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Emotion recognition through Spanish prosody in people with schizophrenia

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EMOTION RECOGNITION THROUGH SPANISH PROSODY IN PEOPLE WITH SCHIZOPHRENIA

ABSTRACT

Introduction

People with schizophrenia have deficits in the ability to identify emotions. An area of important dysfunction is the understanding of affective prosody, which can limit communication and social functionality. The objective of this study is to compare emotional recognition through prosody between a group of people with schizophrenia versus a control group without pathology, through the Reading the Mind in the Voice - Spanish Version scale (RMV-SV).

Method

A group of people with clinically stable schizophrenia or schizoaffective disorder was recruited ($n = 62$). They were compared with a control group ($n = 63$) in sociodemographic, clinical characteristics, intelligence quotient, and performance on RMV-SV scale.

Results

The case group presented lower scores on the RMV-SV, with statistically significant differences ($p < .001$) compared to controls. In 17/22 items of wrong answers, the statements contained negative emotions. The correlation was positive between RMV-SV and IQ. RMV-SV and PANSS, mainly the negative subscale, and age were inversely correlated.

Conclusions

The RMV-SV scale, validated in autism, allows detecting the alterations of prosodic recognition in Spanish in schizophrenia, postulating itself as an evaluating tool of this domain of social cognition.

Keywords: affective prosody, emotion recognition, social cognition, schizophrenia, complex emotions.

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RECONOCIMIENTO DE LAS EMOCIONES A TRAVÉS DE LA PROSODIA EN ESPAÑOL EN PERSONAS CON ESQUIZOFRENIA

RESUMEN

Introducción

Las personas con esquizofrenia presentan déficits en la habilidad para identificar emociones. Un área de importante disfunción es la comprensión de la prosodia afectiva, que puede limitar la comunicación y la funcionalidad social. El objetivo de este estudio es comparar el reconocimiento emocional a través de la prosodia entre un grupo de personas con esquizofrenia frente a un grupo control sin patología, a través de la escala Reading the Mind in the Voice - Spanish Version (RMV-SV).

Metodología

Se reclutó un grupo de personas con esquizofrenia o trastorno esquizo-afectivo, clínicamente estables ($n = 62$). Se compararon con un grupo control ($n = 63$) en las características sociodemográficas, clínicas, el coeficiente intelectual y el rendimiento en la escala RMV-SV.

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Resultados

El grupo de casos presentó puntuaciones más bajas en la RMV-SV, con diferencias estadísticamente significativas ($p < ,001$) frente a los controles. En 17/22 ítems de respuestas erróneas, los enunciados contenían emociones negativas. La correlación fue positiva entre RMV-SV y CI. Se correlacionó de forma inversa el RMV-SV y PANSS, principalmente la subescala negativa, y la edad.

Conclusiones

La escala RMV-SV, validada en autismo, permite detectar las alteraciones del reconocimiento prosódico en español en la esquizofrenia, postulándose como una herramienta evaluadora de este dominio de la cognición social.

Palabras clave: prosodia afectiva, reconocimiento emocional, cognición social, esquizofrenia, emociones complejas.

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INTRODUCTION

Schizophrenia is a chronic mental illness that affects approximately 1% of the world's population¹. It is characterised by positive, negative and cognitive symptoms. Our current therapeutic tools are relatively effective against positive symptoms, but much less effective against the other two. The persistence of negative and cognitive symptoms limits recovery from the disease and can even lead to progressive functional deterioration².

Out of all the cognitive symptoms of the disease, deficits in social cognition and specifically in emotional recognition have recently received research attention³. Difficulties in social integration are associated with difficulties in maintaining effective interpersonal communication. For this to occur, the subject must understand the contents of the messages they receive (verbal communication), assess the interaction context and regulate communicative exchange through a system of common rules (nonverbal communication)⁴. In schizophrenia, the ability to understand the emotional content of language, or emotional prosody, is altered⁵.

