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Disorders of oral narrative connectivity in adults diagnosed with schizophrenia: a scoping review*

Abstract: Deficits in discourse production are a characteristic feature of the language of individuals diagnosed with schizophrenia. A large body of research concerns the connectivity of oral narratives produced by such individuals. With the International Classification of Functioning, Disability and Health (ICF) (WHO 2001) becoming a pivotal framework in speech-language pathology clinical practice and research, continuing systematic research of this area seems to be of prime importance. Using the PRISMA-ScR methodology, a scoping review was conducted to examine the current state of knowledge on the cohesion and coherence of oral narratives in schizophrenia and to determine the main themes present in the international literature. The direct motivation for the present scoping review was to determine the dominant themes in the subject literature to plan further research using Polish language data. A thematic content analysis of the information extracted from the literature identified three themes described in the report: 1) description and classification of oral narrative connectivity deficits, 2) sources of oral narrative connectivity deficits, and 3) comparison of oral narrative connectivity disorders in schizophrenia and other diseases.

Keywords: schizophrenia, coherence, cohesion, narrative, discourse, scoping review

Zaburzenia spójności narracji ustnych u osób dorosłych ze zdiagnozowaną schizofrenią: przegląd zakresu literatury

Streszczenie: Deficyty w produkcji dyskursu są charakterystyczną cechą języka osób z diagnozą schizofrenii. Duża część badań dotyczy spójności narracji ustnych tworzonych przez takie osoby. W sytuacji, gdy Międzynarodowa Klasyfikacja Funkcjonowania, Niepełnosprawności i Zdrowia (ICF) (WHO 2001) staje się kluczową ramą w praktyce klinicznej i badaniach naukowych w zakresie patologii mowy i języka, kontynuacja systematycznych badań w tym obszarze wydaje się mieć pierwszorzędne znaczenie. Wykorzystując metodologię PRISMA-ScR, przeprowadzono przegląd

* The research was carried out as part of our own work.

zakresowy w celu zbadania obecnego stanu wiedzy na temat kohezji i koherencji narracji ustnych w schizofrenii oraz określenia głównych tematów obecnych w międzynarodowej literaturze. Bezpośrednią motywacją do przeprowadzenia niniejszego przeglądu zakresowego było określenie dominujących tematów w literaturze przedmiotu w celu zaplanowania dalszych badań z wykorzystaniem danych polskojęzycznych. W wyniku tematycznej analizy treści informacji wyodrębnionych z literatury zidentyfikowano trzy tematy opisane w raporcie: 1) opis i klasyfikacja deficytów w zakresie spójności narracji ustnej, 2) źródła deficytów w zakresie spójności narracji ustnej oraz 3) porównanie zaburzeń spójności narracji ustnej w schizofrenii i innych chorobach.

Słowa kluczowe: schizofrenia, koherencja, kohezja, narracja, dyskurs, przegląd zakresu literatury

Mental illnesses cause disorders in determining the relationship between stimuli received by the sense organs and the creation of mental representations and distortions in perceiving and defining reality. Thinking disorders manifest themselves through speech disturbances, i.e. the statements of people with a diagnosis of mental illness often are inadequate, unproductive and uncommunicative (Grzywa, 2005; Merrill et al., 2017; Radanovic et al., 2012; Rybakowski et al., 2010). Due to the difficulties in communicating their feelings, intentions and needs, people with psychotic features need psychiatric care and speech therapy.

Among psychotic patients, those with a diagnosis of schizophrenia present the greatest therapeutic challenge. Schizophrenia is considered the most debilitating disease, because it concerns the essence of being human, i.e. personality and intelligence (Lieberman et al., 2006). To understand the functional limitations of people with schizophrenia, a distinction must be made between positive and negative symptoms (Kirkpatrick et al., 2006). Positive symptoms, also known as productive symptoms, mean experiencing stimuli that are absent in normal mental functioning, such as delusions or hallucinations. Negative symptoms are also called deficit symptoms because they result in some loss of the ability to experience and express emotions. Positive symptoms usually appear episodically and are characterized by a rapid onset and remission, while negative symptoms are usually stable and long-lasting (Kay et al., 1987). Periods of remission, therefore, do not indicate a full recovery (Meder, 2004). Schizophrenia also means a decrease in life energy, a decrease in motivation to undertake activity, and limitations in emotional and verbal expression (Gałecki & Szulc, 2018). The occurrence of such symptoms affects social functioning and limits the patient's ability to live independently. Schizophrenia often affects young people, entering adulthood and professionally the most active, preventing them from taking up or keeping a job (Wójciak et al., 2017). Due to significant differences between positive and negative symptoms in terms of their course, content and how they manifest, it is crucial to understand the coping strategies used for each type of symptom. Treatment of schizophrenia and therapy related to maintaining and/or improving individual cognitive and communication functions is a complicated process, requiring specialists to cooperate with patients and their environment as well as

a holistic, but at the same time individualized approach to the patient, based on the most current scientific knowledge, including linguistic research (Ratner, 2006).

Speech deficits in schizophrenia concern both the linguistic and the communicative levels of interaction (Bellani et al., 2009). Andreasen's (1979) report, which today can be regarded as historic, described the syntax of schizophrenics' speech as normative, even though the discursive organization of their speech was completely broken. Schizophrenics' preserved sensitivity to syntactic boundaries was also pointed out (Carpenter, 1976; Rochester et al. 1973). It is now believed, however, that despite the correct application of syntactic rules, people with schizophrenia present disturbed complexity (DeLisi, 2001; Tavano et al., 2008). This thesis is confirmed by the results of imaging studies, showing differences in correlation patterns between the brain activity and the complexity of produced sentences of patients suffering from schizophrenia and healthy individuals (Kircher et al., 2005).

