

Linguistic markers and basic self-disturbances among adolescents at risk of psychosis. A qualitative study

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Summary

Background Language impairments are key features of schizophrenia spectrum disorders, and have also been suggested to signal enhanced psychosis risk. Incoherence, derailment, and monotonous speaking are however closely related to psychosis onset, and thus not very early markers. Recent phenomenologic-psychiatric studies claim that basic self-disturbance (BSD) may represent more useful early markers.

Methods We searched for distinctive irregular linguistics of 30 CHR outpatient adolescents, aged 12–18 years. Standard instruments established psychosis risk and BSD. Participants chose three personal and well manifested BSD phenomena. Ninety verbatim statements were analyzed and grouped into higher order clusters of linguistic irregularities.

Findings We identified five clusters of irregular language features: distinctive words, describing an atmosphere of unreality; irregular use of prepositions, indicating experiential detachment; shifts of personal pronouns, indicating identity confusion; near-literal use of metaphors and conjunctions indicating existential insecurity, and idiosyncratic use of adjectives indicating perceptual transcendence.

Interpretation The adolescents provided naturalistic descriptions of experiences that were markedly twisted and almost ineffable. This unique irregular “BSD -language” was highly meaningful in its proper context, expressing informative characteristics of first-personal experiential alterations, essential for early detection. The features may additionally represent precursors of psychosis transition, useful for clinical decision-making.

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Introduction

Psychotic disorders typically start in adolescence, often resulting in a long-lasting impact on young people's lives. Therefore, risk markers should be identified as early as possible, enabling treatment and support to be provided when necessary. To date, no convincing evidence of biological risk markers for psychosis have been established. The most widely accepted set of clinical criteria, the Clinical High-Risk (CHR) criteria to determine the risk for psychosis, was developed in the late 1990's and has been used in a range of prediction studies.^{1–5} However, there are fundamental challenges

concerning specificity and sensitivity with these criteria. The vast majority (70–90%) fulfilling the criteria do not develop psychosis and studies of young persons suggest that pre-psychotic symptoms should be considered risk markers for more severe psychopathology in general, not limited to psychosis.^{4,6,7} Another challenge to be met is the lack of evidence for any specific type of psychotic disorder predicted by the CHR criteria.⁶ Finally, the CHR criteria are found to be predictive only if they are applied to clinically selected samples.⁸ Considering that the pre-psychotic experiences often precede the onset of psychotic disorders by several years, and long before

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Research in context

Evidence before this study

Basic self-disturbance (BSD) is the overarching concept of various characteristic experiences of self-alienation in schizophrenia and its precursor conditions, and was described in detail in two retrospective phenomenological Scandinavian studies at the beginning of this century. The findings in these studies represented a rediscovery of “forgotten insights” first described by influential psychiatrists throughout the 20th century (Kraepelin, Bleuler, Jaspers and Blankenburg). A semi-structured interview, The Examination of Anomalous Self-Experience (EASE) was developed and published in 2005 and has been used in several studies world-wide, consistently demonstrating the hyper-aggregation of BSD in schizophrenia spectrum disorders. The emergence of BSD in adolescents, and its predictive value have later been documented in prospective and retrospective studies in psychiatry, psychology and neuroscience. Because of the subtle and subjective character of BSD this new core marker is not easy to detect clinically, especially in younger age groups and little research has been conducted on BSD in children and adolescents. In the on-going search for and refinement of the Clinical High-Risk (CHR) criteria, some studies of language in patients at high risk of psychosis have reported linguistic features in disorganized speech as putative risk markers for psychosis. Language and linguistics, as primary domains of consciousness, have however not been explicitly investigated in BSD-research. We searched Medline, Embase, and PsychInfo, from database inception to May 31, 2022 with the keywords “Anomalous self-experience*” OR “basic self-disturbance*” OR “self-disturbance*” OR “self-disorder*” AND “language*” OR “linguistics*”. Additionally, relevant journals were searched by hand, and expert researchers in the field were contacted for information about suitable studies or

papers where such studies were thought to exist. The search returned no results.

Added value of this study

To our knowledge, this study is the first to investigate and demonstrate a link between BSD and linguistic anomalies. We found several distinctive and consistent semantic and syntax irregularities in the language of the patients’ descriptions of BSD (prominent words, prepositions, pronouns, metaphors and adjectives). Former language studies of patients with psychosis in young adults have focused on more circumscribed grammatical anomalies, gross disorganization in speech, and expressions relating to overt false beliefs. Despite its distinctive linguistic irregularities, we found the “BSD-language” to be remarkably rich and often precise in its ability to express ‘real’ basic self-disturbances. The study provides insight into the role of linguistic signifiers in psychopathology in general, and more specific into the field of early intervention in psychosis, in the early stages before the emergence and consolidation of diagnostic symptoms.

Implication of all the available evidence

From the perspective of the development of psychosis, the linguistic features we identified can be seen as precursors to more noticeable near-delusional experiences, and later to fully developed psychosis. Clearer distinctions between developmental phases of psychotic disorders can provide valuable information for clinical decision making regarding treatment and the assumed further course of the present condition. Phenomenological language analysis may also inform future developments of automated language analyses of BSD.

clinical admission, there is a need to enhance the precision and refinement of these phenomena.

