Alexithymia, Social Anhedonia, and Empathy among Client with Schizophrenia: Mediation Model

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ABSTRACT:

Background and Aim: According to earlier studies, schizophrenia is often characterized by social withdrawal and a lack of emotional connection. Alexithymia, and social anhedonia significantly impacts the quality of life for individuals with schizophrenia. If empathy is indeed a mediator between alexithymia, and social anhedonia, then it becomes a potential target for therapeutic interventions. Training programs or treatments designed to enhance empathy could have a significant impact on the social functioning of individuals with schizophrenia. However, limited researches have explored this mediation role of empathy in relationship between alexithymia and social anhedonia among individuals with schizophrenia. So, this study aimed to investigate the mediating role of empathy in relationship between alexithymia and social anhedonia among individuals with schizophrenia**. Subjects& Methods**: A descriptive correlational analytical design was used. on 170 randomly chosen participants who met the selection criteria. Four tools were used for data collection (Socio-demographic and clinical data, Toronto Alexithymia Scale (TAS), Interpersonal Reactivity Index (IRI), and Social Anhedonia Scale (RSAS).**Results, Conclusion &Recommendations:** The present study revealed a significant positive correlation between alexithymia and social anhedonia. However, empathy was negatively associated with both alexithymia and social anhedonia. The results also provided evidence for a partial mediation effect of empathy in the relationship between social anhedonia and alexithymia. This could be a stepping stone for developing more comprehensive treatment plans not only improve social engagement but also foster empathy through enhanced emotional awareness and expression, ultimately leading to better social functioning. This study suggests that mental health nurses (MHNs) should prioritize assessing empathy, social anhedonia, and alexithymia in patients with schizophrenia. Also, psychiatric and mental health nurses should focus on training patients with schizophrenia to identify emotions, regulate them, and improve communication/social interaction to enhance empathy and reduce the impact of alexithymia on social anhedonia. Moreover, building a strong relationship is crucial to provide effective psychoeducation for patients and families on the importance of empathy in social interactions.

Keywords: Alexithymia, Social Anhedonia, Empathy, Schizophrenia, Mediation Model.

INTRODUCTION:

Schizophrenia is a chronic and debilitating mental disorder, ranking among the top 30 causes of disability worldwide (Marder, S. et. al., 2023). It presents with a combination of positive and negative symptoms. While positive symptoms like hallucinations and delusions are often dramatic, but negative symptoms are equally important, overshadowed, and pose significant challenges (Fusar-Poli et al., 2020). Alexithymia, a core feature within negative symptoms, deserves particular attention due to its profound influence on various aspects of schizophrenia.

Alexithymia is a personality dimension characterized by affective and cognitive deficits, including difficulty recognizing, describing, and differentiating feelings. Individuals with alexithymia struggle to differentiate bodily sensations from emotional feelings (Nemiah et al., 1976), limiting their emotional vocabulary and hindering their ability to communicate their inner world. Alexithymia often linked to mental health issues like depression, schizophrenia, and eating disorders (McQuarrie, et. al.,2023) (Yang, T. et. al., 2023).

In patients with schizophrenia, alexithymia is a common but less-recognized affective deficit, with a significant association with psychopathological symptoms like negative symptoms and depression (Yi Y, 2023). Additionally, the inability to identify and express emotions, further limits the ability to understand emotional cues from others. This often leads to social withdrawal, further isolating individuals with schizophrenia and hindering their recovery (Aaron, R., et. al., 2015). So, alexithymia may act as a barrier, hindering the ability to use social cues and emotional experiences to connect with others, significantly complicates building and maintaining healthy relationships leading to social anhedonia. Social anhedonia, the reduced or absent pleasure in social interactions, often co-occurs with alexithymia (Doody et al., 2013), further exacerbating social difficulties.

Anhedonia as central feature of schizophrenia, can be further categorized into physical and social anhedonia (Gooding. Et. al., 2019). Physical anhedonia refers to the inability to experience pleasure from sensory experiences like taste or touch. Social anhedonia, however, specifically affects the enjoyment derived from social interactions.

Individuals with schizophrenia often struggle to anticipate and experience pleasure in social settings, leading to social withdrawal and avoidance. Studies have shown that social anhedonia is linked to poorer employment outcomes in individuals with schizophrenia (Michael, T., 2018). Further Research suggests that social anhedonia is a major factor contributing to poor quality of life in schizophrenia (Seidisarouei, 2022).

Research findings indicate a correlation between social anhedonia and cognitive functions in schizophrenia spectrum disorders, highlighting difficulties in pleasure anticipation and social pleasure experiences (Savla, G., et. al., 2013). So, early intervention targeting social anhedonia is crucial for successful rehabilitation. (Hyun, J. Y., 2016). Several therapeutic approaches, such as cognitive-behavioral therapy and empathy training programs, can be used to address social anhedonia and improve social functioning (Michael, T., 2018).

Empathy is a crucial skill for social interaction, allowing an individual to understand and share the emotional experiences of others. It has two main components: affective empathy (feeling emotions with others) and cognitive empathy

(understanding emotions in others). Empathy contributes to the development of interpersonal networks, forgiveness and altruism (Hoffman ML.,2000). Unfortunately, research suggests that patients with schizophrenia often struggle with empathy (Correll. C., et. al., 2020). Deficits in empathy can have a significant impact on a person's ability to form and maintain relationships (Bora, E., & Häfner, H., 2006). Furthermore, empathy deficits have been linked to impulsive and premeditated violence in male patients with schizophrenia, with affective empathy concern being a significant predictor of premeditated aggression (Lei, Y. et. al., 2023).

Previous researches have showed that patients with schizophrenia experiencing social anhedonia and low empathy also tend to have alexithymia (Yang et al., 2020), which indicate a significant impact of schizophrenia psychopathology and illness onset on social functioning. However, training patients in interpersonal and communication skills can have a greater influence on their social functioning compared to these illness-related factors. Then they can start to close the empathy gap caused by social anhedonia and alexithymia by improving these skills. In light of this, the study suggests that empathy may serve as a mediator by affecting the relationship between alexithymia and social anhedonia.

