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A global survey on the attitudes of neurologists and psychiatrists about functional/psychogenic/dissociative/nonepileptic-seizures/attacks, in the search of its name

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ABSTRACT

Purpose: We conducted an observational study to investigate the opinions of neurologists and psychiatrists all around the world who are taking care of patients with seizures [epilepsy and functional seizures (FS)].

Methods: Practicing neurologists and psychiatrists from around the world were invited to participate in an online survey. On 29th September 2022, an e-mail including a questionnaire was sent to the members of the International Research in Epilepsy (IR-Epil) Consortium. The study was closed on 1st March 2023. The survey, conducted in English, included questions about physicians' opinions about FS and anonymously collected data.

Results: In total, 1003 physicians from different regions of the world participated in the study. Both neurologists and psychiatrists identified "seizures" as their preferred term. Overall, the most preferred modifiers for "seizures" were "psychogenic" followed by "functional" by both groups. Most participants (57.9%) considered FS more difficult to treat compared to epilepsy. Both psychological and biological problems were considered as the underlying cause of FS by 61% of the respondents. Psychotherapy was considered the first treatment option for patients with FS (79.9%).

Conclusion: Our study represents the first large-scale attempt of investigating physicianś attitudes and opinions about a condition that is both frequent and clinically important. It shows that there is a broad spectrum of terms used by physicians to refer to FS. It also suggests that the biopsychosocial model has gained its status as a widely used framework to interpret and inform clinical practice on the management of patients.

1. Introduction

Functional seizures (FS), also known as dissociative seizures (DS) or psychogenic nonepileptic seizures (PNES) [1,2], are characterized by sudden events (paroxysmal changes in feelings, responsiveness, movements, or behavior and reduced self-control) that semiologically may resemble epileptic seizures but are not due to an underlying epileptic activity [3,4]. They belong to functional neurological symptom disorders, are thought to be caused by a complex set of interrelated psychological, social, and biological factors, and are often associated with psychological stressors [5,6]. Functional seizures are commonly encountered in neurology clinics, often affect young adults, with a female predominance, and have a substantial negative impact on many aspects of a person's life, and like epilepsy, are associated with increased mortality [7–11].

Despite its significance and the existing scientific findings pointing to both neurobiological and psychological bases for FS [6,12], this condition is often defined in terms of what it is not rather than what it is (i.e., "non-epileptic"), and there is no universally accepted terminology to indicate this condition [1,2,13–15]. Psychogenic non-epileptic seizures (PNES) is a commonly used term for this condition [14]. However, functional seizures as a term to name this condition is gaining momentum in the recent literature [13]. Other terms (e.g., non-epileptic attack disorder, dissociative seizures, etc.) are also being used by some people to name this condition [13–15]. The terminology of this condition undergoes intense discussions at the time of the present survey in the scientific communities (e.g., The International League Against Epilepsy). Of note, when reporting the results of this survey and discussing them throughout the text, we have consistently used the term functional seizures (FS) to increase the readability of the article, while we acknowledge that there is no consensus on any term for this condition.

Functional seizures affect people worldwide [16], and pose a series of challenges for the treating physician. They include, among others: difficulties in making an accurate diagnosis and differentiating them from epileptic seizures, conveying diagnosis to the patients effectively and understandably, providing a reliable explanation of their nature, and selecting treatments for FS or the related physical and psychiatric comorbidities, such as anxiety or depression [17,18]. Functional seizures are usually treated by neurologists or psychiatrists. Assessing their attitudes and beliefs about this condition would be useful to obtain deeper insight into a condition that can negatively affect the quality of life of many patients worldwide, and to envisage and implement strategies to improve the patient-physician relationship and communication.

We, therefore, conducted an observational study to investigate the opinions of neurologists and psychiatrists all around the world who are taking care of patients with seizures (epilepsy and FS). The primary aim was to investigate the preferred terminology by the participants for the condition in different circumstances (i.e., when communicating with patients, when communicating with colleagues, and when publishing or reading a publication). The secondary aims were to investigate the management plans of the participants for the condition and also to investigate their presumed underlying cause of the condition.

2. Materials and methods

2.1. Participants and procedures

Neurologists and psychiatrists dealing with adult or pediatric patients from around the world were invited to participate in an online survey. On 29th September 2022, an e-mail including a questionnaire was sent to the members of the International Research in Epilepsy (IR-Epil) Consortium [19]. The IR-Epil consortium includes 53 people (lead physicians with epilepsy expertise) from 53 nations, representing all the continents. Only one IR-Epil consortium member per country was contacted. We asked IR-Epil consortium members to share the survey with as many of their colleagues as possible (neurologists and psychiatrists) in their corresponding nations. A reminder email was sent once a month (five reminders in total). The study was closed on 1st March 2023.

The survey was designed by the first four authors. They decided on the questions of the survey by brainstorming, considering the aims of the study. The questionnaire was built using the software Google Forms, part of the free, web-based Google Docs Editors suite offered by Google. The survey, conducted in English, included

questions about physicians' opinions about FS (Appendix 1) and anonymously collected data about demographics, years in clinical practice, discipline (neurology or psychiatry), country, and work setting. Fellows and residents were excluded. There was no compensation for people who decided to participate in this study.

This study was approved by the Shiraz University of Medical Sciences Institutional Review Board (registration number: 25713).

