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Invited commentary

Logic and justification for dimensional assessment of symptoms and related clinical phenomena in psychosis: Relevance to DSM-5

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ABSTRACT

Work on the causes and treatment of schizophrenia and other psychotic disorders has long recognized the heterogeneity of the symptoms that can be displayed by individuals with these illnesses. Further, researchers have increasingly emphasized the ways in which the severity of different symptoms of this illness can vary across individuals, and have provided evidence that the severity of such symptoms can predict other important aspects of the illness, such as the degree of cognitive and/or neurobiological deficits. Additionally, research has increasingly emphasized that the boundaries between nosological entities may not be categorical and that the comorbidity of disorders may reflect impairments in common dimensions of genetic variation, human behavior and neurobiological function. As such, it is critical to focus on a dimensional approach to the assessment of symptoms and clinically relevant phenomena in psychosis, so as to increase attention to and understanding of the causes and consequences of such variation. In the current article, we review the logic and justification for including dimensional assessment of clinical symptoms in the evaluation of psychosis in the Fifth Edition of the Diagnostic and Statistical Manual for Mental Disorders (DSM-5).

1. Introduction

Work on the causes and treatment of schizophrenia and other psychotic disorders has long recognized the heterogeneity of the symptoms that can be displayed by individuals with psychosis. In addition, researchers have increasingly emphasized the ways in which

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the severity of different symptoms of this illness can vary across individuals, and have provided evidence that the severity of such symptoms can predict other important aspects of the illness, such as the degree of cognitive and/or neurobiological deficits (e.g., Strauss et al., 1993; Kerns and Berenbaum, 2002; Barch et al., 2003; Perlstein et al., 2003; Barch et al., 2004; Delawalla et al., 2006). Further, research has increasingly emphasized that the boundaries between nosological entities may not be as categorical as suggested originally by Kraepelin (1971), and putative comorbidity of various disorders may reflect impairments in common dimensions of genetic variation, human behavior and neurobiological function (Owen et al., 2007). As such, it is important to explicitly include dimensional assessments of the core symptoms of psychotic disorders to help us identify this important variability. Further, the severity of these psychopathology domains can vary over time within individuals (Tandon et al., 2009). As such, tracking change over time can help understand course and outcome and help with treatment planning and evaluation. Thus, the Fifth Edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) will include dimensional assessments of eight domains of psychopathology (Table 1). The general framework for deconstructing schizophrenia with psychopathology domains was introduced in 1974 (Strauss et al., 1974), and empirical evidence for these specific domains has been documented (Strauss et al., 1974); (Peralta and Cuesta, 2001). The eight domains included in the dimensional assessment of psychosis in the DSM-5 include the five diagnostic criteria A for schizophrenia as well as depression, mania and impaired cognition. Below we outline our logic and justification for the inclusion of these specific dimensions and describe the approach to assessment available for these dimensions in the DMS-5.

2. Primary symptoms of psychosis

The diagnostic criteria for schizophrenia and other psychotic disorders make reference to five domains of psychopathology: hallucinations, delusions, disorganized speech, abnormal psychomotor behavior and negative symptoms. The severity of each of these domains of symptoms can vary within individuals given the same diagnosis. Further, the severity of these different domains of symptoms often contributes to differential diagnosis decisions. As such, we considered it important to include dimensional assessments of each of these five symptom domains. As shown in Table 1, each of these symptoms will be rated for their current severity (most severe in the past month) on a five-point scale ranging from 0 (not present) to 4 (present and severe). A score of 2 or higher should be considered sufficient severity to fulfill a Criterion "A" diagnostic indicator for schizophrenia.

3. Hallucinations and delusions — One dimension or two?

Hallucinations and delusions are canonical symptoms associated with psychosis that both show clear variability in severity across patients both within and across diagnostic categories. However, one might question whether we could or should collapse these symptoms in to a single dimension. Both hallucinations and delusions are considered to be evidence

Table 1
Dimensional assessment of symptoms and related clinical phenomena in psychosis in DSM-5.

