologische onderzoeken van patiënten met uiteenlopende aandoeningen, gezien binnen een ziekenhuissetting of GGZ instelling).

Psychologisch onderzoek wordt verricht om een beter beeld te krijgen van de symptomen en functioneren om tot een onderbouwde diagnose en een behandeladvies te komen. Voor het psychologisch onderzoek is het noodzakelijk dat patiënten goed meewerken. Patiënten moeten zich inspannen om zo goed mogelijk te presteren bij de cognitieve tests en de vragenlijsten eerlijk en accuraat invullen. Echter niet iedere patiënt zal dit doen. Er zijn tal van vertekeningen mogelijk. Patiënten kunnen onwilling zijn en zich daarom niet inspannen om een lijst woorden te onthouden. Patiënten kunnen ziekte willen aantonen om zich te verzekeren van medische aandacht of om een bepaalde voordelen te behalen. Ook omgekeerd kan een patiënt er belang bij hebben om zich zo gezond mogelijk te presenteren en psychologische symptomen en beperkingen in het functioneren te minimaliseren. Hierbij kan bijvoorbeeld gedacht worden aan een psychologische screening die mede bepaalt of iemand in aanmerking komt voor een bepaalde medische behandeling. Kortom, er zijn tal van redenen waarom de patiënt zich anders kan voordoen dan hij is. Wanneer een dergelijke vertekening aan de orde is, dan volgt hier logischerwijs uit dat de verkregen gegevens – de zelf-geraporteerde klachten, de levensgeschiedenis en de scores op de cognitieve tests – inboeten aan geldigheid. De vraag naar de geldigheid van geraporteerde klachten of voldoende inzet bij testonderzoek, staat ook wel bekend als symptoomvaliditeit. Om symptoomvaliditeit te meten, bestaan allerlei methodieken. Er zijn op zichzelf staande testen en ingebouwde indicatoren binnen gangbare cognitieve tests en psychologische vragenlijsten. Deze methodieken richten zich op het vaststellen of er sprake is van onderpresteren bij cognitieve testen en van over- of onderrapporteren van psychologische symptomen. Met onderpresteren wordt bedoeld dat iemand onder zijn feitelijk niveau van kunnen presteert.

De vraag naar symptoomvaliditeit bij psychologisch onderzoek en hoe de diagnosticus dit objectief kan bepalen, werd aanvankelijk vooral gesteld binnen het forensische domein. Bij gerechtelijke procedures kan het hebben van klachten of ziektes betekenen dat de onderzochte een veroordeling ontloopt, arbeidsongeschikt wordt verklaard of dat een aanzienlijke letselschadebedrag wordt toegekend. De vraag naar symptoomvaliditeit bij de psychologische onderzoeken in de reguliere klinische zorg is - waar dergelijke directe materieel of strafrechtelijke belangen een minder directe rol spelen – is echter nog weinig onderzocht.

De centrale doelstelling van het onderzoek in dit proefschrift is het kaart brengen van hoe vaak verminderde symptoomvaliditeit voorkomt binnen de patiëntzorg, met welke factoren verminderde symptoomvaliditeit samenhangt, of symptoomvaliditeit een multidimensioneel verschijnsel is en hoe neuropsychologen in hun dagelijks handelen met symptoomvaliditeit omgaan. Deze doelen zijn geadresseerd in de vijf studies van dit proefschrift.

Hoofdstuk 1 geeft een algemene inleiding op het onderwerp en de doelstellingen van dit proefschrift. In dit hoofdstuk komen de definitie van het begrip symptoomvaliditeit, methoden om symptoomvaliditeit te meten, en de overlap en afbakening met het begrip malingering aan bod. Ook worden de onderzoeksvragen besproken.

