

RELATIONSHIP BETWEEN DISORGANISED SPEECH, COGNITIVE FUNCTIONS AND SOCIAL FUNCTIONING IN PEOPLE WITH SCHIZOPHRENIA

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Abstract

People with schizophrenia exhibit a wide range of cognitive, behavioral, and emotional dysfunctions; among other difficulties, people with schizophrenia show disorganized speech, also called formal thought disorder or discourse disorder. The aim of this work is to analyze and find associations between disorganized speech, attention, cognitive impairment, and their relationship with the severity and social and adaptive functioning of patients with schizophrenia of chronic evolution living in an institution. A descriptive correlational and quantitative explanatory design is carried out with 71 patients diagnosed with chronic schizophrenia with different clinical scales, cognitive assessment scales and social functioning scales. The results show that people with schizophrenia have difficulties in all the areas assessed. Disconnected or disorganized speech is found to correlate positively with cognitive function, clinical severity, and social functioning. In conclusion, several associations between these variables are observed and need to be considered for proper intervention with this population.

KEY WORDS: *schizophrenia, disorganized speech, social functioning, cognitive impairment.*

Resumen

La esquizofrenia comprende un gran abanico de disfunciones cognitivas, conductuales y emocionales; entre otras dificultades las personas con esquizofrenia muestran discurso desorganizado, también llamado trastorno formal del pensamiento o trastorno del discurso. El objetivo de este trabajo consiste en analizar y encontrar asociaciones entre el discurso desorganizado, la atención, la alteración cognitiva, y la relación que tienen con la gravedad y la funcionalidad social y adaptativa de los pacientes con esquizofrenia de evolución crónica que residen en una institución. Se utilizó un diseño descriptivo correlacional y explicativo para la investigación, con 71 pacientes diagnosticados de esquizofrenia crónica con diferentes escalas clínicas, escalas de evaluación cognitivas y escalas de funcionamiento social. Los resultados muestran que las personas con esquizofrenia tienen dificultades en todas las áreas evaluadas. Se observa que el habla

desconectada o desorganizada correlaciona de manera positiva con la función cognitiva, la gravedad clínica y el funcionamiento social. Como conclusión, se observan una serie de asociaciones entre estas variables y es necesario tenerlas en cuenta para realizar una correcta intervención con esta población.

PALABRAS CLAVE: *esquizofrenia, discurso desorganizado, funcionamiento social, deterioro cognitivo.*

Introduction

Schizophrenia comprises a wide range of cognitive, behavioural and emotional dysfunctions. For a correct diagnosis, the DSM-5 indicates that two or more of the following symptoms must be present: a) Delusions, b) Hallucinations, c) Disorganised speech (e.g. frequent disintegration and incoherence), d) Grossly disorganised or catatonic behaviour, e) Negative symptoms (diminished emotional expression or abulia); as well as a reduced level of occupational or social functioning (American Psychiatric Association, 2014).

Speech or language disorder in schizophrenia has been given numerous names such as formal thought disorder or disorganised speech. It is recorded in the history of psychiatry as a difficulty that accompanies people with schizophrenia on many occasions (Jerónimo et al., 2018). In the original conceptions of schizophrenia, language disorder is considered very important (Bleuler, 1911). Formal thought disorder is part of the disorganised dimension of schizophrenia (Maj et al., 2021); and is closely related to neurocognition (Minor et al., 2015); and it is the psychotic symptoms whose contribution to the functioning of the presenting subjects is most significant (Rocca et al., 2018).

Several diagnostic instruments have been developed to assess these language disorders, the most recommended being the Thinking, Language and Communication Assessment Scale (TLC) (Andreasen, 1979 a,b), for language assessment in this population (Jimeno, 2019; Maj et al., 2021). Two dimensions appear in the TLC scale: negative thought disorder or verbal underproductivity (which involves a decrease in overall language production) and positive thought disorder also called disconnected speech or disorganised speech or discourse (which includes language abnormalities such as tangentiality, incoherence, etc.), which have been widely used in the literature (Bowie & Harvey, 2008; Bowie et al., 2005; Harvey et al., 1992, 1997), and are the ones we are going to focus on in this article.

