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Functional (psychogenic) movement disorders associated with normal scores in psychological questionnaires: A case control study

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ABSTRACT

Objective: Functional movement disorders (FMDs) fall within the broader category called functional neurological symptom disorder (FNSD). New DSM-5 criteria for FNSD no longer require the presence of a 'psychological conflict' suggesting that some patients with FMD may not have obvious psychological comorbidity. We studied patients with FMD in comparison to patients with a neurological movement disorder (MD) and healthy controls (HC) to identify whether there is a subgroup of patients with FMD who have normal psychological test scores.
Methods: We assessed self-rated measures of depression/anxiety (SCL-90), dissociation and personality disorder (PDQ-4) in patients attending neurological clinics and healthy controls. The proportion of patients scoring within normal ranges was determined, and the levels of somatic and psychological symptoms were compared between the three groups.
Results: Among the FMD group, 39% (20/51) scored within the normal range for all measures compared to 38% (13/34) of MD subjects and 89% (47/53) of healthy controls. There were no differences in overall scores in the SCL-90 and PDQ-4 between FMD and MD patients. FMD patients also did not differ from controls on a self-rated measure of personality pathology.
Conclusion: Our data show that a substantial proportion of patients with FMD score within the normal range in psychological questionnaires, lending some support to the new DSM-5 criteria.

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Introduction

Debate about diagnostic criteria for functional neurological symptoms was revitalized with the advent of DSM-5 [1,2]. Functional neurological symptoms include neurological symptoms which are internally inconsistent or incongruent with neurological disease but are not the result of intentional feigning. The DSM-IV-TR criteria [3] for conversion disorder required the presence of a 'psychological stressor' in line with a Freudian idea that these symptoms originate from a psychological conflict. In DSM-5 'conversion disorder (functional neurological symptom disorder (FNSD)' the requirement for a psychological stressor as a diagnostic criterion has been abandoned, although the potential relevance of psychological factors are still highlighted in the text.

High levels of general psychopathology such as depression, anxiety, abnormal coping strategies, personality disorders are typically reported in a large proportion of patients with conversion disorder [4–13]. However, controlled studies of functional movement disorders and non-epileptic seizures have at times struggled to show expected differences in psychopathology [12,14,15]. In addition, the proportion of patients without obvious psychological symptoms are sometimes not identified in studies which typically only report mean values of self-rated measures without extracting the proportion of patients that score within normal ranges on psychological tests. In ICD-10, FMD are classified within dissociative disorders. Dissociative symptoms have been found to be more common in patients with a range of functional neurological disorders than controls in some studies [16] but not in others [11,14,17].

Diagnostic criteria for functional movement disorders originating from the neurological field [18–21] have never required psychological factors to be present. Those working in clinical neurology often

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encounter patients in whom the psychiatrist can find 'no disorder' [22]. In one survey of 519 neurologists, 50% of respondents reported that psychiatrists, psychologists, or rehabilitation specialists sometimes (35%), often (14%) or always (1%) question the neurologists' original diagnosis and recommend the neurological basis for the disorder be reconsidered.

This prospective study aimed to analyze the proportion of patients scoring within normal limits on questionnaire tests of psychopathology within a group of patients diagnosed with functional movement disorder (FMD, i.e. movement disorder or functional paresis) by movement disorder neurologists (TvL). We compared these results to patients with 'neurological' movement disorder (MD) to control for the secondary effects of having a medical condition, and to healthy controls (HC).

Method

Subjects

This study was approved by the Medical Ethical Committee at the University Medical Centre Groningen, the Netherlands and performed according to The Code of Ethics of the World Medical Association (declaration of Helsinki; version Seoul 2008). 'Patients were recruited from the outpatient neurology clinics of the University Medical Center of Groningen (TvL). All patients gave informed written consent. The clinical diagnosis was made after a neurological examination by neurologists specialized in movement disorders (TvL). Additional neurophysiological examination (motor-evoked potentials, electromyography) and/or clinical neuroimaging (MRI, PET, SPECT, or CT) were carried out at the discretion of the assessing neurologist. Questionnaires were given to patients to fill out at home after their hospital visit and were re-collected by mail within the following weeks. Two previous studies [6,7] describe an initial subset of patients who participated in this study. Additional patients with functional movement disorder (FMD) and movement disorder (MD) were recruited between September 2011 and February 2012 at the Movement Disorders Outpatient Clinic of the Department of Neurology of the University Medical Center Groningen. The sample was not consecutive. All patients were diagnosed with FMD or MD except for those where severe cognitive impairment was evident. Healthy controls were included by asking the spouse of MD patients to also fill out the questionnaires themselves. They were only included if they answered negatively to a question about whether they were currently being treated for a mental disorder or chronic somatic illness. Patients with a SCOPA-COG (screening for impaired memory, attention, visuospatial functions and executive functioning [23]) score of 22 or less were excluded (i.e. this cutoff indicates severely impaired cognitive functioning).