3. Statistical analysis

We descriptively summarized the demographic variables and responses from the whole cohort. Values were presented as median (interquartile range) for continuous variables and number (percent) of subjects for categorical variables. Binomial and multinominal logistic regression analyses were performed to explore the associations between baseline characteristics of survey participants and the preferred terms for functional/psychogenic/dissociative/nonepileptic-seizures/attacks to communicating this condition with patients, colleagues, and in scientific reports or articles; terms were categorized as "seizures" versus "attacks/events", and as "functional" versus "psychogenic" versus "dissociative" versus "nonepileptic". Multinomial logistic regression analyses were then performed to explore the associations between baseline characteristics of survey participants and responses to the following questions: 1. "Which condition do you find more difficult to treat?"; 2. "In your opinion, who should be the primary physician (for the initial diagnosis delivery and initial treatments) of a patient with epilepsy?"; 3. "In your opinion, who should be the primary physician (for the initial diagnosis delivery and initial treatments) of a patient with functional/psychogenic/dissociative/nonepileptic seizures/attacks?"; 4. "In your opinion, who should follow a patient with epilepsy during the management period?"; 5. "In your opinion, who should follow a patient with functional/psychogenic/dissociative/nonepileptic seizures/attacks during the management period?"; 6. "In your opinion, what is the underlying cause (we mean the etiology and not the comorbidities or associated conditions) of functional/psychogenic/dissociative/nonepileptic seizures/attacks?". Odds ratios and relative-risk ratios (RRRs) with 95% confidence intervals were estimated. Results were considered significant for p values < 0.05 (two-sided). Data analysis was performed using STATA/IC 13.1 (StataCorp LP, College Station, TX, USA).

4. Availability of data and material.

The anonymized data will be shared upon request.

5. Results

In total, 1003 physicians from different regions of the world participated in the study. The median age of the respondents was 43 (35–53) years, and 51.4% of the participants were women. Most of the respondents were neurologists (79.3%) and reported encountering 10 to 50 patients with epilepsy per month (48.5%) and less than 10 patients with FS per month (78.2%). The demographic and baseline characteristics of participants are shown in Table 1.

Both neurologists and psychiatrists identified "seizures" as their preferred term to communicate this condition with the patients and colleagues, as well as when they want to publish or read a scientific article on this topic in an international journal (Fig. 1 and Table 2). Although "seizures" was the term preferred by both groups, psychiatrists were overall less likely than neurologists to adopt the term "attacks/events" (Table 3). Overall, the most preferred modifiers for "seizures" were "psychogenic" followed by "functional" by both groups, with one exception; neurologists preferred "nonepileptic" in their communications with their patients (Table 2 and Fig. 2). At the multinomial logistic regression, psychiatrists were more likely than neurologists to prefer the term "psychogenic" to communicate with patients and more likely than neurologists to use the term "dissociative" to communicate with colleagues; though, "dissociative" ranked third in their preferred terms. Psychiatrists were also less likely than neurologists to consider "nonepileptic" as the preferred term when publishing or reading a scientific article (Table 4).

Most participants (57.9%) considered FS more difficult to treat compared to epilepsy, and 31.4% of the physicians considered both conditions as similarly difficult to treat. At the multinomial logistic regression, age was inversely associated with the probability to rate epilepsy as a condition more difficult to treat than FS (RRR = 0.93, 95% CI 0.87–0.98; $p = 0.013$); a younger age was associated with a higher probability and an older age with a lower probability to rank epilepsy to be more difficult to treat than FS.

The neurologist has been considered as the physician who should be mainly involved in the delivery of diagnosis, initial treatments, and follow-up of a patient with epilepsy. In contrast, the participants of the survey believed that a neurologist or both a

Table 1
Baseline characteristics of participants.

Characteristics	Participants (*N* = 1003)
Age, years	
N[a]	915
Median	43 (35–53)
Sex	
N[a]	978
Male	475 (48.6)
Female	503 (51.4)
Discipline	
N[a]	1003
Neurology	795 (79.3)
Psychiatry	165 (16.4)
Pediatric neurology	22 (2.2)
Other	21 (2.1)
Years in practice	
N[a]	940
Median	15 (6–25)
World regions	
N[a]	959
Europe	166 (17.3)
Africa	10 (1.0)
Asia	8 (0.8)
Middle East	341 (35.6)
North America	103 (10.8)
South America	136 (14.2)
Former Union of Soviet Socialist Republics	195 (20.3)
Work setting	
N[a]	953
Academic	230 (24.1)
Not academic	312 (32.8)
Both	411 (43.1)
Patients with epilepsy seen per month	
N[a]	981
None	33 (3.4)
<10	319 (32.5)
10–50	476 (48.5)
>50	153 (15.6)
Patients with functional/psychogenic/dissociative/ nonepileptic seizures/attacks seen per month	
N[a]	983
None	57 (5.8)
<10	769 (78.2)
10–50	142 (14.5)
>50	15 (1.5)

Data are median (interquartile range) for continuous variables and n (%) for categorical variables.
N[a] refers to the total number of participants for whom data were available.