Hoofdstuk 2 beschrijft een cross-sectionele studie naar symptoomvaliditeit in een steekproef van 183 patiënten met verschillende psychiatrische aandoeningen gezien binnen een GGZ instelling. Alle patiënten waren voor behandeling verwezen voor neuropsychologisch onderzoek. Bij deze onderzoeken is een validiteitstest gericht op het meten van onderpresteren bij cognitieve testen en validiteitstest gericht op het overrapporteren van klachten afgenomen. In totaal behaalde 13% van de patiënten een score die wijst op onderpresteren of op overrapporteren. Door 8% van de patiënten werd op beide validiteitstesten afwijkend gescoord. Onderpresteren en overrapporteren van klachten bleken slechts matig samen te hangen. Er was een sterk, positief verband tussen overrapporteren van klachten en de score op een lijst voor psychische klachten. De subgroep die enkel de test voor onderpresteren slecht maakte, presteerde slechter op een indexscore voor geheugen. De resultaten van deze studie laten zien dat verminderde symptoomvaliditeit regelmatig voorkomt. Het onderpresteren en overrapporteren van klachten hangt slechts matig met elkaar samen en het overrapporteren is het sterkst gekoppeld aan verhoogde scores op de psychologische klachtenlijst.

In **hoofdstuk 3** wordt een onderzoek gepresenteerd met dezelfde opzet als in hoofdstuk 2 maar uitgevoerd in een ziekenhuissetting. De afdelingen Psychologie van vijf ziekenhuizen participeerden in de studie. De patiënten waren door de medisch specialisten verwezen voor diagnostiek. Patiënten met evidente cognitieve stoornissen uitgezonderd, namen psychologen bij ieder psychologisch onderzoek de SIMS af, een validiteitstest voor het overrapporteren van symptomen. Bij de neuropsychologische onderzoeken namen psychologen ook de AKTG af, een onderpresteertaak. In totaal zijn de data van 469 psychologische onderzoeken geanalyseerd. Hierbij zijn ook achtergrondgegevens van de patiënten, zoals leeftijd, opleiding, diagnose bij aanmelding, en lopende juridische procedures meegenomen. Er waren 5 diagnostische hoofdgroepen: neurologische aandoeningen, morbide obsessies, somatisch onvoldoende verklaarde klachten (SOLK), psychiatrische aandoeningen, cognitieve klachten niet nader gespecificeerd en medische aandoeningen met cognitieve klachten. Het overrapporteren van klachten kwam voor bij 12%-19% van de diagnostische hoofdgroepen. Een uitzondering hierop vormden de groep patiënten met morbide obsessies. Bij deze groep diende het psychologisch onderzoek om de geschiktheid te beoordelen voor een maagverkleiningsoperatie. In deze groep scoorde slechts 1 patiënt afwijkend hoog op de SIMS. De score op de SIMS hield positief verband met de score op een zelfrapportage lijst voor psychische klachten. Bij 29,3% van de neuropsychologische onderzoeken werd afwijkend laag gescoord op de AKTG. De score op de AKTG hing negatief samen met de geheugenprestatie. In onze studie werd geen verband gevonden tussen ver-

minderde symptoomvaliditeit en de aanwezigheid van financiële belangen, zoals het ontvangen van een uitkering of het verwikkeld zijn in een juridische procedure. Deze bevindingen onderschrijven het belang van het meten van symptoomvaliditeit bij regulier klinische psychologische onderzoeken. Meer onderzoek is nodig om te begrijpen welke factoren een rol spelen bij verminderde symptoomvaliditeit.

Hoofdstuk 4 beschrijft drie verschillende studies met als centrale vraag of personen die geen valide beeld tonen van hun problematiek zowel onderpresteren bij testonderzoek als overrapporteren van klachten. De vraag is of beide gedragingen – onderpresteren en overrapporteren – behoren tot één dimensie of dat het twee aparte dimensies zijn van het overtuigende concept symptoomvaliditeit. Deze vraag is belangrijk omdat de meeste validiteitsmaten zich richten op onderpresteren bij geheugentaken en ook worden toegepast om symptoomvaliditeit te bepalen bij aandoeningen waar de geheugenklachten niet primair zijn, zoals bijvoorbeeld bij patiënten met een somatisch onvoldoende verklaarbare klachten.