Procedure and materials

Psychological dissociative symptoms were assessed with the Dutch version of the Dissociation Questionnaire (DIS-Q; [24]), including four scales: (1) identity confusion, (2) loss of control, (3) amnesia, and (4) heightened concentration/absorption.

The Somatoform Dissociation Questionnaire (SDQ-20; [25]) was used as an inventory for somatic dissociative symptoms. 'Somatic dissociative symptoms' is a synonym for 'functional neurological symptoms': the questionnaire was developed based on the dissociative theory on FNSD. It contains items such as 'I am paralyzed for a while' or 'I have an attack that resembles an epileptic fit'.

General psychopathology was assessed with the Dutch version [26] of the Symptom Check List (SCL-90; [27]), consisting of the following subscales: somatization, sleeping disorders, agoraphobia, depression, anxiety, inadequacy, sensitivity, hostility, and psychoneuroticism.

The level of personality pathology was screened by means of the Personality Diagnostic Questionnaire (PDQ-4; [28]), including 12

subscales (paranoid, schizoid, schizotypical, histrionic, narcissistic, borderline, antisocial, avoidant, dependent, obsessive-compulsive, depressive, passive-aggressive) as well as a total scale for personality pathology.

Statistical analyses

Between-group differences in demographic variables were tested for age and education (ANOVA), sex (Kruskal-Wallis), and diagnosis (Chi-square). Means, SD, and percentage of clinically abnormal scores were calculated for PDQ-4, SCL-90, DIS-Q, and SDQ-20 (total scores and subscales) for each group (see Table 2).

Because data was collected in a clinical sample, missing data were inevitable. As there was no evidence for systematically missing values (i.e. missing at random), to obtain maximum power subjects with missing data on one of the questionnaires were included in our analyses.

The presence of clinically relevant psychological symptoms was established by using published clinical norm scores for PDQ-4 (>25; [29]), SCL-90 (males >131, females >150; [30]), DIS-Q (>2.5; [31]), and SDQ-20 (>28; [32]). To provide a detailed psychological description of our sample, the percentage of patients and controls that scored above the normal scores (i.e. indicating presence of psychopathology) was calculated for each questionnaire. Subsequently, we calculated the total percentage that scored *below* the cutoff values on the DIS-Q, PDQ-4, and SCL-90 for each patient group and the HC. The subgroup that was identified in this way did not have any clinically relevant psychological symptom scores on the questionnaires used and was of interest for our main analysis (identifying subgroup with normal psychological test scores).

Associations between psychological characteristics (dissociation, general psychopathology, and personality pathology) were calculated for all three groups (Pearson's *r*).

The Kolmogorov–Smirnov test showed that not all variables were normally distributed. However, we performed parametrical tests, as MANOVA is known to be robust for deviations from normality. A MANOVA was performed with diagnosis (FMD, MD, and HC) as grouping variable and the total SCL-90, PDQ-4, DIS-Q, and SDQ-20 scores as dependent variables ($n = 133$). Post hoc analyses were performed with univariate ANOVAs and LSD multiple comparisons if the MANOVA showed a significant effect, to investigate differences per questionnaire and at group levels. Finally, to control for the effects of personality psychopathology, and general psychological distress MANCOVA was performed to include PDQ-4 and SCL-90 total scores as covariates in the comparison of both groups on DIS-Q and SDQ-20 total scores. ANCOVAs and repeated contrasts were used as follow-up analysis.

Results

Fifty-five participants with functional movement disorder (FMD), 34 participants with movement disorder (MD) and 52 healthy controls (HC) were included. Demographic information, educational data, and symptom category are listed in Table 1. No significant differences were found in age, education, and sex in the three groups.

Table 2 shows the clinical scores on all psychological questionnaires in raw scores as well as in percentage of subjects that fall into the clinically abnormal range. The FMD and MD groups demonstrated a different range and proportion of different test scores (Chi-square: 195.22, $p < .001$).

