

## Review articles

# Speech-language intervention in schizophrenia: an integrative review

Ana Paula Machado Goyano Mac-Kay<sup>(1)</sup>

Ivonne Mondaca Jerez<sup>(1)</sup>

Pía Monardez Pesenti<sup>(1)</sup>

<sup>(1)</sup> Universidad Santo Tomás, Facultad de Salud, Viña del Mar – Chile.

Conflict of interests: Nonexistent



## ABSTRACT

**Objective:** to perform an integrative review to identify speech and language pathology intervention for schizophrenia.

**Methods:** the review covered SCIELO, PUBMED, OXFORD JOURNALS and SCIEDIRECT databases for speech and language pathology intervention studies for schizophrenia. A narrative synthesis was adopted considering the level of clinical and methodological heterogeneity amid studies.

**Results:** the results demonstrated an increase in publications since 2012 with 11 articles meeting the criteria. Language and discourse assessment were the speech and language pathology privileged procedures.

**Conclusion:** the review indicates that the most eligible intervention was assessment, that studies' methodology were heterogeneous and that the communication disorders identified were related to discursive, pragmatic and syntactic disorders, which evidences the importance of more systematized intervention procedures and research on schizophrenic patients.

**Keywords:** Language; Schizophrenia; Speech; Mental Health; Communication; Speech, Language and Hearing Sciences

Received on: December 11, 2017

Accepted on: February 21, 2018

### Mailing Address:

Ana Paula Machado Goyano Mac-Kay  
Carrera de Fonoaudiología  
Av. Limonares, 190  
Viña del Mar – Chile  
Email: apmackay@gmail.com

## INTRODUCTION

Speech and Language Pathology (SLP) studies the prevention, assessment and treatment of human communication disorders (oral and written language, voice, hearing and oral motor skills) <sup>1</sup>. The role played by the speech and language pathologist in Mental Health is based on performing specific procedures for evaluation, intervention, counseling and follow-up on the SLP disordered processes, creating strategies to promote and maintain patient's functional communication, a fundamental component of social interaction <sup>2</sup>.

Schizophrenia is a chronic mental disorder that has a multifactor etiology. Its global prevalence is 0.3% to 0.7% <sup>3</sup> and the incidence is higher in men though the definitions that include more mood symptoms and brief clinical events show an equivalent risk for both sexes <sup>3-5</sup>. The early symptoms occur usually between 15 and 45 years, often emerging at the beginning of youth (15-25 years) <sup>3</sup>.

The schizophrenic signs fall into two categories: positive and negative. Positive symptoms include disorders of perception (hallucinations), language, behavioural organization (severely disorganized or catatonic) and of thinking (delusional ideas) <sup>4-7</sup>. Positive symptoms include two dimensions that may be related to underlying neural mechanisms and different clinical correlations: the psychotic dimension, which comprehends delusions and hallucinations, and the disorganization dimension that compromises behavior and language. Negative symptoms are characterized by disorders of perception, inferential thinking, language and communication, behavior organization, affectivity, speech, hedonic capacity, will, motivation, attention and a decrease or loss of emotions. They also include restrictions on the intensity of emotional expression (affective flattening), on the fluency and productivity of thought and language (alogia) and on the initiation of goal-directed behavior (apathy) <sup>5-8</sup>. Negative symptoms are correlated to language poverty and worse social and occupational function<sup>9</sup>.

The cognitive disorders in schizophrenia do not seem to be a consequence of the disorder itself, since there is no strong corresponding evidence between hallucinations or delusions severity with cognitive deficits severity. Attention and working memory problems are evident early and they do not recede even though the psychotic process is resolved, suggesting that there is no dependence on positive symptoms<sup>9</sup>. It has been established that attention deficits, which affect communication and language use, are observed

before, during and after psychotic episodes and persist despite the attenuation effect of antipsychotic medication.

Communication disorders have been consistently considered as symptoms in the context of schizophrenia<sup>10</sup>, which implies a deficit of language comprehension and production (oral and written), pragmatic-discursive components and syntactic and semantic domains<sup>11</sup>. Patients with schizophrenia present semantic memory problems, that are evident in semantic priming and verbal fluency tests, deficits in word association, in the use of language, in the production of contextualized speech, in inferring context-dependent meanings and in social interaction <sup>9,11-13</sup>. The discourse level attests to a lack of turn taking, discursive connectors and prosody alteration <sup>10,13</sup>. Authors consider that the formal disorder of thought can include the decrease in the content of discourse, perseveration, echolalia, empty discourse and speech blockade because it implies a disconnection or detachment of communicative competence, failures in understanding the communicative context, failures in the use of grammatical links that allow a correct cohesion, an irregular speech and more difficulties in metaphor interpretation <sup>14,15</sup>.

