

LETTER

Clinician and patient perceptions of free will in movement disorders: mind the gap

INTRODUCTION

Most people perceive that their actions arise from their own 'free will', commonly defined as the ability to choose how to act.¹ Neurological disorders, such as epileptic seizures and movement disorders, are often regarded as conditions in which free will is undermined.² Clinically, an action is considered involuntary when it is automatically performed and cannot be controlled. Our study aim was to explore patients' views as well as clinicians' views on 'free will' and voluntariness in three hyperkinetic disorders: tics, functional movement disorders (FMD, previously 'psychogenic' movement disorder) and myoclonus. We developed a questionnaire to determine to what extent patients in these three groups consider their 'free will' to be undermined by the movements induced by their disorder. We compared these findings with clinicians' views of voluntariness in each of these movement disorders.

METHODS

The current study was part of a larger study on FMD, myoclonus and tics, encompassing a clinical and Bereitschaftspotential study

(approved by the local ethics committee).^{3,4} Thirty-nine expert clinicians participated in a diagnostic study of 60 patients with FMD (n=28), myoclonus (n=15) or tics (n=17). Furthermore, 22 healthy control subjects were included.

Clinicians were provided with a 4-item questionnaire. Clinicians were asked to rate the degree of voluntariness on a 100 mm Visual Analogue Scale (VAS) ranging from 0 (completely involuntary) to 100 (completely voluntary) for different movements: (1) raising one's hand to vote, (2) myoclonus, (3) tics and (4) FMD.

Patients were questioned using a custom-made questionnaire on movement disorders and free will (the Symptomatology And Perceived Free will rating scale; SAPF). The 14-item SAPF scale was based on a conceptual framework as suggested by Walter (featured in Meynen)², who distinguished between three aspects of free will.² First, to act freely one must have alternative possibilities, implying that a person must be able to act otherwise. Second, to act freely means acting or choosing for a reason. Third, free action requires that one is the originator or source of one's actions. Thirteen SAPF items rated the voluntariness of the movements as part of the patient's disorder on a 100 mm VAS (zero indicating complete involuntariness). The 14th SAPF item inquired patients if, prior to the jerk, they felt they could decide differently/alternatively from executing the movement (yes/no instead of VAS) (see online supplementary material).

Furthermore, patients and control subjects rated their general beliefs concerning free will and determinism using the validated free will and determinism rating scale (FAD), consisting of 28 items measuring two forms of determinism ('fate' and 'scientific causation') and two forms of non-determinism ('randomness' and 'free will').⁵ FAD scoring ranged between one (strongly disagree) and five (strongly agree).

For statistics, see online supplementary material.

RESULTS

Clinicians' views of the degree of voluntariness differed significantly per disorder (Kruskal–Wallis test, $p < 0.001$). Clinicians considered raising one's hand to vote as complete voluntary action (median: 100 on a 100 scale, range: 2–100) and myoclonus as involuntary (median: 0, range: 0–25). Tics were considered slightly more involuntary than voluntary (median: 40, range: 0–81), and FMD was rated either involuntary or voluntary (median: 55, range: 0–100) (see online supplementary figure).

SAPF results showed that each of the patient groups (tics, myoclonus and FMD) considered voluntariness to be considerably undermined due to their disorder. Furthermore, there were significant between-group differences on the SAPF items: 'movements are part of me' ($p = 0.003$), 'the movements are mine' ($p < 0.001$), 'I can suppress the movements' ($p = 0.011$), 'I have control over the

Table 1 Patients' perception on free will and their movement disorder (SAPF)