Comprehension of syntax has also been described as impaired (Bagner et al., 2003; Lelekov et al., 2000). Spontaneous morphology disorders in the language of schizophrenics are rare (Chaika, 1990; Covington et al., 2005). A characteristic feature of schizophrenia, however, is a semantic deficit (Andreasen & Grove, 1986). Andreasen (1979) indicated that the speech of patients with schizophrenia is characterized by difficulties in finding words, which may result in distorted speech or use of numerous neologisms. Similar semantic disorders were also observed in people with schizotypal personality traits (Kiang & Kutas, 2005). At the pragmatic level, language comprehension dysfunctions have been observed, manifested by concretism, consisting in the inability to identify figurative expressions (Deamer et al., 2019; Kircher, et al., 2007). Research also indicates schizophrenics' difficulties in understanding metaphors (Deamer et al., 2019; Mossaheb et al., 2014; Thoma et al., 2009), idioms (Sela et al., 2015), proverbs (Haas et al., 2014; Mitchell & Crow, 2005; Thoma & Daum, 2006), irony (Rapp et al., 2013) and sarcasm (Kantrowitz et al., 2014).

Deficits in discourse production are a characteristic feature of the language of individuals diagnosed with schizophrenia (Gernsbacher et al., 1999). The term "discourse" refers to the use of language in context (Thomson, 2003; Armstrong et al., 2007) and often means any string of words longer than a single sentence (Schiffrin et al., 2001; Halliday & Matthieson, 2004). Rhetoricians, linguists, and other language experts have created different typologies of discourse, but the division of discourse into descriptive, narrative, expository and argumentative could be considered the most elementary (Brooks & Warren, 1949). The present review concerns the oral narrative of individuals diagnosed with schizophrenia. We understand the narrative as a form of presentation reproducing events in cause-and-effect sequences, justifying these sequences, and informing about situations and relations (Sierotwiński, 1986). The term 'discourse connectivity', used in the present review, refers to the internal structure of discourse, which consists of rela-

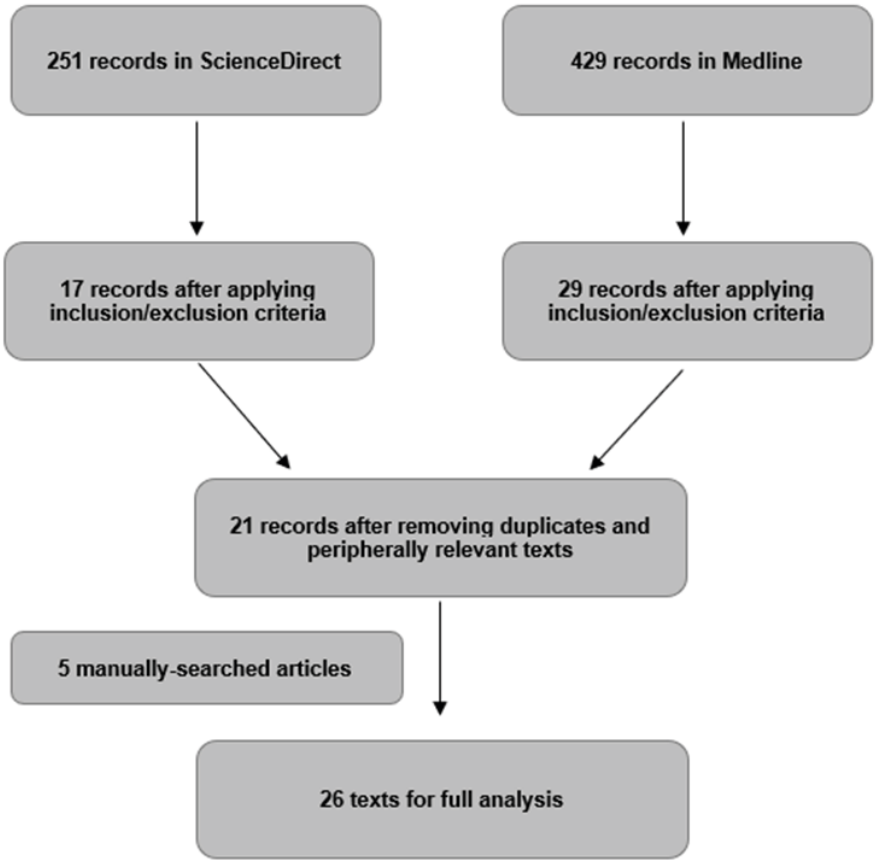
tions between subsequent elements of this structure and the organization of larger units of the discourse structure into a semantic whole. Cohesion is most often understood as the surface (structural) connectivity of a text, achieved explicitly between sentences through a network of lexical and grammatical means. Coherence is understood as the semantic (thematic) connections of an utterance, which is often divided into local coherence, i.e. occurring between consecutive sentences or other conceptual units, and global coherence, i.e. occurring between individual conceptual units and the topic of the text (Linnik, 2022).