Considering that SLP is a professional whose specialty is the study of normal and pathological processes of human communication<sup>1</sup> then its practice collaborates to lead to the improvement of patient's quality of life since communication is essential for personal and social skills development and work integration.

It is relevant to analyze the scientific evidence on SLP praxis in schizophrenia for both clinical and research purposes, so the aim of this study was to synthesize the available evidence, which emphasizes SLP assessment and the therapeutic approach.

## METHODS

This study was carried out with an integrative review to a qualitative approach of descriptive scope. The search for articles used the following databases: SCIELO, PubMed, OXFORD JOURNALS and SCIEDIRECT, It was conducted between September 2016 and April 2017, comprising of articles published from January 2000 to March 2017. The selection considered the following inclusion criteria: studies with topics covering one or more Speech and Language interventions, complete free access studies with sample of schizophrenic patients with ages in the

range of 18 - 75 years, articles with abstract, quantitative or qualitative methodology or both and with description of SLP disorders. The exclusion criteria comprehended systematic reviews, samples of subjects with another psychiatric pathology associated, samples of subjects younger than 18 years and older than 75 years.

The search was performed in Spanish, English and Portuguese languages; the key words, obtained from the PubMed, used the following combinations: ((Speech & Language Pathology AND Schizophrenia)) OR (((Pragmatic AND Schizophrenia AND Speech & Language Pathology))) OR (((Mental Health AND Schizophrenia AND Communication))) OR (( (Speech Language Treatment AND Schizophrenia))); ((Fonoaudiología AND Esquizofrenia)) OR (((Pragmatica AND Esquizofrenia AND Fonoaudiología))) OR (((Salud Mental AND Esquizofrenia AND Comunicación ))) OR ((Lenguaje AND Terapia AND Esquizofrenia)); (((Fonoaudiologia AND Esquizofrenia))) OR (((Pragmática AND Esquizofrenia AND Fonoaudiologia))) OR (((Saúde Mental AND Esquizofrenia AND Comunicação))) OR (((Linguagem AND Terapia AND Esquizofrenia))).

After applying the inclusion and exclusion criteria, articles were analyzed according to author, year of publication, type of SLP procedure, number of subjects in the sample, sex and results.

## RESULTS

The initial search, with the keywords in English, Spanish and Portuguese, resulted first in 13,162 articles and in 8,648 after deleting the copies. Then, the process continued with refinement of the number of articles according to their title and relationship with the objective of the study, resulting in 1,198 articles. After the application of exclusion criteria, the sample dropped to 69 articles and with the application of inclusion criteria, to the final 11 articles. In a systematic review, authors found 18 articles but in their methodology there were different inclusion and exclusion criteria, a superior range of years and the incorporation of paid articles<sup>10</sup>. Figure 1 indicates the articles according to the language in which they were published and the country of origin of the study.

Country	Language	
	English	Spanish
USA	6	
Brazil	2	
Italy	1	
Spain		1
Chile		1

**Figure 1.** Classification by language of publication and country of origin

According to the language in which the articles were written the results indicated 9 in English<sup>16-24</sup> and 2 in Spanish<sup>25,26</sup>. In relation to the country of origin it was verified articles from United States of America<sup>16-18,20-22</sup>, Brazil<sup>19,23</sup>, Italy<sup>24</sup>, Spain<sup>26</sup> and Chile<sup>25</sup>. The investigations varied between individual case studies<sup>18-20,25,26</sup>

and sample studies<sup>16,17,21-24</sup>. Although the incidence of schizophrenia is greater in men<sup>17,27</sup>, in this review it was observed that only five articles specified the sex of participants<sup>16,17,23,24,26</sup>. The analyses of the articles characteristics are presented in Figure 2.