In the on-going search for and refinement of the CHR criteria, many studies inspired by phenomenological psychiatry have demonstrated that basic self-disturbance (BSD), a well-established core phenotype of schizophrenia, also constitutes an early vulnerability marker.^{9,10} Basic self-disturbance refers to various kinds and levels of self-alienation and loss of feeling of natural “presence” in the world. It is often further manifested as a feeling of not fully “inhabiting” oneself and one’s body, and not being the “owner” of one’s experiences. This core disturbance is understood as a particular disturbance of certain structural aspects of human consciousness, an alteration in the sense of ‘minimal self’ that is normally a part of the act of awareness in all kinds of human experience.¹¹ Basic self-disturbance is the overarching concept for these various and characteristic experiences, which are also referred to as

anomalous self-experiences (ASEs) or self-disorders (SDs). The Examination of Anomalous Self-Experience (EASE) manual, was published in 2005, and has been used in most of the research on BSD.^{10,12} In phenomenological psychopathology the role of BSD in fundamental distortions of consciousness is well documented in prospective and retrospective predictive studies, mental disorder symptomatology, neuroscience, and psychology.⁹ In the first systematic review of empirical studies on self-disorders, Henriksen et al. (2021) summarizes that BSD hyper-aggregate in schizophrenia spectrum disorders (SSD), predict later development of SSD in CHR-samples, have a high degree of temporal stability, and correlate with the canonical dimensions of the psychopathology of schizophrenia, impaired social functioning, and suicidality.⁹ In a meta analysis, Raballo et al. (2021) explored BSD across different diagnostic groups, and diagnostic ascription within or outside SSD as main outcome, confirmed that BSD intercept a

specific SSD-proneness distinguished from a broader vulnerability to psychosis.¹³ In 2022, another meta-analysis was performed. Self-disorders showed a greater aggregation within schizophrenia spectrum groups compared to non-schizophrenia spectrum groups and had a greater likelihood of occurring within SSDs.¹⁴

Another promising field of research, pointing towards new predictive risk markers are the studies of linguistic features in the language of CHR patients. The study of linguistics is a vast and interdisciplinary field. It incorporates complex phenomena such as for example how the brain processes and understands sounds (phonetics), the study of word structures and rules (morphology), phrasal structure, hierarchy, combination of words in sentences (syntax), meaning and context (semantics), and the role of context in the interpretation of meaning (pragmatics). Linguistic connections and correlates to mental disorders have been traced in the case of most of these linguistic component. Text analysis programs have been developed for studies computing the incidence of words in predesignated linguistic categories in different patient groups and controls. Researchers have reported that pronouns can be more reliable in identifying depression than negative emotion words. Examples are the frequency of the personal pronoun 'I' versus relational the pronouns 'them' and 'us' in depression or references to *absolute thinking* by use of words as 'never', 'always' in suicide ideation and borderline personality.^{15,16} In recent years, there have been significant breakthroughs in using artificial intelligence to interpret language just as efficiently as, or even better than humans. This is highly relevant to clinical settings: clinical ratings and manual linguistic analyses by expert opinion might be limited by subjective judgements, non-recognizable symptoms, or the lack of precision in ordinal rating scales.

Impaired verbal communication and disorganized speech are among key diagnostic features of SSDs, reflecting cognitive deficits. Some even claim that most of the distinctive symptoms may arise from language dysfunction.¹⁷ Kraepelin named three types of "dream speech" (*Traumsprache*) in patients with schizophrenia: 1) disorders of word-selection (paraphasias), 2) disorders of discourse (e.g., agrammatisms), and 3) formal thought disorders.¹⁸ Bleuler noted that the primary symptoms of schizophrenia "find their expression in language but despite this, the abnormality lies not in language itself" but in a "loosening of associations".¹⁹ To capture the wide range of language characteristics of schizophrenia, Andreasen developed The Scale for the Assessment of Thought, Language and Communication (TLC).²⁰ It includes 18 items (poverty of speech, illogicality, incoherence, clanging, neologisms, word approximations, poverty of content of speech, pressure of speech, distractible speech, tangentiality, derailment, stilted speech, echolalia, self-reference,

circumstantiality, loss of goal, perseveration, and blocking). In a prognostic study using video-taped semi-structured interviews, school-aged offspring of parents with schizophrenia or affective disorder were asked about family, friends, school, and leisure activities.²¹ The TLC scale was applied to predict future psychosis. Formal thought disorder was a predictor of schizophrenia but not of mood disorders with psychosis. After 10 years, the accuracy of diagnosis prediction (schizophrenia vs. mood disorder) was 92% suggesting these are early core features of illness.

Several deviant language features at semantic, syntactic, and phonological levels of language production in CHR-patients have been identified and have been shown to distinguish these patients from healthy controls.²² Bearden et al.²³ applied manually coded linguistic analyses of speech transcripts in a CHR sample (N = 54) and healthy controls (N = 51). After a follow-up period of 12 months, they found that semantic features (illogical thinking) and reduction in syntactic complexity (poverty of content) predicted psychosis onset with an accuracy of 70.5%.