In de eerste studie werden studenten aan de hand van een gevalbeschrijving gevraagd welke symptomen ze wel en welke ze zeker niet zouden veinzen. Aspecifieke lichamelijke symptomen en depressie werden het meest frequent genoemd als symptomen om te veinzen. Bijna 10% van de deelnemers rapporteerde zeker geen geheugenproblemen te veinzen. Bij de tweede experimentele studie, vroegen we studenten om zich in te leven in een gevalbeschrijving en vervolgens te veinzen bij psychologisch onderzoek, waarbij de MSVT, een maat voor onderpresteren bij geheugen, en de SIMS werden afgenomen. De deelnemers werden vrijgelaten in de keuze van welke aandoening ze wilde veinzen. Onder deze omstandigheden werd met de SIMS 91% van de experimentele simulanten correct geïdentificeerd. De MSVT classificeerde slechts 45% correct. In de derde studie werden beide testen afgenomen bij een kleine steekproef van 21 psychiatrische patiënten. Slechts één van de drie subtesten van de MSVT bleek samen te hangen met de score op de SIMS. Tegenom laten deze bevindingen zien dat geheugen georiënteerde validiteitstesten zinvol kunnen zijn om geveinsde geheugentoonrissen op te sporen, maar dat ze minder geschikt zijn om andere vormen van geveinsde psychopathologie vast te stellen. De bevindingen van de drie studies wijzen op een meerdimensionaal concept van symptoomvaliditeit. De klinische implicatie is dat klinici symptoomvaliditeitstests moeten gebruiken die de trekking hebben op de specifieke klachten die de patiënt rapporteert.

Hoofdstuk 5 onderzoekt het vermogen van klinici om van tevoren in te schatten welke patiënt al dan niet een valide beeld zal geven van zijn functioneren bij neuropsychologisch onderzoek. Deze vraag is belangrijk omdat klinici niet standaard validiteits-testen afnemen bij psychologische onderzoeken in de reguliere zorg. Doorgaans maakt de klinicus een inschatting of validiteitstesten aan de testbatterij toegevoegd moeten worden of niet. De vraag is of dit een verstandige werkwijze is. Bij de in hoofdstuk 3 beschreven studie in 5 ziekenhuizen, hebben klinici na de intake en voor aanvang van het testonderzoek, een voorspelling gedaan over hoe de patiënt zou sco-

ren op de symptoomvaliditeitstests (voldoende – matig – onvoldoende). Voor deze studie hebben we ons beperkt tot de neuropsychologische onderzoeken, omdat bij deze onderzoeken twee symptoomvaliditeitstesten – de AKTG en de SIMS – zijn afgenomen. De inschatting van de klinici (voldoende versus matig / onvoldoende) is afgezet tegen de uitkomst van de twee validiteitstesten (normale scores op beide taken versus afwijkende scores op beide taken). In totaal beoordeelden 31 klinici de uitkomst van validiteitstesten van 203 neuropsychologische onderzoeken. De uitkomsten laten zien dat de aanname van veel psychologen dat de 'klinische blik' voldoende is om het overrapporteren van klachten en symptomen te signaleren niet houdbaar is. Slechts in 76% van de gevallen kwam de uitkomst van de klinici overeen met de uitkomst van de validiteitstesten. Van de 152 patiënten bij wie de klinici vooraf een niet afwijkende symptoomvaliditeit hadden ingeschat, scoorden 14 patiënten (9%) afwijkend op beide testen. Omgekeerd scoorden 35 van de 51 patiënten (69%) bij wie de klinici verminderde symptoomvaliditeit hadden voorspeld, normaal bij beide testen. Het standaard met objectieve maten beoordelen van de validiteit verdient daarom de voorkeur boven het per casus klinisch beslissen om deze objectieve maten al dan niet te gebruiken.