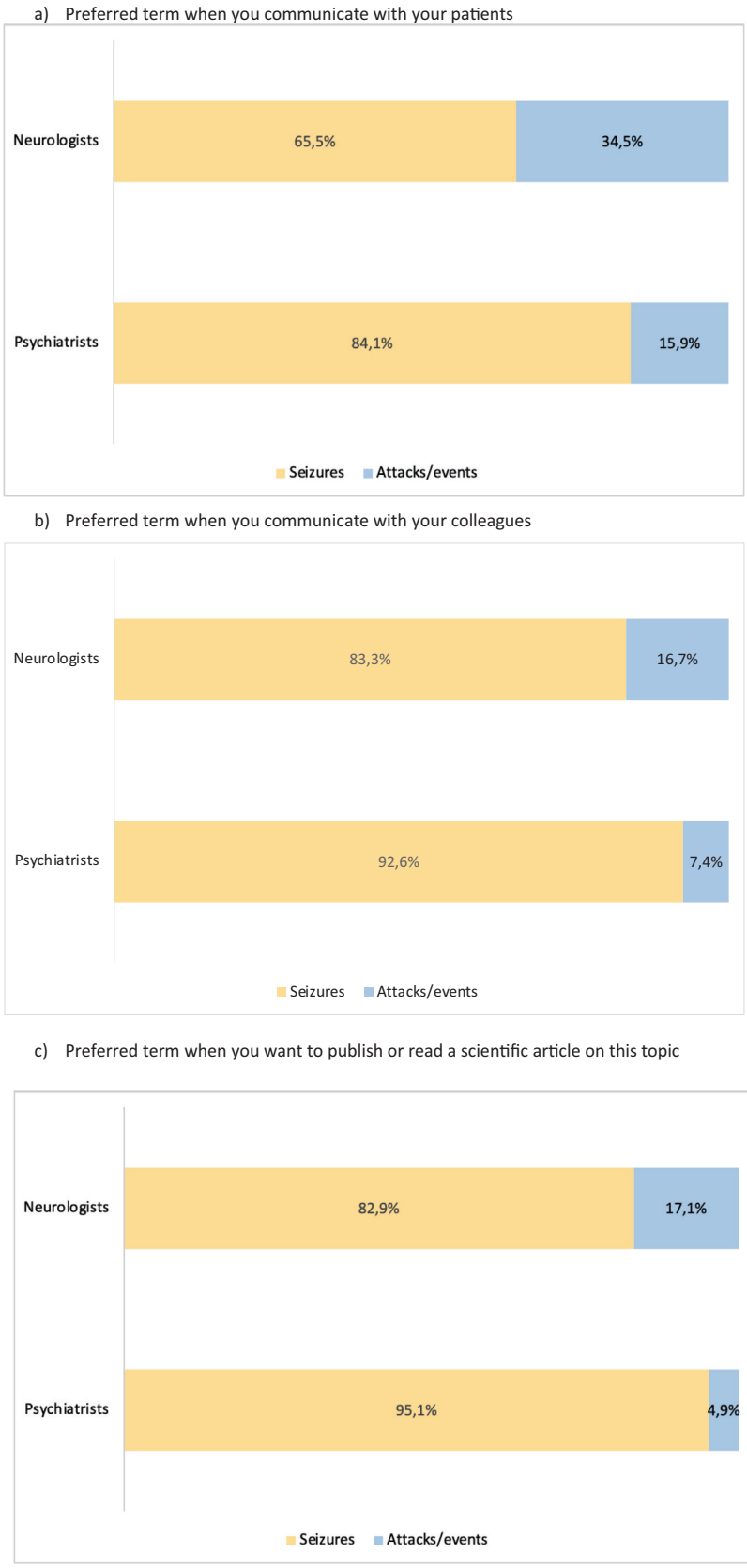


Fig. 1. Preferred terms (seizures *vs.* attacks-events) among study participants according to the discipline. Percentages of the study participants according to their discipline who preferred the terms "seizures" versus "attacks or events" are shown.

Table 2
Answers to the survey questions.