Prosodic recognition is altered in people who are at high risk of psychosis⁶, in the early stages of the disease⁶⁻⁸, and it even persists during stages of clinical stability⁹. There is a correlation between prosodic deficits and clinical severity. This correlation is associated with the presence of greater negative symptoms^{5,10,11}, although positive symptoms can also exacerbate these deficits^{12,13}. Demographic factors can influence deficits in prosodic understanding; studies

based on sex are worth noting here. Some studies suggest females maintain their prosodic recognition skills^{14,15} despite the disease, while others have found that there are no significant differences¹⁶. No correlation has been found between deficits of this type of recognition and factors such as educational level^{10,17,18} or neuroleptic doses^{18,19}. Certain studies argue that there is no relationship^{10,17} between prosodic deficits and patients' intelligence quotient (IQ), while others believe IQ is essential²⁰ for proper emotional recognition. Some studies have not found a significant effect between age¹⁸ and alterations in recognition, whereas others support the hypothesis of progressive emotional recognition deterioration²¹. Regarding the type of emotion, it is more difficult to recognise emotional stimuli than neutral stimuli^{13,22,23}. Additionally, negative stimuli are more difficult to detect²³⁻²⁶. No conclusive studies have been found in the literature in terms of the complexity of the stimulus compared to basic emotions^{27,28}.

One of the main barriers to studying deficits in emotional prosody is a lack of consensus in the assessment tools to be used in such an analysis^{5,8}. The SCOPE project²⁹ tried to unify these tools, and suggested that the Bell Lysaker Emotion Recognition Task (BLERT) should be used to assess multimodal affect recognition³⁰. Another prosodic recognition test is DANVA-2 (Diagnostic of Analysis of Nonverbal Accuracy)³¹. The test comprises 24 sentences that express four basic emotions (joy, sadness, anger, fear) with low and high emotional intensity. The VOICE-ID³² is made up of 21 phrases, written in neutral language and expresses six basic emotions (joy, sadness, anger, fear, surprise, shame). The test created by Juslin and Laukka JL-AER³³ is also worth noting. It has 88 phrases written in neutral language as questions or statements, expressed in the form of fear, anger, joy, sadness and disgust, with two levels of intensity. Finally, the Affective Montreal Voice Database³⁴ includes 35 "vocal expressions" that identify emotional content such as anger, disgust, fear, joy, sadness, surprise or neutral stimuli. These scales include a very limited variety of emotions, as the assessments focus exclusively on simple emotions, and none has been adapted to Spanish to date.

One tool adapted to Spanish is Profiling Elements of Prosodic Systems - Children (PEPS-C)³⁵. PEPS-C is a test used with autistic children and adults; it assesses expressive and receptive prosody in detail. The task consists of listing foods in positive and negative tones and asks the participant to distinguish between them. This test has recently been applied to subjects who participated in a study on the semantic and phonological dimensions in schizophrenia³⁶. The study results found significant differences between the control and schizophrenia groups in the acoustic parameters of prosody, such as speech speed and fundamental frequency. Significant differences were also observed in the evaluation

of receptive ($z=7.517$; $p<.01$) and expressive ($z=-7.697$; $p<.01$) prosody.

Among all existing prosodic recognition tests, the 'Reading the Mind in the Voice' Test-Revised tool stands out³⁷. This instrument assesses receptive prosody through 33 statements of neutral semantic content, expressed by different simple and complex emotions. It is easy to administer, includes a wide variety of emotions that represent real-life conditions, and has recently been validated in Spanish for autism, called Reading the Mind in the Voice - Spanish Version (RMV-SV)³⁸. Based on the above, it could be an ideal tool to assess emotional prosody in schizophrenia.

The main objective of this study is to compare the characteristics of emotional prosody by applying RMV-SV to a group of people who have schizophrenia compared to a healthy population control group. As a secondary objective, we analysed the sociodemographic and clinical factors associated with prosodic differences between both groups. As a final objective, RMV-SV is put forward as a current, useful tool to assess emotional prosody in schizophrenia in Spanish, in the absence of other similar tools.