	Hallucinations	Delusions	Disorganized speech	Abnormal psychomotor behavior	Negative symptoms (restricted emotional expression or avolition)	Impaired cognition	Depression	Mania
0	Not present	Not present	Not present	Not present	Not present	Not present	Not present	Not present
1	Equivocal (severity or duration not sufficient to be considered psychosis)	Equivocal (severity or duration not sufficient to be considered psychosis)	Equivocal (severity or duration not sufficient to be considered disorganization)	Equivocal (severity or duration not sufficient to be considered abnormal psychomotor behavior)	Equivocal decrease in facial expressivity, prosody, gestures or self-initiated behavior	Equivocal (cognitive function not clearly outside the range expected for age or SES, i.e., within 0.5 standard deviation (SD) of mean)	Equivocal (occasionally feels sad, down depressed or hopeless; concerned about having failed someone or at something but not preoccupied)	Equivocal (occasional elevated, expansive or irritable mood or some restlessness)
2	Present, but mild (little pressure to act upon voices, not very bothered by voices; delusions are not bizarre, or little pressure to act upon delusional beliefs, not very bothered by belief)	Present, but mild (delusions are not bizarre, or little pressure to act upon delusional beliefs, not very bothered by beliefs)	Present, but mild (some difficulty following speech)	Present, but mild (occasional abnormal or bizarre motor behavior or catatonia)	Present, but mild decrease in facial expressivity, prosody, gestures or self-initiated behavior	Present, but mild (some reduction in cognitive function below expected for age and SES, b/w 0.5 and 1 SD from mean)	Present, but mild (frequent periods of feeling very sad, down, moderately depressed or hopeless; concerned about having failed someone or at something with some preoccupation)	Present, but mild (frequent periods of somewhat elevated, expansive or irritable mood or restlessness)
3	Present and moderate (some pressure to respond to voices, or is somewhat bothered by voices)	Present and moderate (some pressure to act upon beliefs, or is somewhat bothered by beliefs)	Present and moderate (speech often difficult to follow)	Present and moderate (frequent abnormal or bizarre motor behavior or catatonia)	Present and moderate decrease in facial expressivity, prosody, gestures or self-initiated behavior	Present and moderate (clear reduction in cognitive function below expected for age and SES, b/w 1 and 2 SD from mean)	Present and moderate (frequent periods of deep depression or hopelessness; preoccupation with guilt, having done wrong)	Present and moderate (frequent periods of extensively elevated, expansive or irritable mood or restlessness)
4	Present and severe (severe pressure to respond to voices, or is very bothered by voices)	Present and severe (severe pressure to act upon beliefs, or is very bothered by beliefs)	Present and severe (speech almost impossible to follow)	Present and severe (abnormal or bizarre motor behavior or catatonia almost constant)	Present and severe decrease in facial expressivity, prosody, gestures or self-initiated behavior	Present and severe (severe reduction in cognitive function below expected for age and SES, >2 SD from mean)	Present and severe (deeply depressed or hopeless daily; Delusional guilt or unreasonable self-reproach grossly out of proportion to circumstances)	Present and severe (daily and extensively elevated, expansive or irritable mood or restlessness)

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of impaired reality testing, and in theory we could collapse these into a single dimension of reality distortion. However, some psychotic disorders are defined by the presence of only delusions or only hallucinations. Furthermore, a number of treatment approaches, such as cognitive behavioral therapy, focus on the treatment of hallucinations and delusions in somewhat different ways, and thus we thought it was important for clinicians to have a means by which to assess the severity of such symptoms separately and to be able to track change in each domain of symptom individually (Addington and Mancuso, 2009; Gleeson et al., 2009; Velligan, 2009). As such, we retained separate dimensions for hallucination and delusions.