What is your preferred term for functional/psychogenic/dissociative/nonepileptic seizures/attacks when you communicate this condition with your patients (in your local language)?	
N[a]	974
Functional seizures	139 (14.3)
Psychogenic nonepileptic seizures	238 (24.4)
Dissociative seizures	29 (3.0)
Functional neurological disorder with seizures	70 (7.2)
Pseudoseizures	100 (10.3)
Stress-related seizures	83 (8.5)
Nonepileptic attack disorder	105 (10.8)
Nonepileptic events	194 (19.9)
Others	16 (1.6)
What is your preferred term for functional/psychogenic/dissociative/nonepileptic seizures/attacks when you communicate this condition with your colleagues in medicine (in your local language)?	
N[a]	976
Functional seizures	162 (16.6)
Psychogenic nonepileptic seizures	392 (40.2)
Dissociative seizures	48 (4.9)
Functional neurological disorder with seizures	55 (5.6)
Pseudoseizures	153 (15.7)
Stress-related seizures	9 (0.9)
Nonepileptic attack disorder	52 (5.3)
Nonepileptic events	87 (8.9)
Others	18 (1.9)
What is your preferred term for functional/psychogenic/dissociative/nonepileptic seizures/attacks when you want to publish a manuscript or read a paper in an international journal?	
N[a]	961
Functional seizure	131 (13.6)
Psychogenic nonepileptic seizures	437 (45.5)
Dissociative seizures	60 (6.2)
Functional neurological disorder with seizures	95 (9.9)
Pseudoseizures	68 (7.1)
Stress-related seizures	15 (1.6)
Nonepileptic attack disorder	60 (6.2)
Nonepileptic events	81 (8.4)
Others	14 (1.5)
Which condition do you find more difficult to treat?	
N[a]	975
Functional/psychogenic/dissociative/nonepileptic seizures/attacks	565 (57.9)
Epilepsy	104 (10.7)
Both conditions are similarly difficult to treat	306 (31.4)
In your opinion, who should be the primary physician for the initial diagnosis delivery and initial treatments of a patient with epilepsy?	
N[a]	981
A neurologist	803 (81.9)
A psychiatrist	14 (1.4)
Either a neurologist or a psychiatrist	31 (3.2)
Both a neurologist and a psychiatrist	128 (13.0)
Other (specify)	5 (0.5)
In your opinion, who should be the primary physician for the initial diagnosis delivery and initial treatments of a patient with functional/psychogenic/dissociative/nonepileptic seizures/attacks?	
N[a]	983
A neurologist	329 (33.5)
A psychiatrist	218 (22.2)
Either a neurologist or a psychiatrist	74 (7.5)
Both a neurologist and a psychiatrist	354 (36.0)
Other (specify)	8 (0.8)
In your opinion, who should follow a patient with epilepsy during the management period?	
N[a]	980
A neurologist	758 (77.4)
A psychiatrist	16 (1.6)
Either a neurologist or a psychiatrist	34 (3.5)
Both a neurologist and a psychiatrist	165 (16.8)
Other (specify)	7 (0.7)
In your opinion, who should follow a patient with functional/psychogenic/dissociative/nonepileptic seizures/attacks during the management period?	
N[a]	983
A neurologist	84 (8.6)
A psychiatrist	426 (43.3)
Either a neurologist or a psychiatrist	65 (6.6)
Both a neurologist and a psychiatrist	398 (40.5)
Other (specify)	10 (1.0)
In your opinion, what is the underlying cause (we mean the etiology and not the comorbidities or associated conditions) of functional/psychogenic/dissociative/nonepileptic seizures/attacks?	
N[a]	981
Psychological problems	355 (36.2)
Biological brain problems	26 (2.6)

(*continued on next page*)

Table 2 (*continued*)

What is your preferred term for functional/psychogenic/dissociative/nonepileptic seizures/attacks when you communicate this condition with your patients (in your local language)?	
Both psychological and biological problems	598 (61.0)
Other (specify)	2 (0.2)
In your opinion, what should be the first treatment option(s) for patients with functional/psychogenic/dissociative/nonepileptic seizures/attacks (*multiple answers are allowed*)?	
N[a]	986
Antidepressant drug(s)	436 (44.2)
Antipsychotic drug(s)	123 (12.5)
Antiseizure medications with psychotropic effects, such as lamotrigine	300 (30.4)
Psychotherapy	788 (79.9)
Other drugs/treatments (specify)	7 (0.7)

Data are *n* (%).
N[a] refers to the total number of participants for whom data were available.

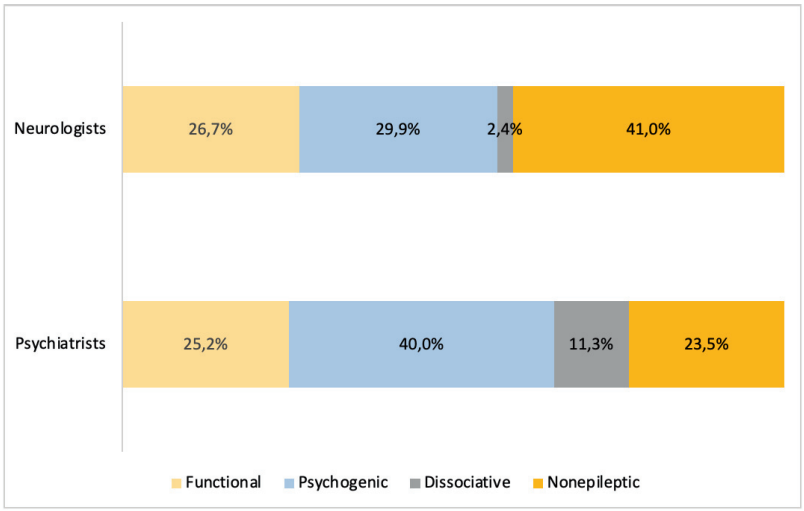
Table 3
Associations between baseline characteristics of the survey participants and their preferred terms (seizures *vs.* attacks/events - seizure as the base) according to logistic regression analyses.