METHODS

Participants

An observational, case-control, retrospective, multicentre study was carried out, in which 125 subjects participated. The group of people with schizophrenia (or the "SQZ group") included 62 patients who were recruited voluntarily from five psychosocial rehabilitation centres in Ourense, Vigo, and A Coruña. The control group was made up of 63 healthy people, from the Faculty of Medicine and Health Sciences of the University of Alcalá (Madrid).

Inclusion and exclusion criteria

- Patients who voluntarily signed an informed consent to participate in the study, were aged between 18-65, had a diagnosis of schizophrenia or schizoaffective disorder (according to the Diagnostic and Statistical Manual of Mental Disorders, 5th edition), were in an outpatient monitoring programme at a Mental Health Unit, had undergone unmodified pharmacological treatment in the last three months, and had an IQ > 70 were included in the study.
- Those who presented with a comorbid severe mental disorder, a history of severe brain damage or a neurological disorder were excluded.

- All participants were clinically stable during the consent period, and the researchers confirmed that they had understood the voluntary nature of participation.
- The control group included university students who voluntarily agreed to participate and signed the informed consent. They declared that they did not present psychiatric pathology, have a history of severe brain damage or a neurological disorder.

Measuring instruments

- **Document collecting data:** data on age, sex, occupation, education level, marital status and living arrangements, main diagnosis and associated diagnoses, treatment and equivalence in mg to doses of chlorpromazine were collected through a clinical interview and the review of the electronic medical records.
- **Reading the Mind in the Voice - Spanish Version (RMV-SV):** instrument for measuring complex emotions through emotional prosody. The original test was developed by Rutherford et al.³⁹, subsequently reviewed by Golan et al.³⁷, and validated in Spanish by Sánchez-Reales et al.³⁸.
- **Kaufman Brief Intelligence Test (K-BIT)⁴⁰:** a brief intelligence test that is used for participants aged 4-90. Its results are a verbal and nonverbal IQ.
- **Positive and Negative Syndrome Scale (PANSS)⁴¹:** assesses positive and negative symptomatology and general psychopathology in the SQZ group.

Procedure

After participant recruitment, clinical interviews and psychometric tests were carried out to collect sociodemographic and clinical data (using PANSS for the SQZ group), assess the recognition of emotional prosody (RMV-SV), and record the IQ (K-BIT) of the participants in both groups.

The assessment was carried out individually, and the evaluations took approximately one and a half hours. In the case of the SQZ group, participants were given the option of carrying out the evaluations in two sessions depending on the level of care they required.

Ethical issues

The study was approved by the Galician Ethics Committee (registration number 2016-407) in January 2017. All procedures were carried out in accordance with the provisions of the Helsinki Declaration revised in 2000.

This study met all the requirements established by Spanish legislation in the areas of biomedical research, protection of personal data and bioethics. Written informed consent was obtained from all participants. The administration of the aforementioned documents was carried out by qualified personnel in centres that participants visited.

Statistical analysis

Initially, and to characterise the participating population sample, the basic descriptive statistics of each different sample was calculated based on the nature of the data (mean and standard deviation for continuous variables, or median and interquartile range if appropriate for the data, and absolute and relative frequencies for categorical variables).

All of the results obtained came from the analyses used for the original validation of the test. We used the statistical software Stata SE, v.15 for all calculations.

In particular, the following analyses were carried out:

- a) Descriptive analyses of the sample and of the subgroups - including variables corresponding to sociodemographic data, for the control and SQZ groups. A descriptive analysis was also carried out in the SQZ group based on the clinical parameters collected.
- b) Probability calculation - using binomial distribution, to understand the expected responses by chance in RMV-SV.