Disorganised or disconnected speech was already described by Bleuler (1911) when he explained that people with schizophrenia tended to have breaks in the connections between the conscious thoughts that were apparent in their language and symptoms of disorganisation (Minor et al., 2018). There are few studies linking disconnected speech and cognitive deficits (Buck et al., 2015; Minor et al., 2015).

But it is important to make this association and to know whether it exists, because in addition to language difficulties, people with schizophrenia show significant cognitive impairment (Keefe, 2008; Miguel de Diego et al., 2017; Sanguino et al., 2018). These difficulties in cognitive impairment are greatest in memory (short and long-term), attention, problem solving and processing speed

(Gold et al., 2018; Jahuar et al., 2022). According to Green (2019) the cognitive functions most affected in people with schizophrenia are: processing speed, verbal learning and memory, visuospatial learning and memory, working memory, attention/vigilance, and reasoning and task solving. There are a multitude of articles that discuss the relationship between cognitive impairment and functional outcome in schizophrenia. These outcomes have included social functioning or the ability to acquire skills in rehabilitation programmes for inpatient samples. In addition, they are associated with difficulties with instrumental skills, problem solving, and social functioning, the latter being understood as an individual's ability to maintain interpersonal relationships and participate effectively in social interactions (Marggraf et al., 2020). There is a strong relationship between cognitive impairment in people with schizophrenia and functional outcome in schizophrenia. These outcomes include social functioning (succeeding at work and achieving independent living) as well as the ability to acquire skills in rehabilitation programmes (Green, 2019). According to Harvey and Strassnig (2012) disability is common in schizophrenia, resulting in an inability to function in everyday settings. It seems likely that there are multiple causes: cognition, certain clinical symptoms (depression, anhedonia, etc.), various environmental and social factors (lifestyle, stigma, etc.) and others (obesity, medical comorbidities, sedentary lifestyle, etc.). In a meta-analysis by Marggraf et al. (2020), it was considered that there was indeed a relationship between language impairment and social functioning, but that further exploration with other cognitive processes was needed. The purpose of this work is to analyse and find associations between disorganised speech, attention, cognitive impairment and their relationship with severity and social and adaptive functioning in a sample of patients with schizophrenia of chronic evolution, residing in a social and health care centre.

In order to carry it out, the following hypotheses have been drafted: (a) disconnected speech is related to impulsivity in people with schizophrenia; (b) disconnected speech is related to some cognitive functions (such as Immediate Verbal Learning, Working Memory, Verbal Fluency, Delayed Verbal Learning and Processing Speed) and (c) disconnected speech is related to social functioning in people with schizophrenia.

Method

Participants

An intentional sample (Etikan and Bala, 2017) of 71 patients suffering from chronic schizophrenia was obtained. Inclusion criteria were as follows: a) diagnosis of schizophrenia with a chronic course, b) admission to the research center for more than 2 years; and c) willingness to participate in the study and providing informed consent signed by themselves or their legal guardians. Exclusion criteria were the presence of other neurological disorders or diseases (e.g., Parkinson's disease, stroke, Alzheimer's disease, dementia).

Of the participants, 59.2% were male and 40.8% were female. Their age ranged from 39 to 93 years ($M= 66.50$; $SD= 10.44$). The mean length of hospital

stay was 22.93 years ($SD= 10.29$). All patients received psychopharmacological treatment with antipsychotics and psychotherapeutic treatment with individual and group therapy. Among the participants, 53.52% took a single antipsychotic, 40.84% took two antipsychotics, and 5.63% took three different antipsychotics. Of the total antipsychotic drugs, 60.19% were second-generation and 39.81% were first-generation. The second-generation drugs taken were clozapine, risperidone, quetiapine, olanzapine, aripiprazole, amisulpride, ziprasidone, and paliperidone palmitate. The first-generation drugs taken were zuclopenthixol decanoate, clotiapine, levomepromazine, and haloperidol. In the patients' medical history, only two cases of attempted suicide and two cases of substance use disorder were reported, but these were not active since admission. However, smoking was frequent among the patients. The persistence of positive psychotic symptoms (delusions, hallucinations, etc.) and the presence of negative symptoms (apathy, anhedonia, lack of interest, etc.) were common in the patients' clinical presentation. Additionally, cognitive, and functional deficits were increasingly important.