4. Restricted emotional expression and avolition

It could also be important to distinguish between two different domains of negative symptoms: 1) restricted emotional expression; and 2) avolition. Exploratory and confirmatory factor analyses of symptom assessment scales at the item level have supported separate negative symptom factors for Flat Affect/Diminished Expression (referred to as "restricted emotional expression") and Avolition/Asociality/Anhedonia (referred to as avolition) (Keefe et al., 1992; Minas et al., 1994; Mueser et al., 1994; Kelley et al., 1999; Peralta and Cuesta, 1999; Emsley et al., 2001; Malla et al., 2002; Kimhy et al., 2006; Nakaya and Ohmori, 2008), with similar findings across heterogeneous groups of patients with any psychotic disorder(Minas et al., 1994; Toomey et al., 1997; Peralta and Cuesta, 1999) as well as schizophrenia spectrum patients (Keefe et al., 1992; Mueser et al., 1994; Sayers et al., 1996; Kelley et al., 1999; Emsley et al., 2001; Malla et al., 2002; Tremeau et al., 2008) and deficit syndrome patients (Kimhy et al., 2006; Nakaya and Ohmori, 2008). Furthermore, these factors were found in patients on (Mueser et al., 1994); (Sayers et al., 1996; Kimhy et al., 2006; Tremeau et al., 2008) and off medication (Kelley et al., 1999) and in first-episode (Malla et al., 2002) and chronic (Keefe et al., 1992) patients. Separate factors for affective flattening and avolition appear to hold up cross-culturally. Factor analyses of data collected from patients in the United States (Keefe et al., 1992; Mueser et al., 1994; Kelley et al., 1999; Kimhy et al., 2006), Canada(Malla et al., 2002), Spain (Peralta and Cuesta, 1999), South Africa (Emsley et al., 2001), Australia (Minas et al., 1994), and Japan (Nakaya and Ohmori, 2008) all supported reduced emotional expression and avolition as separate factors, providing further evidence for recognizing deficits in affect and volition as two distinct symptom domains in schizophrenia. This view was accepted by consensus in a NIMH workshop (Kirkpatrick et al., 2006).

A further reason for asking clinicians to rate each of these types of negative symptoms separately is evidence that they may differentially predict factors such as clinical presentation (Strauss et al., 2013), functional outcome (Tattan and Creed, 2001; Strauss et al., 2013), cognitive deficits (Suslow et al., 1998; Malaspina and Coleman, 2003; Gur et al., 2006), emotional deficits (Gur et al., 2006; Henry et al., 2007), and neurobiological impairments (Fahim et al., 2005; Gur et al., 2007; Dichter et al., 2010; Waltz et al., 2009; Dowd and Barch, 2010). Considering these two domains separately has also been found to reduce heterogeneity, as separable sub-groups of negative symptom patients have been identified who display primarily emotional expression or volitional profiles (Strauss et al., 2013).

However, despite evidence that these dimensions may be distinct, there is also evidence for a high correlation between the two dimensions. Further, in the absence of efficacious treatment it is not known whether the two aspects of the negative symptom construct have different therapeutic implications. We were also concerned that the inclusion of too many dimensions would reduce the utility and acceptability of dimensional assessments in DSM-5. Thus, the negative symptom dimension in the DSM-5 is somewhat of a hybrid — a single item that refers to deficits in either of these two dimensions. Therefore, we highlight that there are two dimensions, allowing clinicians or researchers to assess both, but also allowing for a single rating that may be more parsimonious and efficient for those in clinical practice.

5. Cognitive function

The DSM-5 will include a dimensional assessment of cognitive impairment for use in assessing individuals with psychotic disorders. There is ample evidence that a large percentage of individuals with schizophrenia and other psychotic disorders suffer from impairments in a range of cognitive domains (e.g., Reichenberg et al., 2009), and growing evidence that the level of cognitive impairment predicts functional abilities (social, occupational, living status) (e.g., Green et al., 2004; Cervellione et al., 2007; McClure et al., 2007; Heinrichs et al., 2008b). Despite the importance of cognition to understanding function in schizophrenia and other psychotic disorders, we did not propose to add cognitive deficits to the Criterion "A" of schizophrenia, or to the criteria for any other psychotic disorder. We were concerned that cognitive dysfunction is not a differential diagnostic marker for schizophrenia, either for distinguishing a patient from a healthy person or from a person afflicted by other psychiatric disorders.

