gressed so that they are affordable, reliable, highly sensitive, and unobtrusive, with a high potential for large-scale international data collection across a broad range of behavioral domains. This allows for biobehavioral data collection that extends well beyond the relatively artificial confines of the clinic or research laboratory. For this, ecological momentary and ambulatory assessment methods, such as geolocation, passive vocal recording, activity tracking, and social media analysis, can complement existing measurement approaches.

Efforts to validate these technologies for understanding negative symptoms are currently underway. However, integrating and understanding these data within a network that can handle temporally and contextually dynamic data is a complex computational obstacle. Relatively simplistic "connectionist" and dynamic algorithms are being developed for many important human functions, and there is a growing field of understanding "networks of networks" to model complex interactions (e.g., "network medicine")[9].

In sum, existing clinical rating measures offer a level of precision that has not promoted advances in understanding underlying mechanisms and developing targeted treatments of negative symptoms. This reflects a "scalability" problem that can potentially be solved by modeling clinical ratings with multidimensional biobehavioral data streams.

Developing biobehavioral models can help pinpoint neurobiological and environmental mechanisms, modify them in real time using biobehavioral feedback, and develop, test and individualize targeted psychosocial and pharmacological agents to ameliorate their severity, and ideally, develop treatments.

Accurate modeling of negative symptoms is a complex endeavor, and an exciting computational opportunity that may advance multidisciplinary sciences and bring together researchers, patients and their support teams from around the world.

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Testing a neurophenomenological model of basic self disturbance in early psychosis

The construct of basic (core, minimal) self disturbance has emerged in recent years as a possible key phenotypic marker of the schizophrenia spectrum[1].

Two nested concepts can be identified as constituting this aspect of selfhood: sense of ownership/mineness (I perceive my body, perceptions and thoughts as my own) and sense of agency (I experience myself as the source of my actions and their consequences). These are generally implicit or "given" aspects of a normal sense of basic self and facilitate (and are in turn consolidated by) interactions with others/the world. Fragility or instability of the basic self can manifest in a variety of anomalous subjective experiences, which can intensify and crystallize over time into episodes of positive and negative psychotic symptoms[2].

A considerable body of research has accumulated over the last 15 years indicating that basic self disturbance is a trait vulnerability feature that (though overlapping in some respects with non-schizophrenic dissociative conditions) has considerable specificity to schizophrenia spectrum disorders and is present in the prodromal phase of these disorders[3]. Indeed, disturbed "self-experience" is included in the criteria for schizophrenia of the beta version of the ICD-11.

Taking basic self disturbance as a phenomenological starting point allows researchers to examine correlates and contributing factors, cross-sectionally and longitudinally. Some progress is now beginning to be made in this respect. Sestito et al[4] found that facial reactions in response to negative emotional stimuli, recorded using electromyography, specifically and strongly correlated with basic self disturbance in schizophrenia spectrum patients. Martin et al's[5] findings in schizophrenia indicated a relationship between compromised extraction of temporally predictive information assessed in experimental tasks and basic self disturbance. Given the complexity and foundational nature of the basic self disturbance construct, multiple neural mechanisms are likely to be associated with this constellation of anomalous subjective phenomena.

Nelson et al[6] introduced a theoretical model proposing that the neurocognitive constructs of source monitoring deficits and aberrant salience, both of which have been found to be prominent in schizophrenia spectrum disorders and related to psychosis risk, may be of particular relevance to basic self disturbance in schizophrenia. Source monitoring deficits refer to difficulties in making attributions about the origins of phenomenal experience – e.g., whether an experience was real or imagined, or whether its origin was self- or other-generated. Aberrant salience refers to the reduced ability to suppress attention to irrelevant or familiar information or environmen-

tal stimuli (in other words, *excessive* attention to information that is irrelevant or highly familiar), leading to an unusual salience of stimuli. There is strong face validity that the phenomenological disturbances which might arise from (and in turn consolidate) these neurocognitive disturbances accord with many of the experiential alterations associated with basic self disturbance[6] (e.g., diminished "ownership" of mental content, confusion of self-other boundaries, hyper-reflexivity).