Instruments

- a) *Thinking, Language and Communication* (TLC; Andreasen, 1979 a,b). The TLC evaluates language impairments in patients with schizophrenia using 20 items. For this study only the following items will be used: poverty of speech content, derailment, tangentiality, loss of purpose, circumstantiality and incoherence. These items to be used comprise disorganised speech or discourse (Bowie et al., 2005; Bowie & Harvey, 2008). Each of the items is scored from 0 (absent) to 3 or 4 (severe or extreme). The total score for disorganised speech can be from 0 to 22, with 22 indicating severe or extreme impairment and 0 indicating its absence. Previous work (Harvey et al., 1992, 1997) found these items to have adequate reliability in older people with schizophrenia.
- b) *Clinical Global Impression* (CGI; Guy, 1976). The CGI consists of a single item that assesses clinical severity using a Likert-type scale of 8 values ranging from 0 (not assessed) to 7 (among the most extremely ill patients), the higher the score, the greater the severity.
- c) *Global Assessment of Functioning* (GAF; American Psychiatric Association, 1980). The EEAG allows for the evaluation of the level of activity and overall functioning of the patient. It scale is scored on a scale ranging from 1 to 100. The higher the score, the better the level of activity.
- d) *Test of Perception of Differences - Revised* (Faces Test-R; Thurstone & Yela, 2012). The Faces test-R is used to assess attentional perceptual aspects. In this test we obtain the impulsivity control index (ICI), we consider that there are difficulties at this level when the enneatype is higher than 4. The hits minus errors (H-E) are also assessed, and if the enneatype is less than 6, it indicates attentional difficulties (Green, 2019).
- e) *Mini-Mental State Examination* (MMSE; Folstein et al., 1975), the Spanish version by Lobo et al. (1979). The MEC-30 allows for the detection of cognitive impairment and evaluates its severity. The five areas it explores are: temporal

and spatial orientation, immediate memory, attention and calculation, delayed memory, and finally language and praxis. A total score is obtained, which is the sum of each of the items. The cut-off point is 23/24 for people over 65 years of age and 27/28 for adults under 65 years of age. Above these figures is considered normal cognitive functioning and below is considered possible cognitive impairment.

- f) *Screen for Cognitive Impairment in Psychiatry* (SCIP; Purdon, 2005), adapted and validated in Spanish by Pino et al. (2006). The SCIP is a cognitive screening test used to detect the cognitive deficits that people with a mental illness usually have. The SCIP scores presented are out of 100, and it is considered that they have difficulties when the score is less than 40. The SCIP consists of 5 subtests that evaluate different cognitive areas: immediate auditory-verbal learning, working memory, verbal fluency, recall of immediate auditory-verbal learning, and psychomotor speed. Each section awards an individual score and the sum of all of them results in the final score, which ranges from 0 to 100. If the result is lower than 40, it is considered that the person has difficulties.
- g) *Functioning Assessment Short test* (FAST; Rosa et al., 2007). This test evaluates a person's functioning in their daily life, both in terms of their ability to perform daily activities and their participation in society and is specifically designed for people who are institutionalized. It consists of 6 sections (autonomy, cognitive functioning, finances, interpersonal relationships, leisure, and work functioning), with a total of 24 items that are grouped into the 6 areas mentioned. Each item is scored on a 4-point Likert scale, from 0 (no difficulty) to 3 (a lot of difficulty). This test provides a score for each area and an overall score. There are no established cutoff points; the higher the score, the greater the difficulty in functioning. In this study, we did not use the section related to work functioning because the patients were not employed (5 items were eliminated).

