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The dimensionalization of schizophrenia (overview)

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Abstract

This article shows some different fundamental and practical approaches in modern psychiatry. Still, the understanding of the real nature of schizophrenia remains obscure. Limitations of approaches to conceptualizing and classifying schizophrenia based on a priori assumptions and expert consensus led to new efforts to classify schizophrenia quantitatively. This article is devoted to these and other issues.

KEY WORDS: continuous nature of schizophrenia; post-Kraepelinian typology; discrete nature of schizophrenia; hybrid; categorical-dimensional model of schizophrenia

Introduction

Since the first descriptions of schizophrenia, our understanding of its real nature remains obscure [1,2]. The special status of schizophrenia, whether it is a "discrete categorical entity" or "continuous dimensional phenomena", is still unclear. Whether schizophrenia is best conceptualized and classified in categorical or dimensional terms is a contradictory issue and is still widely debated [3,4]. The category versus dimension debate is dramatically increasing with the growing recognition of traditional categorical taxonomies' limitations [5]. The significant restrictions concern inadequate validity, marked within-diagnosis heterogeneity, arbitrary diagnostic thresholds, excessive comorbidity, and limited clinical utility of categorical diagnosis [6,7]. The criticism of diagnostic categories contributed to developing alternative and complementary perspectives towards improved classification models [8,9,10]. Now and then, the question was whether the categorical construct of schizophrenia should be abandoned in favor of dimensional one or whether additional variables can complement it. Those who recognize the category/dimension dualism in schizophrenia, like wave/particle dualism in quantum mechanics, consider changing the debate's focus. They suggest thinking "category and dimension" instead of "category or dimension" [11,12]. The integration of dimensional elements into the official classification systems such as DSM/ICD is a long-standing scientific effort to address the shortcomings and conceptual ambiguity, as mentioned above, and move toward empirically-based psychopathology [13,14]. The present review aims to explore the trajectory of gradual dimensionalization of schizophrenia, which has significant implications for both research and clinical practice [15,16].

Discreteness versus the continuous nature of schizophrenia

Emil Kraepelin (1856-1926), despite a lack of available validators, delineated schizophrenia as a unique phenotype, a qualitatively distinct category with clearly demarcated boundaries and putative specific causes under the name of "dementia praecox". Kraepelin never treated the issue of discreteness vs. continuity as a research question. He made a priori assumption concerning the categorical concep-

tualization of schizophrenia [17]. Both clinical experience and subsequent empirical research indicate that these assumptions are not justified; however, Kraepelin's ideas continue to be influential at the conceptual and taxonomic level, and schizophrenia is still a predominantly categorical construct in current classification systems [18]. In the opinion of the historians of psychiatry, it looks as if "psychiatry still lives in a Kraepelinian world" [19,20].

Kraepelin inherited a disease's notion as a non-overlapping category from Kahlbaum (1828-1899) and Hecker (1843-1909). Then as now, as Hecker wrote in 1871: "There is an urgent need in psychiatry for a new nomenclature, which allows differentiation between the manifestations and the true clinical disease forms" [21].

Kraepelin revised his classification scheme and nosological principles in his textbook's successive eight editions (1883-1915). In his last works, Kraepelin questioned the dichotomy of dementia praecox, acknowledged a hierarchy within psychiatric nosology, compared them with the different registers of an organ, and anticipated the dimensional nature of schizophrenia. Furthermore, Kraepelin anticipated the current concept of continuity by suggesting personality disorders as attenuated forms of major psychosis. Over time, acknowledging the continuity of psychoses opened the door for its early detection [22,23]. Kraepelin's successor Kretschmer (1888-1964), expanded the continuum from schizothymic through schizoid to schizophrenia and anticipated schizophrenia spectrum disorders. Thus, the dimensionalization of schizophrenia begun within the scopes of Kraepelin's nosology.

Nevertheless, the value of introducing dimensional variables in the classification systems was underestimated until the late 1960s. The fundamental question about dimensionality vs. taxonicity of schizophrenia Kraepelin left open for further empirical studies. He trusted that psychiatry would make progress in this regard [24].