Hoofdstuk 6 richt zich op hoe neuropsychologen denken over symptoomvaliditeit en hoe ze met dit onderwerp omgaan in hun dagelijkse praktijk. Om dit te onderzoeken hebben een enquête uitgezet onder neuropsychologen in zes West-Europese landen: Duitsland, Nederland, Italië, Noorwegen, Finland, en Denemarken. In totaal vulden 515 neuropsychologen de vragenlijst in. De meerderheid van de neuropsychologen had technische kennis over symptoomvaliditeit. Echter, klinici gebruiken SVTs nog relatief weinig: 45% van de respondenten gebruikt een SVT in vrijwel ieder forensisch onderzoek en 12% van de respondenten gebruikt SVTs in vrijwel ieder klinisch psychologisch onderzoek. Hierin waren er wel verschillende tussen de verschillende landen. Zo stelde in Nederland 70% van de respondenten bij vrijwel ieder forensisch onderzoek een SVT te gebruiken, in Finland slechts 14% van de respondenten. Ook bleek een minderheid nog verouderde opvattingen over symptoomvaliditeit erop na te houden, zoals het idee dat klinici de validiteit kunnen vaststellen met hun klinische blik. Verder bleek consensus te ontbreken over hoe klinici patiënten vooraf moeten instrueren over SVTs en over hoe klinici dienen te handelen wanneer een patiënt een afwijkende score op een SVT behaalt. Ook lieten de resultaten zien dat er nog geen consensus bestaat over hoe de uitkomsten het beste gecommuniceerd kunnen worden. Deze kwesties aangaande het toepassen van SVTs bij het testonderzoek en de communicatie van afwijkende uitslagen behoeven verder onderzoek.

In **hoofdstuk 7** worden de resultaten bediscussieerd. Het belang van standaard meten van symptoomvaliditeit bij klinische onderzoeken wordt benadrukt. Een belangrijke klinische implicatie van de bevindingen in dit proefschrift is dat validiteit formeel beoordeeld moet worden in het diagnostisch onderzoek. Zoals het meervoud heeft om tal van psychische symptomen en cognitieve functies te meten in plaats van te

volstaan met een indruk, zo heeft het meerwaarde om de symptoomvaliditeit te meten. Voor toekomstig onderzoek is het belangrijk dat er validiteitsmaten worden ontwikkeld voor lichamelijke klachten, zoals pijn en vermoeidheid. Idealiter zal in de toekomst iedere test en vragenlijst ingebouwde validiteitsindicatoren hebben. Naast de ontwikkeling van nieuwe instrumenten, is meer fundamenteel onderzoek naar het concept van symptoomvaliditeit nodig. Het is notoir moeilijk om onderscheid te maken tussen gefabriceerde symptomen en oprecht ervaren symptomen die niet medisch verklaard kunnen worden. Verschillende lijnen van onderzoek hebben laten zien dat er geen scherp onderscheid bestaat tussen beide condities. Personen die beginnen met het voorwenden van klachten kunnen langzamerhand ook echt zelf gaan geloven in de klachten. Het is alsof de persoon gaandeweg het doe-alsof karakter van de klachten uit het oog verliest. Dit laat zien dat verminderde symptoomvaliditeit meer behelst dan enkel vertekening van het psychologisch onderzoek. Het is niet alleen een verschijnsel dat clinici moeten uitsluiten voordat ze overige testuitslagen kunnen interpreteren. Het is een verschijnsel dat een interventie van clinici behoeft omdat het potentieel kan leiden tot een toename van ervaren klachten. Of anders gezegd dat iemand zichzelf steeds meer gaat ervaren als een patiënt met beperkingen. Meer onderzoek is nodig om te begrijpen hoe het opschuiven van voorwenden naar zelf ervaren van klachten werkt en welke interventies dit kunnen couperen. Terugkoppeling van verminderde symptoomvaliditeit aan de patiënt is een interventie die wetenschappelijke aandacht verdient.