Natural Language Processing (NLP) - a subfield of cognitive linguistics, artificial intelligence (AI), and computer science - now allows for analyses of large amounts of natural/everyday language and have made it easier to track more sophisticated language structures. This development may facilitate future research on early signs of SSD. In recent updated studies of the CHR-group, different NLP techniques referring to various properties of language have been used.²⁴⁻²⁶ One such method is the Latent Semantic Analysis (LSA). While the traditional LSA captures the semantics of analogy by analyzing the similarity of single words in series of texts, new semantic techniques also encode sentences for measuring similarity of content, syntactic parsing (breaking down sentences into their grammatical substructures), and measuring phrase structure, sentence length and frequency of part-of-speech classes (e.g., nouns, verbs, pronouns, adjectives). In the LSA based study of Bedi et al.,²⁴ open-ended, narrative interviews were transcribed from a sample of 34 CHR-individuals where five developed schizophrenia during a 2.5 year follow-up period. An automated machine-learning speech classifier by a method called 'vector unpacking', a technique that decomposes the meaning of a sentence into its core ideas was used. Their analyses showed that the maximum phrase length and use of determiners predicted a conversion to psychosis with 100% accuracy, whereas the Structured Interview of Psychosis Risk Syndrome (SIPS), predicted psychosis with 79% accuracy. In a subsequent study, this same model was adapted and validated in an extended sample across two cohorts (N = 94). The study identified components of decreased semantic coherence, greater variance in that coherence, and reduced use of possessive pronouns. These components had an 83% accuracy in

predicting psychosis onset.²⁵ Most of these are proof-of-concept studies with small sample sizes, but they clearly demonstrate the *potential* of using machine learning and AI-approaches in the early identification of severe mental disorders. More research is needed to address exactly what features of language should be explored and included into the algorithms in order to analyze earlier phases of illness development, i.e., in late childhood and adolescence, when symptoms are more subtle and difficult to detect. Most studies on CHR samples have recruited young adults with a mean [SD] age of 20.6 [3.2] years).³ In the longitudinal study of Zammit et al. (2013), 75% of those who were diagnosed with a psychotic disorder at the age of 18, were retrospectively reporting psychotic symptoms at age 12 years. In another study by Schultze-Lutter et al.²⁷ (2010), the majority in the sample with first episode psychosis had been diagnosed with a mental disorder or with a psychosis risk syndrome and psychosocial disabilities five years before the conversion to psychosis. Also, in the clinical and research literature, BSD is reported to occur from childhood and premorbid phases.^{28–30} In general, the detection and diagnostics of severe mental disorders in children and adolescents is challenging. Symptoms at a young age are by nature less pronounced, more unstable, and there is a high incidence of comorbidity. Furthermore, poor verbalizing ability compared to adults represents a challenge. Children and adolescents may also find it awkward and embarrassing to talk about such symptoms to others. Among external factors complicating early diagnostics are 1) higher rates of refusal to seek help, 2) professionals overlooking symptoms, and 3) misinterpreting phenomena as a ‘typical’ or ‘ordinary’ adolescent crisis by parents and teachers. Furthermore, due to fear and stigma related to the expectation of poor prognosis, clinicians are reluctant to use labels like risk of psychosis or schizophrenia, being concerned about negative effects on hope and positive outcome.³¹ Despite the evidence that BSD is a crucial and characteristic feature, highly predictive of the development of SSDs, this core marker is neither trivial or easy to detect, especially in younger age groups. Considering the subtle and vague clinical manifestations of BSD, usually hard to describe for the patients, this makes BSD even more difficult to capture. The central entity in BSD studies is *the self*, the most central manifestation of human consciousness. Clearly, the study of consciousness is no longer a purely philosophical topic, but an interdisciplinary discourse between various fields such as the philosophy of mind, social philosophy, psychiatry, developmental psychology, cognitive neuroscience, and linguistics. One of the indisputable features of consciousness is that it is exclusively experienced by the subject, also pointing to the concept of *subjectivity* as a core aspect of consciousness.

While studies of CHR have documented language features as putative risk markers for psychosis, language and linguistics, as primary domains of consciousness, have so far not been solely investigated in the phenomenological BSD-research. No study appears to have explicitly targeted the relationship between the semantic (meaning/content) and syntactic (structure/grammatical) aspects of language in adolescents with BSD. Thus, the present study aimed to: 1) explore how adolescents at risk of psychosis describe BSD; 2) identify any specific and consistent language features in these descriptions.

Methods

Design

This study was part of a larger prospective naturalistic multi-case in-depth study examining the type, characteristics, and individual course of BSD over a six month period in adolescents at initially confirmed increased risk of psychosis. The larger study uses a mixed-method design combining 1) quantitative data from ambulatory momentary assessments with a mobile application measuring the frequency, intensity, and multiple correlates of BSD in an everyday context, and 2) qualitative data from semi-structured interviews, (partly) through the EASE manual. In this paper, we present the findings from the qualitative part of the study exploring the language use in the self-reported descriptions of BSD by adolescents at risk of psychosis. This qualitative research design is characterized by a flexible, iterative style of eliciting and categorizing data. In this way, it is distinguished from quantitative methods by documenting responses in the participants’ own words, rather than documenting fixed responses.

The study is approved by the Regional Committee of Medical and Health Research Ethics (Id.Nr.2016/1758C). The regional agency of The Norwegian Data Protection Authority (NSD) is notified. The research protocol describes for the most part the quantitative part of study, and thus not included as supplementary materials in this paper.