Table 1		Descriptive analysis of the control and SQZ groups							
CONTROL GROUP (n= 63)				SQZ GROUP (n= 62)					
	Mean	SD	Range	%	Mean	SD	Range	%	
Age	19.8	4.1	18-43		40	11.7	19-63		
Female				63.4				45.1	
Male				36.6				54.9	
Educational level									
Primary								32.2	
Secondary				100				64.5	
Unknown								3.2	
Occupation									
Active				6.3				4.9	
Inactive								87	
Student				93.7				4.9	
Marginal activities								3.2	
Marital Status									
Single				98.4				85.5	
Married				1.6				6.4	
Widowed								1.6	
Separated								6.4	
Familiar coexistence									
Alone				1.6				6.2	
With parents				85.7				56.5	
As a couple				1.6				8	
Siblings				11.1				4.8	
Others								24.2	
Total IQ	104.7	8.4	74-119		98.7	28.1	70-201		
Verbal IQ	106.5	8.5	80-122		96.6	15.6	72-132		
Non verbal IQ	105.8	10.7	54-119		88.8	18.8	61-123		

- c) Chi-squared parametric test or its corresponding non-parametric test (Fisher's exact test) to study the association between categorical variables, and the Student *t*-test for the comparison of means for independent samples or its corresponding non-parametric (Mann-Whitney U test) for the study of sociodemographic and clinical variables (PANSS and IQ), prosodic results and results between response items (both in RMV-SV).
- d) Multiple linear regression analysis, to calculate the influence of the variables that were significant in the univariate analysis for the RMV-SV Outcome. Two analysis models were carried out, the first included verbal IQ, age, educational level, sex and group; and the second nonverbal IQ, age, educational level, sex and group.
- e) We carried out an analysis of Pearson's correlation coefficient between IQ and its subscales, PANSS and age, in both groups.

RESULTS

Descriptive analysis of the sample

In the descriptive analysis (Table 1), the control group is made up of a young population ($M=19.8$, $SD=4.1$) compared to the older age of the SQZ group ($M=40$, $SD=11.7$), with a balanced percentage of females and males (63.4% of females in the control group, compared to 45.1% in the SQZ group). 100% of the control group participants and 64% of the SQZ group participants had completed secondary education. Despite the fact that there were significant differences in IQ between groups, they presented normal range scores for total IQ (control group $M=104.7$, $SD=8.4$, SQZ group $M=98.7$ $SD=28.1$). The nonverbal IQ for the SQZ group is worth noting, as it presented scores below the normal mean ($M=88.8$, $SD=18.8$).

The results showed statistically significant differences between groups, both for sociodemographic variables and total K-BIT scores ($p<.001$) and its subscales (both $p<.001$).

Table 2 shows the specific characteristics of the SQZ group. The main diagnosis was schizophrenia (91.9%), without associated diagnoses (75.8%). The mean chlorpromazine dose was 985.72 ($SD=638.1$). Total PANSS values were 54.8 ($SD=17.5$) with a positive PANSS of 13 ($SD=5.43$), a negative PANSS of 20.9 ($SD=8.14$) and General Psychopathology of 28.6 ($SD=9.1$).

Table 2		Descriptive analysis of clinical variables for the SQZ group		
SQZ GROUP (n=62)				
	N	%	Mean (SD)	Range
Diagnosis				
Schizophrenia	57	91.9		
Schizoaffective Disorder	5	8.1		
Associated diagnosis				
F9-F19	9	14.5		
F30-F39	1	1.6		
F40-F49	1	1.6		
F60-F69	3	4.8		
F90-F98	1	1.6		
No other diagnoses	47	75.8		
Equivalence to CPZ, mg.			985.72 (638.1)	25-3050
Typical APS	4	6.5		
Atypical APS	58	93.5		
Formulation				
Oral	39	63		
LAI	23	37		
Oral+LAI	20	32.2		
PANSS				
Positive			13(5.43)	7-33
Negative			20.9(8.14)	7-46
GP			28.6 (9.1)	16-54
Total			54.8 (17.5)	30-100

