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Schneider's first-rank symptoms have neither diagnostic value for schizophrenia nor higher clinical validity than other delusions and hallucinations in psychotic disorders

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Abstract

The validity of studies on the diagnostic significance of first-rank symptoms (FRS) for schizophrenia has been put in doubt because of a poor compliance with Schneider's criterion for their definition and the lack of use of the phenomenological method for their assessment. In this study, using a rigorously phenomenological approach to elicit FRS, we examined (a) the degree to which unequivocally present FRS differentiated schizophrenia (n=513) from other psychotic disorders (n=633), and (b) the comparative validity between FRS and other reality-distortion symptoms against 16 external validators in the whole sample of psychotic disorders (n=1146). Diagnostic performance indices (with 95% CIs) of FRS for diagnosing schizophrenia were as follows: sensitivity=0.58 (0.54–0.61), specificity=0.65 (0.62–0.67), positive predictive value=0.57 (0.54–0.60) and negative predictive value=0.65 (0.63–0.68). While the overall association pattern of FRS and non-FRS scores with the validators was rather similar, three validators (premorbid social adjustment, number of hospitalizations and global assessment of functioning) were significantly related to non-FRS scores ($p < 0.006$) but not to FRS scores ($p > 0.05$). Furthermore, no validator was significantly related to FRS scores and unrelated to non-FRS scores, all of which indicates an overall better predictive validity for non-FRS delusions and hallucinations. These findings suggest that FRS do not have diagnostic value for diagnosing schizophrenia and that they do not meaningfully add to the external validity showed by other delusions and hallucinations. We believe that much of the misunderstanding about the diagnostic and clinical validity of FRS for schizophrenia is rooted in Schneider's confusing concept of the disorder.

Introduction

The overwhelming evidence for a lack of diagnostic significance of Schneider's first-rank symptoms (FRS) in schizophrenia (Tandon et al. 2013) led DSM-5 and ICD-11 authors to eliminate the special diagnostic significance placed on these symptoms in previous versions of the manuals. However, Moscarelli (2020) argues that the previous data on the diagnostic value of FRS are invalid because of the lack of 'strict compliance with Schneider's criterion for their definition'. More specifically, he argues that previous studies do not fit the phenomenological method for assessing FRS and that some ratings may have included equivocal or doubtful FRS.

Although Moscarelli notes significant methodological limitations in the literature, the article does not mention studies conducted in Schneider-oriented German centers (Koehler, Guth, & Grimm, 1977; Marneros, 1984; Marneros, Rohde, Deister, & Sakamoto, 1987) or with a rigorous assessment methodology (Peralta & Cuesta, 1999) that failed to demonstrate a diagnostic specificity of FRS. Furthermore, he does not refer to evidence indicating that FRS can be expressed along a continuum of severity (Klosterkötter, 1992; Koehler, 1979), similar to that reported for other reality-distortion symptoms (van Os, Linscott, Myin-Germeys, Delespaul, & Krabbendam, 2009). The report by Moscarelli aligns with some other recent studies that vindicate the historical, diagnostic, etiopathological, or clinical relevance of FRS (Cutting, 2015; Heinz et al., 2016; Kendler & Mishara, 2019; Malinowski et al., 2020; Picardi, 2019). Thus, a re-examination of the diagnostic and clinical validity of FRS in psychotic disorders appears to be in order. While the debate about the importance of FRS has been mainly focused on their diagnostic value, there is a paucity of empirical studies examining other validity indicators, and no studies have examined the comparative validity between FRS and other reality-distortion symptoms.

In this report, using a rigorously phenomenological approach to elicit FRS, we examined (a) the degree to which 'unequivocally present' FRS differentiated schizophrenia from other

psychotic disorders in a large sample of subjects with the full range of 'functional' psychotic disorders, and (b) the comparative validity between FRS and other reality-distortion symptoms against 16 external validators. Relatedly, we were specifically interested in examining the extent to which FRS predicted the validators over and above other delusions and hallucinations, a question that, to the best of our knowledge, has not been addressed previously.

Methods and results

The study sample comprised 1146 subjects with psychotic disorders derived from consecutive admissions to the psychiatry ward of the Complejo Hospitalario de Navarra (Spain) due to first-episode psychosis ($n = 486$) (Peralta, Moreno-Izco, Calvo-Barrena, & Cuesta, 2013) or multi-episode psychosis ($n = 660$) (Peralta & Cuesta, 1999). The latter sample had been already employed to assess the diagnostic performance of FRS. All the subjects were examined using the Comprehensive Assessment of Symptoms and History (CASH) (Andreasen, Flaum, & Arndt, 1992) that served to evaluate symptoms, diagnosis, and most external variables. All subjects were personally interviewed by VP or MJC, and to rate reality-distortion symptoms, we used the Scale for the Assessment of Positive Symptoms (SAPS), which is embedded within the CASH. The SAPS includes 18 delusions and hallucinations rated on a 6-point Likert-type scale, 7 of which are FRS: delusions of being controlled, delusions of mind reading, thought broadcasting/audible thoughts, thought insertion, thought withdrawal, voices commenting and voices conversing.