Procedure

A quantitative descriptive correlational and explanatory correlational design is conducted (Bloomfield, & Fisher, 2019). In order to begin, all participants or their legal guardians must sign the informed consent form. Subsequently, data collection begins, which is carried out by two speech therapists, who are in charge of applying the TLC and the SCIP; and a psychiatrist who is in charge of applying the rest of the tests. The evaluations are carried out at different times, so that the participants do not get tired and their attention is maintained. The evaluation of the participants is individual, the evaluation was carried out on three different days.

Data analysis

Once the tests have been applied, the statistical analysis is carried out with SPSS Statistics v. 27.0 for Windows. First, the Kolmogorov-Smirnov normality test was performed; the results show that the sample does not have a normal distribution, so we performed the Spearman's Rho non-parametric statistical test with a significance level of 5%, to assess the correlation between variables. The correlation coefficient of the variables indicates the strength of this correlation which can be different depending on the value: (1-0.5 indicates that it is strong; 0.5-0.3 indicates that it is moderate, and less than 0.3 indicates that it is weak) (Akoglu, 2018).

Results

Descriptive analysis

Table 1 shows the results of the descriptive statistics for all participants. We can see that people with schizophrenia have difficulties in disconnected speech (9.07); but we can also observe a great variety in the results since the minimum that at least one of them obtains is 0 and the maximum is 20. We can determine that there are difficulties in attention (Faces Test H-E=1.0141), as the result is less than 6; but we cannot determine that the same occurs with impulse control (Faces Test ICI=1.51) as the result is less than 4, which indicates a normotypical result. With regard to the cognitive traits measured with the SCIP, it is observed that they have difficulties in all of them, as the result is less than 40 in all the subtests and in the total test. In order of greatest to least difficulty are the following: processing speed, immediate verbal learning, delayed verbal learning, verbal fluency and working memory.

With regard to the GAF, its score is low, which reveals a low level of activity; while the CGI score is high, which reveals a significant state of severity as the score is between 0 and 7. The total FAST score expresses a fairly high degree of difficulty in the areas of functioning, ranging from 0 to 57.

Correlational analysis

When the results are broken down by areas, it can be seen that the participants have a high degree of difficulty in their autonomy and Cognitive Functioning, as well as a high degree of difficulty in doing calculations, or concentrating on a film, or remembering a name or learning new information. They also have difficulties in finances, in the area of interpersonal relationships and in the area of Leisure.

Table 1
Descriptive statistics for the results of each of the subtests

Instrument/variable	<i>M</i>	<i>SD</i>	Minimum	Maximum
TLC Disconnected speech	9.07	4.34	0.00	20.00
Faces Test H-E (Eneatype)	1.01	0.12	1.00	2.00
Faces Test ICI (Eneatype)	1.51	1.14	1.00	5.00
SCIP I-VL (PC)	10.30	20.00	1.00	94.00
SCIP WM (PC)	20.21	23.77	1.00	87.00
SCIP VF (PC)	19.80	24.13	1.00	96.00
SCIP D-VL (PC)	17.65	21.15	4.00	93.00
SCIP PS (PC)	9.25	17.85	1.00	84.00
SCIP TOTAL (PC)	9.03	17.24	1.00	94.00
GAF	32.61	9.63	15.00	60.00
CGI	5.72	0.68	5.00	7.00
MEC30	23.23	5.67	10.00	30.00
FAST TS	44.63	6.53	24.00	57.00
FAST Autonomy	10.11	1.56	5.00	12.00
FAST Functioning cognitive	9.54	3.26	3.00	15.00
FAST Finance	5.25	0.91	2.00	6.00
FAST Interpersonal relations	14.21	2.71	7.00	18.00
FAST Leisure	5.70	0.72	4.00	9.00

Note: Faces Test H-E (hits minus errors); Faces Test ICI (Impulsivity Control Index); Immediate Verbal Learning (I-VL), Working Memory (WM), Verbal Fluency (VF), Delayed Verbal Learning (D-VL) and Processing Speed (PS); FAST TS (FAST Typical Score) and Percentile (PC).