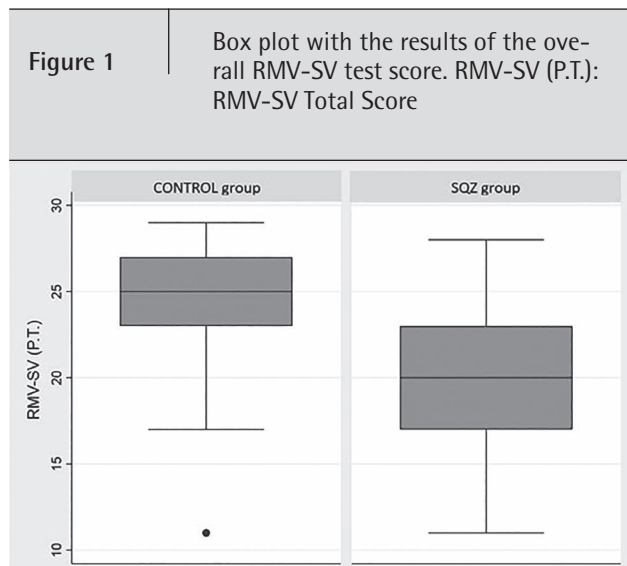
Note. CPZ: chlorpromazine, APS: antipsychotics, LAI: Long acting injection, GP: general psychopathology.

Reading the Mind in the Voice - Spanish Version

All participants in the SQZ and the control group, except one participant in each group, exceeded the number of correct responses by chance in the RMV-SV (12 points, $p<.05$, binomial test). The results of the RMV-SV test are specified below. We first list the global scores, and then those scores broken down by each of the test items. We then finally analyse the possible relationship with other study variables.

A) Overall score

The comparison of the global test scores between the two groups showed statistically significant differences between the control group and the SQZ group ($p < .001$) (Figure 1). The control group had a mean score of 24.7 ($SD=3$) compared to a mean score of 20.1 ($SD=3.9$) for the SQZ group.



B) Scores by response item

The control group presented significantly higher scores in 22 of 33 emotions for the differences in scores in each of the RMV-SV items. Item 12 presented marginal differences ($p=.058$). In item 9, the SQZ group obtained significantly higher scores than the control group. In 17 of the 22 response items that scored as significantly erroneous, the statements contained emotions with negative valences (Table 3).

Other relevant variables

The last analyses carried out consisted of controlling for heterogeneity between SQZ and control groups and studying the correlation of RVM-SV with the other variables considered, such as IQ, sex or age.

A) Control of the main heterogeneous variables

Two multiple linear regression analyses were performed for the RMV-SV Outcome, introducing the variables that were significant in the univariate analyses into the model. Firstly, age, verbal IQ and group, and secondly, age,

ITEM	CONTROL GROUP (n=63)	SQZ GROUP (n=62)	Dif %	χ^2 (p)	Emoción
1	19	16	3	0.29(.58)	
2	63	50	15.2	13.48(.00)	<i>Threatening</i>
3	47	34	15.9	5.35(.02)	<i>Confused</i>
4	62	45	22.1	16.91(.00)	<i>Worried</i>
5	40	39	-2.6	0.00(.94)	
6	38	30	9.4	1.79(.18)	
7	63	56	5	6.40(.01)	<i>Nervous</i>
8	47	42	3.4	0.71(.39)	
9	17	31	-25.5	6.99(.00)	<i>Surprised</i>
10	46	23	33.3	16.30(.00)	<i>Joyful</i>
11	60	48	13.8	8.44(.00)	<i>Terrified</i>
12	44	33	12.9	3.64(.05)	
13	57	43	17.6	8.71(.00)	<i>Disappointed</i>
14	52	28	35	18.94(.00)	<i>Concerned</i>
15	52	40	14.7	5.22(.02)	<i>Sincere</i>
16	37	13	36.7	18.56(.00)	<i>Melancholy</i>
17	53	41	14.6	5.42(.02)	<i>Suspicious</i>
18	45	14	48.4	29.91(.00)	<i>Resentful</i>
19	47	46	-3.3	0.00(.95)	
20	55	44	12.7	5.06(.02)	<i>Honest</i>
21	47	45	-1.6	0.06(.79)	
22	49	28	29.5	14.05(.00)	<i>Derogatory</i>
23	46	39	6.9	1.46(.22)	
24	58	33	36.1	23.80(.00)	<i>Sarcastic</i>
25	56	36	27.8	15.28(.00)	<i>Defensive</i>
26	29	36	-14.9	1.81(.17)	
27	58	39	25.9	15.28(.00)	<i>Aggrieved</i>
28	23	25	-5.8	0.19(.66)	
29	63	51	13.5	12.25(.00)	<i>Appalled</i>
30	55	44	10.11	5.06(.02)	<i>Desperate</i>
31	45	29	22.2	7.86(.00)	<i>Hopeful</i>
32	58	33	36.1	23.80(.00)	<i>Upset</i>
33	31	31	-3.3	0.00(.9)	