Continuing research on the connectivity of oral narratives of individuals diagnosed with schizophrenia seems to be important for modern speech therapy. According to the International Classification of Functioning, Disability and Health (ICF) (WHO, 2001), the psychosocial aspects of diseases and disorders should be emphasized, including 'participation', understood as an individual's involvement in specific life events. Living together in society is conditioned by communication skills, and the task of a speech therapist is to treat deficits in these skills in people with communication disorders and to educate their communication partners. Discourse related knowledge is important, as speech/language diagnosis and therapy use a range of discursive strategies and techniques (Dipper & Pritchard, 2017). The direct motivation for the present scoping review concerning the cohesion and coherence of oral narrative in schizophrenia was to determine the current state of knowledge on this subject to plan further research using Polish language data. The study was guided by the general research question: What are the main themes in research reports devoted to the cohesion and coherence of oral narratives produced by individuals diagnosed with schizophrenia?

1. Research methodology

The present study used the scoping review methodology (Arksey & O'Malley, 2005) with additional guidance from the PRISMA-Scr protocol (PRISMA Extension for Scoping Reviews) (Levac et al., 2010; Tricco et al., 2018). The scoping review is commonly used in medicine, health sciences and speech/language pathology to synthesize research findings to identify research gaps and direction of further research, and to develop evidence-based clinical guidelines (Dollaghan, 2007). For example, Ibrahim et al. (2013) used the PRISMA-ScR methodology to determine the scope of knowledge on the prevalence of depression in college students; Cusimano et al. (2017) to determine the extent of knowledge on 30-day readmission after cranial neurosurgery; and Wren et al. (2018) to describe and classify interventions for speech and voice disorders in preschool children.

Figure 1.
The data searching process and results



Source: Own research.

Table 1.

Reference literature included in the analysis

Title and authors	Participants and data elicitation	Major findings	Theoretical and previous research foundations
1. *Computational analysis of spoken language in acute psychosis and mania* (Girard et al., 2021)	38 individuals with either schizophrenia, bipolar disorder, major depressive disorder, or a related condition. Semi-structured interviews & clinical interviews/tests.	Experiencing negative symptoms was associated with the production of more words expressing negative emotions and fewer expressing relativity in time and space.	Impairment in language expression, termed clinically as *thought disorder* (Andreasen & Grove, 1986). Preliminary work from the group (Vail et al., 2018).
2. *Topic shifts in spontaneous interaction of speakers with schizophrenia: Cohesion and thematic structures* (Badash, 2021)	3 schizophrenics (1 focal & 2 additional). Semi-structured interviews.	Individuals with schizophrenia are unable to maintain semantic cohesion.	Message organisation in terms of topic and rheme (Daneš, 1974; Fries, 2002; Halliday & Matthiessen, 2013; Martin, 1992; Martin & Rose, 2007) and coherence (Halliday & Hasan, 1976; Martin, 1992; Martin & Rose, 2007).
3. *A cognitive model of diminished expression in schizophrenia: The interface of metacognition, cognitive symptoms and language disturbances* (García-Mieres et al., 2020)	201 individuals with schizophrenia or schizoaffective disorder. Semi-structured interviews & clinical interviews.	Disturbed language coherence in causal and intentional relationships partially depended on disrupted self-reflectivity.	Impairments in the self-reflectivity domain of metacognition (Lysakeret al., 2015, 2020; Mcleod et al., 2014).

Table 1.

Reference literature included in the analysis (cont.)

Title and authors	Participants and data elicitation	Major findings	Theoretical and previous research foundations
4. *Piecing together fragments: Linguistic cohesion mediates the relationship between executive function and metacognition in schizophrenia* (Lundin *et al.*, 2019)	54 schizophrenics, 40 individuals with schizoaffective disorder. Semi-structured interviews & clinical interviews/tests.	Deep cohesion significantly correlates with inhibition and monitoring.	Executive function deficits may contribute to impairments in metacognition (Lysaker et al., 2008) and related abilities of perspective-taking (Long et al., 2018; Wardlow 2013) and ToM (Wade et al. ,2018).
5. *Evidence of disturbances of deep levels of semantic cohesion within personal narratives in schizophrenia* (Willits et al., 2018)	200 individuals with schizophrenia or schizoaffective disorder, 55 individuals with a diagnosis of HIV +. Semi-structured interviews.	Schizophrenics produced fewer causal, logical and contrastive conjunctions.	Schizophrenics experience stigma, demoralization and social alienation, which likely influences how they think and talk about their lives in ways that may extend beyond their illness (Ehrlich-Ben Or et al., 2013).
6. *Grasping the mechanisms of narratives' incoherence in schizophrenia: an analysis of the temporal structure of patients' life story* (Allé et al., 2016)	20 schizophrenics, 21 controls. Narration of their life story & clinical interviews/tests.	Temporal coherence of life narratives is significantly reduced in schizophrenics.	Impairment in life narratives of patients with schizophrenia (Allé et al., 2015).
7. *The communicative impairment as a core feature of schizophrenia: Frequency of pragmatic deficit, cognitive substrates, and relation with quality of life* (Bambini et al., 2016)	47 schizophrenics, 35 controls. Semi-structured interviews & clinical interviews/tests.	Schizophrenia limits pragmatic competence, closely related to discourse planning.	Relationship between pragmatic performance and symptoms (Rapp et al., 2014; Mossaheb et al., 2014) or no association between though disorders and high-level language functioning (Schettino et al., 2010) / conversational abilities (Linscott, 2004).

Table 1.

Reference literature included in the analysis (cont.)