To what extent does this statement apply to your movements?	Myoclonus (n=15)	Tics (n=17)	FMD (n=28)	p Value*	p Value pair-wise comparison†		
					FMD vs tics	FMD vs myoclonus	Myoclonus vs tics
The movements take me by surprise	56	32	51	0.104	0.041 [‡]	0.574	0.142
The movements are a part of me	38	83	8	0.003 [‡]	0.001 [‡]	0.104	0.165
The movements are mine (egosyntonic)	53	86	5,5	<0.001 [‡]	<0.001 [‡]	0.013 [‡]	0.202
I can suppress the movements	30	67	11	0.011 [‡]	0.005 [‡]	0.452	0.024 [‡]
I have control over the movements	5	40	7,5	0.019 [‡]	0.006 [‡]	0.939	0.044 [‡]
The movements are unwanted	99	93	99	0.055	0.057	0.635	0.022 [‡]
The movements are voluntary	0	7	5	0.214	0.061	0.826	0.411
The movements have a purpose	1	18	1	0.009 [‡]	0.003 [‡]	0.453	0.044 [‡]
I can decide when movements occur	1	3	1	0.150	0.092	0.925	0.097
I can influence the movements	9	47	9,5	0.310	0.386	0.351	0.153
I can avoid the movements	2	17	2,5	0.033 [‡]	0.054	0.419	0.010 [‡]
I am responsible for the movements	1	3	1	0.693	0.468	0.863	0.478
I experience less freedom due to the movements	8	11	9	0.927	0.841	0.759	0.766

SAPF items were scored on 100 mm VAS ranging from 0 to 100, with 0 indicating completely absent/disagreement with the item and 100 completely present/agreement. Scores presented in medians.

*Three group comparison using Kruskal–Wallis test.

†Pair-wise comparisons (Mann–Whitney U test).

‡Indicate significant differences ($p < 0.05$).

FMD, functional movement disorder; SAPF, Symptomatology and Perceived Free will rating scale; VAS, Visual Analogue Scale.

movements' ($p=0.019$), 'movements have a purpose' ($p=0.009$) and 'I can avoid the movements' ($p=0.033$) (see table 1). Five patients (three FMD, two tics) reported the ability to decide differently.

FAD results showed no significant differences between patients and controls on free will beliefs. See online supplementary table for FAD details.

DISCUSSION

Among clinicians we found considerable divergence of opinion regarding the degree of voluntariness in tics and FMD, indicated by the wide range of their voluntariness ratings. Furthermore, a considerable gap between clinicians' views and patients' views regarding voluntariness in FMD and tics was found. Notably, compared to patients with tics, those with FMD perceive to a lesser extent that the movements belong to them, perceive less ownership, less control and less ability to suppress the movements (SAPF). These findings are in line with several studies that indicate a diminished sense of self-agency in patients with FMD.¹

Even though our study involved abstract concepts like free will, its implications are practical. For clinicians, it may be helpful to realise that doctors and patients may have different views of voluntariness in movement disorders, in particular regarding tics and FMD. Keeping this gap in mind during consultation could prevent misunderstandings that might jeopardize the doctor–patient relationship.

The difference in perceived control between tics and FMD may have further therapeutic implications. Cognitive behavioural therapy focused on using and augmenting the patients' sense of self-agency with respect to their movements is successfully used to treat tics.² Our results suggest that patients with FMD probably require different cognitive behavioural techniques than those used for tics, because patients with FMD experience less behavioural control.

Intriguingly, five patients (three FMD, two tics) indicated that they were able to decide differently shortly before occurrence of the movement. In other words, they could have decided not to perform the action, which is considered a central aspect of free will. Yet, these patients did not perceive the jerks to be freely willed.

As the general free will perception (FAD scores) did not differ between the three patient groups and controls, the SAPF questionnaire findings are unlikely to be biased by patients' general views of free will and determinism. A limitation of this study is that the SAPF questionnaire is a custom-made instrument that reduces the multifaceted phenomenon of voluntariness to standardised items.

Nevertheless, with our exploratory study using the SAPF questionnaire novel insights are found. Future research should clarify the exact nature and implications of the perceived involuntariness and free will in these neuropsychiatric disorders. In addition, results of such research will aid to bridge the gap between patients and clinicians.