Note. Text in bold indicates significant results and their corresponding response. Italics indicate negative valences emotions.

nonverbal IQ and group (Table 4). In both models, sex and educational level were added, which were not significant. Age was also not significant in the nonverbal IQ model.

RMV-SV	Coefficient	P	CI of 95%	P	Adjusted R2
Age	-0.89	.01	[-0.16, -0.19]	.00	0.37
Verbal IQ	0.07	.00	[0.28-0.12]		
Group	-1.98	.04	[-3.9, -0.06]		
Constant	18.37	.00	[13.12, 23.61]		
Non verbal IQ	0.07	.00	[0.30, 0.11]	.00	0.36
Group	-3.32	.00	[-4.69, -1.96]		
Constant	17.33	.00	[13.06-21.59]		

B) Differences regarding sex

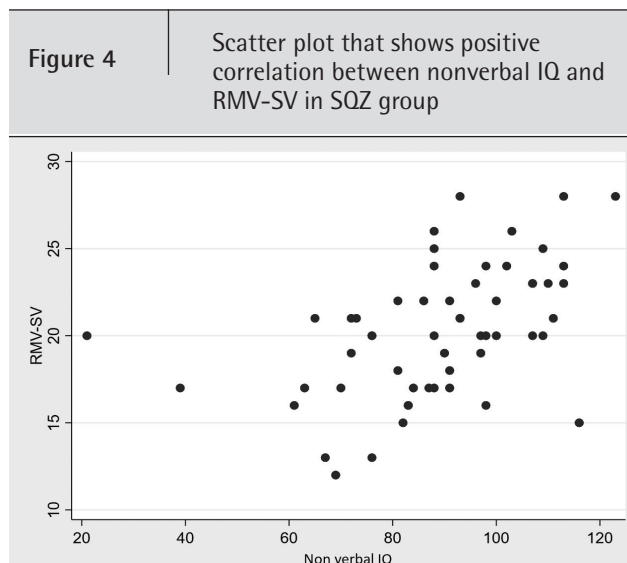
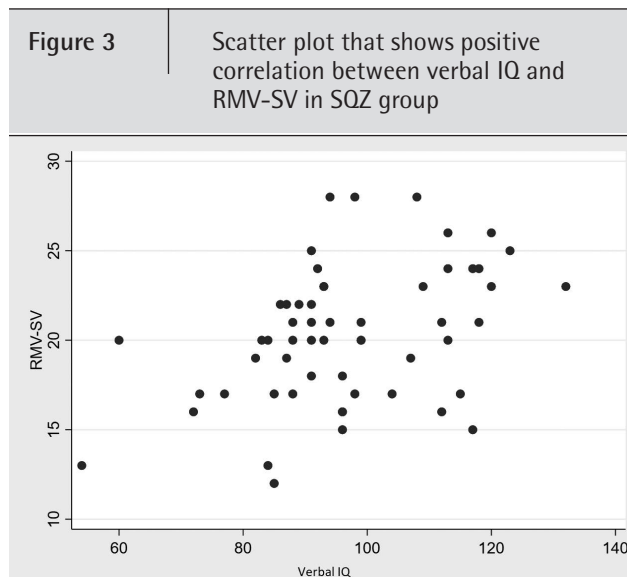
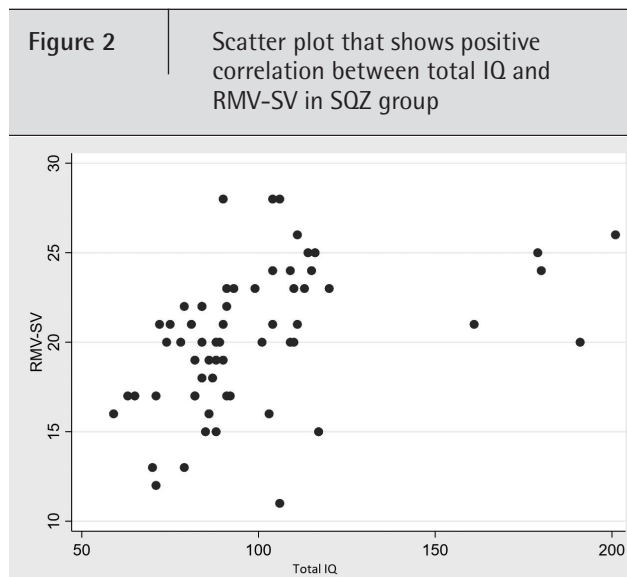
There were no statistically significant differences in the control group ($p=.70$) in terms of RMV-SV and sex. The results of the comparison between IQ and sex showed no statistically significant differences in the SQZ group (total IQ, $p=.53$; verbal IQ, $p=.54$; nonverbal IQ, $p=.21$).