Significance of the study

Schizophrenia is a complex mental illness that significantly impacts an individual's emotional experience and social functioning. Research suggests that these difficulties may stem from a combination of social anhedonia and alexithymia (McQuarrie, et. al., 2023), (Seidisarouei, 2022). The concept of empathy can bridge the gap between social anhedonia and alexithymia. Empathy allows us to not only understand the emotions of others but also share their emotional

experiences. So, mental health nurses can play a significant role in developing and implementing targeted interventions to improve empathy, social functioning, and overall well-being in individuals with schizophrenia which is essential for psychosocial rehabilitation.

Aim of the study

This study aimed to examine the association between alexithymia, social anhedonia, and empathy in schizophrenia. Moreover, it aimed to examine the mediating role of empathy in the relationship between alexithymia, and social anhedonia. By investigating these variables, the study can denote a better understanding of how alexithymia, social anhedonia, and empathy are interrelated in patients with schizophrenia, which in turn could address the underlying issues that contribute to social dysfunction in that population.

Research question

-What are the levels of alexithymia, social anhedonia, and empathy in patients with schizophrenia?
-What is the type of association between alexithymia, social anhedonia, and empathy in patients with schizophrenia?
- Does empathy mediate the relationship between alexithymia and social anhedonia in patients with schizophrenia?

Subjects and Methods:

Research design

A descriptive correlational research design was used in this study. The setting where the current study was conducted was the outpatient of Alexandria's El-Maamoura Hospital for Psychiatric Medicine, The Ministry of Health and Population is associated with the hospital. Alexandria, Matrouh, and El-Beheira are the three governorates it serves. The Psychiatric outpatient clinic provides free treatment services for all patients suffering from mental illness and

substance dependence. It works 6 days a week (Saturday through Thursday), from 9 am to 1 pm.

Subjects: Sample size calculation and sampling technique

The researchers adopted a convenience sampling approach, recruiting 170 male patients diagnosed with schizophrenia for the present study. Notably, participants were chosen based on strict inclusion criteria, ensuring a sample homogeneous with respect to gender and diagnosis, with no comorbid conditions present, aged more than 18 years, able to communicate coherently and relevantly, and willing to participate in the study. The study's sample comprised exclusively of male participants due to two primary considerations. Firstly, outpatient clinics tend to observe a higher prevalence of schizophrenia among males compared to females. This disparity might be attributed to social stigma and cultural factors that may discourage females from seeking treatment. Secondly, the researchers aimed to mitigate confounding variables potentially introduced by gender differences.

The study sample was calculated according to (Epi-info statistical package, version 7.2, designed by the CDC) with 80 percent power, a value of 2.5 is chosen at the acceptable limit of precision (D) at 95 percent confidence level (C1), with expected prevalence 10%, worst acceptable 25% for population size about 500 schizophrenic cases over the last 3 months (The Official Statistics of El-Maamoura Hospital for Psychiatric Medicine, 2023). As a result, the sample size was estimated to be 170.

Data collection

The researchers utilized four tools to collect the required data:

Tool 1: Socio-demographic and clinical data: To develop the instrument, researchers conducted a comprehensive literature review to identify relevant sociodemographic and clinical

data points. Sociodemographic data encompassed factors such as age, gender, educational attainment, marital status, occupational, and place of residence. Clinical data included duration of mental illness, number of previous psychiatric hospitalization, and family history of mental illness.

Tool 2: The Toronto Alexithymia Scale (TAS-20)

The TAS-20 was developed by Bagby et al., (1994) for measuring alexithymia. It consists of a 20-item self-report measure that evaluates 3 subscales: The first subscale, difficulty identifying feelings that formed of 7 items to assess the ability to identify feelings and distinguish them from the somatic sensations that accompany emotional arousal (1, 3, 6, 7, 9, 13, 14). The second subscale, difficulty describing feelings that composed of 5 items (2, 4, 11, 12, 17), to detect participants ability to find right wards and describe feeling. Finally, the third subscale of being externally oriented thinking difficulty, including 8 items (5, 8, 10, 15, 16, 18, 19, and 20).

Each item is rated on a 5-point Likert scale (from 1=strongly disagree to 5=strongly agree), and the answers within each relevant item were added together to form a total subscale score. The total alexithymia score was generated from the sum of all responses. With greater TAS scores representing greater alexithymia. Reverse scoring is used for items 4, 5, 10, 18, and 19

To determine the alexithymia percentage, the total TAS-20 score was classified based on the critical point proposed by Bagby et al, (1994). Based on this classification scheme, a score of≤51 indicates no alexithymia (low), scores between 52–60 indicate possible alexithymia (medium), and scores of≥61 indicate alexithymia (high). The Cronbach's α in the current study was 0.825.

Tool 3: the Interpersonal Reactivity Index (IRI)

The Interpersonal Reactivity Index (IRI) was developed Davis, (1983). This scale is used to study an empathy deficit or disturbance in patients with psychiatric disorders. The IRI consists of 28 items that that features four, seven-item subscales: Fantasy Scale (FS) items (1-7) that describes the likelihood that a person identifies with a fictional character, Perspective-Taking Scale (PT) items (8-14) for assessing unplanned attempts to adopt others' points of view, Empathic Concern Scale (EC) items (15-21) that refers to individuals' feelings of compassion and concern for others, and Personal Distress Scale (PD) items (22-28), which indicating the extent to which an individual feels uneasiness or worry when exposed to the negative experiences of others. The IRI was rated on a 5-point Likert scale (0-4), and total scores range from 0 to 112 with higher scores resulting in higher levels of empathy. Reverse scoring is used for items (3, 6, 9, 12, 16, 19, 20, 25 &27). Criterion-related validity was evaluated by examining correlations between the IRI and affective dimension scale $r=.31$, $p<.05$ (Kang.et. al., 2009). The Cronbach's α in David's study was 0.79, while it was 0.83 in current study.