Patients, settings, and measures

We consecutively and prospectively recruited 30 adolescents admitted to seven outpatient units in the Child and Adolescent Mental Health Service (CAMHS) from three different Hospital Trusts in South-Eastern Norway. Qualitative research seeks detailed, in-depth information from individuals, so usually small samples of people (N = 5–15) are required. Since our endeavor was to investigate fairly consistent language structures in large transcripts from comprehensive EASE – interviews, a purposive sample (adolescents with BSD) of 30 was considered, both necessary and adequate.

Clinicians were encouraged in informational meetings, by brochures and mail correspondence to ask patients 12–18 years at clinically suspected risk of psychosis to participate in the study. Exclusion criteria were past or present psychosis, intellectual impairment, neurological or developmental disorders, addiction disorder, anti-psychotic treatment, either currently or for ≥ 4 weeks lifetime (dose equivalent to ≥ 5 mg Olanzapine per day) and inability to speak Norwegian. Patients (and their parents if under 16) provided written consent, and then filled out a screening-questionnaire. The questionnaire, comprising an extended version of the Prodromal Questionnaire 16-item version (PQ-16)³² with four additional composite questions on basic self-disturbances. These four items were pragmatically adapted from the EASE by one of its main authors (PM). These items were selected based on the most frequently reported EASE-items in six studies.^{33–38} A cut-off score for eligibility for the study was nine or more (>50%) on the PQ-16 and at the same time one or more positive scores on the additional four BSD questions. If criteria were fulfilled, the SIPS and a full EASE interview were conducted by the first author LB to confirm the risk of psychosis status and the presence of BSD. Data presented in this paper were collected between February 2019 and July 2021.

The SIPS is a semi-structured interview designed to detect enhanced risk of psychosis and define presence/absence of psychosis. SIPS identifies three types of psychosis-risk syndromes: 1) Attenuated Positive Symptoms Syndrome (APSS), 2) Brief Intermittent Psychosis Syndrome (BIPS), and 3) Genetic Risk and Deterioration syndrome (GRDS). SIPS/SOPS inter-rater reliability (IRR) was tested by comparing scores on nine case vignettes with final scores of raters from the North American Prodrome Longitudinal Study (NAPLS). The rater was used as fixed effect and the cases as random effect. CHR-status agreement was 100%, and SOPS positive symptom scores IRR was excellent (single measure ICC: 0.95, 95% CI [0.96, 0.99], two-way mixed effects model, absolute agreement). In addition to probing for and assessing specific self-disturbance phenomena, the EASE interview is designed to generally obtain rich descriptive and detailed clinical information suitable for qualitative analysis. The interview consists of 57 items divided into five rational domains: 1) cognition and stream of consciousness, 2) self-awareness and presence, 3) bodily experiences, 4) demarcation/transitivity, and 5) existential reorientation. EASE has very good to excellent internal consistency and inter-rater reliability with k values ranging from 0.62 to 0.94.³⁹ The interview is semi-structured and should be performed in a highly conversational style. If items are endorsed, the patient is asked to describe in more detail the experiences in question (i.e., a disturbed sense of identity) in his/her own words and to give concrete personal illustrating examples.

Diagnoses

Most mental disorders in childhood and adolescence have substantial symptomatic overlap, a considerable level of comorbidity, limited temporal stability, and the reports from multiple informants are therefore invaluable (patient, clinicians, parents, teachers). Facing these challenges, single 'main' diagnoses are of limited value. To get a clinical, real-world picture of our patient group - adolescents at risk of psychosis - we still chose to present the principal clinical diagnoses, achieved through all-data consensus assessments in multidisciplinary teams.

Procedure

Patients fulfilling the formal criteria of CHR-status on the SIPS/SOPS and subsequently also *confirming* at least three clearly articulated and prototypical items in the EASE manual, were included in the main study. LB conducted both SIPS- and EASE-interviews. The EASE-interviews were videotaped, and after scoring, they were evaluated, discussed, and confirmed in close dialogue with PM (one of the main authors of the EASE). Transcripts from the videotaped EASE interviews were read and re-confirmed by the patient, whereupon he or she was encouraged to choose three personally significant, well manifested, and clearly expressed personal ASEs. For the sake of authenticity and verifiability, all these ASE phenomena were analyzed and used as precise quotations, formulated in the client's own words in the form of short statements. This amounted to a total of 90 statements (3 × 30) which comprise the basis for the present analyses.

Analyses

We followed the principles for Interpretative Phenomenological Analysis (IPA) by Smith et al.⁴⁰ An essential element of IPA is to examine the structure of experiences precisely as they are. It is a method involving detailed in-depth examination of the lifeworld, subjective experiences, and sense-making of each individual, often documented in transcripts as the main source for data analysis. Four quality indicators of IPA is suggested by Nizza et al.⁴¹ (2021), 1) constructing a compelling, unfolding narrative, 2) developing a vigorous experiential and/or existential account, 3) close analytic reading of participants' words, 4) attending to convergence and divergence.