The categorization of schizophrenia as a multidimensional phenomenon led to the proliferation of schizophrenia subtypes in Kraepelin's nosology. Consequently, in the last eighth edition of Kraepelin's textbook, in search of homogenous clinical forms, dementia praecox grew from three to eleven subtypes. Furthermore, a late-onset subtype – paraphrenia, emerged as a separate category itself [24]. Kraepelin assumed the diversity and heterogeneity of schizophrenia in clinical presentation but not in the underlying pathophysiology. He did not regard the issue of a unitary process versus multiple disease states as a research question.

Thus, two issues of crucial importance for our understanding of the concept of schizophrenia: 1. the issue of dimensionality versus category; 2. the problem of heterogeneity of schizophrenia and its typology, Kraepelin regarded "an open question".

In the 1960s, Meehl and his colleagues, for the practical solution of the category vs. dimension dilemma, developed a taxometric analysis method. Taxometric research helped clarify schizophrenia's underlying latent structure by distinguishing

categorical and dimensional variables [25,26]. Meehl applied this method to test his hypothesis of schizophrenia taxon called schizotaxia. Further, with the co-authors, Haslam conducted a comprehensive review of 177 published taxometric studies of different psychopathological constructs [27,28]. Taxometric methods used to treat category vs. dimension as a research question provided insufficient evidence for discrete categories and supported the hypothesis of continuity. Substantial literature indicates that dimensions offer more accurate and predictive descriptions of patients [6].

Nevertheless, a meta-analysis of studies employing taxometric methodology demonstrated high clinical benefits of the dimensional model, compared with the categorical one [17], Kraepelin's categorical construct of schizophrenia dominated the field for further 100 years. It gained ready acceptance except for a temporary period of "marginalization" of American psychiatry in the 1940s and 1960s, with selective Eurocentric trends and psychoanalytical orientation. The introduction of psychoanalysis was estimated as an intellectual revolution. Meier's "psychobiological" concept was opposed to Kraepelin's nosological model. The process ended in the 1970s with the re-categorization of psychoanalytical constructs and creating DSM-III (APA, 1980) operative psychopathology. The transition from a psychosocial model to a medical one was estimated as a neo-Kraepelinian revolution. As a result, instead of Kraepelin's apriori concept of schizophrenia, we obtained the neo-Kraepelinian construct based on expert consensus. This process was a paradigm shift in the history of conceptualization and the classification of schizophrenia.

Post-Kraepelinian typology of schizophrenia

The nosological typology of schizophrenia continued in the post-Kraepelinian period resulted in schizoaffective, schizophreniform, process/reactive, paranoid/nonparanoid, acute/chronic, deficit/nondeficit, positive vs. mixed vs. negative, systematic/unsystematic forms of schizophrenia [20,29]. Within the scopes of the categorical model, typology of schizophrenia implied quantitative variations of schizophrenia subtypes, in particular, increase and decrease of their quantity. Still, it did not change, either expand or constrict the construct's conceptual boundaries, even in Leonhard's alternative classification. Traditional subtypes such as paranoid, catatonic, hebephrenic (disorganized) became part of official classification systems.

In DSM-III, commenced reorganization and elimination of the schizophrenia subtypes, ending with their complete elimination and dimensionalization in DSM-5 (APA, 2013) and ICD-11 [30].

The continuous vs. discrete nature of schizophrenia

Regarding the historical context, schizophrenia undergoes a gradual dimensionalization process, which is not a straight-line one. One of the first, attempting to complement the categorical model of schizophrenia was Bleuler (1857-1939). Bleuler introduced the term “Schizophrenia”. Renaming dementia praecox was not just a semantic revision but reconceptualization of construct. Bleuler offered a new direction to understand schizophrenia as a dimensional phenomenon [20]. Berze and Bleuler were the first who described schizophrenia-like symptoms manifesting as aberrant personality characteristics in a non-clinical, “non-psychotic” population – family members of schizophrenia patients. In 1909, Gadelius described this phenomenon as a precatatonic personality type. In 1910, Berze called it “Ausdruck der Praecoxanlage”. In 1911, Bleuler coined the term ”latent schizophrenia” and provided the basis for studying borderline and sub-threshold, mild forms of schizophrenia [31]. By introducing the personality dimension, Bleuler expanded the initial concept of schizophrenia and cleared a path for its alternative conceptualization. As a result, instead of discrete category, we received the phenotypic continuum of clinical and subclinical variations (further, from schizotypy to schizophrenia) and instead of the dementia praecox – the “group of schizophrenias” [20]. There appeared the borderline schizophrenic patients called “as if a patients”, “in between patients” or “borderline schizophrenics” and non-psychotic forms of schizophrenia including “ambulatory schizophrenia” introduced by Zilboorg in 1941, “pseudoneurotic schizophrenia” presented by Hoch and Polatin in 1949, “borderline states” described by Kety in 1953. [31,32]. As a consequence, the early diagnosis of schizophrenia, as Sullivan (1892-1949) wrote in 1926: “prompt investigation of failing adjustment, rather than… wait and see what happens”, was regarded as a realistic, achievable goal [1]. Bleulerian, not predominantly psychotic concept of schizophrenia, was reflected in DSM-I (APA, 152), DSM-II (APA, 1968) classifications. Post-war American psychiatry’s psychodynamic orientation officially recognized by the Psychiatric Board in 1946 has dramatically contributed to this. World War II has changed the focus of biological, institutional, psychosis-centered psychiatry and its target population. Men-