Tool 4: The Social Anhedonia Scale (RSAS)

Revised Social Anhedonia Scale was developed by (Eckblad, et. al., (1982). The RSAS consists of forty True/False items that assess the following: Schizophrenic apathy, being associable, not enjoying social interactions, and not caring about others. The total scores range from 0 to 40; higher scores are associated with greater degrees of anhedonia (Mishlove M, et, al., 1985). Criterion-related validity was evaluated by examining correlations between social anhedonia and social relationships ($r=-.43$, $p<.001$) (Ritsner, et. al., 2011). The Cronbach's α was 0.86 in the previous study (Gooding, et. al., 2017), and 0.90 in this study. Empirical evidence has supported the validity of the RSAS (Chapman et al., 1995; Fonseca-Pedrero et al., 2008; Kwapil et al., 2008).

PROCEDURE

The study received ethical approval from the Research Ethics Committee of the Faculty of Nursing at Damanhour University, ensuring adherence to rigorous ethical guidelines. To facilitate data collection, written permissions were obtained from both the General Secretariat of Mental Health and the Director of El-Maamoura Hospital for Psychiatric Medicine.

A panel of five specialists in the disciplines of psychiatric nursing was given tools 2, 3, and 4 after it had been translated into Arabic.

A pilot project was used to assess the study instruments' clarity, and application on 20 patients with schizophrenia who were excluded from the study sample.

Alpha Cronbach's test was used to assess the study instruments' internal consistency.

All medical charts of patients who attend to the outpatient clinics screened and the clients who met the inclusion criteria were recruited to participate in the study. To discuss the research objectives and complete the study, a private, one-to-one interview conducted until the required total number of sample size was collected.

Data collection lasted about three months (from the beginning of January 2024 to the end of March 2024).

ETHICAL CONSIDERATION

After being told of the purpose and significance of the study, the participants were required to complete a printed informed consent form. They were also advised of their unrestricted right to withdraw from the study at any point before completing the study items. Additionally, anonymity was acknowledged and respected. Data confidentiality was ensured throughout the whole study's implementation.

Statistical analysis

Data underwent analysis using the IBM SPSS Statistics software package (version 23.0). Pearson's correlation coefficient was employed to assess the strength and direction of linear relationships between normally distributed quantitative variables. Subsequently, regression analysis was conducted to identify the independent variable with the most significant influence on the Social Anhedonia Scale (RSAS) score. Finally, path analysis was performed using AMOS 23.0 software to explore the Direct and Indirect Effect of Toronto Alexithymia Scale (TAS) on Social Anhedonia Scale (RSAS) Mediated by Interpersonal Reactivity Index (IRI). Significance of the obtained results was judged at the 5% level.

RESULTS

Regarding distribution of the studied sample according to demographic and clinical data, **Table (1): Shows** the s**ocio-demographic data of the studied schizophrenic sample. It** reveals that the mean age for the studied subjects was 32.94± 9.26. The majority of them (72.4%) were single. Regarding the residence, 64.1% of the subjects were from rural area. Large proportion of them were free work, unemployed with (53.5%& 30.0% respectively), and got basic education (34.1%). Nearly half of the subject (48.8%) reported that their income not enough. Nearly three quarter (70.0%) of them live with their father, mother, and siblings.

 Table (2) reveals the clinical characteristics of the studied schizophrenic patients. Regarding age of onset of psychiatric illness, (51.8%) were categorized as suffering from mental illness from age 20 to less than 30. Nearly three quarter (72.4%) were previously hospitalized for 4-7 times. Also, more than one quarter (27.6 %) of the subjects reported having family history with mental illness. Nearly half of them (48.9%) were from the first-degree relatives.

Table (3) provides the mean and mean percent score of empathy, alexithymia, and social anhedonia among the studied patients with schizophrenia. As regards empathy, the total mean percent score was (40.03±16.38). The highest mean percent score was for empathic concern subscale (EC) with (49.92±14.78). As regards alexithymia, the total mean score for alexithymia was (58.0 ±9.0), and the highest mean percent score (78.87 ±17.96) was for difficulty identifying feelings subscale. Regarding social anhedonia, the participant mean percent score was (62.90 ±9.36).

 Table (4) displays the distribution of the studied subject regarding the levels of empathy, alexithymia, and social anhedonia. Regarding empathy level among participant, more than two third of them (69.4%) have low, while only (7.6%) of them have low level of empathy.

Regarding alexithymia level among participants, nearly half (42.3%) of them have high level of alexithymia, followed by (31.8%) of them with moderate level of alexithymia. Also, the majority of study subject's (98.8%) reported having social anhedonia. Among those with social anhedonia (68.2%& 31.8%) have moderate and high level of social anhedonia respectively.

Table (5) presents the Pearson correlation coefficient (r) for the relationships between empathy, alexithymia, and social anhedonia among the studied patients with schizophrenia. Notably, empathy exhibits negative correlations with other constructs, such as alexithymia (r = -0.157*) and social anhedonia (r = -0.686*) at p= (0.041* &<0.001* respectively). Whereas, statistical positive correlation between alexithymia and social anhedonia was found where (r= 0.249* at p=0.001*) among study subjects.

Table (6): The results of the linear regression analysis revealed significant associations between empathy, and social anhedonia.

Empathy negatively predicted social anhedonia (B = -0.152   , Beta = -0.663, p < 0.001). This indicates that higher levels of empathy were associated with lower levels of social anhedonia. Contrary, the analysis revealed that alexithymia positively predicted social anhedonia (B = 0.060, Beta = 0.145, p < 0.011*). This implies a positive association between alexithymia, and social anhedonia. The model accounted for 49.1% of the variance in social anhedonia (R^2= 0.491, Adjusted R^2= 0.484), and the overall model was highly significant (F= 80.400*, p<0.001*).

Table (7), and Figure (1) presents the direct and indirect effects between empathy, alexithymia, and social anhedonia. The table revealed that there is a direct effect of (-0.284) of Toronto Alexithymia Scale on Interpersonal Reactivity Index (C.R. = -2.066*, p =0.039*). Also, Toronto Alexithymia Scale had a direct effect of (0.060), and an indirect effect of (0.036) on Social Anhedonia Scale (C.R. = 2.600*   , p =0.009*). Also, the Interpersonal Reactivity Index had a direct effect of (-0.152) on the Social Anhedonia Scale (C.R. = -11.926*, p <0.001*). These results suggest that empathy partially mediates the relationship between the Social Anhedonia and Alexithymia. The model fit parameters, including the Comparative Fit Index (CFI), Incremental Fit Index (IFI), and Root Mean Square Error of Approximation (RMSEA), scored a (1.000; 1.000; 0.150, respectively), indicating a good fit. The chi-square test of model fit was significant (39.37*, p <0.001*), suggesting that the model fits the data well.