C) Correlation between RMV-SV and other relevant variables

Here we present the Pearson correlation coefficient of the IQ variables, PANSS and age with RMV-SV (Table 5). In the SQZ group, there was a positive correlation between IQ and RMV-SV (.43) (Figure 2), also present in the verbal (.41) and nonverbal (.47) subscales (Figure 3 and 4). PANSS values showed a negative correlation with the RMV-SV score, with more evidence in the negative PANSS (-.20). In the control group, the correlation between total IQ and its subscales was small. In terms of age, the correlation was negative, with a stronger correlation in the SQZ group (-.30).

	RMV-SV		
	TOTAL	GRUPO CONTROL	GRUPO SQZ
CI total	,346	-,01	,435
CI Verbal	,402	-,05	,412
CI No Verbal	,499	,01	,47
PANSS T			-,127
PANSS P			-,153
PANSS N			-,203
PANSS PG			-,04
Edad	-,56	-,15	-,30

Note. PANSS: Positive and Negative Syndrome Scale. T: Total. P: Positive. N: Negative. GP: General Psychopathology.



DISCUSSION

In this study, we described and compared the sociodemographic, clinical, and prosodic recognition characteristics of a group of people with schizophrenia compared to a healthy control group, using the Reading the Mind in the Voice - Spanish Version tool. In the SQZ group, the overall scores and those broken down by individual prosodic test response item were significantly lower than in the control group. These results are consistent with the English and Spanish versions of the test in autism^{37,38}, and with the revised literature^{5,8}. Given that this tool has been useful in studying autism, we believe that it could also be useful for evaluating prosodic recognition in schizophrenia. As far as we know, RMV-SV is the first tool validated in Spanish that assesses prosodic recognition through complex and simple emotions.

In the breakdown of test results by item, we found that most deficits in emotional recognition correlated with responses of negative valences, which is also consistent with the literature reviewed^{22,24,26}. The cause of this relationship is not clear, but some authors have associated it with a greater complexity of the emotional level in negative stimuli^{23,42}, which would result in an abnormal and hypersensitive assignment of salience⁴³. According to Vogel²⁷, negative emotions are probably more similar to each other, making their discrimination more difficult. Also noteworthy was the score for item 9, "surprise", which presented a significantly higher score in the SQZ group than it did in the control group. This result was also reproduced in the English and Spanish versions. As it is a neutral emotion, this could be explained by the hypothesis that recognition is greater in these types of emotions compared to those with affective content²⁰.