Preferred term when you communicate with your patients	***Adjusted ddds ratio (95% confidence interval**	**p-value**
Age	1.04 (1.01–1.08)	0.021
Female sex	0.97 (0.71–1.32)	0.842
[a]Discipline	0.42 (0.24–0.71)	0.001
Years in practice	0.96 (0.93–0.99)	0.045
[b]Work setting		
Not academic	0.90 (0.60–1.36)	0.612
Both	0.86 (0.58–1.26)	0.436
[c]Patients with epilepsy seen per month		
<10	0.39 (0.14–1.09)	0.074
10–50	0.70 (0.24–2.01)	0.504
>50	0.80 (0.26–2.42)	0.688
[c]Patients with functional/psychogenic/dissociative/nonepileptic seizures/attacks seen per month		
<10	1.31 (0.59–2.89)	0.504
10–50	1.12 (0.46–2.73)	0.797
>50	1.02 (0.24–4.31)	0.983
Preferred term when you communicate with your colleagues	***Adjusted odds ratio (95% confidence interval)**	**p-value**
Age	1.06 (1.01–1.11)	0.011
Female sex	0.74 (0.50–1.11)	0.143
[a]Discipline	0.30 (0.13–0.67)	0.004
Years in practice	0.95 (0.91–0.99)	0.021
[b]Work setting		
Not academic	0.75 (0.44–1.27)	0.289
Both	0.85 (0.52–1.39)	0.520
[c]Patients with epilepsy seen per month		
<10	0.17 (0.05–0.56)	0.004
10–50	0.20 (0.06–0.70)	0.012
>50	0.21 (0.06–0.78)	0.020
[c]Patients with functional/psychogenic/dissociative/nonepileptic seizures/attacks seen per month		
<10	1.00 (0.40–2.52)	0.994
10–50	0.66 (0.22–1.98)	0.456
>50	0.97 (0.16–5.85)	0.971
Preferred term when you want to publish or read a scientific article	***Adjusted odds ratio (95% confidence interval)**	**p-value**
Age	1.08 (1.03–1.13)	0.001
Female sex	0.82 (0.55–1.22)	0.329
[a]Discipline	0.27 (0.11–0.67)	0.005
Years in practice	0.94 (0.89–0.98)	0.004
[b]Work setting		
Not academic	0.79 (0.46–1.36)	0.391
Both	1.02 (0.62–1.68)	0.924
[c]Patients with epilepsy seen per month		
<10	0.27 (0.06–1.26)	0.095
10–50	0.41 (0.09–2.01)	0.275
>50	0.52 (0.10–2.66)	0.435
[c]Patients with functional/psychogenic/dissociative/nonepileptic seizures/attacks seen per month		
<10	2.09 (0.62–7.06)	0.234
10–50	1.22 (0.31–4.79)	0.772
>50	2.58 (0.42–15.84)	0.307

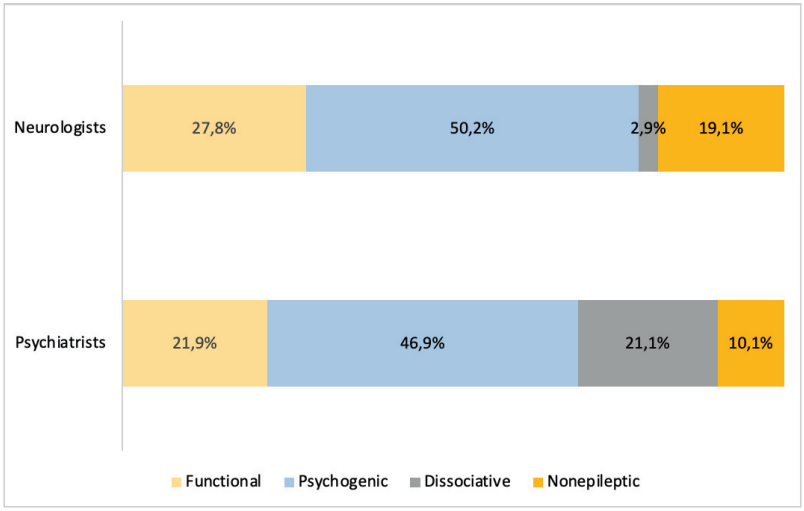
[a] Discipline categorized as neurology versus psychiatry. [b]Reference is academic. [c]Reference is none. *Adjustment for age, sex, discipline, years in practice, work setting, number of patients with epilepsy seen per month, and number of patients with functional/psychogenic/dissociative/nonepileptic seizures/attacks seen per month.

neurologist and a psychiatrist should be the primary physician of a patient with FS, and a psychiatrist or both a neurologist and a psychiatrist should be involved in their follow-up. Both psychological and biological problems were considered as the underlying cause of FS by 61.0% of the respondents, whereas 36.2% considered psychological problems as the underlying cause. Psychotherapy was considered the first treatment option for patients with FS (79.9%), followed by antidepressant drugs (44.2%) and antiseizure medica-

a) Preferred term when you communicate with your patients



b) Preferred term when you communicate with your colleagues



c) Preferred term when you want to publish or read a scientific article on this topic

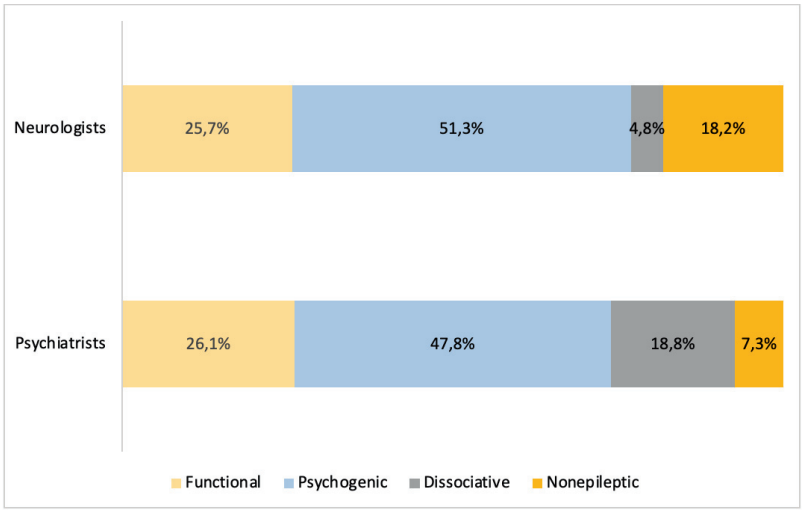


Fig. 2. Preferred terms (functional *vs.* psychogenic *vs.* dissociative *vs.* nonepileptic) among study participants according to the discipline. Percentages of the study participants according to their discipline who preferred the terms "functional" versus "psychogenic" versus "dissociative" versus "nonepileptic" are shown.