Title and authors	Participants and data elicitation	Major findings	Theoretical and previous research foundations
8. *Life story chapters and narrative self-continuity in patients with schizophrenia* (Holm et al., 2016)	25 schizophrenics, 25 controls. Narration of their life story & clinical interviews/tests.	Fewer negative symptoms in patients associated with more causally coherent life stories.	Mental time travel deficits in patients with schizophrenia (Suddendorf & Corballis, 2007; Tulving, 2002). Patients' narrations of their entire lives (Allé et al., 2015; Allé et al., 2016).
9. *Impaired coherence of life narratives of patients with schizophrenia* (Allé et al., 2015)	27 schizophrenics, 26 controls. Narration of their life story & clinical interviews/tests.	Difficulties in generating coherent speech linked to deficits in episodic memory, attention and executive functions.	Autobiographical memory in schizophrenia (Bennouna- Greene et al., 2012; Cuervo-Lombard et al., 2007; D'Argembeau et al., 2008; Dimaggio et al., 2012).
10. *Evidence of pragmatic impairments in speech and proverb interpretation in schizophrenia* (Haas et al., 2014)	15 schizophrenics, 7 controls. Semi-structured interviews & clinical interviews/tests.	Schizophrenia is a condition that limits pragmatic capacities, which affects both comprehension and production.	Impairment at the pragmatic level in schizophrenia (Brüne & Bodenstein 2005; Mitchley et al., 1998).
11. *Linguistic production and syntactic comprehension in schizophrenia and bipolar disorder* (Perlini et al., 2012)	30 schizophrenics, 30 individuals with bipolar disorder. Story-telling elicited with picture-story description task & clinical interviews/ tests.	Macrolinguistic processes influence microlinguistic processes.	Previous studies have not produced conclusive results regarding potential similarities and differences in language processing in people with schizophrenia and bipolar disorder (e.g. Lott et al., 2002; Ragin & Oltmanns, 1987; Taylor et al., 1994).

Table 1.

Reference literature included in the analysis (cont.)

Title and authors	Participants and data elicitation	Major findings	Theoretical and previous research foundations
12. *The relationship between incoherent speech and different types of delusions and hallucinations in schizophrenics with positive symptoms* (Momeni & Raghibdoust, 2012)	18 schizophrenics. Spontaneous speech during casual conversation with the clinician.	Schizophrenics' speech incoherence may be explained by deficits in Theory of Mind (ToM).	The origin of speech problems among schizophrenic patients lies in the Theory of Mind (Abu-Akel, 1999, 2008; Bright-Paul et al., 2008; Brune, 2005; Frith, 2004;).
13. *Quantitative criteria of narrative coherence and complexity in persons with paranoid schizophrenia* (Saavedra, 2010)	18 schizophrenics. Semi-structured interviews.	Schizophrenics had difficulties with semantic cohesion, e.g. they created neologisms and improperly contextualized references.	Disintegration of inner dialogue between different dimensions of identity in persons with schizophrenia (Lysaker & Lysaker, 2002).
14. *Symptoms of schizophrenia and social cognition* (Shean & Meyer, 2009)	54 individuals with schizophrenia or schizoaffective disorder. Clinical interviews/tests including picture-story description task.	Negative symptoms associated with significant deficits in the ability to organize information about interpersonal events and understanding the intentions and motivations of others.	Studies of the relationship between negative and positive symptom patterns and social functioning (Brekke et al., 1994; Penn et al., 2008; Liddle, 1987).
15. *The language of schizophrenia: An analysis of micro and macrolinguistic abilities and their neuropsychological correlates* (Marini et al., 2008)	29 schizophrenics, 48 controls. Clinical interviews/tests including a single-picture and picture-story description task.	Microlinguistic errors result from macrolinguistic errors. Schizophrenics use empty speech filled with semantic paraphasias and derailments.	Disordered, filled with irrelevant pieces of information and derailments speech of schizophrenics (Andreasen, 1979) linked to the inability to use pragmatic rules & cognitive deficits (Neuchterlein et al., 2002), action planning, ordering and sequencing (Docherty et al., 2006; Woelwer & Gaebel, 2002,).

Table 1.

Reference literature included in the analysis (cont.)

Title and authors	Participants and data elicitation	Major findings	Theoretical and previous research foundations
16. *Cognitive correlates of schizophrenia signs and symptoms: I. verbal communication disturbances* (Berenbaum et al., 2008)	47 individuals with schizophrenia spectrum disorders (39 schizophrenics & 8 schizoaffective disorder patients). Clinical interviews/tests including picture-story description task	Discourse coherence is strongly influenced by working memory, as it is needed for the execution of the discourse plan.	Explanation for poverty of speech (Barch & Berenbaum, 1994; Costello & Warrington, 1989; Stolar et al., 1994).
17. *Quantifying incoherence in speech: An automated methodology and novel application to schizophrenia* (Elvevåg et al., 2007)	26 schizophrenics, 25 controls. Semi-structured interviews & clinical interviews/tests.	Patients with high levels of clinically assessed ThD generated fewer typical word associations.	As a symptom ThD is an important criterion in the diagnosis of schizophrenia (Bleuler, 1911; Kraepelin, 1919; McKenna & Oh, 2005) and may have significance prognostic (Andreasen & Grove, 1986; Harrow & Marengo, 1986).
18. *The cognitive origins of specific types of schizophrenic speech disturbances* (Docherty et al., 2006)	39 schizophrenics, 36 controls. Semi-structured interviews & clinical interviews/tests.	Speech coherence deficits are associated with cognitive dysfunction.	Schizophrenia involves marked deficits in attention (Nuechterlein, 2002), ordering and sequencing ability (Docherty et al., 2000; Woelwer & Gaebe, 2002).
19. *Narrative qualities in schizophrenia: associations with impairments in neurocognition and negative symptoms* (Lysaker et al.,2005)	16 schizophrenics, 9 individuals with schizoaffective disorder, 4 individuals with major depression, 8 legally blind individuals. Narration of their life stories & clinical interviews/tests.	Even schizophrenics who were cognitively functioning relatively well, when asked to tell their life stories, produced less coherent accounts of their disorder.	Schizophrenia spectrum disorders often involve a profound diminishment in people's ability to narrate their own lives in a full or coherent manner (Laing, 1978; Lysaker & Lysaker, 2001, 2002; Minkowski, 1987; Sass, 1994; Searles, 1965).