Table 2 includes the results of the Spearman's Rho correlation between the different variables. There is a moderate positive correlation between disconnected speech, and impulsivity which we measured with the ICI Faces Test with the CGI or clinical severity and with the Fast total which measures functioning, Fast autonomy, Fast cognitive functioning and Fast finances. This indicates that subjects who show disconnected speech tend to have more difficulties in the rest of the correlated variables. There is also a moderate negative correlation between disconnected speech and the Immediate Verbal Learning SCIP, the Verbal Fluency SCIP, the Deferred Verbal Learning SCIP, the SCIP total test or cognitive impairment, the GAF which measures general functioning, the MMSE-30 which measures cognitive impairment. It also correlates, albeit weakly, with the SCIP for Processing Speed.

The FAST correlates with all its subtests. There is a positive and very strong correlation between FAST and the age of the participants. There is also a strong negative correlation between the FAST and the GAF, the MMSE-30 and moderately with several SCIP subtests: SCIP D-VL, AV-I, SCIP total. In addition to a weak negative correlation with SCIP PS.

Table 2
Spearman correlation of different variables

Instrument/variable	TLC Disconnected speech		FAST Total		SCIP Total	
	Rho	<i>p</i>	Rho	<i>p</i>	Rho	<i>p</i>
Disconnected speech	1.00		0.438	0.000	-0.432	0.000
Faces test ICI	0.44	0.010	-0.080	0.505	0.333	0.005
SCIP I-VL	-0.39	0.001	-0.353	0.003	0.597	0.000
SCIP VF	-0.35	0.003	-0.184	0.125	0.810	0.000
SCIP D-VL	-0.42	0.000	-0.356	0.002	0.689	0.000
SCIP PS	-0.27	0.000	-0.254	0.033	0.626	0.000
SCIP TOTAL	-0.43	0.000	-0.301	0.011	1.000	
Age	0.20	0.099	0.928	0.011	-0.352	0.003
GAF	-0.44	0.000	-0.756	0.000	0.183	0.126
CGI	0.42	0.000	0.678	0.000	-0.139	0.248
MEC30	-0.46	0.000	-0.593	0.000	0.687	0.000
FAST TS	0.44	0.000	1.000		-0.321	0.006
FAST Autonomy	0.44	0.000	0.627	0.000	-0.079	0.511
FAST cognitive functioning	0.44	0.000	0.821	0.000	-0.535	0.000
FAST Finance	0.33	0.006	0.645	0.000	-0.385	0.001

Note: Coef. (Correlation Coefficient); sig. (Sig. (bilateral)); Faces Test ICI (Impulsivity Control Index); Immediate Verbal Learning (IV-L), Verbal Fluency (VF), Delayed Verbal Learning (D-VL) and Processing Speed (PS); FAST TS (FAST Typical Score); FAST cognitive functioning (FAST cognit. function).

Finally, the SCIP correlates with all the subtests of the SCIP. Furthermore, The SCIP correlates strongly positively with the MMSE-30 and moderately with the ICI Faces Test. The correlation is negative and strong with the FAST cognitive functioning, and moderate with disconnected speech as mentioned above, and with age, with the FAST total score and with the FAST finance.

Discussion

The results presented in this research offer a new insight into the relationships between disengaged speech, attention, cognitive impairment and functioning in people with schizophrenia, as these relationships are currently understudied (Buck et al., 2015; Minor et al., 2018).

This work has found that people with schizophrenia with prolonged residential admissions show significant cognitive impairment (Keefe, 2008), difficulties in disconnected speech (Harvey et al., 1997; Iter et al., 2018; Marengo & Harrow, 1997), difficulties in functioning and social functioning (Bowie & Harvey, 2008).

All the results are helpful in answering the research hypotheses stated at the beginning. To begin with, the first hypothesis that disconnected speech is related to impulsivity in people with schizophrenia is accepted; as a moderate relationship is found between disconnected speech and impulsivity (an important aspect of attention), indicating that when disconnected speech is higher they have more difficulties in attention. The findings found are consistent with the results found by Hoonakkler et al. (2017) and by Harvey et al. (1997); as both explain how attention disturbances are prevalent in people with schizophrenia. The study by Docherty and Gordinier (1999) relates problems with attention and immediate memory to different language disorders such as thought and language disorganisation. But, although results on attention are found, no previous scientific evidence has been available to date on the association between impulsivity and disconnected speech, so this study can be declared pioneering in that sense.