Table 4
Associations between baseline characteristics of the survey participants and preferred terms (functional *vs.* psychogenic *vs.* dissociative *vs.* nonepileptic) according to multinomial logistic regression analyses.

Preferred term when you communicate with your patients **Functional**	***Adjusted relative risk ratio (95% confidence interval)** (base)	**p-value**
Psychogenic		
Age	1.08 (1.03–1.14)	0.003
Female sex	0.93 (0.61–1.42)	0.738
[a]Discipline	1.96 (1.05–3.65)	0.033
Years in practice	0.94 (0.89–0.99)	0.025
[b]Work setting		
Not academic	0.94 (0.54–1.66)	0.842
Both	1.40 (0.83–2.36)	0.207
[c]Patients with epilepsy seen per month		
<10	0.48 (0.12–1.91)	0.299
10–50	1.29 (0.30–5.46)	0.73
>50	1.45 (0.31–6.73)	0.632
[c]Patients with functional/psychogenic/dissociative/nonepileptic seizures/attacks seen per month		
<10	1.19 (0.43–3.30)	0.738
10–50	0.71 (0.22–2.26)	0.559
>50	0.22 (0.03–1.54)	0.127
Dissociative		
Age	0.95 (0.84–1.08)	0.44
Female sex	2.45 (0.96–6.27)	0.06
[a]Discipline	4.37 (1.58–12.13)	0.005
Years in practice	1.10 (0.97–1.25)	0.147
[b]Work setting		
Not academic	0.84 (0.27–2.63)	0.768
Both	0.86 (0.29–2.51)	0.782
[c]Patients with epilepsy seen per month		
<10	1.54 (0.20–12.15)	0.682
10–50	0.99 (0.10–10.40)	0.996
>50	1.68 (0.13–21.04)	0.689
[c]Patients with functional/psychogenic/dissociative/nonepileptic seizures/attacks seen per month		
<10	0.44 (0.10–1.96)	0.282
10–50	0.17 (0.02–1.37)	0.096
>50	1.17 (0.12–11.77)	0.896
Nonepileptic		
Age	1.09 (1.03–1.14)	0.001
Female sex	1.09 (1.03–1.14)	0.89
[a]Discipline	0.84 (0.43–1.64)	0.612
Years in practice	0.94 (0.89–0.99)	0.014
[b]Work setting		
Not academic	1.08 (0.64–1.84)	0.762
Both	1.08 (0.65–1.79)	0.756
[c]Patients with epilepsy seen per month		
<10	0.30 (0.08–1.19)	0.086
10–50	0.90 (0.22–3.76)	0.886
>50	1.02 (0.23–4.63)	0.979
[c]Patients with functional/psychogenic/dissociative/nonepileptic seizures/attacks seen per month		
<10	1.26 (0.46–3.43)	0.651
10–50	0.86 (0.28–2.66)	0.789
>50	0.38 (0.07–2.07)	0.263
Preferred term when you communicate with your colleagues **Functional**	***Adjusted relative risk ratio (95% confidence interval)** (base)	**p-value**
Psychogenic		
Age	1.04 (0.99–1.09)	0.106
Female sex	0.86 (0.59–1.25)	0.423
[a]Discipline	1.61 (0.92–2.82)	0.096
Years in practice	0.97 (0.93–1.02)	0.232
[b]Work setting		
Not academic	0.66 (0.40–1.07)	0.092
Both	0.96 (0.59–1.55)	0.862
[c]Patients with epilepsy seen per month		
<10	1.47 (0.31–6.95)	0.626
10–50	3.10 (0.62–15.38)	0.167
>50	2.50 (0.48–13.12)	0.279
[c]Patients with functional/psychogenic/dissociative/nonepileptic seizures/attacks seen per month		
<10	1.31 (0.53–3.22)	0.56
10–50	0.62 (0.23–1.68)	0.346
>50	0.29 (0.05–1.60)	0.155
Dissociative		
Age	0.95 (0.85–1.06)	0.339

Table 4 (*continued*)