Author and year of publication	SLP procedure	N° subjects	Sex Females (F) Males (M)	Results	Observations
Bosco et al. (2016).	<ul style="list-style-type: none"> <li>- Pragmatic communicative skills (linguistic, extra linguistic, paralinguistic).</li> <li>- Conversational skills.</li> <li>- Cognitive functions (awareness, planning).</li> <li>- Theory of the mind ToM.</li> </ul>	17	10 M 7 F	<p>According to the results of the ABaCo protocol, a significant improvement in post-training performance was observed compared to the measure in pre-training in comprehension and production tasks.</p> <p>The improvements were stable at all scales even after 3 months from the end of the remediation program, as shown by the comparison between the scores on the linguistic, extra linguistic and paralinguistic scales obtained in pre-training and in the follow-up evaluation.</p> <p>Neuropsychological and theory of mind tests revealed no statistically significant difference between performance before and after training.</p> <p>These preliminary findings provide evidence of the effectiveness of the Pragmatic Communicative program in improving the pragmatic-communicative skills of schizophrenic individuals.</p>	<ul style="list-style-type: none"> <li>- Evaluation Battery for Communication (ABaCo) in its forms A and B.</li> <li>- Battery of neuropsychological tests: Attentive Matrices, Trail making test, Verbal Span, Spatial Span, Immediate and Deferred Recall test for long-term verbal memory, Tower of London, Modified Card Sorting test, Raven's Standard Progressive Matrices, Aachenner Aphasia test (AAT) naming scale.</li> <li>- The theory of the mind was evaluated through the story of Sally and Ann and with odd stories assignments.</li> </ul>
Santos et al. (2014)	<ul style="list-style-type: none"> <li>- Discourse</li> <li>- Pragmatic inference.</li> <li>- Semantic lexicon.</li> <li>- Prosody.</li> </ul>	50	26 M 24 F	<p>The communicative behavior of individuals diagnosed with schizophrenia is abnormal in every aspect of language.</p> <p>Among the aspect most affected was discourse and pragmatics, which should also be related to the characteristics of thinking and alterations of cognition.</p> <p>The prosodic components were the less changed at the comprehension level; however, linguistic production proved to be the most changed area.</p> <p>The study participants showed greater difficulty in expressing their emotions or repeating sentences with different intonations. Considering these conclusions, it should be noted that the speech pathologist could contribute considerably in the clinical care and formulation of intervention programs for patients diagnosed with schizophrenia.</p>	<ul style="list-style-type: none"> <li>- The Montreal Battery for Communication Evaluation (abbreviated version) was used to evaluate four communicative processes: discourse; pragmatics; semantic lexicon; and prosody.</li> </ul>
Docherty, (2012).	<ul style="list-style-type: none"> <li>- Speech samples were evaluated using scales selected from the Thinking, Language and Communication Scales (TLC)</li> <li>- Communication disorders were classified using the Communication Disturbance Index (CDI).</li> <li>- Sustained attention was assessed by the cognitive performance test (CPT-A) and CPT-Identical Pairs test (CPT-IP).</li> <li>- Working memory was assessed by the digit span test and a computer version of the Wisconsin Card Sorting Test (WCST).</li> </ul>	60	N/A	<p>Cognitive control task</p> <p>The foundations of the cognitive process of schizophrenic speech impairment are more easily identifiable when the measure of speech disorder is related to disordered thinking and disorganization or deterioration of linguistic structure.</p> <p>The neuropsychological tests were not directly related to the speech disorder measured (disorder of thought, disorganization or linguistic structuring), but explained a significant proportion of the variance in the speech disorder measured from the perspective of communication failure.</p> <p>The idea that communication failures in schizophrenic patients' speech do not reflect psychotic ideas, but evidences combinations of neuropsychological disorders related to schizophrenia.</p> <p>That said, most of the variance in schizophrenic speech disorder remains unexplained.</p>	<ul style="list-style-type: none"> <li>- The linguistic structural disturbance was evaluated using a method based on Hoffman's work that examines the hierarchical relations between the statements in the narrative discourse. (Hoffman et al, 1986).</li> </ul>