Since our study explicitly explored language aspects in the descriptions of BSD, the analyses were conducted by close reference to linguistic categories, attention to similar patterns across the sample, but also a preconception of BSD from the authors' clinical experience and research background. We constructed a linguistic narrative of BSD across the themes, developed an existential account by focusing on the participants' experience of their situatedness in the world, and of course a

close analytic reading of the participants’ words. However, our analysis deviated from the criteria of idiography by paying less attention to convergence and divergence in the statements. Thus, we performed an adapted form of IPA-analysis. A first step of the analysis was to narrow down the material into a manageable amount of text. For this purpose, LB (first author) randomly selected 30 statements from the total number of 90. The sentences were initially broken down, identifying any distinct language features (grammatical irregularities, prominent words). In the next step, connections between the identified language features were noted and grouped together according to linguistic similarities. After this, LB and PM re-read the 30 statements and searched for concordant, modified, or new language features and verified the consistency of meaning. The identified features were organized into higher order linguistic clusters (semantic, morphological, syntactic) and each cluster was provided with a descriptive, thematic label. A final list of five linguistic clustering clusters (codes A–E) was compiled and was applied to classify the totality of 90 statements.

Role of the funding source

The funders of the study had no role in the study design, data collection, data analysis, writing of the report or the decision to submit the paper for publication.

Results

Sample characteristics

Baseline sociodemographic and clinical data of the participants are shown in Table 1.

Number of participants; N	30
Female gender; N (%)	18 (60)
Mean age (years)	16.1
School attendance; N (%)	
Full time	24 (80)
Part time	4 (13)
Dropped out	2 (7)
ICD-10 clinical consensus diagnoses; N (%)	
Affective disorders (F30–F39)	6 (20)
Anxiety, dissociative, stress-related, somatoform and other nonpsychotic mental disorders (F40–F48.9)	9 (30)
Developmental (F80–F89)	3 (10)
Attention-deficit hyperactivity disorder (F90)	5 (17)
Symptoms, Signs and Abnormal Clinical and Lab Findings (R codes)	7 (23)
Scale of psychosis-risk symptoms (SOPS); mean score (range)	10.6 (4–18)

Table 1: Sociodemographic and clinical characteristics.

We identified five major linguistic clusters across the 90 statements. These were: a) distinctive and prominent words relating to ASE, b) irregular use of prepositions as to place and location, c) shifts of personal pronouns, d) use of conjunctions and metaphors, and e) idiosyncratic use of adjectives and perceptual modalities. Examples of the representative statements are presented in the panels 2–6 with reference to each cluster (A–E).

Cluster A. Distinctive and prominent words of ASE – indicating an atmosphere of unreality

We identified several recurring and analogical adjectives and nouns in the adolescents’ descriptions of ASE. Examples of recurring adjectives were ‘unreal, blurry, fake, artificial, dream-like’ (See Fig. 1). These words seemed to describe a fundamental experience of altered, strange and distant reality feeling, often by reference to nouns such as ‘everything, the whole world, my mind, consciousness’. Particularly frequent words used by the adolescents were ‘blurry’ and ‘fake’. ‘Blurry’ is generally an adjective referring to the quality of a disturbed visual experience. However, in the present statements, the adolescents used this word in a two-fold way. Firstly, they reported a specific feeling of a seemingly affected or disturbed vision as expressed in the statement “I feel that my vision is blurry”. Two patients had even sought optometrist regarding their eyes and vision, but without any relevant findings. A second connotation of the word

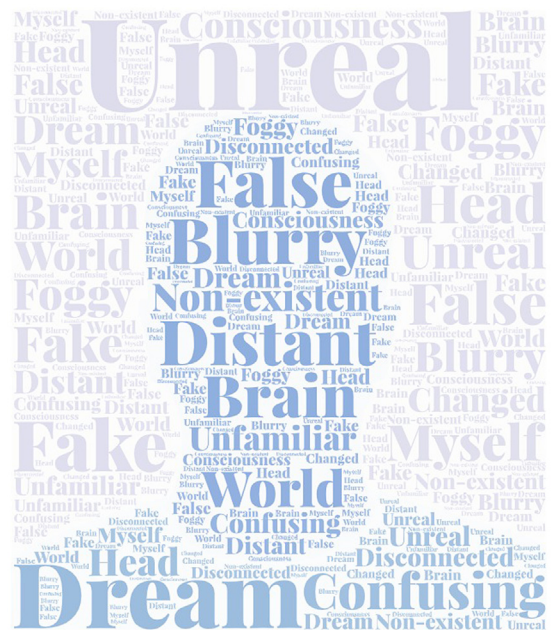


Fig. 1: Word cloud of prominent words in the patient descriptions of ASE. The word size is not relative to frequency.

'blurry' was found in the descriptions of the nature of thoughts and consciousness in statements like "my consciousness feels blurry". The words 'fake' and 'false' seemed to be an experience of oneself or the surrounding world as an artificial construction or copy. Other related words used were 'unreal' or 'dream'. Through references to 'everything' or 'the whole world', this was clearly an overriding and inescapable aspect of their feelings, relational experiences, and perceptions. Some of the adolescents in the upper age level used the word 'existence' frequently and in several grammatical forms, examples are; 'exist', 'nonexistence', 'not existing'. Some statements were marked by connotations of 'existence' like for example 'to be real'. We noticed that the use of these words were not necessarily representations of inconspicuous philosophical reflections but rather an overwhelming and non-autonomous experience of metaphysical discomfort.