The reason for this concern is that the profile of cognitive impairments is similar across the non-affective and affective psychoses (Hill et al., 2004a; Depp et al., 2007; Schretlen et al., 2007; Reichenberg et al., 2009; Smith et al., 2009), though the level of impairment may be greater in non-affective psychoses (Hill et al., 2004a; Krabbendam et al., 2005; Depp et al., 2007; Schretlen et al., 2007). Perhaps one of the clearest examples of such a result was provided by Reichenberg et al. (2009). They compared individuals with consensus research diagnoses of schizophrenia, schizoaffective disorder, major depressive disorder with affective features and bipolar disorder with psychotic features. The individuals with schizophrenia and schizoaffective disorder were overall more impaired than the individuals with psychotic mood disorders, and the prevalence of cognitive impairment was higher in schizophrenia and schizoaffective disorder by the definitions that they examined. However, the individuals within all four groups showed the same *relative* cross-sectional pattern of impairment across cognitive domains, with the greatest impairment in verbal memory, and the least impairment in visual processing and general verbal ability. Depp et al. provided another compelling example in their study, comparing individuals with schizophrenia, bipolar disorder and healthy controls (Depp et al., 2007). Unlike, Reichenberg et al., Depp found that the bipolar patients were as impaired as the schizophrenia patients on many of the tests. Further, the profile of impairment was very similar across groups, with the most impairment in information processing speed for both groups, and the least impairment in crystallized IQ. In addition, there is evidence that the factor structure of cognition is very similar across schizophrenia and bipolar disorder (Czobor et al., 2007). There are of course some exceptions to these results, and some studies that have shown differences across psychotic disorders in the pattern or severity of cognitive impairment (Heinrichs et al., 2008a). However, the preponderance of data suggests that this separation is not sufficient to justify inclusion of cognition as a Criterion "A" symptom of schizophrenia. Nonetheless, cognition patterns overtime show more promise for distinctions across disorders in that lasting trait impairment that predates clinical manifestation is typical in schizophrenia (Rund, 1998; Hill et al., 2004b; Rodriguez-Sanchez et al., 2008), while bipolar disorder pattern is relatively spared in development (Olvet et al., 2010) and more state-like during episodes of mania or depression (Barch et al., 2003).

Nonetheless, it remains clear that cognitive function is important for understanding functional status in schizophrenia (Green et al., 2000; Green et al., 2004; Bowie et al., 2008), as well as other psychotic disorders, including bipolar disorder (Martinez-Aran et al., 2004; Jaeger et al., 2007; Gruber et al., 2008; Tabares-Seisdedos et al., 2008), and that cognitive deficits are not well treated by current antipsychotic medications (e.g., Keefe et al., 2007). Thus, we have included a dimensional

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assessment of cognition because it is important to highlight the potential need for additional treatments specifically targeting cognitive remediation in schizophrenia and other psychotic disorders (e.g., Marder and Fenton, 2004; Marder, 2006).

We would suggest that when possible, clinicians obtain a formal clinical neuropsychological assessment in individuals with psychosis to fully understand the nature and severity of their cognitive impairments. Such assessments may be of particular value early in the course of illness when considering plans for further education and vocational functioning. When it is not possible to obtain a full neuropsychological evaluation, a number of studies have shown that several different brief assessment approaches provide clinically useful information concerning a patient's general level of cognitive impairment (Gold et al., 1999; Keefe et al., 2004; Velligan et al., 2004; Wilk et al., 2004; Dickinson et al., 2007; Dickinson et al., 2008; Hurford et al., 2011). Such measures should be administered and scored by personnel trained in the use of testing instruments and who are familiar with the expected influence of demographic factors (i.e., age, gender, education) to ensure valid interpretation of observed scores relative to normative data. Brief screening instruments developed for use in the detection of frank dementia, such as the Mini-Mental Status Exam, are not sensitive to the types of impairments that are typically observed in patients with schizophrenia and therefore their use is discouraged in this context. The growing research on other methods for assessing cognitive function (e.g., self-report, clinician interview) suggests that these methods have limited correlation with performance based measures of cognitive performance (Green et al., 2008), though they may still have utility in predicting functional status (Bralet et al., 2007; Kaneda et al., 2007; Green et al., 2008; Hill et al., 2008; Keefe et al., 2008; Harvey et al., 2009; Chia et al., 2010; Ventura et al., 2010). If a formal assessment of cognition by trained personnel is not possible, the clinician should use the best available information to make a judgment about the client's cognitive function, including the clinicians interactions with the patient and/or reports of family members or clinical staff that regularly interact with the patient. However, it is likely that without objective assessments, such ratings will have poor reliability and potentially low validity.