Author and year of publication	SLP procedure	N° subjects	Sex Females (F) Males (M)	Results	Observations
Becker et al. (2012).	<ul style="list-style-type: none"> <li>- Cognitive control task</li> <li>- Discourse assessment.</li> <li>- Speech</li> <li>- Working Memory.</li> </ul>	45	N/A	<p>Alogia is associated with the poor topic maintenance and poor verbal working memory.</p> <p>The association between disorganized speech and poor topic maintenance suggests that disorganized speech symptoms in schizophrenia can be related to problems in maintaining a topic and directing a continuous behavior.</p> <p>The results suggest that alogia is not only related to problems in the management of speech objectives but also to problems in working memory capacity. This indicates that people with alogia may have problems initiating and producing speech due to maintenance problems in working memory.</p>	<ul style="list-style-type: none"> <li>- Each participant participated in a semi-structured interview of 15 to 30 minutes that was recorded and transcribed. During the interview they were asked to provide up to 19 memories. The first memory was used for practice. Then, they were asked to give six neutral memories, six negative memories and finally six positive memories.</li> <li>- CDI scale measured disorganized discourse.</li> <li>- The CSS evaluated speech deficit and confused thinking.</li> <li>- N-back, POP (Preparation to Overcome a Prepotent Response), Running Memory Span Task evaluated tasks of cognitive control.</li> </ul>
Docherty et al. (2012).	<ul style="list-style-type: none"> <li>- Pre-morbid verbal intelligence was estimated using the vocabulary test of the Shipley Life Scale Institute.</li> <li>- Sustained attention was measured using the Continuous Performance-Identical Pair Test (CPT-IP).</li> <li>- The cognitive social tests (that include evaluation of prosody, facial expression and body language) were: Eckman test, Bell-Lysaker Emotion Recognition Test (BLERT) and the non-verbal sensitivity profile (PONS- media-PONS).</li> </ul>	84 (21 in group control)	N/A	<p>The emotional alterations and problems related to Theory of the Mind contribute to lack of communication in the discourse.</p> <p>The results of the current study suggested that the lack of communication in the speech of patients with schizophrenia might be a natural consequence of the limitations related to neuro-cognitive and relational functioning.</p> <p>Most participants had cognitive and social impairments and some level of speech disorder.</p>	
Berberian et al. (2009).	<ul style="list-style-type: none"> <li>- Auditory working memory test (AWM) and the visual work memory test (VWM) were selected for working memory evaluation.</li> <li>- The computerized version of Stroop was used to evaluate selective attention.</li> <li>- Semantics was evaluated with the semantic generation test.</li> <li>- The executive functions were evaluated through the Trail Making Test</li> </ul>	40 (20 included in group control)	N/A	<ul style="list-style-type: none"> <li>- The executive functions showed a great deterioration in subjects with schizophrenia when compared to healthy controls.</li> <li>- Cognitive dysfunction is a central feature of schizophrenia and the possible main cause of dysfunctional outcome in working memory and semantics.</li> <li>- Parametric analysis indicated auditory and visual working memory alterations in patients with schizophrenia.</li> <li>- Selective attention reaction time was marginal, which reveals a tendency in schizophrenia group to require more time to respond to selective attention tasks.</li> </ul>	