Table (1):　　**Distribution of the studied sample according to Socio-demographic data (N=170)**

Demographic data	No	%
Age		
<20	7	4.1
20 <30	63	37.1
30 <40	63	37.1
40 <50	28	16.5
50 <60	7	4.1
≥60	2	1.2
Mean± SD	32.94± 9.26	
Marital status		
Single	123	72.4
Married	23	13.5
Divorced	24	14.1
Residence		
Urban	61	35.9
Rural	109	64.1
Occupation		
Unemployed (does not work)	51	30.0
Governmental work	3	1.8
Free work	91	53.5
Student	10	5.9
Private work	15	8.8
Level of education		
Illiterate	12	7.1
Read and write	29	17.1
Basic education	58	34.1
High school	51	30.0
University	18	10.6
Psot university	2	1.2
Monthly income		
Enough	87	51.2
Not enough	83	48.8
Live with:		
Alone	26	15.3
wife/husband/sons/daughters	24	14.1
father/mother/siblings	119	70.0
Others	1	0.6

Table (2):   Distribution of the studied sample according to their clinical data. (N=170)

Clinical data	No	%
Age of onset of mental illness		
<20	53	31.2
20 <30	88	51.8
30 <40	14	8.2
≥40	15	8.8
Period of mental illness		
<1	21	12.4
1 <5	56	32.9
5 <10	40	23.5
≥10	53	31.2
Previous psychiatric hospitalization		
1-3	47	27.6
4-7	123	72.4
8-10	23	13.5
More than 10	24	14.1
Family history of mental illness		
YES	47	27.6
No	123	72.4
In case of yes (n = 47)		
1st degree relative	23	48.9
2nd degree relative	24	51.1

Table (3): The mean and mean percent score of empathy, alexithymia, and social anhedonia among the studied patients with schizophrenia.

Variables	Total score		Mean percent score	
	Mean	±SD	Mean	±SD
The Interpersonal Reactivity Index (IRI)	**72.18**	**16.29**	**40.03**	**16.38**
Fantasy	16.64	5.97	34.43	21.31
Perspective talking	15.29	5.86	29.60	20.91
Empathic concern	20.98	4.14	49.92	14.78
Personal distress	19.27	3.24	43.82	11.58
The Toronto Alexithymia Scale (TAS)	**58.0**	**9.0**	**72.50**	**11.25**
Difficulty identifying feelings	22.08	5.03	78.87	17.96
Difficulty describing feelings	15.19	3.72	75.97	18.60
Externally oriented thinking difficulty	20.72	4.82	64.76	15.05
The Social Anhedonia Scale (RSAS)	**25.16**	**3.74**	**62.90**	**9.36**

Table (4): The levels of empathy, alexithymia, and social anhedonia among the studied patients with   schizophrenia (n=170)

Levels of the variables	No.	%
Interpersonal Reactivity Index (IRI)	No.	%
Low	118	69.4
Moderate	39	22.9
High	13	7.6
Toronto Alexithymia Scale (TAS)	No.	%
Low	44	25.9
Moderate	54	31.8
High	72	42.3
Social Anhedonia Scale (RSAS)	No.	%
<16 (don't have social anhedonia)	2	1.2
>16 (have social anhedonia)	168	98.8
Level of Social Anhedonia in patients with social anhedonia		
Low	0	0.0
Moderate	116	68.2
High	54	31.8

Table (5):   Correlations between the Toronto Alexithymia Scale (TAS), Interpersonal Reactivity Index (IRI), and Social Anhedonia Scale (RSAS).

		Fantasy subscale	Perspective talking subscale	Empathic concern subscale	Personal distress subscale	Total Interpersonal Reactivity Index (IRI)	Difficulty identifying feelings subscale	Difficulty describing feelings subscale	Externally oriented thinking difficulty	Toronto Alexithymia Scale (TAS)
Fantasy subscale	r									
	p									
Perspective talking	r	0.790*								
	p	<0.001*								
Empathic concern	r	0.807*	0.785*							
	p	<0.001*	<0.001*							
Personal distress	r	0.467	0.267*	0.246*						
	p	<0.001*	<0.001*	0.001*						
Total Interpersonal Reactivity Index (IRI)	r	0.931*	0.865*	0.857*	0.539*					
	p	<0.001*	<0.001*	<0.001*	<0.001*					
Difficulty identifying feelings subscale	r	0.013	-0.212*	-0.106	0.267*	-0.045				
	p	0.864	0.006*	0.167	<0.001*	0.559				
Difficulty describing feelings subscale	r	-0.098	-0.132	-0.219*	0.167*	-0.106	0.532*			
	p	0.203	0.086	0.004*	0.029*	0.170	<0.001*			
Externally oriented thinking difficulty	r	-0.225*	-0.100	-0.070	-0.143	-0.164*	0.035	-0.082		
	p	0.003*	0.197	0.366	0.063	0.032*	0.651	0.287		
Total Toronto Alexithymia Scale (TAS)	r	-0.154*	-0.226*	-0.187*	0.142	-0.157*	0.797*	0.667*	0.521*	
	p	0.045*	0.003*	0.014*	0.065	0.041*	<0.001*	<0.001*	<0.001*	
Social Anhedonia Scale (RSAS)	r	-0.650*	-0.648*	-0.573*	-0.347*	-0.686*	0.151*	0.146	0.194*	0.249*
	p	<0.001*	<0.001*	<0.001*	<0.001*	<0.001*	0.049*	0.057	0.011*	0.001*

r: Pearson coefficient   *: Statistically significant at p ≤ 0.05

Table (6):   Linear Regression Analysis Showing the Effect of Toronto Alexithymia Scale (TAS) and Interpersonal Reactivity Index (IRI) on Social Anhedonia Scale (RSAS)