A subgroup of subjects was identified that scored within the normal range on the DIS-Q, SCL-90, and PDQ-4 questionnaires: 39% (20 out of 51) of FMD subjects scored within the normal range, 38% (13 out of 34) of MD subjects and 89% (47 out of 53) of HC subjects on the questionnaires.

Psychological dissociation was consistently and significantly related to general psychopathology and also to symptoms of personality disorders within all three groups (see Table 3 for significant associations). Somatic and psychological dissociative symptoms were associated in the FMD group ($r = 0.45$, $p < .001$) and in normal controls ($r = 0.32$, $p < 0.05$), but not in MD ($r = 0.12$, n.s.). Somatic dissociation was related to psychological functioning, as measured with the SCL-90 and PDQ-4, only in the FMD group (see Table 3).

Table 1
Demographic and illness characteristics of patients with functional movement disorder (FMD; $n = 51$), movement disorder (MD; $n = 34$), and healthy controls (HC; $n = 52$).

	FMD		HC		MD	
	Range	Mean (SD)	Range	Mean (SD)	Range	Mean (SD)
Age	21–71	50.4 (14.1)	18–78	50.6 (11.2)	20–78	52.3 (10.5)
Education[a]	2–7	4.6 (1.4)	1–7	5.0 (1.3)	1–7	4.9 (1.1)
		Number (%)				
Gender	Male	19 (37%)		20 (38%)		17 (50%)
	Female	32 (63%)		33 (62%)		17 (50%)
Diagnoses						
Paralysis		10 (19.6%)				1 (3%)
Gait disorder		10 (19.6%)				0 (0%)
Dystonia		2 (4%)				5 (15%)
Myoclonus		16 (31.4 %)				1 (3%)
Tremor		10 (19.6%)				24 (71 %)
Seizure		3 (6%)				3 (9%)

[a] Education was assessed using a Dutch rating scale (minimum = 1 = primary school not finished; maximum = 7 = university finished).

MANOVA revealed significant overall differences between the three groups ($F (8,254) = 8.27$, $p < .001$). Post hoc contrasts revealed that FMD patients showed elevated scores on measures for somatic dissociative symptoms (SDQ-20) and psychological dissociative symptoms (DIS-Q) when compared to MD patients, but not on measures for general psychopathology (SCL-90). MD patients scored higher on the questionnaire for somatic dissociative symptoms and psychopathology than healthy controls but not on the measure for psychological dissociative symptoms. There were no overall differences between the groups on scores of personality pathology (PDQ-4; see Table 4).

The MANCOVA showed that overall group differences in the presence of somatic and psychological dissociative symptoms were still present ($F (4,254) = 5.24$, $p < .001$) after controlling for general psychopathology and personality pathology. Follow-up ANCOVAs (see Table 5) however revealed that only somatic dissociative symptoms but not psychological dissociative symptoms were elevated in FMD compared to MD.

Table 3
Associations (two-sided Pearson's *r*) between dissociative psychological symptoms and other psychological symptoms such as general psychopathology (SCL-90) and personality disorders (PDQ-4) for all groups.

		Psychological Dissociation DIS-Q	Somatic Dissociation SDQ-20
		r (*p*)	*r* (*p*)
FMD*	SCL-90	.57 (.001)	.37 (.008)
	PDQ-4	.70 (.001)	.39 (.005)
MD*	SCL-90	.71 (.001)	ns
	PDQ-4	.61 (.001)	ns
HC*	SCL-90	.51 (.001)	ns
	PDQ-4	.47 (.001)	.35 (.010)

* FMD = functional movement disorders; MD = movement disorder; HC = healthy controls.

Discussion

The data indicate that abnormal psychological test scores are common but not necessarily present in functional neurological symptoms. Among patients, 39% that were diagnosed by movement disorder neurologists as FMD scored within the normal range on psychological questionnaires measuring general psychopathology, personality disorders, and psychological dissociation. This lends some support to the idea in the new DSM-5 criteria for functional neurological disorders, psychological symptoms may be present but do not have to be [33]. An analogy might be that a diagnosis of stroke should not be rejected because the patient has never smoked or is not hypertensive. Our data suggests that psychiatrists or psychologist should not reject a diagnosis of FMD just because psychological testing is normal.