Table 1.

Reference literature included in the analysis (cont.)

Title and authors	Participants and data elicitation	Major findings	Theoretical and previous research foundations
20. *Personal narratives of illness in schizophrenia: associations with neurocognition and symptoms* (Lysaker et al., 2005)	38 schizophrenics, 14 individuals with schizoaffective disorder. Semi-structured interviews & clinical interviews/tests.	Increased positive symptoms resulted stories about the disease less organized by timeframe.	Lack of awareness in schizophrenia spectrum disorder has been linked to e.g. poorer social function (Francis & Penn, 2001; Lysaker et al., 1998) and vocational dysfunction (Lysaker et al., 2002).
21. *Quantitative assessment of the frequency of normal associations in the utterances of schizophrenia patients and healthy controls* (Maher et al., 2005)	43 schizophrenics, 25 controls. A single-picture describing task.	Schizophrenics produce high mean totals of associations, which indicates hyperactivity of associational networks.	Hyperactivity of associations may represent one of the implicit criteria by which thought disorder is judged to be present (Manschreck et al., 1988).
22. *Dynamical quantification of schizophrenic speech* (Leroy et al., 2004)	10 schizophrenics, 10 controls. Recalling the story after reading it aloud& clinical interviews/tests.	Schizophrenics have difficulty maintaininga discourse plan.	Deficits in contextual data integration, both at the neuropsychological levels (Cohen & Servan-Schreiber, 1992; Chapman et al. 1976; Plagnol et al., 1996) and neurological levels (Salisbury et al., 2002; Sitnikova et al., 2002).
23. *Influence of a working memory load manipulation on language production in schizophrenia* (Melinder & Barch, 2003)	44 schizophrenics, 3 individuals with schizoaffective disorder. Single-task interviews & clinical interviews/tests.	No direct impact of negative thinking disorders on discourse coherence deficits.	Correlations between deficits in tasks using working memory and global measures of formal thinking disorders and/or referential errors (Harvey & Pedley, 1989; Serper, 1993) and absence of correlations (Nuechterlein et al., 1986).

Table 1.

Reference literature included in the analysis (cont.)

Title and authors	Participants and data elicitation	Major findings	Theoretical and previous research foundations
24. *The effect of language production manipulations on negative thought disorder and discourse coherence disturbances in schizophrenia* (Barch & Berenbaum, 1997)	39 schizophrenics. Listening to two stories and then answering a series of questions after each story.	Fewer discourse coherence disorders were observed along with less verbosity and syntactic complexity.	Reduced verbosity, reduced syntactic complexity, and increased pausing tend to covary in schizophrenics (Alpert et al., 1993, Alpert et al., 1994; Barch & Berenbaum, 1996; Resnick & Oltmanns, 1984).
25. *Cohesion in schizophrenic narratives, revisited* (Chaika & Lambe, 1989)	14 schizophrenics, 8 manics, controls (number not specified). Narration about a previously watched TV program.	Schizophrenics created more newspeak and had fewer opportunities to use anaphora.	Research on schizophrenic narratives in terms of failures to employ the kinds of cohesive ties described in Halliday and Hasan (1976): pronouns, conjunctions, ellipsis, and words related to each other semantically (Rochester & Martin, 1979).
26. *A Comparative study of manic vs. schizophrenic speech disorganization* (Hoffman, 1986)	39 schizophrenics, 24 manics, 40 controls. Interviews.	More speech coherence deficits in schizophrenics with low levels of manic symptoms.	Manics and schizophrenics demonstrate major difficulties in generating a coherently organized stream of speech (Harrow et al., 1982).

1.1. Data sources and text selection

The authors used two full-text databases, ScienceDirect and Medline, which are the leading sources of information in the field of biomedical and health research (Figure 1). The database search lasted from June 2021 to January 2022. In the first stage of the research, the term "schizophrenia" was searched in conjunction with the terms 'cohesion' and 'coherence' in the abstracts of English-language articles. 251 records were obtained in ScienceDirect and 429 in Medline. At the next stage of text qualification, several inclusion and exclusion criteria were applied to the selected abstracts. It was decided that texts qualifying for further analysis must: 1) concern oral narratives of individuals diagnosed with schizophrenia, 2) present the results of empirical research, and 3) be published in scientific journals. Research reviews, theoretical papers, conference presentations, articles with incomplete data or articles published in popular science journals were excluded from further analysis, reducing the number of relevant articles to 17 from ScienceDirect and 29 from Medline. After excluding duplicate texts and those where the issue of narrative connectedness turned out to be peripheral, 21 articles found in databases and 5 articles found manually were finally qualified for the full thematic content analysis.

1.2. Data analysis

The analysis involved reading and searching the articles for information using a datasheet containing the following categories: 1) article title and authors, 2) research participants and methods of data collection, 3) main research findings and 4) theoretical basis and references to previous research (Table 1). The definitions of each category were developed jointly by the authors. To improve the quality of the analysis, the authors held regular meetings and negotiated decisions on qualifying the information contained in the articles. Information extracted from the research reports on the results and theoretical background of the studies (categories 3 and 4) was then subjected to thematic analysis, in accordance with the six analytical stages proposed by Braun and Clarke (2006), previously successfully used by Ford, Douglas and O'Halloran (2018). A thematic content analysis of the extracted information allowed to identify three main themes described in the present report: 1) description and classification of oral narrative connectivity deficits, 2) sources of oral narrative connectivity deficits, and 3) comparison of oral narrative connectivity disorders in schizophrenia and other diseases.

