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BRIEF COMMUNICATION

Social cognition and suicide-related behaviors in depression: a cross-sectional, exploratory study

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Objective: To explore the association between social cognition and previous suicide attempts and non-suicidal self-injurious behavior in adults with unipolar depressive disorders.
Methods: Seventy-two patients undergoing outpatient treatment for unipolar depression were enrolled in this cross-sectional study. Theory of mind was assessed using the Hinting Task and the Revised Reading the Mind in the Eyes Test. Empathy was evaluated using the Interpersonal Reactivity Index. Lifetime suicide attempts and non-suicidal self-injurious behavior were assessed using the Columbia Suicide Risk Rating Scale. Participants with and without these suicide-related outcomes were compared in terms of social cognition.
Results: Patients with previous suicide attempts performed worse on the Reading the Mind in the Eyes Test ($p = 0.017$). Patients with a history of non-suicidal self-injurious behavior were younger ($p = 0.005$), had a younger age at first depressive episode ($p = 0.017$), and scored higher on personal distress in the Interpersonal Reactivity Index ($p = 0.027$). Only personal distress remained independently associated with non-suicidal self-injurious behavior in multivariable analysis ($p = 0.038$).
Conclusion: Among patients with depression, those with previous suicide attempts or non-suicidal self-injurious behavior showed worse social cognition. These results encourage future research on social cognition deficits as clinical markers of suicide-related behaviors and as targets for interventions.

Keywords: Theory of mind; empathy; suicide; self-injurious behavior; depressive disorder

Introduction

Social cognition is the ability to identify and interpret social cues, such as facial expressions, body language, prosody, and the mental state of others.[1] Two of the most important aspects of social cognition are empathy and theory of mind (ToM). Empathy involves understanding the thoughts and feelings of others and responding to them with affective mobilization.[2] ToM is the ability to infer the mental states of others based on social cues and prior knowledge.[3]

Studies have shown deficits in patients with depressive disorders. ToM impairment has been described in patients with major depression, with a meta-analysis showing medium effect sizes compared to healthy controls.[4] These individuals have difficulty understanding subtle or nuanced expressions of emotion and tend to interpret stimuli in a more negative way.[1] Deficits seem to be related to depression severity, and persistent ToM impairment may be a risk factor for depression relapse.[4,5]

Suicide is one of the most serious outcomes in psychiatry, and major depressive episodes are related to most of deaths from suicide. Non-suicidal self-injury (NSSI) is a parasuicidal behavior defined as self-injurious behavior with no intent to die. NSSI differs from suicidal behavior in terms of etiology, psychiatric impairment, means, and life course. Of note, social isolation is a strong contributor to suicide risk, whether isolation is measured objectively (such as living alone) or through perceived loneliness.[6]

Nevertheless, the relationship between social cognition and suicide-related behavior has been little studied in this population. For example, the aforementioned meta-analysis included only one study assessing suicidal behavior. The study included participants aged over 60 years and found worse ToM performance in patients with depression and suicide attempts than controls.[7]

Here we aimed to explore the associations between social cognition and suicide-related behavior in individuals undergoing outpatient treatment for unipolar depressive disorder. We compared individuals with depression with and without a history of suicide attempts and NSSI behavior in terms of sociodemographic, clinical, and social cognition variables. We expected that patients with

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depression and suicide-related behaviors had greater deficits in social cognition. This general hypothesis was based on the link between poorer social cognition and depression, and that impaired social relationships are a risk factor for suicide.

Methods

Participants

Data were collected cross-sectionally from July 2019 to May 2021. Seventy-two patients were enrolled, initially from a public university outpatient clinic. After the onset of the COVID-19 pandemic, data collection was adapted to ensure participant safety, with recruitment of private practice patients and use of online interviews. The inclusion criteria were a diagnosis of major depressive disorder or dysthymia in the absence of manic or hypomanic episodes, determined through a structured clinical interview (see below), and age between 18 and 60 years. The exclusion criteria were inability to provide accurate responses or informed consent due to physical or cognitive impairment according to clinical evaluation. The study was approved by the local ethics committee.