We tested this model empirically in 50 ultra-high risk for psychosis subjects, 39 first-episode psychosis patients and 34 healthy controls. Participants were assessed with a variety of clinical measures, including the Examination of Anomalous Self-Experience (EASE)[7], and neurocognitive and neurophysiological measures of source monitoring deficits (Action Memory Task, Word Recognition Test, Temporal Binding Task, Auditory Button-Press Task) and aberrant salience (Salience Attribution Test, Babble Task, Auditory Oddball Paradigm).

Linear regression indicated that source monitoring (composite score across neurocognitive and neurophysiological measures), with study group as an interaction term, explained 39.8% of the variance in EASE scores (R^2=.41, F(3,85)=14.78, p<0.001). Source monitoring significantly predicted EASE scores (β=.80, p<0.001), and there was a significant source monitoring by study group interaction effect (β=.29, p<0.05).

In order to determine the specificity of the relationship between source monitoring deficits and EASE scores, a series of regressions with other clinical scales as dependent variables were performed. Although source monitoring was found to significantly predict variance in scores on each of these clinical measures, the variance explained was not as substantial as for the EASE scale: 25% for Brief Psychiatric Rating Scale (BPRS) scores (R^2=.25, F(3,85)=9.01, p<0.01); 19% for BPRS positive symptoms (R^2=.19, F(3,85)=6.69, p<0.01); 26% for Comprehensive Assessment of At Risk Mental States (CAARMS) positive symptoms (R^2=.26, F(3,85)=9.45, p<0.01); 14% for Scale for the Assessment of Negative Symptoms (SANS) scores (R^2=.14, F(3,85)=4.71, p<0.01).

The same analysis was performed with the aberrant salience composite score. This score explained only 6% of the variance in EASE scores (R^2=.06, F(3,85)=1.44, p=0.93). However, exploratory analyses indicated moderate relationships between aberrant salience, particularly the Babble task[8], and general psychopathology (BPRS score in first-episode psychosis patients, r=.44, p<0.05), particularly with positive psychotic symptoms (BPRS positive symptoms in first-episode psychosis patients, r=.53, p<0.01; CAARMS positive symptoms in ultra-high risk subjects, r=.44, p<0.01).

This is the first empirical test of a neurophenomenological model[6] organized around the construct of basic self disturbance. Partial support for the model emerged: there was a significant relationship between basic self disturbance and source monitoring deficits, while no relationship was found with aberrant salience, which was moderately related to general psychopathology, particularly positive psychotic symptoms (and is therefore possibly more a state-based feature of the illness).

The model may need to be expanded from source monitoring deficits to encompass other constructs that recent theoretical and empirical work suggests may be relevant, such as disturbed temporal processing, intermodal/multisensory integration, and hierarchical predictive processing. These are overlapping constructs and it is yet to be determined if one or several of these constructs have causal or explanatory primacy with regard to basic self disturbance.

The current data and other related recent research show an emerging picture of neurocognitive and neurophysiological correlates of core phenomenological aspects of schizophrenia spectrum disorders beyond surface-level episodic psychotic symptoms. Pursuing this approach offers the possibility of integrating levels of research around central features of the schizophrenia spectrum and of "mutual enlightenment" between these different levels of enquiry.

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Improving access to evidence-based interventions for young adolescents: Early Adolescent Skills for Emotions (EASE)

About half of all mental disorders emerge by 14 years of age[1]. In adolescents, depression is the main cause of disability, anxiety is ranked seventh, and suicide is the third leading cause of death[1]. An estimated 10-20% of adolescents worldwide suffer from mental disorders[2], which are associated with health and social problems, such as poor academic attainment, substance