Table 2
Mean score, standard deviation, and percentage of clinically abnormal scores on all questionnaire (sub)scales of all three groups.

	FMD[a]		MD		HC	
	Mean (SD)	Abnormal *n* (%)	Mean (SD)	Abnormal *n* (%)	Mean (SD)	Abnormal *n* (%)
Questionnaire (range)						
DIS-Q (1–5)[b]						
Identity confusion (6%)	1.2 (0.26)	10 (20%)	1.2 (0.26)	4 (12%)	1.1 (0.16)	3
Loss of control	1.6 (0.50)	11 (22%)	1.5 (0.41)	2 (6%)	1.4 (0.24)	1 (2%)
Amnesia	1.5 (0.47)	7 (14%)	1.3 (0.26)	1 (3%)	1.2 (0.31)	2 (4%)
Absorption	1.9 (0.65)	9 (18%)	1.5 (0.48)	–	1.7 (0.45)	3 (6%)
Total	1.5 (0.33)	–	1.3 (0.29)	–	1.3 (0.16)	–
SDQ-20 (20–100)	27.5 (7.2)	20 (39%)	24.4 (4.8)	5 (15%)	20.9 (1.54)	–
SCL-90 (0–360)[b]						
Agoraphobia	16.3 (6.33)	26 (51%)	13.2 (5.47)	20 (59%)	9.8 (2.58)	3 (6%)
Anxiety	10.5 (4.63)	9 (18%)	11.0 (4.30)	15 (44%)	8.8 (2.13)	2 (4%)
Depression	26.2 (8.62)	20 (39%)	25.1 (8.76)	18 (53%)	18.8 (3.15)	3 (6%)
Somatic complaints	25.6 (9.10)	27 (53%)	22.0 (8.00)	25 (74%)	15.8 (3.50)	2 (4%)
Insufficiency	17.1 (6.38)	22 (43%)	15.2 (5.94)	17 (50%)	11.3 (2.70)	4 (8%)
Distrust	25.1 (8.55)	13 (26%)	24.8 (9.03)	11 (32%)	21.2 (3.91)	4 (8%)
Hostility	7.3 (1.57)	9 (18%)	7.2 (1.32)	7 (21%)	6.5 (0.80)	2 (4%)
Sleep problems	6.5 (3.25)	11 (22%)	6.5 (3.31)	18 (53%)	4.3 (1.92)	3 (6%)
Other	13.0 (3.69)	23 (45%)	11.4 (3.18)	13 (38%)	10.0 (1.35)	4 (8%)
Total	147.3 (39)	24 (48%)	145.1 (36.8)	11 (34%)	106.3 (14.9)	1 (2%)
PDQ-4 (0–99)[b]						
Paranoid	1.5 (1.41)	3 (6%)	1.0 (1.16)	1 (3%)	1.3 (1.20)	3 (6%)
Schizoid	1.6 (1.67)	9 (18%)	1.5 (1.62)	3 (9%)	1.3 (1.40)	4 (8%)
Schizotypical	1.3 (1.64)	2 (4%)	1.3 (1.52)	1 (3%)	1.2 (1.40)	1 (2%)
Histrionic	1.0 (0.98)	–	0.9 (1.27)	–	1.1 (1.13)	1 (2%)
Narcissistic	1.0 (1.10)	–	0.9 (1.15)	–	0.8 (0.88)	–
Borderline	1.4 (1.42)	1 (2%)	1.3 (1.24)	–	0.8 (0.84)	–
Antisocial	0.3 (0.48)	–	0.2 (0.46)	–	0.3 (0.49)	–
Avoidant	1.8 (1.85)	9 (18%)	1.7 (2.10)	7 (21%)	1.2 (1.36)	5 (9%)
Dependent	0.9 (1.25)	–	0.9 (1.47)	1 (3%)	0.5 (0.75)	–
Obsessive-compulsive	2.3 (1.45)	11 (22%)	2.1 (1.67)	6 (18%)	2.1 (1.70)	14 (26%)
Depressive	2.2 (1.60)	4 (8%)	1.8 (1.75)	3 (9%)	1.4 (1.32)	1 (3%)
Passive-aggressive	0.5 (0.83)	–	0.7 (1.15)	1 (3%)	0.5 (0.67)	–
Total	17.4 (9.45)	9 (18%)	16.2 (12.34)	8 (24%)	14 (8.36)	5 (9%)

[a] FMD = functional movement disorder; MD = movement disorder; HC = healthy controls.
[b] Abnormal scores on subscales were calculated using the criterion of ± 2 SD from the mean in the HC group.