2. Results

2.1. Description and classification of oral narrative connectivity deficits

Describing and classifying deficits in the connectivity of oral narratives produced by individuals diagnosed with schizophrenia was an important theme in the research included in the present analysis. Researchers most often divided those deficits into coherence and cohesion deficits (e.g., Allé et al., 2015; Badash, 2021; García-Mieres et al., 2020; Girard et al., 2021; Holm et al., 2016; Perlini et al., 2012; Saavedra, 2010). The reviewed literature reveals a complex discussion of the notion of discourse coherence. Girard et al. (2021) distinguished local coherence, which they defined as a type of connectivity on the sentence-level. Marini et al. (2008) examined local coherence, which measures the lack of conceptual connection between statements, and global coherence, which they calculated dividing the number of tangential utterances by the number of utterances that made up each description. Perlini et al. (2012) wrote that local coherence referred to semantic connectivity between adjacent sentences, and global coherence to connectivity between distant utterances. Other analyses of coherence distinguished between temporal, causal, and motivational coherence deficits (e.g., Allé et al., 2015; Allé et al., 2016; Holm et al., 2016; Lysaker et al., 2005).

In their analysis of the ability of patients with schizophrenia to create coherent life stories, Allé et al. (2015; 2016) detected four main facets of the global coherence of the life story: the cultural concept of biography, temporal coherence, causal-motivational coherence, and thematic coherence. The cultural concept of biography provided information on normative transitional life events in a life story and the normative timing when they should occur (Berntsen & Rubin, 2004, as cited in Allé et al., 2015). Temporal coherence was defined as determining when and in what order particular events happened. Causal-motivational coherence allows to understand the personal development of the narrator and determine how subsequent events result from previous ones. Thematic coherence allows listeners to see what personality traits or life events are stable in the narrator's life. Stability is noticeable when the narrator explains some of his actions with an enduring personality trait or explains why a given event is inconsistent with his personality. The authors suggested that global coherence is a property of the entire life narrative, therefore it can be measured using global coherence ratings. Specific text elements that contribute to temporal, thematic and causal global coherence can be measured using local coherence indicators (Allé et al., 2015; 2016).

Several studies concerned the cohesion of oral narratives produced by schizophrenics. García-Mieres et al. (2020) introduced the concepts of temporal, causal

and intentional cohesion. In their research, casual cohesion included linking phrases to explain actions or events that had a causal nature, such as verbs that reflect a change in state; intentional cohesion included linking phrases to explain actions or events that occurred to accomplish some human goal, whereas temporal cohesion included linking phrases used to explain changes in time and aspect throughout the text. The analyzed literature also identified other types of cohesion, such as deep cohesion, the frequency of connection between causal and intentional content; referential cohesion, the word and theme overlap (Lundin et al., 2019); and semantic cohesion, resulting in more neologisms being created (Lundin et al., 2019; Saavedra, 2010).

A group of studies divided connectivity deficits into micro- and macrolinguistic dimension deficits (Hoffman, 1986; Marini et al., 2008; Perlini et al., 2012). Marini et al. (2008) defined the microlinguistic dimension of discourse as text elements responsible for intra-sentence functions, such as lexical processing, organization of phonological and graphemic patterns into morphological strings and words, and syntactic processing. The macrolinguistic dimension, on the other hand, was characterized as responsible for cross-sentence functions, that is pragmatic processing, contextual determination of the meanings of words and sentences, and discourse processing, consisting in combining sentences and utterances to integrate the discourse features of a text and understand its essence (Marini et al., 2008). Under the label of macrolinguistic measures of discourse organization, Marini et al. (2008) included cohesion errors as well as local and global coherence errors. They detected errors of cohesion through problems with structural connectedness between utterances, and errors of local coherence through the patients' difficulties in linking utterances conceptually. Reduced informativeness, tangential utterances, use of empty speech filled with semantic paraphasias, and derailments were considered macrolinguistic speech coherence disorders. A similar classification was adopted in Perlini et al. (2012), where the authors suggested that the microlinguistic dimension of discourse in their study referred to lexicon, morphology, and syntax, while the macrolinguistic dimension to the coherence of discourse and pragmatics. For example, the researchers considered flow of speech as an indicator of microlinguistic discourse organization and measures of local and global coherence as indicators at the macrolinguistic level. Also and Hoffman (1986) pointed to the significant difficulties experienced by schizophrenics on a macrolinguistic scale, understood in the research as a reduced ability to plan a narrative, resulting from a lower-than-normal size of the hierarchy of speech substructures which schizophrenics had at their disposal. In sum, the subject literature seems to lack consistency in defining and classifying the basic concepts of connectivity.

The detection of relationships between discourse connectivity indicators located at different linguistic levels emerges as an important research issue (Marini

et al., 2008; Perlini et al., 2012). Marini et al. (2008) failed to determine if the reduced inter-sentential connectivity was related to the incorrect use of language devices (i.e. cohesion errors) or the lack of conceptual connections between sentences (i.e. local coherence errors). Also, it has been recognized that lexical-semantic errors made by patients with schizophrenia may result from more general difficulties in global reasoning and sequencing of utterances (Marini et al., 2008), and thus that microlinguistic errors result from macrolinguistic ones. Likewise, the results presented by Perlini et al. (2012) allowed them to conclude that higher-order macrolinguistic processes, i.e. reasoning, planning and the ability to organize incoming information, influence microlinguistic processes, i.e. lexical selection and grammar sequencing.