Measures

Sociodemographic and clinical data were obtained. Diagnoses were made using the Brazilian version of the Mini International Neuropsychiatric Interview Plus.[8] Depressive and anxiety symptoms were measured using the Hospital Anxiety and Depression Scale (HADS).[9] Alcohol use was assessed using the Alcohol Use Disorders Identification Test-Consumption.[10] Suicide-related behaviors were assessed using the Columbia Suicide Risk Rating Scale,[11] which quantifies and characterizes suicidal ideation, suicide attempts and NSSI behavior.

Three aspects of social cognition were assessed: ToM based on non-verbal stimuli, ToM based on verbal stimuli, and empathy. Non-verbal ToM was assessed using the Revised Reading the Mind in the Eyes Test (RMET).[12] In this test, the participants chose one word (out of four) that best defined the expression in images of a person's eyes. Verbal ToM was evaluated using the Hinting Task.[3] This test consists of ten brief stories featuring social interactions and asks questions about the meaning implicit in the dialogue. Empathy was measured using the Interpersonal Reactivity Index (IRI).[2] This questionnaire assesses the subdomains ''Empathic Concern,'' ''Perspective Taking'', and ''Personal Distress.''

Statistical analysis

IBM SPSS Statistics version 22.0 was used in the analyses. Categorical variables were described as absolute and relative frequency (%). Data normality was assessed with the Kolmogorov-Smirnov test. Numerical variables were described as mean and standard deviation or median and first and third quartiles (Q1-Q3). The same sample was used to assess both outcomes. The associations between variables of interest and any lifetime suicide attempt or NSSI behavior were analyzed using the chi-square test or Fisher's exact test for categorical variables, or Student's *t*-test or Mann-Whitney *U* test for numerical variables. The effect sizes were described as Phi (ø), Eta (η^2) or Nagelkerke R^2, according to the test used in each analysis; $p < 0.05$ was considered statistically significant. Variables with significant associations in the univariate analyses were included in a binary logistic regression analysis to assess the independence of the association.

Results

There were no significant differences between participants from the public university outpatient clinic (n=30) and private practice (n=42) in the study variables (comparison not shown), except for a higher education level in the latter ($p < 0.001$). The sample's characteristics and social cognition performance are shown in Table 1. Most participants were female, unmarried, and had completed high school. Most did not have a family history of suicide. Only four patients (5.6%) had a history of both suicide attempts and NSSI.

Table 1 also shows the associations between sociodemographic, clinical, and social cognition variables and lifetime suicide attempts. Patients with depression and a history of suicide attempts scored significantly lower on the RMET than those without them ($p = 0.017$). Table 2 shows the results of analyses with lifetime NSSI behavior as the outcome. Significant associations were observed with age ($p = 0.005$), age at first depressive episode ($p = 0.017$), and IRI personal distress domain ($p = 0.027$). Only the empathetic personal distress score remained independently and directly associated with lifetime NSSI behavior in a binary logistic regression analysis including these variables ($p = 0.038$; OR = 1.194; Nagelkerke $R^2 = 0.318$). When analyzing associations between HADS-D score and social cognition variables, patients with higher HADS-D scores scored significantly lower on RMET (comparison not shown; $r = -0.293$; $p = 0.012$).

Discussion

In this exploratory study, we found that patients undergoing treatment for unipolar depression with previous suicide attempts scored significantly lower on the RMET (a measure of non-verbal ToM). In addition, those with a history of NSSI behavior had higher empathetic personal distress scores on the IRI. These associations were independent of sociodemographic and clinical variables.