tal health problems went beyond the institutions, and psychiatry showed interest in the relatively mild conditions seen in the general population [33]. New, stress-related diagnostic categories, e.g., “transient situational disturbances,” “conditions without manifest psychiatric disorder,” appeared in the nosological system (DSM-I). Psychoneurosis and anxiety became the central problem, while in the Kraepelinian system, anxiety was not even mentioned as an independent diagnostic category. Psychoanalysis expanded views about schizophrenia, but its nosological status has weakened. From a psychodynamic perspective, schizophrenia turned from a category into the “reaction”, and in DSM-I, it is classified in the chapter of functional disorders as “schizophrenic reaction” [34]. The DSM-I structure was developed based on the classification system Medical 203, created by W. Menninger and his psychodynamically oriented colleagues. At that time, the sixth revision of the international classification of diseases – ICD-6 (WHO, 1948) [44], similar to ICD-7 (WHO, 1955), had the function of nomenclature and had no other characteristics of psychopathology classifiers (e.g., descriptive, predictive) described later by Blashfield and Draguns [2]. Schizophrenia was mentioned as dementia praecox in the 1938 fifth revision in the section on the nervous system’s diseases and sense organs [35]. A special section devoted to mental disorders was created in ICD-6. The significant discrepancies existed between DSM (I-II) and ICD (7-8), conceptual ambiguity related to schizophrenia, and the absence of clearly defined diagnostic criteria hindered collaborative research. In the 1960s, the low reliability of schizophrenia diagnosis emerged as in the psychiatric community, also beyond its limits. German philosopher, representative of logical empiricism, Hempel criticized psychiatric practice and wrote about developing reliable diagnostic categories. The development of psychopharmacology and neurotransmitter theories has “undermined” the positions of psychoanalysis. To determine the risk-benefit ratio of the antipsychotic medications, defining the diagnostic categories was necessary. An increase in the number of schizophrenia sub-types in DSM-II indicated the re-categorization of schizophrenia. Term “reaction” was withdrawn in DSM-II, and in subsequent editions, the requirement for a psychosocial stressor has been gradually eliminated. In DSM-II, schizophrenia appeared in a chapter entitled “schizophrenia.” Later “brief reactive disorder” transformed into “brief psychotic disorder.” The categorical reorganization of the conditions conceptualized with psychodynamic terminology commenced suggesting a return to the Kraepelinian categorical tradition. Parallel to taxonomic modifications, the research community responded with series of innovations:

1. the development of the five-component (clinical description; laboratory studies; delimitation; follow-up studies and family data) model for validating diagnosis introduced by Robins and Guze in the 1970s. Applying the model to the patients with schizophrenia, authors concluded that good prognosis “schizophrenia” is a nosological category itself rather than a mild form of schizophrenia;

2. the formulation of preliminary Feighner criteria for fourteen operational diagnoses including schizophrenia in the “Renard School” of psychiatry at Washington University in the early 1970s;

3. the development of the Columbia University Research Diagnostic Criteria (RDC) – for schizophrenia and about ten diagnostic categories that provided a basis for DSM-III operational psychopathology;