Variable	B	Beta	T	p	95% CI	
					LL	UL
Interpersonal Reactivity Index (IRI)	-0.152	-0.663	-11.855*	<0.001*	-0.178	-0.127
Toronto Alexithymia Scale (TAS)	0.060	0.145	2.585*	0.011*	0.014	0.106
R^2= 0.491, Adjusted R^2= 0.484, F= 80.400*,p<0.001*						

F,p: f and p values for the model
R^2: Coefficient of determination
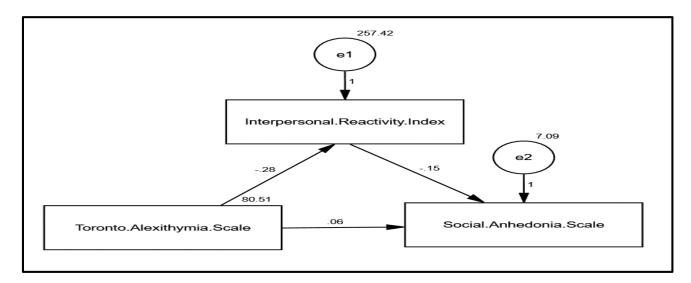B: Unstandardized Coefficients
Beta: Standardized Coefficients
t: t-test of significance
LL: Lower limit   UL: Upper Limit
*: Statistically significant at $p \leq 0.05$

Figure (1):   Path Analysis to detect the Direct and Indirect Effect of Toronto Alexithymia Scale (TAS) on Social Anhedonia Scale (RSAS) Mediated by Interpersonal Reactivity Index (IRI). (n =170)

Model fit parameters CFI; IFI; RMSEA (1.000; 1.000; 0.150).
CFI = Comparative fit index; IFI = incremental fit index; and RMSEA = Root Mean Square Error of Approximation.
Model $\square^{\square}$; significance 39.37*(<0.001*)

Table (7):   **Direct and Indirect Effect between Toronto Alexithymia Scale (TAS), Social Anhedonia Scale (RSAS), and Interpersonal Reactivity Index (IRI). (n =170)**

Variable 1		Variable 2	Direct effect	Indirect effect	C.R	p-value
-Interpersonal Reactivity Index	←	Toronto Alexithymia Scale	-0.284	-	-2.066*	0.039*
- Social Anhedonia Scale	←	Toronto Alexithymia Scale	0.060	0.036	2.600*	0.009*
-Social Anhedonia Scale	←	Interpersonal Reactivity Index	-0.152	-	-11.926*	<0.001*

Discussion

Schizophrenia disrupts not only an individual's perception and cognition, but also their ability to connect with others (Frattaroli n., et al., 2022). Key symptoms like social anhedonia (Harvey et al., 2009), and alexithymia (Nesse, 2023), can significantly hinder social functioning. Furthermore, impaired emotional processing (Yang et al., 2020) may contribute to reduced empathy, making it challenging to understand and share the feelings of others. So, this study investigates these factors in schizophrenia, specifically focusing on whether empathy acts as a mediator between alexithymia and social anhedonia.

Concerning alexithymia, this study found a high prevalence of alexithymia among participants with schizophrenia. These results are consistent with research by Trimble et. al., (2024) found that 40–46% of schizophrenia patients have alexithymia. Additionally, study by Cedro, et al., (2001) found that in a sample of outpatients with a diagnosis of schizophrenia, the TAS-20 detected considerably greater levels of alexithymia. In the same line previous research demonstrates a significantly higher prevalence of alexithymia in individuals with schizophrenia compared to the general population (Henry et al., 2006).

Based on the previous researches, current finding of elevated alexithymia levels may refer to severity of negative symptoms and cognitive dysfunction. Previous research suggests that he level of alexithymia in schizophrenia is increased by higher severity of negative symptoms, leading to difficulties in understanding and describing emotions (Aliyev et al., 2017). Also, Fogley et al., (2020) reported that impression management, poor working memory, severe anxiety, and poor verbal memory increase alexithymia levels in schizophrenia.

Concerning the social anhedonia, a significant portion of participants exhibited moderate to high levels of social anhedonia. This result in line with previous study documented high levels of social anhedonia in schizophrenia patients compared to healthy individuals (Harvey et al., 2009).

The observed high prevalence of social anhedonia among these adult schizophrenic subjects may contribute to the finding that approximately two-thirds are single and nearly one-third are unemployed. This aligns with existing research demonstrating that social difficulties, such as withdrawal, isolation, and challenges with interpersonal interactions, are prevalent among individuals with schizophrenia (Aliyev et al., 2017; Mohamed A., et al., 2024).

Several factors associated with schizophrenia may contribute to social anhedonia; Research suggests that the ability to experience pleasure from social interaction is related to the concept of hedonic capacity, suggesting that schizophrenia disrupts this capacity (Fonseca-Pedrero et al., 2015). Also, research suggests that schizophrenia symptoms can involve difficulty distinguishing between reality and distorted perceptions (e.g., hallucinations) (Mohamed. A., et al., 2024) may contribute to social anhedonia. Additionally, negative symptoms which include a lack of emotional expression, reduced speech, and a general withdrawal from social interaction may contribute to social anhedonia (Blanchard et al., 2015).

Regarding the level of empathy, the majority of subjects tend to suffer from empathy deficits. This result consistent with previous researches suggests that empathy can be impaired in schizophrenia (Correll, C., et. al., 2020 & Gong et al., 2023). This result could be justified as many factors may contribute to deficits in empathy among individuals with schizophrenia; Cognitive deficits, such as impairments in intellectual processes and inhibitory control which mark schizophrenia, may be associated with reduced empathic abilities in this population (Chuang S., et. al., 2021). Study by Varachhia S, et. al., (2018) indicate that people with schizophrenia exhibit medium deficits in cognitive empathy, or the ability to understand and infer the thoughts and perspectives of others. Also, this study suggest that the chronicity and progression of the disorder may exacerbate empathy impairments over time. This reason could be applied on the subject of current study especially nearly one third of them reported start suffering from mental illness before age of 20 years old, and for duration of mental illness more than ten years. Which indicating earlier age of

schizophrenia diagnosis and a longer duration of illness.