2.2. The sources of oral narrative connectivity deficits

2.2.1. The role of cognitive indicators

Many studies focusing on the connectivity of narratives produced by schizophrenics see the sources of these deficits in cognitive disorders (Docherty et al., 2006). The causes of coherence disorders are sought in working memory deficits (Berenbaum et al., 2008; Leroy et al., 2004; Melinder and Barch, 2003). Berenbaum et al. (2008) showed that discourse coherence, understood as derailments, was strongly influenced by working memory, which is needed to execute the discourse plan. Other studies confirmed that the need for discourse planning was an underlying problem of the lack of speech connectivity (Elvevåg et al., 2007). Melinder and Barch (2003), in their study of the Influence of a working memory load manipulation on language production in schizophrenia, used a dual-task manipulation in which patients performed two tasks at the same time: they answered interview questions and simultaneously performed a task that burdened their working memory. Through the strain on memory, there has been an increase in negative thinking disorders. However, the dual-task manipulation did not cause a significant increase in discourse coherence errors – understood by researchers as non sequiturs, loss of goals, tangential responses, derailments, distractibility, and pronominal reference errors – or fluency disorders, evidenced by neologisms, word approximations and incoherence. Researchers suggested that working memory deficits alone may not be sufficient to lead to coherence disorders in schizophrenia (Melinder & Barch, 2003). Leroy et al. (2004), in turn, observed difficulties experienced by patients with schizophrenia not so much in generating a discourse plan as in its implementation. They associated them with deficits in working memory, episodic memory as well as deficits in attention and other executive functions. Deficits in executive functions were correlated with impaired causal-motivational and thematic coherence in Allé et al. (2015).

Disturbances of self-reflection seem to be another factor influencing oral narrative connectivity disorders. Garcia-Mieres et al. (2020) showed that causal and intentional coherence significantly correlated with downregulated expression and thus depended in part on self-reflection. With a diminished capacity for self-reflection, experiencing one's own emotions and thoughts can be fragmented and confusing because different fragments of one's own experience may seem disjointed. The inability to understand one's own mental states and to establish causality and agency in understanding events may lead to more simplistic speech and non-verbal expression, and thus reduce the ability to express one's own opinions and verbalize feelings. Messages created by people with self-reflection disorders become difficult to understand by others. Momeni and Raghibdoust (2012) suggested that speech coherence disorders in people with schizophrenia, defined after Finch (Finch, 2000) as the way in which propositions are logically and sequentially related to each other, may be caused by difficulties in distinguishing self-generated perceptions from external ones. Such difficulties may cause a person to attribute his actions to others. During a conversation, patients may replace the real interlocutor with a mental interlocutor and, consequently, their speech may be mentally coherent but contextually distorted. For this reason, researchers proposed that schizophrenic speech coherence disturbances can be explained by a theory of mind (ToM) deficit. Finally, Maher, Manschreck, Linnet and Candela (2005) showed that schizophrenics generate high mean totals of associations when forming coherent utterances. Overactivity of associative networks may suggest a reduction in inhibitory processes, so that activated associations may appear more often and disappear more slowly, and thus disrupt the coherence of patients' statements.

Other studies (Lundin et al., 2019) found that deep cohesion, defined as connections between causal and intentional content, and lexical diversity independently mediated the relationship between executive functioning and metacognitive capacities. Deep cohesion correlated with inhibition and monitoring, and lexical diversity correlated with conceptual flexibility. Referential cohesion, understood as word and theme overlap, did not correlate significantly with any measures of executive functioning or metacognition (Lundin et al., 2019). Bambini et al. (2016) proved that a group of patients with schizophrenia showed serious breakdowns in discourse and understanding non-literal language. They showed that schizophrenia limited pragmatic competences, closely related to discourse planning. Researchers have confirmed the impact of cognition and social cognition on pragmatic behavior.

2.2.2. The role of psychiatric indicators

The experience of negative symptoms by patients with schizophrenia seems to be one of the main psychiatric indicators affecting discourse connectivity disorders (Girard et al., 2021; Holm et al., 2016; Shean and Meyer, 2009). Shean and Meyer (2009) wrote that patients with negative symptoms may be expected to speak less, as alogia, social withdrawal, and anhedonia are core negative symptoms. The results of their research on story coherence and attribution of character intentions indicate that negative symptoms are also associated with significant deficits in the ability to organize information about interpersonal events and understand the intentions and motivations of others (Shean and Meyer, 2009). Research by Holm, Thomsen and Bliksted (2016) showed that fewer negative symptoms in patients were associated with more causally consistent life histories. Girard et al. (2021) showed that participants experiencing more negative symptoms uttered more words expressing negative emotions and fewer words expressing relativity in time and space. In turn, Lysaker et al. (2005) found that patients' reports of their own illness were less structured according to timeframes with more severe levels of positive symptoms.

Noteworthy are the studies by Momeni and Raghibdoust (2012), in which the authors analyzed the speech of patients with schizophrenia in relation to two types of delusions: 1) the type that has an unchanging subject, regardless of whether the story changes or not and 2) the type with variable themes and stories. They were called invariable delusion (ID) and variable delusion (VD), respectively. The speech of people in the second group was less coherent. Their initial responses to questions were appropriate to the situation, but soon became deviant and diverted to other topics. Patients in this group sometimes said "yes" or "no" without being asked by the interviewer and made up a different story as if they were talking to someone else (Momeni & Raghibdoust, 2012).