Knowledge valorization

This dissertation focuses on symptom validity in psychological assessments of clinically referred patients in a hospital or mental health care setting. This valorization paragraph aims at describing how the obtained knowledge from our research can be made valuable for clinical and social use.

Societal relevance

The implications of poor symptom validity are extensive and can be subdivided in first, second and third order effects (Armistead-Jehle, & Green, 2016). First order effects are the direct consequences for the patient and the clinician. The consequences of poor symptom validity are invalid diagnostic data, and therefore inconclusive assessment. When poor symptom validity is not taken into account, it can lead to incorrect diagnosis and treatment advice. This can potentially worsen the patient's status.

Second order effects entail the consequences for treatment benefit and loss of work capacity. It is hypothesized that poor symptom validity is associated with poor treatment adherence and increased disability claims. The few studies that have examined the relation between symptom validity and treatment outcome found a higher treatment dropout rate in patients who exhibited poor symptom validity during the pre-treatment assessment (Goedendorp, Van der Werf, Blijenberg, Tummers, & Knoop, 2013; Greene, 1988). An association between invalid responding and disability seeking has been repeatedly found. An example is the study of Chafetz, Prentkowski, and Rao (2011) on symptom validity in patients with a low IQ (Full scale IQ < 80). In their study the patients who were evaluated for parenting abilities did not fail the performance validity test (PVT), whereas half of the group patients that was applying for disability benefits did fail the PVT. Bianchini, Curtis, and Greve (2006) even found a dose-response relation in their study. The patient group that was applying for a high incentive compensation failed validity testing more frequently than the patient group that was applying for a limited incentive compensation. The group of patients with no incentive rarely failed validity testing.

From research standpoint poor symptom validity contaminates clinical trials. A real relation between two variables can become obscured, and consequently an additional number of participants are needed to detect the relationship (Rienstra, 2015). For example, Rienstra and colleagues found that the relationship between verbal learning performance and hippocampal atrophy in patients seen in a memory clinic for diagnosis of mild cognitive impairment was absent in the group patients that exhibited underperformance (Rienstra et al., 2013). Also, in a sample of self-reported sexual abuse victims the usual relation between trauma severity and mental health problems was largely absent in the group responders that evidenced symptom over-reporting (Merkelbach, Langeland, De Vries, & Draijer, 2014). In conclusion, poor symptom validity entails the risk of mistaken conclusions (no or weak relationship exists) and waste of research time and money.

Third order effects entail the consequences for society at large such as erroneously awarded disability payments, lost work productivity, increased health care costs, and consequently higher premiums for health insurance. For example, a link has been found between poor symptom validity and an increased number of emergency department visits and inpatient hospitalizations (Horner, VanKirk, Dismuke, Turner, & Muzzy, 2014). The true financial burden of poor symptom validity is unknown. For the United States Chafetz and Underhill (2013) estimated the costs of erroneously awarded disability benefits in the group of adult mental disorder claimants for selected Social Security programs at \$20 billion in 2011. The real costs will be even higher since the costs of loss of work productivity and health care utilization were not taken into account.

Target audience

The results described in this dissertation are relevant to various stakeholders who are involved in diagnostic decision-making. First and foremost, the results are relevant for the patients. Those patients who exhibit poor symptom validity during the psychological assessment are expected to benefit more from detection of poor symptom validity than from erroneous diagnosis. Clinicians are important stakeholders, since on them rest the burden of interpreting the diagnostic data and behavioral observations gathered during interview, test data and inspection of the medical file. They need to draw conclusions based on these data, the knowledge they have on the brain-behavior relationship, and psychometric qualities of the tests used. Symptom validity is a necessary prerequisite to interpret the collected data. Researcher and funders of research are stakeholders. From both a scientific and efficiency point of view, establishing the validity of the obtained data in clinical trials is of utmost importance. Finally, the results are relevant to the society at large that bears the financial burden of poor symptom validity in the form of increased health insurance premiums, loss of work productivity and amount spent on disability aids and benefits. Societal support for the health care and social security system is dependent on a sense of fairness that is strengthened by taking the validity of symptom reporting into account.