Author and year of publication	SLP procedure	N° subjects	Sex Females (F) Males (M)	Results	Observations
Elvevåg et al. (2007).	<ul style="list-style-type: none"> <li>- Verbal Fluency.</li> <li>- Semantics.</li> <li>- Narrative discourse evaluation (TLC).</li> </ul>	51 (25 included in group control)	N/A	<ul style="list-style-type: none"> <li>- Through latent semantic analysis (LSA), inconsistency was identified in different types of schizophrenic patients discourse.</li> <li>- It was shown that the LSA could detect an Incoherent speech in patients with high levels of formal mental disorder was detected by LSA mainly in larger units of speech (more than 5 words).</li> <li>- The LSA can be applied successfully to the model and measure semantic content expressed through speech .</li> </ul>	<ul style="list-style-type: none"> <li>- Verbal fluency was assessed by requesting the subjects to verbally generate as many "animals" as they could in a period of 1 min.</li> <li>- Semantics was evaluated by requesting the subject to verbalize the first word that came to mind when a group of 10 words was read one at a time.</li> </ul>
Servat et al. (2005).	<ul style="list-style-type: none"> <li>- The functions of visual perception, visual memory, verbal fluency, motor function, speed of visual search, mental flexibility, ability to inhibit inappropriate responses, immediate memory and numerical reasoning were examined through the Benton visual retention test, the Trail Making Test (forms A and B), the Stroop test, the controlled association test of words and the sub-tests of Digits and Arithmetic of the WAIS</li> </ul>	40 (20 included in group control))	N/A	<ul style="list-style-type: none"> <li>- According to the results obtained, it can be concluded that some altered functions appear in the schizophrenic group while others maintain the levels of functioning comparable to those of the control group.</li> <li>- Verbal fluency, auditory memory, numerical reasoning and the ability to inhibit inappropriate responses did not show significant differences between schizophrenic patients and the control group.</li> </ul>	
Bowie et al. (2004).	<ul style="list-style-type: none"> <li>- Evaluation of verbal episodic memory.</li> <li>- Evaluation of the perceptual organization and visual memory.</li> <li>- Semantic memory.</li> <li>- Semantic fluency.</li> <li>- Phonological fluency.</li> <li>- Evaluation of thinking, language and communication.</li> </ul>	392	176 M 216 F	<ul style="list-style-type: none"> <li>- Patients with severe semantic and phonological verbal fluency impairment showed deterioration in verbal episodic memory test, perceptual organization, visual memory and language, in addition to presenting worse functionality than patients with intact or moderately impaired verbal fluency.</li> <li>- The majority of patients with geriatric schizophrenia demonstrated impairments in verbal fluency tests, when age and educational level were considered. The performance in tasks of semantic and phonological fluency were related more to cognitive factors than to negative symptoms.</li> <li>- Phonological and semantic fluency was more linked to functional status than to verbal memory, which can be an important predictor.</li> <li>- It was not evident that impaired verbal fluency was predictive of the functional condition in patients.</li> <li>- More research is needed to understand the benefits that can result from improving verbal fluency.</li> </ul>	<ul style="list-style-type: none"> <li>Assessment was performed with the CERAD cognitive battery supplemented by:</li> <li>- Word list learning and delayed recall.</li> <li>- Praxic drawings.</li> <li>- Modified Boston naming test.</li> <li>- Semantic fluency test, (animals in one minute).</li> <li>- Phonological fluency test (words with f, a, s in one minute).</li> <li>- Evaluation of thought, language and communication (TLC).</li> <li>- Scale of social functioning (SAFE).</li> </ul>



Author and year of publication	SLP procedure	N° subjects	Sex Females (F) Males (M)	Results	Observations
Insúa, Grijalvo y Huici (2001),	- Language Assessment. - Verbal production. - Discourse Semantic Organization.	21 ( 11 included in control group)	11 M 10 F	- Assessment of language from the clinical point of view, revealed few variations over time.  - Subjects with schizophrenia could have altered "autonomous components of linguistic processing" in addition to the deficits observed in the pragmatic and macro-structural coding of discourses what could have consequences in the morphosyntax area.  - There are significant differences in speech coherence between subjects with normal schizophrenia and control.  - Subjects with schizophrenia presented distortions and additional information, errors in the order of events, inadequate connections and did not present sufficient information for discursive adequate comprehension.	- TLC scale was used for language clinical evaluation.  - Psycholinguistic evaluation using a test of verbal narration (the main episodes of the "Pirate's Story") were the basis for the analysis of the psycholinguistic indexes that operationalize the global semantic organization of discourse (textual macro-structure. - Tests were applied at the beginning of the study and then at 9 months, without performing any type of intervention.
Docherty et al. (2000).	- Discourse evaluation.  - Attention.  - Immediate auditory memory.  - Sequence organization.	26	21 M 5 F	- Communication deficits were identified; subjects with schizophrenia presented disordered references, omission of information, grammatical alterations and difficulties with the meanings of ambiguous words.  - There was an inability to preserve auditory memory.  - Subjects presented alteration of organizational sequences of discourse.  - Regarding sequence organization, two types of disorders were verified: confusing references and meanings of ambiguous words.	- To obtain speech sample, an interview was conducted; participants were asked to report negative memories, which were recorded and subsequently transcribed.  - To measure the disorganized discourse, the CDI scale was used.  - The CPT test was used to evaluate attention.  - Digit spam was used to evaluate the immediate auditory memory.  - The trail making test form B was used to evaluate sequence organization.