I feel that my vision is blurry	I'm wondering if I even exist
My thoughts are disconnected the whole time, they are blurry	The world is like a dream in someone else's head
It's like I'm someone else, a fake person	I feel that I have changed in a strange way
My memories are false like they're coming from a video game	All the time I have this feeling that I'm waking up from a dream
Everything is like a dream and I feel that I can control everything, because nothing is real	I don't know who I am, it's like having an unfamiliar relation to something very well known
It feels like everything is unreal and that I have crafted everything	Time is confusing , it's as if everything happened one second ago
I need to touch myself to know if I really exist	I'm lacking myself
It's a feeling of not having existed before this actual moment	I wonder if things and people around me exist . I need to touch, take an extra look to confirm

Panel 1. Cluster A: Distinctive and prominent words of ASE

Cluster B. Irregular use of prepositions – indicating experiential detachment, or transition from presence to distance

Some statements were characterized by an unconventional use of prepositions describing the relation to placement and positions. In our sample, prepositions that are usually applied to indicate presence in, inhabiting or integration into something, were exchanged with prepositions to indicate separation, distance or detachment. The use of prepositions in common phrases such as 'in the world' or 'in myself' were replaced by prepositions such as 'outside', 'far away', or 'distant from'. These experiential statements seemed to differ from an experience of intentional or passive withdrawal or removal related to social impairment or a typical loss self-esteem in teenage. Rather, they were expressed as an experience of being apart from, or separated from, in the meaning of not being *able to reach out*, or to be *let in*,

because of a mental, metaphysical, or almost physical detachment or hindrance to the world. This phenomenon is also illustrated by a statement such as "It feels like everything is distant". Furthermore, the use of prepositions turned abstract ideas into something tangible. One example is from the quotation "outside consciousness", where outside indicates an almost physical relation to something fully abstract, rather than a mental one. In this way, consciousness was described as an almost physical object rather than the abstract yet familiar phenomenon we normally take it to be. This is further illustrated by the use of verbs such as 'standing' or 'floating' (in an active/behavioural way) in relation to an abstract use of nouns such as 'world' in the sentence "standing far away from the world" or "floating off the world". Again, this gives the impression of a quite literal, almost physical experience of being 'cut off' rather than in the usual metaphorical sense.

I am not in this world , I'm standing far away	In a strange way, it feels like I am placed out of reality
I am floating off the world , I'm sitting behind a glass wall	I am moving out of myself
The thoughts are outside of my consciousness	I feel like I'm not on the earth, as if I had been removed from the world
I'm outside my body	My consciousness steps out for a bit
My thoughts are passing to the side . It feels like my thoughts are on autopilot	It feels like everything is at a distance .

Panel 2. Cluster B: Irregular use of prepositions

Cluster C. Metaphors and subordinating conjunctions – indicating deep experiential insecurity and ambivalence

The statements included a conspicuous and extensive use of subordinating conjunctions 'in a way, as if, seems like'. Conjunctions like 'feel like' and 'as if' indicated an ambivalence and deep doubt or insecurity that did not fade away, towards the reality status of their experiences. This element was further explored in analyses of figurative language and the widespread use of metaphors. We noted a fuzzy border between the symbolic and literal meaning of metaphors. Two participants reported that they had daily moments of being slightly uncertain whether they were asleep or awake (not related to waking up or falling asleep) and were anxious when they attended school and were together with family and friends when they had this experience. Hence, we understood 'dream' not only as a simple metaphor but more literally, as an overwhelming experience of unreality, which caused fear and confusion. The accompanying use of conjunctions stresses the ambivalence and therefore an essential contrast to delusional convictions and fixed beliefs manifested in the case of definite psychotic symptoms.

<i>I feel like I'm not in this world,</i>	<i>It's like everything is arranged, as a theatre</i>
<i>It is as if my thoughts were not my own thoughts</i>	<i>I have a flying brain or several brains, in a way</i>
<i>The world is like a dream in someone else's head</i>	<i>My thoughts are just nonsense, it is almost like a sort of baby language</i>
<i>I can't understand who I am, it's like I've bought another body with its own thoughts</i>	<i>All the time I pose the question: is it real? Because everything feels like a cartoon</i>
<i>My thoughts are on autopilot, as though my real thoughts have been put aside</i>	<i>It's like seeing out from the eyes from a body I have bought or a robot put aside</i>
<i>I feel like I'm seeing everything from the outside, like a movie</i>	<i>It's like being blocked inside something</i>

Panel 3. Cluster C: Metaphors and subordinating conjunctions

Cluster D. Pronouns oscillating between 1. and 3. personal perspective - indicating identity confusion and diffusion

In several formulations, even occurring in one and the same sentence, first person pronouns like 'me' or 'I' shifted to a third person pronoun despite the persons referring to themselves, and these shifts in pronouns did not involve referring to an imaginary person or instance. Our finding was also supported by similar descriptions in other, more direct formulations, for example "it's like I'm someone else", "I have this peculiar feeling that I do not know myself, that I am a stranger", or "I have the experience that other people are thinking for me". Due to the overt and strong doubt that is simultaneously expressed through the extensive use of conjunctions 'feel like', 'wonder if' etc. (outlined under cluster C), these features in language were clearly not fully psychotic experiences. Some used the word 'robot' to describe this experience of themselves, for example in "It's like seeing out from the eyes of a body I have bought, or from a robot". Again, this was rather an awareness of altered functionality of the 'me-ness' experience as something mechanical and objectified, not an explicit psychotic experience of something or someone else.