Table 4
MANOVA results: between group differences on the DIS-Q, SDQ-20, SCL-90, and PDQ-4 total scores. For the PDQ-4, no pairwise comparisons could be made because the overall test did not show a significant effect.

	ANOVAs		Post hoc pairwise comparisons (Fisher's LSDs)					
	$F_{(2,130)}$	p	*FMD-MD	p	FMD-HC	p	MD-HC	p
DIS-Q	6.86	<.0010	0.13	<.05	0.19	<.001	0.06	n.s.
SDQ-20	22.85	<.0001	3.74	<.01	6.76	<.001	3.02	<.050
SCL-90	21.68	<.0001	9.39	n.s.	41.13	<.001	31.73	<.001
PDQ-4	1.92	n.s.						

* FMD = functional movement disorders; MD = movement disorder; HC = healthy controls.

Studies of psychological comorbidity and symptomatology in functional neurological disorders usually present mean scores and group differences and the proportion of individuals with normal test scores are typically not identified. In addition, psychological distress is also commonly present in patients with recognized neurologic disorders [13,34] and therefore not specific for FMD, as illustrated earlier by case control studies of FMD and non-epileptic seizures with 'organic' control groups [12,14,15,35]. Our data supported these reports as the psychological profile of patients with FMD resembled patients with recognized neurological symptoms in terms of elevated scores on general psychopathology such as depression or anxiety and psychological dissociative symptoms compared to healthy controls. FMD patients differed from MD patients in terms of higher scores on a questionnaire for somatic dissociative symptoms. Also, while psychological dissociative symptoms are related to general psychological symptoms in all three groups, only the FMD group showed an association between somatic dissociative symptoms and psychological symptoms at the test level.

Contemporary models offer an interesting synthesis of psychological factors such as attention, the feeling of self-agency, and disturbed perception of bodily events that lead to a unique form of involuntariness [19,36–38]. For example, a model of functional movement disorder has been proposed by Edwards et al. [17], in which the core problem is defined as a disorder of attention and belief interacting with abnormal attribution of bottom-up sensory information. According to this model, patients experience a mismatch between beliefs and expectations and sensory information associated with the symptom. This leads to a feeling of lack of self-agency. In this model, the presence of psychological stressors, emotional symptoms, or psychological dissociative symptoms can be seen as additive but not essential to the development of symptoms.

Limitations

Scores on psychological questionnaires are not a substitute for psychiatric diagnosis by interview and it is likely that some of our 'normal' population would have had psychological or personality problems not detected by questionnaires [13]. We also cannot exclude the possibility of misdiagnosis, factitious disorder, or malingering in the FMD group. Patients were diagnosed by experienced movement disorder neurologists and studies of misdiagnosis in a number of neurological centres suggest that misdiagnosis of organic diseases is rare [39,40]. As these are clinical data, patients were not asked consecutively and not all

Table 5
MANCOVA results: between group differences on the DIS-Q and SDQ-20, controlled for SCL-90 and PDQ-4.

	ANCOVAs		Post hoc pairwise comparisons (repeated contrasts)					
	$F_{(2,127)}$	p	FMD-MD[a]	p	FMD-HC	p	MD-HC	p
DIS-Q	2.11	n.s.						
SDQ-20	9.42	<.001	3.25	<.001	4.63	<.001	1.38	n.s.

[a] FMD = functional movement disorders; MD = movement disorder; HC = healthy controls.

patients agreed for various reasons. Also, some of our healthy control subjects were relatives of patients with a recognized neurological disorder. This means that they are not, strictly speaking, 'healthy' and their psychological scores could have been contaminated because they were living with someone who had a movement disorder. However, to determine the proportion of patients with normal test scores, we used clinical cutoff scores, as they are applied in clinical practice. Finally, the data regarding somatoform dissociation are only of value in assessing the differences in scores on somatoform dissociation in patients with functional movement disorder and normal controls. Note that in patients with 'neurological' movement disorder, the SDQ result is confounded by the presence of neurological disease causing symptoms.