Recently, Ferrer et al. also found impaired ToM in patients with depression and a history of suicide attempts.[13] Instead of using total RMET scores, the authors separated emotions into positive, negative, and neutral, finding deficits only when interpreting neutral emotions. A recent meta-analysis included studies with heterogeneous diagnoses assessing the relationship between ToM and suicidal behavior.[5] The authors found a significant negative relation between ToM and

Table 1 The sample's sociodemographic, clinical, and social cognition characteristics and their association with lifetime suicide attempts

Variable	Total (n = 72)	Any lifetime suicide attempt		p-value	η^2 or ø
		Yes	No		
		n = 14 (19.4%)	n = 58 (80.6%)		
Sociodemographic and clinical variables					
Sex, n (%)					
Female	60 (83.3)	12 (85.7)	48 (82.8)		
Male	12 (16.7)	2 (14.3)	10 (17.2)	1.000	0.001
Age	33.0 (24.3-43.0)	32.5 (25.0-42.3)	33.0 (24.0-45.0)	0.765	0.001
Married or live-in partner, n (%)					
Yes	25 (34.7)	5 (35.7)	20 (34.5)		
No	47 (65.3)	9 (64.3)	38 (65.5)	1.000	0.000
Education, n (%)					
Less than high school	8 (11.1)	3 (21.4)	5 (8.6)		
High school or higher	64 (88.9)	11 (78.6)	53 (91.4)	0.180	0.026
Family history of suicide, n (%)					
Yes	7 (9.7)	2 (14.3)	5 (8.6)		
No	65 (90.3)	12 (85.7)	53 (91.4)	0.615	0.006
Age at 1st depressive episode	22.0 (15.5-30.8)	19.5 (14.8-26.0)	23.0 (17.0-31.0)	0.213	0.022
HADS					
Anxiety	9.0 (6.0-13.0)	8.5 (5.0-15.3)	9.0 (6.0-12.0)	0.853	0.000
Depression	7.0 (4.0-11.5)	6.5 (3.0-11.5)	7.5 (4.0-12.0)	0.638	0.003
AUDIT-C	2.0 (0.0-4.0)	3.0 (0.0-3.3)	2.0 (0.0-4.0)	0.833	0.001
Social cognition variables					
RMET	26.0 (24.0-28.0)	23.5 (19.8-27.3)	27.0 (24.0-28.0)	**0.017**	0.078
Hinting Task	19.0 (18.0-20.0)	19.0 (18.0-20.0)	19.0 (18.0-20.0)	0.444	0.008
IRI					
Empathic concern	31.0 (27.0-34.0)	30.0 (28.8-34.0)	31.0 (27.0-34.0)	0.572	0.004
Perspective taking, mean (SD)	25.3 (5.0)	24.4 (4.8)	25.6 (5.1)	0.430	0.009
Personal distress	24,0 (20.3-27.0)	24.0 (21.5-27.3)	24.0 (18.8-27.3)	0.842	0.001
Total, mean (SD)	78.6 (8.9)	78.7 (5.1)	78.6 (9.7)	0.931	0.000

Data presented as median (Q1-Q3) when non-normally distributed data and as mean (SD) when normally distributed. Other presentations indicated.
Bold type denotes statistical significance.
AUDIT-C = Alcohol Use Disorders Identification Test-Consumption; HADS = Hospital Anxiety and Depression Scale; RMET = Revised Reading the Mind in the Eyes Test; IRI = Interpersonal Reactivity Index.
Effect sizes were described as η^2 for Student's *t* test or Mann-Whitney *U* test, and as ø for chi-square test.

suicidality with a medium effect size. As in our study, this association was not moderated by age or sex.