<i>I look at myself and then I wonder who she is.</i>	<i>It's like some of my thoughts are placed in me while other thoughts are placed in the body I live in</i>
<i>My thoughts don't feel like mine, it's like her thoughts</i>	<i>When I look at something, I often get this strange feeling that another person is looking out of my eyes</i>
<i>My body feels like another person's body, who is she?</i>	<i>I can see myself in the mirror and then I can't recognize either the appearance or the personality of that person</i>
<i>My thoughts feel as if they belong to another person</i>	<i>Sometimes I wonder if I am just a girl that I have made up</i>

Panel 4. Cluster D: Pronouns oscillating between first- and third-person perspective

Cluster E. Idiosyncratic use of adjectives and nouns - indicating transcendence of perceptual modalities

In most cases, adjectives in the statements were properly used, but several times in an unusual way, by for example giving normally inanimate nouns more active/behavioural or illogical properties. Nouns or concepts normally associated with a certain abstractness and physical inaccessibility turned into physical or somehow life-like/animate entities. In one of the statements, this phenomenon was manifested by a noun being turned into a verb, in for example the noun 'human' turning into the verb 'to human' (see Panel 5.). This is obviously connected to the severe identity alteration and the associated confusion of what it is to be a human, thus making it all instrumental and more manageable. Likewise, thoughts were described as having illogical properties, such as being visible or moveable. As such, thoughts were described in spatial, physical or perceptual terms, implying the possibility of seeing, hearing, touching, localizing or moving thoughts. Thoughts and consciousness could also be described as having spatial properties, as for example in the statement "my thoughts are located in the left part of my forehead".

<i>I have a flying brain</i>	<i>Others are humaning while I'm not humaning</i>
<i>There are loud-sounding thoughts in my head</i>	<i>I have this weird experience of my thoughts being read aloud from a book or a manuscript</i>
<i>My thoughts are blurry</i>	<i>I experience my thoughts like a loud reading of the alphabetic letters</i>
<i>I see my thoughts as subtitles, like in a video</i>	<i>I can almost hear that my thoughts make sounds</i>

Panel 5. Cluster E: Idiosyncratic use of adjectives and nouns

Discussion

We extracted and analyzed language features of 90 selected personal statements from the EASE interview from 30 adolescents experiencing basic self-disturbances. The statements represent verbatim spontaneous formulations by the adolescents, chosen and formulated by themselves. By an adapted form of the IPA-method, based on a linguistic conceptual framework and the concept of BSD, these statements were analyzed and thematically grouped into five linguistic clusters (A-E): (A) Distinctive and prominent words, indicating an atmosphere of unreality, (B) Irregular use of prepositions, indicating experiential detachment, (C) Metaphors and subordinating conjunctions, indicating deep experiential insecurity, (D) Pronouns oscillating between first- and third-person perspective, indicating identity confusion, and (E) Idiosyncratic use of adjectives and nouns, indicating transcendence of experiential modalities.

Taken together, the linguistic features of the five identified clusters seemed to describe, from different angles, one of the fundamental and intriguing experiences of BSD, namely the overriding existential perplexity and confusion towards themselves, their identity and the surrounding world. Prominent words like ‘artificial’, ‘unreal’ and ‘machine-like’, and the extensive use of subordinate conjunctions attached to metaphors by reference to a state-like atmosphere of being in a dream and for some even confusion about being awake or dreaming documented this experience. Furthermore, it disclosed an invisible and unclear border between the basic/nonliteral and the literal meaning in the use of metaphors. The intensity of the experience seemed almost physical and so intriguing that the distinction between the literal and the allegorical meaning seemed somewhat disrupted. This also brings on to a well-known clinical phenomenon described in the psychosis and BSD literature, the so-called ‘double book-keeping’, a partly preserved ability to distinguish between disturbed experiences from the intersubjective, socially shared worlds.^{42,43}

Shifts from first-personal to third-personal perspectives (Cluster D) are well known in the BSD-literature, indicative of another core element of the BSD experiences; a distance to, and detachment from the self. In cluster B the replacements of prepositions signaling detachment and distance from other normally integrated entities like oneself, thoughts, body also relates to the BSD phenomena of not experiencing the natural primary presence in the world. The phenomena of detachment was further documented in the descriptions of an almost physical barrier or hindrance between oneself and the world around, or between the self and one’s own mental apparatus or body. Cluster E unites the types of metaphysical alterations of common logical perceptual modalities like ‘seeing’ or ‘hearing’ thoughts. As a parallel to the use of metaphors, we did not interpret these descriptions only figuratively, but quite literally, regarding them as reports of raw and remarkable experiences which had caused confusion.