Regarding emotional complexity, some authors argue that complex emotions are more easily understood because they require cognitive resources other than emotional processing⁴⁴. On the other hand, they are considered the most common and therefore most "useful" emotions as they value recognition in real-life social situations. For this reason, the high presence of these emotions in RMV-SV should be noted.

The results from the clinical variables, which inversely correlates with the PANSS values and, specifically, with negative symptoms, with lower values in RMV-SV, are consistent with those described in the literature with other prosodic recognition scales. In the SQZ group, the moderate negative symptom values are of note (PANSS Total=54.8, PANSS Negative=20.9). Furthermore, IQ values were positively correlated with higher prosody scores (.43). The existing relationship with verbal IQ (.41), could point to the existence of limited access to emotional lexicon. This deficit

was addressed by a subsequent study, creating a method that facilitates the understanding of complex emotional terms, through the Natural Semantic Metalanguage⁴⁵. However, the greatest relationship occurs with nonverbal IQ (.47), which suggests that this eventual linguistic bias does not explain everything; instead, it suggests that prosodic alteration could be caused by other cognitive deficits produced by the disease.

This study has several limitations, one of the main ones being a data collection bias. The control group participants were all university students (higher educational level, younger age and better IQ scores) compared with patients with psychotic disorders, whose illness generally presents at an early age - in many cases limiting academic activities - and cause a greater deterioration. The comparison between groups presents statistically significant differences, so a statistical control was performed with the main variables, where no statistically significant differences were observed in variables of interest such as sex or educational level, or age in the case of the nonverbal IQ model. Furthermore, it is an exploratory study of the RMV-SV tool, with a limited *n* and no other cognitive performance measures that could have enriched the study.

Finally, the development of emotional recognition assessment tools is essential for research into social cognition and social functioning in schizophrenia. The different dimensions of social cognition, such as the theory of mind or emotional recognition, act as mediating variables in the strong association between neurocognition and global functionality⁴⁵. Thus, alterations in the understanding of prosody in patients with schizophrenia can lead to interpersonal conflicts and disruptive behaviours derived from ineffective interpersonal communication; for this reason, we believe that further studying these areas and their impact on functionality is of interest.

CONCLUSIONS

When comparing the prosodic characteristics of the RMV-SV scale in a control group without pathology against the SQZ group, we obtained significantly lower overall and response-item scores in the group with schizophrenia, with a greater number of erroneous responses in negative valence emotion items.

Second, when analyzing the sociodemographic and clinical factors of the sample, heterogeneity was observed in some of the sociodemographic variables, that did not present statistically significant differences between groups when controlled by multiple linear regression models. For clinical factors, variables such as IQ showed a positive correlation, and PANSS, mainly the negative subscale, was inversely correlated.

Finally, the results observed in this work reasonably suggest that this new tool can be used in assessing emotional prosody, which had not been described for the Spanish population with schizophrenia until now. The brevity and ease of its administration give it potential clinical and research utility. For all these reasons, and in an attempt to further the study of social cognition in people with psychosis, access to the RMV-SV tool has been made free of charge and is available to researchers at the CIBERSAM Instrument Bank, <https://bi.cibersam.es/busqueda-de-instrumentos/ficha?Id=481>.

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Conflicts of interest

Dr. Lahera has been a consultant or has received honoraria or grants from Janssen-Cilag, Otsuka-Lundbeck, Lilly, AstraZeneca, CIBERSAM and Instituto de Salud Carlos III. Dr. García-Caballero has received honoraria from Janssen-Cilag, Otsuka-Lundbeck, and Pfizer. The rest of the authors declare that they have no conflicts of interest when carrying out this research.

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