Consistent with prior research by Chuang et al., (2021), the observed high levels of alexithymia and social anhedonia in this subject population may underlie potential deficits in empathy. Schizophrenia's negative symptoms, particularly social withdrawal and emotional blunting, have been identified as significant predictors of impaired empathy, especially on objective measures of empathic ability (Chuang et al., 2021). This suggests a possible causal pathway where the difficulties in identifying and expressing emotions (alexithymia) and the reduced pleasure in social interactions (social anhedonia) contribute to a diminished capacity for empathy.

As expected, negative correlation was observed between empathy and alexithymia, which aligns with extant research (Peng et al., 2023; Yang et al., 2020). This finding suggests that individuals with greater difficulty identifying and understanding their own emotions (alexithymia) may experience diminished capacity for empathy. As highlighted by Grynberg et al. (2010) and McQuarrie et al. (2023), alexithymia can hinder the ability to recognize and respond to the emotions of others.

Empathy also exhibited a negative correlation with social anhedonia in current study. Furthermore, linear regression analysis revealed that empathy significantly predicted social anhedonia. This implies that individuals with higher levels of empathy tend to demonstrate better social skills and engagement. This aligns with previous research by Bora et al. (2010) who identified positive correlations between empathy and social function in schizophrenia. Moreover, previous research suggested social anhedonia among the factors contributing to empathy

deficits in schizophrenia. Individuals with social anhedonia experience a diminished ability to derive pleasure from social interactions. This lack of enjoyment can lead to social withdrawal and a decreased interest in understanding the emotions of others (Ritsner, M., et. al., 2013).

From other perspective, studies show that successful treatments for both alexithymia and social anhedonia in schizophrenia often focus on improving emotional awareness and regulation (e.g., McQuarrie et al., 2023). These skills can indirectly enhance empathy by strengthening the ability to distinguish between one's own and others' emotions (a core aspect of empathy).

The Path Analysis contributes to the understanding of the relationship between alexithymia and empathy. This finding reveals a direct effect of alexithymia on empathy, suggesting that difficulties processing one's own emotions can hinder the ability to understand and respond to the emotions of others. This aligns with prior research by (Rebecca, L., et. al., 2014) who suggest similar challenges. Further evidence from studies by Farah et al., (2018) and Aaron et al., (2015) who pinpoint the specific difficulty of identifying one's own emotions as a key factor in hindering empathy. This aligns with the work of Valdespino et al., (2017) who propose that the ability to identify and process one's own emotions may be a fundamental building block for understanding the emotions of others.

In the current study, the result revealed a positive correlation and predictive power of alexithymia on social anhedonia in schizophrenia. Regression analysis showed that alexithymia can predict social anhedonia which consistent with established research (Goerlich, 2018). The difficulty understanding and expressing emotions in alexithymia can make it challenging to build and maintain social relationships (Henry

et al., 2006). Also, As highlighted by O'Driscoll et al., (2014), emotional processing difficulties likely contribute significantly to the social challenges faced by many schizophrenia patients.

Furthermore, the study aligns with study by Aliyev et al., (2017) who demonstrated a link between high alexithymia in schizophrenia and difficulties in emotional cognition, social interaction, and an increased risk of social isolation and violence. This reinforces the notion that alexithymia directly hinders social functioning.

While acknowledging the potential influence of structural abnormalities in the orbitofrontal cortex on the development of alexithymia in schizophrenia patients, as suggested by Lingfang, Yu et al., (2023), this study's path analysis confirms a direct effect of alexithymia on social anhedonia. This finding strengthens the understanding of how alexithymia directly impacts social functioning in this population.

The analysis further reveals an indirect effect of alexithymia on social anhedonia, mediated by empathy deficits, suggesting that empathy deficits may act as a mediator in this relationship. In other words, alexithymia might lead to social withdrawal (social anhedonia) because it hinders the ability to connect with others emotionally (empathy). This aligns with the findings in the Lenzenweger et al. (2016) study, suggesting that impaired empathy due to alexithymia might be a key factor contributing to social withdrawal (a core feature of social anhedonia) in schizophrenia.

Empathy allows individuals to connect with others on an emotional level. This connection can motivate social interaction and engagement, potentially reducing social anhedonia (Fan, Y,. et. al., 2011). So, this study suggests that interventions targeting alexithymia may improve

social functioning in schizophrenia not only by increasing social engagement but also by fostering empathy through improved emotional awareness and expression.

Conclusion

These findings highlight the complex interplay between alexithymia, social anhedonia, and empathy in schizophrenia. Also, the findings suggest that empathy may act as a mediator in the relationship between alexithymia, and social anhedonia among clients with schizophrenia. So, interventions that target emotional processing skills may help improve social functioning in schizophrenia

Recommendations

Mental health nurses as the primary healthcare providers for individuals with schizophrenia should give priority to assess empathy, social anhedonia, and alexithymia. Mental health nurses should pay attention to therapeutic alliance; Through ongoing therapeutic relationships, nurses can provide psychoeducation to patients and families about these challenges and the importance of empathy in social interactions. Also, psychiatric and mental health nurses can train patients with schizophrenia on skills such as identifying emotions in oneself and others, emotional regulation techniques, and strategies for improving communication and social interaction which may improve empathy level and reduce the effect of alexithymia on social anhedonia. Reapplication of the study on larger sample including female client is recommended. Also, further longitudinal studies are recommended to track changes in empathy, social anhedonia, and alexithymia over time in individuals with schizophrenia. This can provide a clearer picture of how these factors interact and evolve.

Limitations

This study has some limitation as the generalizability of the findings may be limited due to the exclusively male sample and the relatively small sample size. Also, factors like medication use, comorbid mental health conditions, and cognitive impairments can influence empathy, social anhedonia, and alexithymia. Controlling for these variables statistically can be complex.