Preferred term when you communicate with your patients **Functional**	***Adjusted relative risk ratio (95% confidence interval)** (base)	**p-value**
Female sex	2.42 (1.04–5.63)	0.039
[a]Discipline	6.05 (2.42–15.13)	<0.001
Years in practice	1.10 (0.98–1.23)	0.115
[b]Work setting		
Not academic	0.73 (0.27–1.93)	0.524
Both	0.67 (0.25–1.78)	0.425
[c]Patients with epilepsy seen per month		
<10	0.27 (0.06–1.32)	0.106
10–50	0.27 (0.05–1.61)	0.15
>50	0.28 (0.04–2.21)	0.229
[c]Patients with functional/psychogenic/dissociative/nonepileptic seizures/attacks seen per month		
<10	0.75 (0.20–2.81)	0.668
10–50	0.39 (0.08–1.88)	0.239
>50	0.74 (0.05–10.16)	0.824
Nonepileptic		
Age	1.08 (1.02–1.14)	0.009
Female sex	0.70 (0.43–1.15)	0.159
[a]Discipline	0.58 (0.24–1.40)	0.224
Years in practice	0.94 (0.89–0.998)	0.041
[b]Work setting		
Not academic	0.61 (0.32–1.15)	0.124
Both	0.98 (0.53–1.80)	0.95
[c]Patients with epilepsy seen per month		
<10	0.13 (0.03–0.60)	0.009
10–50	0.25 (0.05–1.26)	0.092
>50	0.24 (0.04–1.31)	0.099
[c]Patients with functional/psychogenic/dissociative/nonepileptic seizures/attacks seen per month		
<10	1.19 (0.40–3.58)	0.758
10–50	0.39 (0.11–1.43)	0.156
>50	0.48 (0.06–3.68)	0.483
Preferred term when you want to publish or read a scientific article **Functional**	***Adjusted relative risk ratio (95% confidence interval)** (base)	**p-value**
Psychogenic		
Age	1.03 (0.99–1.08)	0.177
Female sex	0.85 (0.59–1.21)	0.363
[a]Discipline	0.96 (0.57–1.60)	0.867
Years in practice	0.98 (0.94–1.03)	0.384
[b]Work setting		
Not academic	1.05 (0.65–1.68)	0.854
Both	1.15 (0.73–1.80)	0.539
[c]Patients with epilepsy seen per month		
<10	0.48 (0.13–1.78)	0.272
10–50	0.75 (0.19–2.89)	0.671
>50	0.74 (0.18–3.06)	0.682
[c]Patients with functional/psychogenic/dissociative/nonepileptic seizures/attacks seen per month		
<10	1.35 (0.59–3.09)	0.475
10–50	0.77 (0.31–1.93)	0.573
>50	0.29 (0.05–1.52)	0.142
Dissociative		
Age	0.91 (0.83–1.00)	0.06
Female sex	1.12 (0.57–2.20)	0.744
[a]Discipline	1.85 (0.85–4.03)	0.122
Years in practice	1.13 (1.03–1.25)	0.014
[b]Work setting		
Not academic	0.85 (0.38–1.92)	0.701
Both	0.62 (0.27–1.41)	0.253
[c]Patients with epilepsy seen per month		
<10	0.30 (0.07–1.35)	0.116
10–50	0.14 (0.03–0.76)	0.022
>50	0.08 (0.01–0.65)	0.019
[c]Patients with functional/psychogenic/dissociative/nonepileptic seizures/attacks seen per month		
<10	0.99 (0.30–3.30)	0.992
10–50	0.43 (0.10–1.92)	0.268
>50	1.22 (0.10–15.62)	0.879
Nonepileptic		
Age	1.09 (1.03–1.16)	0.002
Female sex	0.74 (0.46–1.20)	0.223
[a]Discipline	0.37 (0.15–0.95)	0.039
Years in practice	0.94 (0.88–0.99)	0.024

(*continued on next page*)

Table 4 (*continued*)

Preferred term when you want to publish or read a scientific article Functional Psychogenic	*Adjusted relative risk ratio (95% confidence interval) (base)	p-value
[b]Work setting		
Not academic	0.85 (0.45–1.62)	0.627
Both	1.18 (0.65–2.12)	0.589
[c]Patients with epilepsy seen per month		
<10	0.16 (0.03–1.01)	0.052
10–50	0.32 (0.05–2.07)	0.23
>50	0.38 (0.06–2.67)	0.333
[c]Patients with functional/psychogenic/dissociative/nonepileptic seizures/attacks seen per month		
<10	2.56 (0.68–9.62)	0.165
10–50	0.95 (0.22–4.20)	0.948
>50	1.29 (0.17–9.59)	0.806

[a] Discipline categorized as neurology versus psychiatry. [b]Reference is academic. [c]Reference is none. *Adjustment for age, sex, discipline, years in practice, work setting, number of patients with epilepsy seen per month, and number of patients with functional/psychogenic/dissociative/nonepileptic seizures/attacks seen per month.

tions with psychotropic effects, such as lamotrigine (30.4%). Table 2 provides the details about the responses of participants to the survey questions.

Compared to neurologists, psychiatrists were more likely to consider either a neurologist or a psychiatrist (RRR = 3.06, 95% CI 1.19–7.87; p = 0.021) and both a neurologist and a psychiatrist (RRR 1.87, 95% CI 1.09–3.23; p = 0.024) as the primary physician of a patient with epilepsy than a neurologist alone. Similarly, being a psychiatrist increased the probability to consider a psychiatrist (RRR = 3.86, 95% CI 2.21–6.73; p < 0.001), either a neurologist or a psychiatrist (RRR = 2.44, 95% CI 1.06–5.58; p = 0.035), and both a neurologist and a psychiatrist (RRR 1.80, 95% CI 1.03–3.15; p = 0.039) as the primary physician of a patient with FS. Being a woman was also associated with the belief that both a neurologist and a psychiatrist (RRR 1.43, 95% CI 1.02–1.99; p = 0.038) should be the primary physician of a patient with FS compared to a neurologist alone. Being a woman (RRR = 1.93, 95% CI 1.10–3.39; p = 0.021) and working as a psychiatrist (RRR = 2.31, 95% CI 1.01–5.31; p = 0.048) were associated with a higher probability to consider a psychiatrist than a neurologist as the physician who should follow a patient with FS during the management period; further, older age (RRR = 1.11, 95% CI 1.01–1.21; p = 0.031) increased the likelihood to consider either a neurologist or a psychiatrist and female sex of respondents (RRR = 1.82, 95% CI 1.04–3.21; p = 0.037) increased the likelihood to consider both a neurologist and a psychiatrist as the most appropriate physicians to take care of a patient with FS over the management period. There were no associations between the baseline characteristics of the study participants and their belief about the cause underlying FS.