**Figure 2.** Characteristics of selected studies

## DISCUSSION

The main objective of this integrative review was to identify scientific evidence on the SLP intervention in schizophrenia and in the reviewed literature it was observed that the 11 selected studies favor the SLP evaluation over other interventions. They also indicate an increase in publications since 2012, with a greater number of research studies carried out in the United States. A variety of topics was observed such as those that discuss the effects of social cognition damage in language disorders <sup>20</sup>, the components of cognitive control and speech symptoms in people with schizophrenia <sup>21</sup>, the identification of the underlying processes of the disorder of schizophrenic speech <sup>22</sup>, the communicative behavior of subjects diagnosed

with schizophrenia <sup>23</sup> and the communicative-pragmatic treatment in schizophrenia <sup>24</sup>.

The methodology of the evaluations showed heterogeneity of designs. The most used tests were semantic and phonological fluency <sup>17,19,24,25</sup> and the Trail Making Test part A and part B <sup>16,19,24,25</sup>.

The procedure to evaluate language and communication in subjects with formal thought disorder was the Thought Disorders, Language and Communication Scale, which serves to identify speech and speech content poverty, distracted speech, tangentially, incoherence, neologisms and echolalia among others <sup>17,18,22,26</sup>. The Index of Communication Disturbances (IDC), which measures and identifies the words or phrases with a confusing meaning and recognizes six types of errors (vague references, confusing references, lack of references in the information,

ambiguous meanings of the word, incorrect use of the word and lack of structural clarity) was applied for the evaluation of the disorganized discourse<sup>16,21,20</sup>.

Consonant to the results, the importance of speech and language pathology treatment in subjects with schizophrenia is confirmed by the alterations detected in the evaluations. The most obvious symptoms were related to the semantic-pragmatic area, speech coherence, verbal fluency, prosody, attention, planning, sequencing and facial expression<sup>16-22,25</sup>.

The reviewed studies suggest that cognitive deficits are associated with language poverty, alteration of speech and a worse social and occupational function<sup>9,15</sup> and also that the presence of cognitive dysfunction and executive functions directly or indirectly affect language and communication<sup>16,19,24,25</sup>.

The pathological processes predisposing to schizophrenia are present early in life and the signs of social and language impairment are some of their nuclear characteristics<sup>13</sup>, a fact that indicates the importance of a prompt and, when possible, longitudinal Speech and Language Pathology intervention.

## CONCLUSION

In accordance to the evidence given here, the present review demonstrates that there is a lack of research in SLP therapy in schizophrenia, given that no article covering treatment was found in this review. The study also identified a wide range of communication disorders, in various degrees, especially the areas related to incoherent language and grammatical alterations and evaluation as the most frequent procedure. The data indicates the need for further investigation of therapeutic practices in order to build a scientific evidence foundation for the benefit of the patient's quality of life. The information obtained serves as an argument for improvements in methodological homogeneity.

## REFERENCES

- Romero L. Displacements with respect to disciplinary knowledge of Speech, Language and Voice Therapist. *Revista Chilena de Fonoaudiología*. 2012;11:99-106.
- Ramírez SA, Colina Matiz S. Papel del fonoaudiólogo en el área de salud mental: una experiencia profesional en el hospital militar central. *Revista Med*. 2009;17(1):26-33.
- Herráez D, Palacios J. Recordatorio de semiología. *Semiología de la esquizofrenia*. Servicio de Psiquiatría. Hospital Infanta Sofía. San Sebastián de los Reyes. Madrid: No.1755, 2009.
- American Psychiatric Association: *Diagnostic and Statistical: Manual of Mental Disorders, Fifth Edition*. Arlington: American Psychiatric Association, 2013.
- Holder SD, Wayhs A. Schizophrenia. *American Family Physician*. 2014;90(11):775-82.
- Musiol M, Rebuschi M. Rationality of inconsistency in schizophrenic conversation (Conversational pragmatical and formal semantic analysis). *Psychologie Française*. 2007;52(2):137-69.
- Abdollahian E, Ghravi MM, Soltanifar A, Mokhber N. Relationship between positive and negative symptoms of schizophrenia and psychotic depression with risk of suicide. *Iranian Journal of Psychiatry and Behavioral Sciences*. 2009;3(1):27-32.
- Almeida BPB, Cunha MC. Alterações da comunicação em pacientes institucionalizados portadores de esquizofrenia crônica. *Rev. Soc. Bras. Fonoaudiol*. 2011;16(1):117-8.
- Barrera A. Cognitive deficits in schizophrenia. *Revista Chilena de Neuro-Psiquiatría*. 2006;44(3):215-21.
- Joyal M, Bonneau A, Fecteau S. Speech and language therapies to improve pragmatics and discourse skills in patients with schizophrenia. *Psychiatry Research*. 2016;240:88-95.
- Bordas C, Puyuelo M. Aspectos semánticos y pragmáticos en personas con esquizofrenia. *Revista de Logopedia, Foniatría y Audiología*. 2010;30(2):84-93.
- Figueroa A. Análisis pragmatolingüístico de los marcadores de coherencia en el discurso de sujetos con esquizofrenia crónica y de primer episodio [Tesis doctoral]. Valladolid (ES): Universidad de Valladolid, 2015. Disponible en: <https://uvadoc.uva.es/bitstream/10324/16539/1/Tesis910-160314.pdf>
- Bambini V, Arcara G, Bechi M, Buono-core M, Cavallaro R, Bosia M. The communicative impairment as a core feature of schizophrenia: frequency of pragmatic deficit, cognitive substrates, and relation with quality of live. *Compr Psychiatry*. 2016;71:106-20.
- McKenna P, Oh T. El lenguaje de los esquizofrénicos. *Revista GU*. 2005;1(3):229-32.