Patients' narrative abilities have also been described in relation to negative thinking disorders. Barch and Berenbaum (1997) showed a negative correlation between negative thought disorder and discourse coherence disorders. Diminished literalness and syntactic complexity were associated with fewer discourse coherence errors, while increased literalness and syntactic complexity were associated with more discourse coherence errors (Barch and Berenbaum, 1997). A further study by Melinder and Barch (2003) confirmed the lack of a direct effect of negative thinking disorders on discourse coherence deficits.

2.2.3. The role of language production indicators

Barch and Berenbaum (1997) informed about deficits in specific components of language production – discourse planning, lexical selection, and syntactic encoding – which were in relationship with discourse coherence errors, e.g.

derailments, scattered speech, tangential responses, loss of target, inconsistent responses, and incompetent references. Fewer discourse coherence errors were observed along with decreased verbality and syntactic complexity. Discourse coherence errors were correlated with the results of word finding tasks but not with verbality. Elvevåg et al. (2007) confirmed that that patients' narrative coherence did not correlate with verbal productivity (speech poverty).

2.3. Comparison of oral narrative connectivity deficits in schizophrenia and in other diseases

Narrative connectivity disorders in people diagnosed with schizophrenia are compared to narrative connectivity disorders in people with other diseases (Chaika & Lambe, 1989; Hoffman, 1986; Lysaker et al., 2005; Perlini et al., 2012; Willits et al., 2018). Hoffman (1986) compared the coherence of narratives produced by patients with schizophrenia with the coherence of narratives created by manic patients and healthy individuals. Manic patients and those with schizophrenia often generated speech that could not be represented by a well-formed tree structure. Two groups of schizophrenics were distinguished in the study: a group of schizophrenics with high-level manic symptoms (HMS) who had three or more symptoms of the manic syndrome and a group of schizophrenics with low-level manic symptoms (LMS) with two or fewer manic features. Hoffman (1986) observed the most pronounced deficiencies in generating coherent discourse (narrative) hierarchies in schizophrenics with low-level manic symptoms. This group also represented a more homogeneous sample of language disorganization. Interestingly, in a study comparing the narrative abilities of schizophrenic, manic and healthy subjects, Chaika and Lambe (1989) demonstrated that each of these groups produced stories of the same length and, on average, used the same percentage of connectives.

The narrative skills of people diagnosed with schizophrenia were also compared with those of people with bipolar disorder. In a study by Perlini et al. (2012) schizophrenics had significant difficulties in creating narratives and understanding syntax. They produced stories with a normal word count, but with a reduced speaking rate, shorter utterances, more paragrammatical errors, and a lower level of syntactic complexity. They also had difficulties, especially women, with ensuring semantic connectivity between adjacent and distant sentences, i.e. with local and global coherence. The language competences of patients with schizophrenia were also compared with those of participants with schizoaffective disorders, depression, and legally blind participants. Individuals with schizophrenia showed a poor level of personal narrative production. Even patients who functioned relatively well cognitively, when asked to tell their life story, created incoherent

accounts of their disorder. They often perceived events in their lives as the result of external forces. The researchers emphasized that although all participants were disabled and received a disability pension, patients with schizophrenia presented the worst, and could be considered a more disabled group than the other two, marked by one of the most disabling diseases in medicine (Lysaker et al., 2005).

Finally, Willits et al. (2018) compared the coherence of the oral narratives of schizophrenics and HIV+ individuals. Schizophrenics produced fewer cause-and-effect, logical, and contrasting conjunctions. According to the authors, the low level of causal and intentional coherence suggests that people with schizophrenia often lack clarity in conversations with other people about goal-directed and non-goal-directed actions. The schizophrenic patients did not use referents that would help listeners follow their train of thought; this was within sentences, between sentences, and throughout the interview. In addition, schizophrenics produced fewer utterances, more unique words, and had a higher ratio of unique words to total words produced than the HIV+ individuals.

Conclusions

The present scoping review of research on the connectivity of oral narratives of individuals diagnosed with schizophrenia has identified three main themes present in the international literature. Firstly, research in this area aims to describe the connectivity deficits in narratives produced by schizophrenics and to build typologies of those deficits. A significant difficulty in the study of discourse connectivity is the multidimensionality of this phenomenon, resulting from the fact that it relies on the use of morphological-syntactic, semantic, and pragmatic means. Secondly, researchers are attempting to determine the origin of connectivity deficits in schizophrenics' oral narratives. Studies trace the sources of those deficits to cognitive factors (e.g., Allé et al., 2015; Berenbaum et al., 2008; Docherty et al., 2006), psychiatric factors (e.g. Girard et al., 2021; Holm et al., 2016; Momeni & Raghibdoust, 2012;) or linguistic factors (e.g. Barch & Berenbaum, 1997; Berenbaum et al., 2008; Elvevåg et al., 2007). Finally, an important research theme is the comparison of speech connectivity in individuals diagnosed with schizophrenia with the same skills of individuals with other diagnoses. Schizophrenic patients have been compared to manic patients (Chaika & Lambe, 1989; Hoffman, 1986), individuals with bipolar disorder (Perlini et al., 2012), individuals with schizoaffective disorder, depression, and individuals with visual impairment (legally blind) (Lysaker et al., 2005), and HIV+ (Willits et al., 2018). Schizophrenia emerges as a disease that is more debilitating than many other conditions.

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