6. Depression and mania

We also propose to include dimensional assessments of depression and mania for all psychotic disorders. There is growing evidence that schizoaffective disorder does not represent a distinct nosological category separate from schizophrenia (e.g., Owen et al., 2007; Malhi et al., 2008; Peralta and Cuesta, 2009). However, at the same time there is good evidence that the severity of the mood pathology present in individuals with schizophrenia indicates important information about prognosis and outcome (Crumlish et al., 2005; Bowie et al., 2006), and the need for treatments specifically targeting these mood symptoms (e.g., Addington et al., 1998; Peralta and Cuesta, 2009). Thus, dimensional assessments of depression and mania for all psychotic disorders will serve to alert clinicians to look for the presence of mood pathology and treat appropriately.

7. Relationship to Research Domain Criteria (RDoC) dimensions

The recommended eight dimensional assessments for psychotic disorders in DSM-5 make some contact with the domains identified by the Research Domain Criteria (RDoC) project. However, they are clearly not isomorphic with RDoC dimensions and align much more closely to traditional conceptions of symptom dimensions in psychopathology. The dimensional assessment of cognition is perhaps the best aligned with RDoC, though RDoC distinguishes among several different components of cognitive function. RDoC is conceptually correct to do so, but for practical reasons we needed to collapse the assessment of cognition into a single dimension. This is not meant to diminish the importance of understanding different aspects of cognitive impairment, nor is it meant to ignore the likelihood that there is differential impairment in distinct aspects of cognition across domains of psychopathology. In addition, the dimension of Restricted Emotional Expression/Avolition likely assesses phenomena associated with the RDoC Positive Valence and Social Processes systems, but again aggregates across a number of different dimensions of behavior that may be dissociable in the RDoC framework. As work on the RDoC progresses, it is our hope that future iterations of dimensional assessments in the DSM will be much more closely aligned with validated dimensions of behavior and brain function identified by RDoC that capture core variance related to psychopathology.

8. Summary

The recommended eight dimensional assessments will help diagnosticians make reliable decisions about the presence or absence of diagnostic phenomena and will help clinicians attend to the clinically meaningful variation in the severity of these symptoms. This will help with treatment planning, prognostic decision-making, and research on pathophysiological mechanisms. We recognize that requesting clinicians to make these additional dimensional decisions adds to the workload and that for some it will be a change in focus or approach in terms of thinking about the diagnostic picture for an individual. However, we would argue that the benefits associated with enhancing attention to important dimensions of function and symptoms, as well as increased recognition of the meaningful heterogeneity in symptom presentation and severity will help move forward the efforts to understand the causes and treatments of psychotic disorders. The Psychoses Work Group recommended these dimensions for the main text, but they will only appear in Section 3 referred for more study based on concerns that they may complicate clinical practice. More specifically, the DSM-5 task force was concerned that clinicians did not yet know how to use these dimensions and that more experience with them was needed before they were placed in the primary text. Unfortunately, this probably means that some individuals using the DSM-5 will not likely use these dimensions, though some will in order to better capture and understand the clearly important heterogeneity in symptom presentation in psychotic disorders.

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This was not an empirical study and there was no funding source.

Contributors

The DSM-5 Psychosis committee developed the approach and implementation for the dimensions to be assessed in the DSM-5 Schizophrenia Spectrum and Other Psychotic Disorders Chapter as a group. Deanna M. Barch drafted the written implementation of the dimensions for the Schizophrenia Spectrum and Other Psychotic Disorders Chapter and drafted the manuscript. The remaining authors edited the dimensions for the Schizophrenia Spectrum and Other Psychotic Disorders Chapter and provided comments on the manuscript. All authors have approved the final manuscript.

Conflict of interest statement

The authors have declared all relevant conflicts of interest regarding their work on the DSM-5 Psychotic Disorders work group to the APA on an annual basis. The complete details are posted on the public website http://www.dsm5.org/MeetUs/Pages/PsychoticDisorders.aspx.

We will provide an update of this detailed statement to the editor when all of the manuscripts submitted for a special section on DSM-5 in Schizophrenia Research are complete.

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