15. Steinau S, Stegmayera K, Langb FU, Jagerb M, Strika W, Walthera S. Comparison of psychopathological dimensions between major depressive disorder and schizophrenia spectrum disorders focusing on language, affectivity and motor behavior. *Psychiatry Research*. 2017;250:169-76.
16. Docherty NM, Hall MJ, Gordinier S W, Cutting LP. Conceptual sequencing and disordered speech in schizophrenia. *Schizophrenia Bulletin*. 2000;26(3):723-35.
17. Bowie CR, Harvey PD, Moriarty PJ, Parrella M, White L, Davis KL. A comprehensive analysis of verbal fluency deficit in geriatric schizophrenia. *Archives of Clinical Neuropsychology*. 2004;19(2):289-303.
18. Elvevág B, Foltz PW, Weinberger DR, Goldberg TE. Quantifying incoherence in speech: An automated methodology and novel application to schizophrenia. *Schizophrenia research*. 2007;93(1):304-16.
19. Berberian AA, Trevisan BT, Moriyama T S, Montiel JM, Oliveira JAC, Seabra AG. Working memory assessment in schizophrenia and its correlation with executive functions ability. *Revista Brasileira de Psiquiatria*. 2009;31(3):219-26.
20. Docherty N, McCleery A, Divilbiss M, Schumann EB, Moe A, Shakeel MK. Effects of social cognitive impairment on speech disorder in schizophrenia. *Schizophrenia Bulletin*. 2013;39(3):608-16.
21. Becker TM, Cicero DC, Cowan N, Kerns JG. Cognitive control components and speech symptoms in people with schizophrenia. *Psychiatry Research*. 2012;196(1):20-6.
22. Docherty NM. On identifying the processes underlying schizophrenic speech disorder. *Schizophrenia Bulletin*. 2012;38(6):1327-35.
23. Santos AED, Pedrão LJ, Zamberlan-Amorim NE, Carvalho AMP, Bárbaro AM. Communicative behavior of individuals with a diagnosis of schizophrenia. *Rev. CEFAC*. 2014;16(4):1283-93.
24. Bosco FM, Gabbatore I, Gastaldo L, Sacco K. Communicative-pragmatic treatment in schizophrenia: a pilot study. *Front Psychol*. 2016;7:166. doi:10.3389/fpsyg.2016.00166.
25. Servat P, Lehmann S, Harari A, Gajardo I, Eva C. Evaluación neuropsicológica en esquizofrenia. *Revista Chilena de Neuro-Psiquiatria*. 2005;43(3):210-6.
26. Insúa P, Grijalvo J, Huici P. Alteraciones del lenguaje en la esquizofrenia: Síntomas clínicos y medidas psicolingüísticas. *Revista de la Asociación Española de Neuropsiquiatría*. 2001;(78):27-50.
27. McGrath J, Saha S, Welham J, El Saadi O, MacCauley C, Chant D. A systematic review of the incidence of schizophrenia: the distribution of rates and the influence of sex, urbanicity, migrant status and methodology. *BMC Medicine*. 2004;2(1):1-22.