Regarding NSSI behavior and social cognition, we only found an association with the IRI empathetic personal distress domain. We are unaware of any studies that have assessed empathy specifically in patients with depression and a history of NSSI. However, in line with our findings, one study evaluated female inpatient adolescents with NSSI and found impaired ToM compared to healthy controls, with greater impairment in those engaging in different types of NSSI.[14] Using the IRI, Guhn et al. found that patients with depression reported greater personal distress than healthy controls, with no differences in the other domains.[15]

Our study has some limitations that should be considered. First, the cross-sectional design precludes causal inferences. Second, due to our sample's relatively high education level, the findings may not be applicable to the general Brazilian population. The relatively small sample size prevented us from finding other significant associations or comparing subgroups. For example, we did not differentiate patients in an acute depressive episode from those undergoing treatment but in remission. This is a relevant topic to be addressed in future research, as pointed out by other authors.[4] Finally, it is important to remember that our findings apply only to patients with unipolar depression, although suicidal behavior may share common ground with different disorders.

Despite its limitations, our study is one of only a few to have assessed the relationship between social cognition and suicide attempts in patients with unipolar depression. In addition, as far as we know, it is the first to evaluate the association between social cognition and NSSI in this population. Furthermore, we investigated different domains of social cognition, whereas most previous studies have focused only on one domain.

Table 2 Associations between sociodemographic, clinical, and social cognition variables and lifetime self-injurious behavior

	Self-injurious behavior			
	Yes	No		
Variable	n=11 (15.3%)	n=61 (84.7%)	p-value	η^2 or ø
Sociodemographic and clinical variables				
Sex, n (%)				
Female	10 (90.9)	50 (82.0)		
Male	1 (9.1)	11 (18.0)	0.677	0.007
Age	24.0 (20.0-30.0)	35.0 (26.0-45.0)	**0.005**	0.110
Married or live-in partner, n (%)				
Yes	3 (27.3)	22 (36.1)		
No	8 (72.7)	39 (63.9)	0.737	0.004
Education, n (%)				
Less than high school	1 (9.1)	7 (11.5)		
High school or higher	10 (90.9)	54 (88.5)	1.000	0.001
Family history of suicide, n (%)				
Yes	0 (0.0)	7 (11.5)		
No	11 (100.0)	54 (88.5)	0.585	0.019
Age at 1st depressive episode	17.0 (14.0-22.0)	23.0 (17.0-31.0)	**0.017**	0.079
HADS				
Anxiety	9.0 (6.0-12.0)	9.0 (6.0-13.0)	0.962	0.000
Depression	5.0 (4.0-12.0)	7.0 (4.0-11.0)	0.515	0.006
AUDIT-C	3.0 (2.0-5.0)	2.0 (0.0-4.0)	0.106	0.036
Social cognition variables				
RMET	27.0 (24.0-29.0)	26.0 (23.0-28.0)	0.444	0.008
Hinting Task	18.0 (16.0-20.0)	19.0 (18.0-20.0)	0.903	0.000
IRI				
Empathic concern	30.0 (28.0-34.0)	31.0 (27.0-34.0)	0.637	0.003
Perspective taking, mean (SD)	26.5 (5.5)	25.1 (5.0)	0.421	0.009
Personal distress	26.0 (24.0-30.0)	24.0 (18.5-27.0)	**0.027**	0.068
Total, mean (SD)	83.1 (7.3)	77.8 (9.0)	0.068	0.047

Data presented as median (Q1-Q3) when non-normally distributed data and as mean (SD) when normally distributed. Other presentations indicated.
Bold type denotes statistical significance.
AUDIT-C = Alcohol Use Disorders Identification Test-Consumption; HADS = Hospital Anxiety and Depression Scale; RMET = Revised Reading the Mind in the Eyes Test; IRI = Interpersonal Reactivity Index.
Effect sizes were described as η^2 for Student's *t*-test or Mann-Whitney *U* test, and as ø for chi-square test.

Overall, our results suggest that depression patients with a history of suicide attempts have lower social cognition performance, while those with NSSI have greater empathic personal distress than depression patients without these behaviors. The findings are preliminary, based on an exploratory design, and require further investigation. If these associations are confirmed, poorer social cognition performance could be used as a clinical marker of suicide attempts in depression, helping to identify people at risk. In addition, therapies focused on improving social cognition might help mitigate suicide-related behaviors.

Disclosure

The authors report no conflicts of interest.

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