4. the first structured psychiatric interview, a diagnostic algorithm of the Present State Examination (PSE), was developed by Wing et al [36,20]. Thus, a priori categorical construct of schizophrenia was supported by the validation instruments based on expert consensus rather than empirical data. In DSM-III, there were 18 sub-categories of schizophrenia, compared with 14 ones in DSM-II. In the innovative multiaxial system of DSM-III, psychopathology, and personality disorders were placed on separate axes. The mild forms of schizophrenia, particularly borderline and latent schizophrenia mentioned in DSM-II, operationalized into the Cluster A personality disorders – schizoid, paranoid, and schizotypal. Schizoaffective disorder, one of the subtypes of schizophrenia in DSM-I and II, now became a diagnostic entity. A separate diagnostic category was created for the dissociative disorders, and taxonomic relation with schizophrenia and dissociation phenomenon was lost. Dissociation has shown many phenotypic similarities to reality distortion. At the same time, according to DSM-I, the schizophrenic reaction was associated with the dissociative phenomenon. In DSM-II, an acute schizophrenic episode with the “dream-like dissociation”. According to Knight and Kernberg, the term “borderline”, was separated from the schizophrenia concept and became an independent clinical item. As a result, in DSM-III, appeared a diagnostic category of borderline personality disorder. Hebephrenic schizophrenia was renamed as disorganized schizophrenia, emphasizing puerile (Lat. Puerilis – childish) and regressive aspect and disorganizing nature. Simple schizophrenia, due to limited validity and clinical utility, disappeared from DSM-III, though simple and hebephrenic forms of schizophrenia were maintained in ICD-9 and ICD-10.

Taken together, all these amendments introduced to DSM-III indicate a return to the categorical construct of schizophrenia. The operationalization and the purification of schizophrenia from the mild forms, so-called “non-psychotic satellites”, resulted in a narrow, “psychosis-focused” categorical construct. The third revision of DSM was an attempt to develop classification based on scientific, empirical research. The validation process should be iterative – accumulated factual materials should have been transformed into biological markers. Based on the modification of Robins, Guze’s model, Kendler identified three key types of validators:

1. Antecedent (familial aggregation, premorbid personality, precipitating factors);
2. Competitive (e.g., psychological tests);
3. Predictive (diagnostic consistency over time, rates of relapse/recovery, response

to treatment). Andreasen introduced additional validation factors in molecular genetics, neuropsychological, and neuro-anatomic research [20,37].

"Etiologically agnostic" diagnostic criteria allowed testing of different causal hypotheses of schizophrenia through epidemiological, genetic, and neurobiological research, and on the other – it delayed the process of schizophrenia validation data.

Prospects and problems of a categorical approach to schizophrenia

Explicit categorical criteria ensured the reliability and stability of schizophrenia diagnosis. In particular, 70-80% of individuals with an initial diagnosis maintained a schizophrenia diagnosis for 1-10 years. The categorical model ensured the scientific-research value of the classification systems and was optimally suited to the needs of biological, institutional, psychosis-oriented psychiatric practices. Significant clinical decisions were built based on dichotomy-categorical principles [37,38]. The role of the categories was significant in epidemiological-statistical respect as well. Notwithstanding the advantages, the diagnostic category could not fully reflect the individual psychopathological profile and did not allow differentiated and personalized treatment [13]. The dichotomous principle was optimal for particular clinical decisions, though the psychosocial and pharmacological interventions' categorical specificity was not confirmed [38]. Within the scopes of the categorical model, the treatment of schizophrenia, as a homogenous construct, has created the concept of treatment-resistant, refractory schizophrenia. Kraepelinian typology turned out to be insufficient for an explanation of the heterogenic nature of the construct. The problem of diagnostic stability, reliability, and validity of schizophrenia subtypes (paranoid, hebephrenic (disorganized), catatonic, residual, and undifferentiated) became significant. Since 1994 (DSM-IV publication date), the scientific literature extensively discussed classical subtypes' further utilization. The special diagnostic value of Schneider's first-rank symptoms and the reliability of distinction bizarre from non-bizarre delusions were questioned. In the DSM-IV, the concept of schizophrenia did not change substantially. Since its release in 1992 (ICD-10), the next 25-year period has been the longest in ICD history without a significant revision.

Instead of validity, the concept of clinical utility was introduced [31].

The priority in revising DSM-IV and ICD-10 was to enhance clinical utility of diagnostic categories [14,39].