Sandra MA van der Salm,¹
Daniëlle C Cath,^{2,3} Anne-Fleur van Rootselaar,¹
Johannes HTM Koelman,¹ Rob J de Haan,⁴
Marina AJ Tijssen,⁵ Gerben Meynen^{6,7,8}

¹Department of Neurology and Clinical Neurophysiology, Academic Medical Center, Amsterdam, The Netherlands

²Department of Clinical Psychology, University of Utrecht, Utrecht, The Netherlands

³GGZ Drenthe, Department of Psychiatry, University Medical Center Groningen, The Netherlands

⁴Clinical Research Unit, Academic Medical Center, Amsterdam, The Netherlands

⁵Department of Neurology, University Medical Center Groningen, University of Groningen, The Netherlands

⁶Department of Philosophy, Faculty of Humanities, VU University, Amsterdam, The Netherlands

⁷Department of Criminal Law, Tilburg Law School, Tilburg University, Tilburg, The Netherlands

⁸GGZ inGeest, Amsterdam, The Netherlands

Correspondence to Sandra MA van der Salm, Academic Medical Center, Department of Neurology and Clinical Neurophysiology, Meibergdreef 9, Amsterdam, Netherlands; smvandersalm@gmail.com

Acknowledgements We thank the participating patients and clinicians. Expert panel (alphabetical order): KP Bhatia, P Brown, A Carson, AE Cavanna, JN Caviness, R Davenport, MJ Edwards, A Espay, E Ferlazzo, S Franceschetti, VSC Fung, DL Gilbert, CG Goetz, R Guerrini, M Hallett, AG Hounie, J Jankovic, C Klein, A Lang, P Limousin, D Martino, KR Muller-Vahl, A Münchau, F Nahab, M Orth, M Reuber, E Roze, G Rubboli, P Sandor, C Schrader, A Schrag, H Shibasaki, J Stone, P Striano, S Striano, E Tolosa, Y Ugawa, M Vidai-lhet and W Weiner.

Contributors SvdS, DC and GM initiated and designed the study with RdH. SvdS collected the data. Data analysis was performed by SvdS, RdH and GM. SvdS drafted the first version of the manuscript. Data interpretation and writing of the manuscript was performed by all authors.

Funding Academic Medical Center Graduate School PhD stipend for SvdSalm.

Competing interests None declared.

Provenance and peer review Not commissioned; externally peer reviewed.

© Article author(s) (or their employer(s) unless otherwise stated in the text of the article) 2017. All rights reserved. No commercial use is permitted unless otherwise expressly granted.

To cite van der Salm SMA, Cath DC, Rootselaar A-Fvan, et al. *J Neurol Neurosurg Psychiatry* Published Online First: [please include Day Month Year]. doi:10.1136/jnnp-2016-315152

Received 24 October 2016

Revised 13 January 2017

Accepted 17 January 2017

J Neurol Neurosurg Psychiatry 2017;0:1–2.
doi:10.1136/jnnp-2016-315152

References

- Hallett M. Volitional control of movement: the physiology of free will. *Clin Neurophysiol* 2007;118:1179–92.
- Meynen G. Free will and mental disorder: exploring the relationship. *Theor Med Bioeth* 2010;31:429–43.
- van der Salm SMA, de Haan RJ, Cath DC, et al. The eye of the beholder: inter-rater agreement among experts on psychogenic jerky movement disorders. *J Neurol Neurosurg Psychiatry* 2013;84:742–7.
- van der Salm SM, Tijssen MA, Koelman JH, et al. The Bereitschaftspotential in jerky movement disorders. *J Neurol Neurosurg Psychiatry* 2012;83:1162–7.
- Paulhus DL, Carey JM. The FAD-Plus: measuring lay beliefs regarding free will and related constructs. *J Pers Assess* 2011;93:96–104.