On the other hand, the second hypothesis is also accepted: disconnected speech is related to some cognitive functions (such as Immediate Verbal Learning, Working Memory, Verbal Fluency, Deferred Verbal Learning and Processing Speed); since it is observed that there is a relationship between disconnected speech and some cognitive functions such as immediate and deferred verbal learning, verbal fluency. According to Bora et al. (2019) neurocognition is significantly associated with disorganised speech, verbal memory, visual memory, attention and processing speed. Kerns and Berenbaum (2002) explain how formal thought disorder or disorganised speech is one of the core signs of schizophrenia and is strongly associated with impaired executive functioning and impaired semantic information processing. In the work of Mutlu et al. (2021), disorganised speech is associated with deficits in executive functions and social functioning, and a relationship is found between disconnected speech and clinical severity. However, research by Bowie et al. (2005) described how disconnected speech remained mostly stable when age and clinical severity were taken into account.

Finally, the third hypothesis is also accepted: disconnected speech is related to social functioning in people with schizophrenia since the results previously explained indicate that there is a correlation between disconnected speech and functioning, as well as several areas of it: autonomy, cognitive and financial; where these participants have great difficulties. Less difficulties are also found in interpersonal relationships and leisure, than the other aspects of social functioning referred to above. This finding supports previous research by Bowie and Harvey (2008) which found an association between disconnected speech and discourteous social

behaviour and previous research by Bowie et al. (2011) which looked at disconnected speech and social functioning and found that communication abnormalities are associated with specific social skills and behaviours and can be targeted for treatment. The article by Muralidharan et al. (2018) explains that disconnected speech is associated with deficits in task-oriented social skills and occupational functioning. Suggesting that people with schizophrenia may benefit from skills training with a focus on decreasing disconnected speech, which could improve performance in occupational tasks and increase verbal production in unstructured social situations. According to Marggraf et al. (2020) formal thought disorder is inversely related to social functioning and has important implications for the daily lives of people with schizophrenia, so it is useful to be aware of it in order to treat these people appropriately. Affected people who have tangential, circumstantial, incoherent and illogical speech have more difficulty maintaining interpersonal relationships and are less able to engage in appropriate social interactions. Similarly, this disorder appears to be associated with the communication necessary for social and community functioning. However, as we have repeated in our admitted residents, this is not the case for interpersonal relationships and leisure. Comparelli et al. (2020) found that patients with moderate/severe formal thought disorder performed worse in processing speed, reasoning, problem solving and social cognition, and demonstrated poorer overall functioning than those with mild disorder. In the meta-analysis by Roche et al. (2015), thought disorders are associated with greater clinical severity. Furthermore, formal positive thought disorder is predicted by a poor appreciation of irony and poor mind reading (Langdon et al., 2002). Other authors, such as Köther et al. (2012) found that formal thought disorder is the only symptom domain that impacts on measures of social behaviour. Cramer et al. (1992) reported negatively on the impact of this disorder on social functioning and cognition (Tan et al., 2014); furthermore Marggraf et al. (2020) state that there is a small-medium relationship between social functioning and language impairment. He further emphasises the need for future studies to explore underlying cognitive processes such as social cognition with language impairment, as is done in this study.

Finally, it is concluded that the difficulties in disorganised discourse shown by the participants in this study are significant; furthermore, these difficulties are related to cognitive impairment and social functioning. However, it is true that it is necessary to take these data with caution, as the characteristics of the participants and their age vary greatly, which may have influenced the results to a certain extent. Moreover, we should not lose sight of the fact that no control group was used.

On the other hand, it is advisable to continue with studies similar to the one carried out, as this research establishes that it is necessary to take into account the existing relationships between cognitive impairment and social functioning; but it is advisable to go deeper and carry out a study with other instruments such as the PANNS scale; in addition to carrying out causality studies, which may shed light on whether a set of variables may be the cause of these patients having difficulties in any of the areas evaluated.

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RECEIVED: OCTOBER 19, 2021

ACCEPTED: JULY 30, 2022