A hybrid, categorical-dimensional model of schizophrenia

Improvement of the diagnostic criteria' clinical utility and the refinement of concurrent validity of schizophrenia diagnosis became the primary goal of DSM-5 and ICD-11. In DSM-5, schizophrenia is still conceptualized as psychosis, and the presence of "positive symptoms" is necessary for the reliability of diagnosis. The special treatment of the Schneiderian first-rank symptoms is eliminated; the definition of negative symptoms is revised, and the addition of cognitive impairment as a diagnostic criterion for schizophrenia was appraised [40]. DSM-5 maintained the polythetic-categorical model of schizophrenia. Categorical principles (present/absent) are still used for symptoms assessment, but the heterogeneity of schizophrenia is described in terms of six interacting psychopathological dimensions. These include positive symptoms (hallucinations and delusions), disorganized speech, abnormal psychomotor behavior, negative symptoms (restricted emotional expression or avolition), impaired cognition, and mood symptoms (depression and mania).

In DSM-5, the borders between schizophrenia and schizo affective disorder are strengthened, and in section III, there is an added diagnostic category of attenuated psychosis syndrome. This category implies conceptualization of schizophrenia within the dimensional-spectrum model's scopes, rather than within the categorical one. The mentioned model differs from Meehl's (1962) quasi-dimensional model, according to which genetic lability – schizotaxia deals with the discrete group, in particular, 10% of the population [25,41]. Incorporating dimensional approaches for psychotic disorders, particularly for schizophrenia within the context of explicitly categorical systems (DSM/ICD), resulted from the evidence that it is a continuous phenotype including a wide range of phenotypic variations from transdiagnostic endophenotypes to clinical schizophrenia, rather than a discrete category [17,33,42,43].

In the ICD-11, schizophrenia has undergone similar taxonomic and conceptual changes [44,45]. The importance of Schneiderian first-rank symptoms is de-emphasized. Schizophrenia sub-types (e.g., paranoid, hebephrenic, catatonic) are omitted due to the lack of their predictive value, and dimensional descriptions are introduced [44]. Rather than focusing on the stable categories, a newly created hybrid (categorical-dimensional) construct of schizophrenia focuses on the current variable clinical presentations. It offers improved differentiation of patients who need personally-targeted complex treatment.

Conclusion

A fundamental question of whether schizophrenia is most accurately presented as a category or dimension still raises contradictory views [46]. Limitations of approaches to conceptualizing and classifying schizophrenia based on a priori assumptions and expert consensus led to new efforts to classify schizophrenia quantitatively [17]. The researchers are still weighing the pros and cons; however, there is no agreement on which of these alternatives – the dimensional or taxonomic structure of psychopathology – is preferential and has potential utility. Supporters of the dimensional view argue convincingly for moving from the current classification systems, such as DSM and ICD, to dimensional alternatives (e.g., The Hierarchical Taxonomy of Psychopathology-HiTOP) [6,47]. However, most researchers insist that the current criterion-based categorical system should not be abandoned entirely and that "it is premature to contemplate a largely dimensional formal classification". They believe in progress by way of addition, not a substitution, by adding elements rather than displacing categories [11,20,33]. As a result, in DSM-5 and ICD-11, we obtained a hybrid, categorical-dimensional model of schizophrenia. Dimensionality is gradually introduced into the categorical construct of schizophrenia by replacing traditional clinical sub-types with corresponding symptom-cluster dimensions.

The dimensional measures and rating scales, including recently proposed CRD-PSS – The Clinician-Rated Dimension of Psychosis Symptom Severity and SOPS – the Scale of Prodromal Symptoms for assessment of patients with attenuated psychosis syndrome are widely used routinely and in clinical trials. These validated scales mostly ensure the clinical utility of the current categorical diagnosis [6,48]. Undoubtedly, neither category nor dimension is an exhaustive approach. They are not entirely separable contrary; they are dialectically interconnected as the "yin" and "yang" and the strength of one complement the other's relative limitations. Each approach is likely to contribute meaningfully to developing an optimal schizophrenia construct [37].

There is little doubt that adopting a hybrid model would solve many of the problems noted with previous classifications, and illuminated by the light of dimensionality, our understanding of schizophrenia can be expanded toward measurable and personally targeted interventions.

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