References:

Aaron, R. V., Benson, T. L., & Park, S. (2015). Investigating the role of alexithymia on the empathic deficits found in schizotypy and autism spectrum traits. Personality and Individual Differences, 77, 215–220. https://doi.org/10.1016/j.paid.2014.12.032

Aliyev, Na., Teymur, A., Gafarov., Zafar, N., Aliyev., Eldar, R., Haqverdi. (2017). Comparison of alexithymia in schizophrenia and somatic diseases. doi: 10.15761/MHAR.1000135

Aliyev. N. A., Gafarov. T. A., Aliyev.Z. N., and E. R. Haqverdi, "Comparison of alexithymia in schizophrenia and somatic diseases, 2016;175(1-3):109-117.

Bagby RM, Parker JD, Taylor GJ (1994) The twenty-item Toronto Alexithymia Scale–I Item selection and cross-validation of the factor structure. J Psychosom Res 38(1):23–32

Blanchard, J.J., Park, S.G., Catalano, L.T., Bennett, M.E., 2015. Social affiliation and negative symptoms in schizophrenia: Examining the role of behavioral skills and subjective responding. Schizophrenia Research 168, 491-497

Bora, E., & Häfner, H. (2006). Theory of mind in schizophrenia: A review. Journal of Neuropsychiatric Disorders and Treatment, 2(4), 343-356.

Cedro, A. Kokoszka. A., Popiel. A., and W. Narkiewicz Jodko, "Alexithymia in schizophrenia: an exploratory study," Psychological reports, vol. 89, no. 1, pp. 95-98, 2001.

Chuang SP, Wu JYW, Wang CS. Metacognitive Beliefs, Cognitive Functioning, Psychiatric Symptoms and Empathy in People with Schizophrenia. Neuropsychiatr Dis Treat. 2021;17:2209-2217
https://doi.org/10.2147/NDT.S313932

Correll, C.U., Schooler, N.R., 2020. Negative symptoms in schizophrenia: a review and clinical guide for recognition, assessment, and treatment. Neuropsychiatr. Dis. Treat. 16, 519–534.
https://doi.org/10.2147/ndt.S225643

Davis MH. Measuring individual differences in empathy: evidence for a multidimensional approach. Journal of Personality and Social Psychology.1983;44(1):113-126.
https://doi.org/10.1037/0022-3514.44.1.113

Derntl, B, Finkelmeyer, A, Voss, B, Eickhoff, SB, Kellermann, T, Schneider, F, et al. Neural correlates of the core facets of empathy in schizophrenia. Schizophr Res. (2012) 136:70–81. doi: 10.1016/j.schres.2011.12.018

Doody, G. A., Fahlén, T., Johansson, E., Lindström, K., & Ohlund, L. (2013). Alexithymia and social anhedonia in schizophrenia: Factor structure and relationships with social functioning. Schizophrenia Research, 149(1-3), 122-127.

Driscoll. C. O', Laing. J., and Mason. O., "Cognitive emotion regulation strategies, alexithymia and dissociation in schizophrenia, a review and meta-analysis," Clinical psychology review, vol. 34, no. 6, pp. 482-495, 2014

Eckblad, M., Chapman, L. J., Chapman, J. P., & Mishlove, M. (1982). The Revised Social Anhedonia Scale.Unpublished manuscript, University of Wisconsin – Madison

Farah, C., Ling, S., Raine, A., Yang, Y., & Schug, R. A. (2018). Alexithymia and the neural substrates of affective processing and aggression. Personality Disorders: Theory, Research, and Treatment, 9(2), 189-202. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5873282/

Fogly, R. L., Johnson, M. C., & Taylor, D. M. (2020). The influence of social anxiety on alexithymia in schizophrenia. Journal of Abnormal Psychology, 125(2), 345-352.

Fonseca-Pedrero, E., Gooding, D.C., Ortuno-Sierra, J., Paino, M., Debbané, M., Muñiz , J., 2015. Brief assessment of physical and social anhedonia traits. Nova Science Publishers.

Frattaroli, N., Geljic, M., Runkowska, D., Darke, H., Reddyhough, C., Mills, T., Mitchell, M., Hill, R., Carter, O., Sundram, S., & Hickie, I. (2022). Cognitive and perceptual impairments in schizophrenia extend to other psychotic disorders but not schizotypy. Schizophrenia Research: Cognition, 30, 100266.

Fusar-Poli, P., McGuire, P., & Borgwardt, S. (2020). Negative symptoms in schizophrenia: From phenomenology to pathophysiology and treatment. The Lancet Psychiatry, 8(12), 1156-1165.

Goerlich, K. S. (2018). The multifaceted nature of alexithymia–a neuroscientific perspective. Frontiers in Psychology, 9, 1614. https://doi.org/10.3389/fpsyg.2018.01614

Gong, M., Yao, L., Ge, X., Liu, Z., Zhang, C., Yang, Y., ... & Zhang, X. (2023). Empathy deficit in male patients with schizophrenia and its relationships with impulsivity and premeditated violence. Frontiers in psychiatry, 14, 1160357.

Gooding DC, Padrutt ER, Pflum MJ. The predictive value of the NEO-FFI items: parsing the nature of social anhedonia using the Revised Social Anhedonia Scale and the ACIPS. Frontiers in Psychology. 2017;8: 147.https://doi.org/10.3389/fpsyg.2017.00147

Grynberg, D., Luminet, O., Corneille, O., Grèzes, J., & Berthoz, S. (2010). Alexithymia in the interpersonal domain: A general deficit of empathy? Personality and Individual Differences, 49(8), 845–850. https://doi.org/10.1016/j.paid.2010.07.013

Harvey, P. O., Bodnar, M., Sergerie, K., Armony, J., & Lepage, M. (2009). Relation between emotional face memory and social anhedonia in schizophrenia. Journal of Psychiatry and Neuroscience, 34(2), 102-110.

Hoffman ML. Empathy and Moral Development: Implications for Caring and Justice. New York: Cambridge University Press; 2000.

Hyun JW, Woo JM, Jung CH, Kim HC, Kim YT. The relationship between negative symptoms and social cognition in patient with schizophrenia. Journal of the Korean Society of Biological Therapies in Psychiatry. 2016;22(2):84-92.