Language and speech are primary sources and tools for clinicians to identify and treat mental disorders. The therapist’s ability to understand their patients is a prior condition for every therapeutic setting.^{44,45} However, ‘understanding’ in the clinical meaning of the word is a multi-faceted concept that applies to a variety of therapist functions, such as recognizing symptoms, identifying oneself cognitively and emotionally with the patient and empathic listening. Understanding, in the basic phenomenological sense, is to relate to subjective experiences and fundamental existential concerns, to explore the other person’s way of ‘being-in-the-world’.⁴⁶ The phenomenological approach to understanding another human means to understand how she finds herself situated in the world as described from the first-person point of view. In psychotherapy this means

paying attention to the ontological dimension of the patient’s experiences.⁴⁷ The linguistic features we identified can be seen as parts of a unique language with a certain vocabulary, grammar, and metaphors. By attending to a patient’s chosen metaphors, words, concepts, and linguistic structure, a clinician stands to gain a deeper understanding of the patient. From the perspective of the individual development of psychosis, the linguistic features we identified, can be seen as precursors to clearly identifiable psychotic delusions. Clearer distinctions between phases of the disorders could provide valuable information for clinical decision making regarding treatment and course of the disorder. Identifying these linguistic features may lead to new and sounder interpretations of disturbed experiences, providing a base for further therapeutic explorations and interventions.

With the aim of improving precision in the prediction and early detection of psychosis in general, promising efforts have been made to characterize early subtle language disturbances in CHR-individuals using linguistic analysis.^{22–24} The linguistic markers of BSD we present, however, seem qualitatively different from the linguistic markers analyzed in studies of CHR patients so far. Therefore, the linguistic markers we identified may serve as further clinical risk markers in the detection of even earlier occurring phenomena specifically linked to schizophrenia spectrum disorders. Experiencing a disordered self is not necessarily the same as having the well known conventional language disturbances, such as reduction in syntactic complexity (concrete speech, poverty of speech), loss of semantic coherence, or the disruption in flow of meaning in language (derailment, tangentially). Rather, we identified the BSD language features as strikingly precise, genuine, ‘reasonable’, and coherent descriptions of highly deviant and confusing underlying experiences. At this pre-psychotic stage, language is not necessarily characterized by *disorganized* speech, latency, or incoherence but by other initially less conspicuous language features often camouflaging the possible pre-psychotic nature of experiences. If it is the case that language in patients with BSD differs qualitatively from language in ‘ordinary’ high-risk youth, based on conventional linguistic markers of psychosis (i.e., illogical thinking, disorganized or poverty of speech), the question is whether automated speech analysis of BSD can increase predictive power beyond CHR speech analyses. Considering that the language features we identified were clearly present at a young age (mean = 16 yrs), there is a potential in the CHR-group of identifying subtle signs earlier in adolescence, and of differentiating more reliably between symptoms.

Although clinicians can detect disorganized speech/risk of psychosis based on clinical observations or clinical instruments, research data on CHR evaluations suggest that automated analytic methods may allow for

superior assessment.²⁵ Considering our present findings, the question arises as to whether linguistic analyses can be useful as a supplementary diagnostic tool in the detection of BSD. Like many other clinical interviews, the EASE interview is time-consuming due to its detailed design and exploratory nature, requiring high expertise and extensive training. Alongside future developments and validations of shorter screening versions of the EASE interview, automated language analysis of speech or written texts could be an effective supplementary way to identify BSD. Often, adolescents with BSD do not speak about their experiences to others, and CHR language characteristics like loss of semantic coherence, disorganization, or reduced flow are not necessarily yet present or identifiable in the natural language of persons experiencing BSD. Thus, improving detection of BSD by automated language analyses may require more tailored language analyses. This could be analysis of speech or written texts on certain topics relating to existential thoughts, sensations, and the experience of oneself. Our study suggests that linguistic markers of BSD represent new information which is relevant for the AI-approach in early intervention of SSD. If further refined, these markers may complement the AI-approaches with more precise and targeted analyses. This could elicit poorly accessible information, detect comorbidity and facilitate targeted early intervention.

A central strength of this study is the uniquely comprehensive material of self-prioritized BSDs, triggered by and retrieved via the specifically targeting EASE manual, and the solid bottom-up design that this ensures. The striking consistency of the types of irregular language and linguistics also contributes to its validity. The study thus demonstrates how the subtle and peculiar experiences of BSD are described by patients in a remarkably consistent and irregular linguistic pattern, which provides important insights into certain characteristics of language anomalies in these conditions, and may guide future studies in distinguishing individuals with BSD and CHR in initial phases of psychosis. Taken together, this contributes to further development of staging models in preventing progression, promoting personalized interventions, and improving outcomes of psychotic disorders, in particular schizophrenia spectrum disorders.

There are still many obstacles to overcome in the process of constructing initial linguistic algorithms for the future purpose of more reliable identification of BSD. Studies should develop more fine-grained methods to capture these language features in larger samples, and in other patient groups.

Contributors

L.B. and P.M. initiated the study. L.B. collected the data, L.B. and P.M. analyzed the data, L.B., P.M. and J.I.R., surveyed initial analyses and interpretation. L.B. drafted the manuscript. L.B. drafted the manuscript,

with ongoing edits and contributions from P.M. All authors edited and approved the final version.

Data sharing statement

Anonymized transcripts are available on reasonable request to the corresponding author. Data that could identify participants will not be provided.

Declaration of interests

All other authors declare no competing interests.

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