FRS were assessed using the phenomenological method described by Jaspers (1968); thus, when exploring one of the given FRS, an affirmative answer does not suffice to rate the symptom as present and the subject is asked to describe the experience as clearly as possible. Within the SAPS, clearly present delusional FRS are typically scored 2 (mild level), although this rating also allows 'occasional' doubts about the experience. Thus, we defined FRS as unequivocally present using a score $\geqslant 3$, corresponding to a presence of the experience at the level of moderate or higher.

To examine the diagnostic performance of FRS for schizophrenia, we used standard psychometric indices for a diagnostic test (Jaeschke, Guyatt, & Liimer, 2002). To study the external validity of FRS (sum score of the 7 FRS) and non-FRS (sum score of all other 11 delusions and hallucinations), we used 16 validators including antecedents, illness characteristics, episode characteristics, and psychosocial functioning variables. We conducted a series of linear regressions with the validators as dependent variables and symptom scores as independent variables. Last, a series of hierarchical linear regressions served to examine the incremental validity of the FRS score over and above the non-FRS score. We controlled for age, gender, and diagnosis (schizophrenia *v.* other psychotic disorders) in the analyses.

The mean age at admission was 33.5 years (S.D. = 13.4), 58% of the subjects were male, 73% were single and the mean educational level was 9.74 years (S.D. = 3.42). The DSM-IV diagnostic breakdown was as follows: schizophrenia ($n = 513$, 44.8%), schizophreniform disorder ($n = 138$, 12%), brief psychotic disorder ($n = 136$, 11.9%), delusional disorder ($n = 62$, 5.4%), schizoaffective disorder ($n = 60$, 5.2%), bipolar disorder ($n = 106$, 9.2%), major depressive disorder ($n = 79$, 6.9%), and psychotic disorder not otherwise specified ($n = 52$, 4,5%).

The mean (S.D.) FRS score was 5.94 (8.19), and the mean non-FRS score was 10.2 (6.65). The Pearson's correlation coefficient between the two scores was 0.51.

At least one of the FRS was present in 296 subjects with schizophrenia (56.9%) and in 224 subjects with other psychotic disorders (43.1%).

Diagnostic performance indices (with 95% confidence intervals) of FRS for diagnosing schizophrenia were as follows: sensitivity = 0.58 (0.54–0.61), specificity = 0.65 (0.62–0.67), positive predictive value (PPV) = 0.57 (0.54–0.60), negative predictive value (NPV) = 0.65 (0.63–0.68), positive likelihood ratio (LR) = 1.61 (1.43–1.86), negative LR = 0.65 (0.58–0.73), number needed to diagnose = 4.48 (3.56–6.07), and number needed to misdiagnose = 2.60 (2.41–2.80). Using a set prevalence for schizophrenia of 0.5, corresponding to an acute care unit, the adjusted PPV and NPV were 0.62 (0.57–0.66) and 0.60 (0.57–0.64), respectively; when using a set prevalence of 0.1, corresponding to a primary care setting, the adjusted PPV and PPN were 0.15 (0.13–0.19) and 0.93 (0.91–0.95), respectively. Table 1 shows the associations of FRS and non-FRS scores with the validators.

Discussion

Following a strictly phenomenological approach to ascertain FRS in subjects with psychotic disorders, such as a restrictive definition of FRS to avoid false-positive cases, our data on the diagnostic value of FRS are in broad agreement with a recent meta-analysis reporting sensitivity and specificity values of 58% and 74%, respectively (Soares-Weiser et al., 2015). Our findings indicate that within a mixed sample of psychotic disorders, the presence of at least one FRS increases the probability of a diagnosis of schizophrenia by 1.6-fold, which invalidates these symptoms as a diagnostic test according to standard criteria (Jaeschke et al., 2002).

Regarding the external validity issue, we found that the overall association pattern of FRS and non-FRS scores with the validators was rather similar. A major difference was that some validators (i.e. premorbid social adjustment, number of hospitalizations, and global assessment of functioning) were significantly related to non-FRS but not to FRS; however, the reverse was not true, which indicates an overall better predictive validity for non-FRS. Of the 16 validators examined, the FRS score significantly predicted only two validators over and above other reality-distortion symptoms (antipsychotic dose and illness course), and this was with a negligible increase in the explained variance. Thus, it can be concluded that FRS do not meaningfully add to the external validity showed by other delusions and hallucinations.