In conclusion, our data illustrates that patients with FMD form a heterogeneous group in terms of psychological symptoms with over one-third of patients scoring within normal ranges on questionnaires. Although there are many limitations to this finding, it should encourage clinicians to take a less rigid view of the role of psychological factors in FMD. Assessment of psychiatric diagnosis nevertheless remains an essential part of formulation and treatment for most patients with FMD.

References

[1] Stone J, Lafrance WC, Brown R, Spiegel D, Levenson JL, Sharpe M. Conversion disorder: current problems and potential solutions for DSM-5. J Psychosom Res Dec 2011; 71:369–76.

[2] Kanaan RA, Carson A, Wessely SC, Nicholson TR, Aybek S, David AS. What's so special about conversion disorder? A problem and a proposal for diagnostic classification. Br J Psychiatry Jun 2010;196:427–8.

[3] American Psychiatric Association. Diagnostic and Statistical Manual IV. Washington DC: American Psychiatric Association; 2000.

[4] Binzer M, Andersen PM, Kullgren G. Clinical characteristics of patients with motor disability due to conversion disorder: a prospective control group study. J Neurol Neurosurg Psychiatry 07 1997;63:83–8.

[5] Feinstein A, Stergiopoulos V, Fine J, Lang AE. Psychiatric outcome in patients with a psychogenic movement disorder: a prospective study. Neuropsychiatry Neuropsychol Behav Neurol 07 2001;14:169–76.
[6] Beilen van M, Griffioen BT, Leenders KL. Coping strategies and IQ in psychogenic movement disorders and paralysis. Mov Disord 04/30 2009;24:922–5.
[7] Beilen van M, Griffioen BT, Gross A, Leenders KL. Psychological assessment of malingering in psychogenic neurological disorders and non-psychogenic neurological disorders: relationship to psychopathology levels. Eur J Neurol 10 2009;16:1118–23.
[8] Fink P, Steen HM, Sondergaard L. Somatoform disorders among first-time referrals to a neurology service. Psychosomatics 11 2005;46:540–8.
[9] Crimlisk HL, Bhatia K, Cope H, David A, Marsden CD, Ron MA. Slater revisited: 6 year follow up study of patients with medically unexplained motor symptoms. BMJ 02/21 1998;316:582–6.
[10] Sar V, Akyuz G, Kundakci T, Kiziltan E, Dogan O. Childhood trauma, dissociation, and psychiatric comorbidity in patients with conversion disorder. Am J Psychiatry 12 2004;161:2271–6.
[11] Factor SA, Podskalny GD, Molho ES. Psychogenic movement disorders: frequency, clinical profile, and characteristics. J Neurol Neurosurg Psychiatry 10 1995;59:406–12.
[12] Testa SM, Krauss GL, Lesser RP, Brandt J. Stressful life event appraisal and coping in patients with psychogenic seizures and those with epilepsy. Seizure May 2012;21:282–7.
[13] Stone J, Warlow C, Sharpe M. The symptom of functional weakness: a controlled study of 107 patients. Brain May 2010;133:1537–51.
[14] Kranick S, Ekanayake V, Martinez V, Ameli R, Hallett M, Voon V. Psychopathology and psychogenic movement disorders. Mov Disord Aug 15 2011;26:1844–50.
[15] Roelofs K, Spinhoven P, Sandijck P, Moene FC, Hoogduin KA. The impact of early trauma and recent life-events on symptom severity in patients with conversion disorder. J Nerv Ment Dis 08 2005;193:508–14.
[16] Sar V, Koyuncu A, Ozturk E, Yargic LI, Kundakci T, Yazici A, et al. Dissociative disorders in the psychiatric emergency ward. Gen Hosp Psychiatry 01 2007;29:45–50.
[17] Strutt AM, Scott BM, Ferrara J, York MK, Jankovic J. Assessing dissociative pathology in psychogenic movement disorders: Clinical utility of the dissociative experiences scale-II. Mov Disord 2011;26:S266.
[18] Gupta A, Lang AE. Psychogenic movement disorders. Curr Opin Neurol Aug 2009;22:430–6.
[19] Edwards MJ, Fotopoulou A, Parees I. Neurobiology of functional (psychogenic) movement disorders. Curr Opin Neurol Aug 2013;26:442–7.