Kang I, Kee SW, Kim SE, Jeong BS, Hwang JH, Song JE, et al. Reliability and validity of the Korean-version of Interpersonal Reactivity Index. Journal of the Korean Neuropsychiatric Association. 2009;48(5):352-358.

Lei, Yao., Zhenru, Liu., Caiyi, Zhang., Yujing, Yang., Nousayhah, Amdanee., Cheng-dong, Wang., Xiangrong, Zhang. (2023). Empathy deficit in male patients with schizophrenia and its relationships with impulsivity and premeditated violence. Frontiers in Psychiatry, doi: 10.3389/fpsyt.2023.1160357

Lenzenweger, M. F., Fleury, M. J., & Lewis, K. V. (2016). Schizotypy dimensions and social connectedness: The mediating role of empathy. Journal of Abnormal Psychology, 125(4), 881-892

Lingfang, Yu., Zenan, Wu., Dandan, Wang., Chaoyue, Guo., Xinyue, Teng., Guofu, Zhang., Xinyu, Fang., Chun, Zhang. (2023). Increased cortical structural covariance correlates with anhedonia in schizophrenia. Schizophrenia, doi: 10.1038/s41537-023-00350-3

Marder, S. R., & Umbricht, D. (2023). Negative symptoms in schizophrenia: newly emerging measurements, pathways, and treatments. Schizophrenia Research, 258, 71-77.

McQuarrie, A. M., Smith, S. D., & Jakobson, L. S. (2023). Alexithymia and sensory processing sensitivity account for unique variance in the prediction of emotional contagion and empathy. Frontiers in Psychology, 14, 1072783.

Michael S. Ritsner , Yael Ratner , Nina Mendyk , Diane Carol Gooding .The characterization of social anhedonia and its correlates in

schizophrenia and schizoaffective patients, Psychiatry Research (2018), doi: https://doi.org/10.1016/j.psychres.2018.11.003

Mohamed. A., Sediek Refai, Fatimah A. Al-Abdullatif, (2024). A Comparative Study of Alexithymia in Patients with Schizophrenia and Normal People: The Case of Egypt. Arch Clin Psychiatry. 2024;51(1):21-28. DOI: 10.15761/0101-60830000000846

Nemiah, S. J., Freyberger, H., & Sifneos, P. E. (1976). Alexithymia: A view of the psychosomatic process. The Psychoanalytic Quarterly, 45(4), 366-380.

Nesse. R. M., "Evolutionary psychiatry: foundations, progress and challenges," World Psychiatry, vol. 22, no. 2, pp. 177-202, 2023

Peng, P., Wang, D., Wang, Q., Zhou, Y., Hao, Y., Chen, S., Wu, Q., Liu, T., & Zhang, X. (2023). Alexithymia in Chinese patients with chronic schizophrenia: Prevalence, clinical correlates, and relationship with neurocognition and empathy. Asia-Pacific Psychiatry, 15.

Rebecca, L., Fogley, l., Debbie, M., Warman., Paul, H., Lysaker., Paul, H., Lysaker. (2014). Alexithymia in schizophrenia: Associations with neurocognition and emotional distress. Psychiatry Research-neuroimaging, doi: 10.1016/J.PSYCHRES.2014.04.020

Ritsner, M. S., Ratner, Y., Mendyk, N., & Gooding, D. C. (2018). The characterization of social anhedonia and its correlates in schizophrenia and schizoaffective patients. Psychiatry research, 270, 922-928.

Savla, GN, Vella, L, Armstrong, CC, Penn, DL, and Twamley, EW. Deficits in domains of social cognition in schizophrenia: a meta-analysis of the empirical evidence. Schizophr Bull. (2013) 39:979–92. Doi: 10.1093/schbul/sbs080

Seidisarouei, M., Schäble, S., van Wingerden, M., Trossbach, S. V., Korth, C., & Kalenscher, T. (2022). Social anhedonia as a Disrupted-in-Schizophrenia 1-dependent phenotype. Scientific Reports, 12(1), 10182.

Shi, LJ, Zhou, HY, Wang, Y, Shen, YM, Fang, YM, He, YQ, et al. Altered empathy-related resting-state functional connectivity in adolescents with early-onset schizophrenia and autism spectrum disorders. Asian J Psychiatr. (2020) 53:102167. doi: 10.1016/j.ajp.2020.102167

Trimble A. C., Robinson K., and Preece, D. A. "Assessing alexithymia in adolescents: psychometric properties of the Perth Alexithymia Questionnaire in high school students," Australian Psychologist, pp. 1-13, 2024

Valdespino, A., Antezana, L., Ghane, M., & Richey, J. A. (2017). Alexithymia as a transdiagnostic precursor to empathy abnormalities: The functional role of the insula. Frontiers in Psychology, 8. https://doi.org/10.3389/fpsyg.2017.02234

Varachhia S, Ferguson E, Doody GA (2018) A Meta-Analysis Tax- onomizing Empathy in Schizophrenia. J Psychiatry Depress Anxiety 4: 016.

Yang, H. X., Shi, H. S., Ni, K., Wang, Y., Cheung, E. F., & Chan, R. C. (2020). Exploring the links between alexithymia, empathy and schizotypy in college students using network analysis. Cognitive Neuropsychiatry, 25(4), 245-253.

Yang, Tian., Huixia, Zhou., Dongmei, Wang., Xiang, Yang, Zhang. (2023). Association of Alexithymia With Positive Symptoms in Chinese Chronic Schizophrenia Patients With and Without Obesity.. Psychiatry Investigation, doi: 10.30773/pi.2023.0004

Yi Y, Huang Y, Jiang R, Chen Q, Yang M, Li H, Feng Y, Feng S, Zhou S, Zhang L, Ning Y, Li Z, Wu F. The percentage and clinical correlates of alexithymia in stable patients with schizophrenia. Eur Arch Psychiatry Clin Neurosci. 2023 Apr;273(3):679-686. doi: 10.1007/s00406-022-01492-8. Epub 2022 Oct 14. PMID: 36239818; PMCID: PMC10085932.