Innovation / Products

The results in this dissertation are among the first that are based on large, naturalistic samples of clinically referred patients in several health institutions (i.e., five hospitals and one mental health care institution). Also, opposed to most studies on this topic, we took both dimensions of symptom validity – symptom over-reporting and cognitive underperformance - into account. Further, as far as we know, our study is the first to examine the practices and beliefs regarding symptom validity of clinicians in

Western-Europe and compare our findings to the survey-studies conducted in the United States, Canada, and the United Kingdom. The main product of this dissertation is the implications that our findings have for the psychological assessment of clinically referred patients.

Implementation

In order to facilitate the process of dissemination of the results to clinical practice several endeavors have been undertaken. First of all, all studies have been published in international, peer-reviewed journals. Several articles have been published in the Dutch journal for Neuropsychology [Tijdschrift voor Neuropsychologie]. All study results have been presented in international and national symposia. Also, the results have been processed in a chapter on Symptom validity in a Dutch textbook on rehabilitation psychology (Ponds & Dandachi-FitzGerald, 2016). Further, the data have been incorporated in the guideline on neuropsychological medico-legal assessment from the Dutch Institute for Psychology section Neuropsychology (2016). In order to further disseminate the results, it would be beneficial to incorporate our findings in a brief manual on symptom validity in clinical psychological assessment. Also, systematic education on symptom validity in the master of psychology and in the post-graduate training programs (i.e., training for health care psychologist and training for clinical psychologist and clinical neuropsychologist) is recommendable. Finally, the results of this dissertation have contributed to new research projects that examine the intervention of feedback on poor symptom validity, and that aim to gain more insight into the dynamics operating behind poor symptom validity.

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Curriculum Vitae

Brechtje Dandachi-FitzGerald werd geboren op 18 mei 1976 te Veghel. In 1994 deed ze eindexamen VWO aan het Zwijssen college te Veghel. Hierna ging ze Psychologie studeren aan de Katholieke Universiteit Nijmegen. Na twee jaar zette ze haar studie voort aan de Vrije Universiteit te Amsterdam, waar ze in 1999 afstudeerde in richting Klinische Psychologie met als specialisatie neuropsychologie. In datzelfde jaar ging ze als psycholoog in het revalidatiecentrum De Trappenberg te Huizen aan de slag. In 2001 verhuisde ze naar Maastricht om in het academisch ziekenhuis Maastricht te starten met de opleiding tot gezondheidszorgpsycholoog. Na afronding heeft ze bij de revalidatiedagbehandeling in het Orbis Concern te Sittard gewerkt en in het academisch ziekenhuis Maastricht bij de sectie neuropsychologie waar ze deel uitmaakte van het behandelteam diepe-hersensstimulatie bij de ziekte van Parkinson. Vervolgens is ze bij het Psycho-Medisch Streekcentrum Vijverdal te Maastricht gaan werken als coördinator op de Academische Afdeling Neuropsychologie, waar ze betrokken is geweest bij de ontwikkeling van de zorgprogramma's ADHD en autismespectrumstoornissen volwassenen. Ze heeft ze les gegeven binnen de Universiteit Maastricht, Rino Zuid te Eindhoven, SPON te Nijmegen, en expertises verricht bij Lavori, Riagg Maastricht. Ze maakte deel uit van de commissie Richtlijn expertise onderzoek van het NIP sectie neuropsychologie. Momenteel volgt zij de opleiding tot klinisch psycholoog bij het Maastricht Universitair Medisch Centrum (MUMC+).

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