[20] Morgante F, Edwards MJ, Espay AJ, Fasano A, Mir P, Martino D, et al. Diagnostic agreement in patients with psychogenic movement disorders. Mov Disord Apr 2012;27:548–52.
[21] Schwingenschuh P, Katschnig P, Seiler S, Saifee TA, Aguirregomozcorta M, Cordivari C, et al. Moving toward "laboratory-supported" criteria for psychogenic tremor. Mov Disord Dec 2011;26:2509–15.
[22] Espay AJ, Goldenhar LM, Voon V, Schrag A, Burton N, Lang AE. Opinions and clinical practices related to diagnosing and managing patients with psychogenic movement disorders: An international survey of movement disorder society members. Mov Disord Jul 15 2009;24:1366–74.
[23] Verbaan D, Jeukens-Visser M, Van Laar T, van Rooden SM, Van Zwet EW, Marinus J, et al. SCOPA-cognition cutoff value for detection of Parkinson's disease dementia. Mov Disord Aug 15 2011;26:1881–6.
[24] Vanderlinden J, Van Dyck R, Vandereycken W, Vertommen H. The Dissociation Questionnaire (Dis-Q): Development, reliability and validity of a new self-reporting dissociation questionnaire. Acta Psychiatr Belg Jan-Feb 1994;94:53–4.
[25] Nijenhuis ER, Spinhoven P, Van DR, Van der HO, Vanderlinden J. The development and psychometric characteristics of the Somatoform Dissociation Questionnaire (SDQ-20). J Nerv Ment Dis 11 1996;184:688–94.
[26] Arrindell WA, Ettema JHM. SCL-90: handleiding bij een multidimensionele psychopathologie-indicator. Lisse: Swets & Zeitlinger; 1986.
[27] Derogatis LR, Lipman RS, Covi L. SCL-90: an outpatient psychiatric rating scale—preliminary report. Psychopharmacol Bull Jan 1973;9:13–28.
[28] Hyler SE, Skodol AE, Kellman HD, Oldham JM, Rosnick L. Validity of the Personality Diagnostic Questionnaire–revised: Comparison with two structured interviews. Am J Psychiatry Aug 1990;147:1043–8.
[29] Davison S, Leese M, Taylor PJ. Examination of the screening properties of the personality diagnostic questionnaire 4+ (PDQ-4+) in a prison population. Pers Disord Apr 2001;15:180–94.
[30] Van Kamp I, Van der Velden PG, Stellato RK, Roorda J, Van Loon J, Kleber RJ, et al. Physical and mental health shortly after a disaster: First results from the Enschedefirework Disaster Study. Eur J Pub Health Jun 2005;16:252–8.
[31] Vanderlinden J, Van Dyck R, Vandereycken W, Vertommen H. Dissociative Experiences in the general population in the Netherlands and Belgium: Study With the Dissociative questionnaire (DIS-Q). Dissociation Mar 1991;4:180–4.
[32] Nijenhuis E. Somatoform Dissociation. New York: Norton; 2004.
[33] Stone J, Warlow C, Sharpe M. Functional weakness: Clues to mechanism from the nature of onset. J Neurol Neurosurg Psychiatry Jan 2012;83:67–9.
[34] Binzer M, Almay B, Eisemann M. Chronic pain disorder associated with psychogenic versus somatic factors: a comparative study. Nord J Psychiatry 2003;57:61–6.
[35] Testa SM, Lesser RP, Krauss GL, Brandt J. Personality Assessment Inventory among patients with psychogenic seizures and those with epilepsy. Epilepsia Aug 2011;52:e84–8.
[36] Stone J, Zeman A, Simonotto E, Meyer M, Azuma R, Flett S, et al. FMRI in patients with motor conversion symptoms and controls with simulated weakness. Psychosom Med 12 2007;69:961–9.
[37] van Beilen M, de Jong BM, Gieteling EW, Renken R, Leenders KL. Abnormal parietal function in conversion paresis. PLoS One 2011;6:e25918.
[38] Voon V, Brezing C, Gallea C, Hallett M. Aberrant supplementary motor complex and limbic activity during motor preparation in motor conversion disorder. Mov Disord Nov 2011;26:2396–403.
[39] Stone J, Smyth R, Carson A, Lewis S, Prescott R, Warlow C, et al. Systematic review of misdiagnosis of conversion symptoms and "hysteria". BMJ 2005;331:989.
[40] Stone J, Carson A, Duncan R, Coleman R, Roberts R, Warlow C, et al. Symptoms "unexplained by organic disease" in 1144 new neurology out-patients: How often does the diagnosis change at follow-up? Brain 2009;132:2878–88.