In view of the lack of diagnostic significance of FRS for schizophrenia together with the negligible added validity relative to other delusions and hallucinations, the following question arises: Why are we continuously debating about the relevance of FRS for schizophrenia when there is a lack of empirical data supporting it? Without doubt, the phenomenology of FRS is fascinating, and they clearly appear to be qualitatively distinct from other reality-distortion symptoms from a phenomenological perspective. However, the phenomenological distinctiveness of FRS does not appear to be of diagnostic or clinical relevance. For example, if delusional FRS are not only merely a kind of delusional *content* but also a *form* of experience, as claimed by Cermolacce, Sass, & Parnas (2010), this form of experience should be assessed and subjected to empirical testing to examine its clinical validity

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Table 1. Associations of first-rank and non-first-rank symptom scores from the Scale for the Assessment of Positive Symptoms (SAPS) with the validators

		FRS score		Non-FRS score		Effects of adding the FRS score to the non-FRS score in the hierarchical model		
	Mean (SD)	β	p	β	p	ΔR^2	F change	p
Antecedents								
Familial load of schizophrenia[a]	−0.03 (0.63)	−0.027	0.373	−0.010	0.742	0.001	0.702	0.402
Lewis-Murray scale of obstetric complications	0.14 (0.43)	−0.035	0.244	−0.013	0.661	0.001	1.195	0.275
Educational performance[b]	2.23 (0.70)	−0.070	0.019	−0.060	0.041	0.002	2.326	0.128
Gittelman-Klein scale of premorbid social adjustment	4.94 (2.45)	−0.045	0.098	−0.0.90	0.001	0.000	0.002	0.967
Illness characteristics								
Duration of untreated illness, years	2.39 (4,58)	−0.012	0.666	0.089	0.929	0.000	0.303	0.582
Age at illness onset, years	27.3 (10.8)	0.017	0.375	0.033	0.084	0.000	0.001	0.981
Number of hospitalizations	2.39 (3.44)	−0.012	0.412	−0.079	0.006	0.000	0.403	0.526
McLelland Addiction Severity Index	1.24 (2.03)	0.082	0.007	0.091	0.001	0.001	1.672	0.196
Deficit syndrome scale, global rating	0.36 (0.93)	−130	<0.001	−0.180	<0.001	0.001	1.274	0.259
Illness course[c]	1.70 (0.74)	−0.109	<0.001	−0.120	<0.001	0.003	4.663	0.031
Episode characteristics								
Mini Mental State Examination, total score[b]	27.4 (3.48)	0.074	<0.001	0.130	<0.001	0.002	2.334	0.127
Number of distinct psychopharmacological groups prescribed	1.37 (0.70)	−0.024	0.411	0.045	0.123	0.003	3.409	0.065
Defined Daily Doses of antipsychotics (Olanzapine equivalents)	8.72 (4.81)	0.356	<0.001	0.382	<0.001	0.033	47.34	<0.001
Treatment response (CGI-EI score)	1.80 (0.92)	−0.080	0.003	−0.134	<0.001	0.000	0.241	0.634
Psychosocial functioning								
Global assessment of functioning scale[b]	67.6 (20.1)	0.048	0.051	0.130	<0.001	0.000	0.768	0.381
WHO-DAS, total score	9.32 (5.66)	−0.058	0.021	−0.095	<0.001	0.000	0.020	0.658

CGI-EI, Clinical Global Impression-Efficacy Index; FRS, First-rank symptoms; WHO-DAS, World Health Organization-Disability Assessment Schedule.
[a]Log-transformed score based on the presence of a positive history of schizophrenia in first-degree relatives taking into account age and number of relatives.
[b]Unless than otherwise specified, higher scores indicate more impairment.
[c]Scored 1 (remission), 2 (partial remission), and 3 (chronic/continuous).

and utility. Otherwise, such hypotheses will remain a sterile ground for the clinician.

It is rarely noted in the literature regarding the putative diagnostic value of FRS that the weight of the question is not (or not only) the FRS issue but the very concept of schizophrenia and Schneider's own concept thereof. Schneider never provided clear diagnostic criteria for schizophrenia, except for his famous assertion that 'if first-rank symptoms are present in absence of an organic pathology, we call it schizophrenia' (Schneider, 1974). Furthermore, he acknowledged that schizophrenia could be diagnosed on the basis of second-rank (i.e. other disorders of the experience) and even third-rank symptoms (i.e. behavioral signs) 'if present in certain combinations and numbers' (Schneider, 1974). The main problem here is that Schneider never provided such 'combinations [of symptoms] and numbers', and, as a consequence, his schizophrenia concept remained a rather obscure matter. He never published empirical data about the prevalence of symptoms and other illness characteristics, and the majority of the diagnoses of schizophrenia according to Schneider's concept appear to be founded on non-FRS (Marneros, 1984). In other words, based on a subjective position, Schneider placed a high specificity value on FRS, but he left unanswered their sensitivity value, and hence their true diagnostic significance. We believe that much of the misunderstanding about the diagnostic and clinical validity of FRS for schizophrenia is rooted in Schneider's confusing concept of the disorder.

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Conflict of interest. The authors declare no conflicts of interest.

Ethical standards. The authors assert that all procedures contributing to this work comply with the ethical standards of the relevant national and institutional committees on human experimentation and with the Helsinki Declaration of 1975, as revised in 2008.

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