6. Discussion

Our survey was an attempt to collect and investigate the opinions of neurologists and psychiatrists about FS on a global level. This disorder affects people worldwide, and therefore conducting a study was important to obtain deeper insight into the attitudes and beliefs of physicians involved in the diagnosis, treatment, and follow-up of patients with FS.

One aspect that we aimed to evaluate was the preferred term(s) used to indicate FS when communicating with patients, other colleagues, or when writing scientific articles.

Adopting a universally accepted terminology to describe this condition would facilitate better communication between healthcare professionals and more importantly, between such professionals and patients [13]. To achieve this task successfully, multiple aspects should be investigated and considered meticulously. First, the scientific community should adopt a term that considers its nature, clinically and etiologically. Then, the opinions of important stakeholders (e.g., healthcare professionals and patients) should be investigated and valued. Finally, an international consensus on the terminology should be reached [13,15]. Regarding the terminology used to refer to this condition, responders chose different terms, but showed an overall preference for the term "psychogenic nonepileptic seizures", "nonepileptic events", and "functional seizures" to communicate with their patients. To communicate with other colleagues or when publishing study results or articles on this subject, the preferred terms were "psychogenic nonepileptic seizures" and "functional seizures". This probably reflects the wide use of this term (i.e., "psychogenic nonepileptic seizures") in the scientific literature [14]. However, the terminology "psychogenic nonepileptic seizures" appears not free from concerns for several reasons. It relies on a presumed psychogenic cause, although identifying its causative role is sometimes challenging and not always possible [20–22]. Perhaps appreciating that the term "psychogenic" relies upon a dualistic conception of the brain-mind, that is no longer tenable and is anchored to an organic view of functional disorders, neurologists were less likely than psychiatrists in using the terms "psychogenic" and "dissociative" to communicate with patients. However, they still tended to emphasize the different nature of the two phenomena (i.e., epilepsy *vs.* FS), preferring the term "nonepileptic" when communicating with their patients.

Functional seizures should be regarded as clinical phenomena arising from a complex and not yet fully understood interplay of psychological and biological factors, integrating with social aspects in individual patients [23]. The biopsychosocial model appears to be the most effective way of interpreting FS, although the exact mechanisms leading to them can differ significantly across individuals so no single comprehensive explanation could be offered for every single case [12,23]. The greatest emphasis on psychological aspects reflected in the term "psychogenic nonepileptic seizures" could result in an oversimplification of an intrinsically heterogeneous, multifactorial, and complex phenomenon, driving the focus away from other components that could have a major role in its genesis. However, sometimes it is difficult to get rid of the old terms, even if they are no longer perceived to reflect accurately

the current knowledge. In this regard, in our survey, it is worth noting the discrepancy between the wide use of the term "psychogenic nonepileptic seizures" and the view of most participants that both psychological and biological problems play a role in these phenomena. Interestingly, working as a psychiatrist or a neurologist, responderś age, and the number of patients with this condition seen per month did not affect the belief about the underlying cause of FS.

While most respondents believed that neurologists should be the healthcare professionals primarily involved in the care of patients with epilepsy (diagnosis, initial treatment, and follow-up), participants responded that a neurologist or both a neurologist and a psychiatrist should have a primary role in the care of people with FS, and a psychiatrist or both a neurologist and a psychiatrist should be involved in their follow-up. These findings suggest that, despite differences in the preferred terminology, the biopsychosocial model appears to be widely accepted in practice.

Our survey revealed that most participants considered FS to be more difficult to treat than epilepsy, whereas a relevant proportion of respondents considered both conditions as similarly difficult to treat. This finding could reflect difficulties in achieving an accurate diagnosis, differentiating FS from epileptic seizures, conveying information to the patients in an accurate, easy, and effective way, or in treating FS or their associated comorbidities, including anxiety and depression [24,25].

This study has a few limitations. It included responses from people who were willing to participate in the survey and hence carries the risk of voluntary response bias. The numbers of participants from different world regions were various and the actual representativeness of the participants for each nation is not known; it is likely that some world regions were overrepresented compared to others with regard to the total number of neurologists and psychiatrists. Furthermore, the structure and language of the survey might have influenced the results, particularly for respondents who were not English-native speakers or were not fluent in English.

In conclusion, our study represents the first large-scale attempt of investigating the physicianś attitudes and opinions about a condition that is both frequent and clinically important. It shows that there is a broad spectrum of terms used by physicians to refer to FS both in clinical practice and in scientific reporting. Future studies should consider the cultural aspects in understanding and contemplating different terminologies. It is also important to consider the difficulty in finding appropriate translations in different languages. Further studies are required to explore in more detail specific attitudes towards FS on a global scale.

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8. Authors' contributions

Ali Asadi-Pooya, Francesco Brigo, Eugen Trinka, and Simona Lattanzi: study design, data collection, statistical analyses, and manuscript preparation.

Others: data collection and manuscript revision.

Declaration of Competing Interest

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Appendix A. Supplementary data

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