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COMPARISON OF THEORY OF MIND AND ALEXITHYMIA IN ADULT ATTENTION DEFICIT AND HYPERACTIVITY DISORDER AND OBSESSIVE-COMPULSIVE DISORDER

Shima Tamannaeifar (First Author)
Assistant professor, Department of clinical psychology, SR.C.,Islamic Azad University, Tehran **Iran**
shimatamannaeifar@iau.ac.ir

Maryam Nazemi (corresponding author)
Department of psychology, ,Islamic Azad University, Kashan Branch, Kashan, **Iran**
maryamnazemi83@gmail.com

Somayeh Marmazi
Master of science in psychometrics, Allameh Tabataba'i University, Tehran **Iran**
S.marmazi2017@gmail.com

Nazanin Vahidi
Master's student in clinical psychology, Department of clinical psychology, SR.C., Islamic Azad University, Tehran, **Iran**
nazanin.vahidi@iau.ir

ABSTRACT

Aim: The overarching aim of this study is to better understand the theory of mind and alexithymia in adult ADHD and OCD patients. **Method:** In this study a sample of thirty patients with OCD, thirty patients with adult ADHD and thirty controls were recruited. Inclusion criteria were age between eighteen and fifty and a score above thirteen on the Yale-Brown obsessive-compulsive scale(Y-BOCS) for patients with OCD. Exclusion criteria included past or current diagnosis of substance abuse and psychotic disorders. All participants were assessed with the Reading the mind in the eye task (RMET), Toronto Alexithymia Scale (TAS-20), and Yale-Brown Obsessive-Compulsive Scale (YBOCS). **Result:** Healthy group in comparison with the OCD and ADHD groups, showed significantly higher scores in theory of mind. There were no significant differences between two clinical groups. In comparison to ADHD and OCD group, the healthy group showed significantly lower scores in alexithymia. Furthermore, alexithymia scores were lower in the OCD group compared to the ADHD group. **Discussion:** Adults with ADHD showed higher levels of alexithymia than those with OCD, potentially affecting emotional regulation and social functioning. Both groups also had reduced theory of mind abilities compared to controls, likely due to underlying executive and emotional processing deficits. **Conclusion:** Alexithymia is more common in OCD and ADHD due to shared brain mechanisms affecting emotional awareness and theory of mind.

Keywords: Theory of mind, Alexithymia, Obsessive-Compulsive Disorder, Adult Attention Deficit and Hyperactivity Disorder.

INTRODUCTION

Obsessive-Compulsive disorder is characterized by unwanted and repetitive images, thoughts and behaviors with a prevalence of 2-3% (Carmi, et al, 2022). Many brain areas involved in social cognition process, are implicated in psychopathology of OCD such as amygdala, ACC and insula (Molenberghs, et al, 2016) and identifying social cognitive impairments have therapeutic implication and may improve our understanding of social cognition of this patients (Jansen et al,2020). The ability to infer from mental state of oneself and others to predict the behavior which is known as theory of mind plays a crucial role in social communication (Brune, 2005). Theory of mind impairment has been reported in a variety of psychiatric disorders such

as schizophrenia (Brune, 2005), autism spectrum disorders (Baron-Cohen et al, 1985) and substance abuse (Sanvicente-Vieira, et al, 2017).By evolving the concept of theory of mind, mentalizing refers to the ability to understand what others are thinking and feeling based on sorting out one's own thoughts and feelings from those of others. Mentalizing-based therapy, developed by Peter Fonagy and colleagues, focuses on improving the patients' capacity to understand their own and others' mental states. (Allen & Fonagy, 2006). Impairments in social cognition abilities are vital predictive factors in social function in variety of psychiatry disorders (Fett, et al, 2011). In the last edition of the American Psychiatric Association's Diagnostic and Statistical Manual for Mental Disorders (DSM-5), it has been considered one of the six principal factors of neurocognitive functioning, impaired in different pathologies (Arioli, et al., 2018).

The ability of a variety of individuals to make inferences about others' thoughts and feelings (TOM) depends greatly on the availability of information. The accuracy of inferences about mental states and emotions from emotional cues is related to alexithymia, which refers to an individual's inability to identify and describe their own emotions (Pisani, et al, 2021). The term "alexithymia" originates from the Greek language, meaning "absence of words for feelings". Research has shown that alexithymia is associated with difficulties in identifying, describing, and expressing emotions and can lead to impairments in imaginative and operational thinking, as well as an externally oriented cognitive style (Taylor et al, 2013). The capacity to recognize, express, and process emotions is necessary for being long-lived and identifying and expressing one's emotions is key to coping with bad feelings (Bozorg, et al, 2021).

Some evidence about the association between alexithymia and theory of mind comes from the study by (Moriguchi, et al, 2006) .In the systematic review by (Pisani, et al, 2021) about the relation between alexithymia(inability to identify and describe one`s own feeling) and theory of mind(the cognitive capacity to understand and predict the thoughts, beliefs and feelings of oneself and others), the majority of evidence supporting the relationship between alexithymia and difficulties in inferring mental states has been provided by using the "Reading the Mind in the Eyes" test (RMET) which is a task that involves looking at photographs of people's eyes and selecting the emotional state or intention that best describes the person in the photo (Olderbak, S., et al, 2015). The research indicates that higher levels of alexithymia are associated with poorer performance on the test.

The poorer social adjustment of patients with OCD can be the consequence of the inability to establish meaningful relation to others because their compulsions are time-consuming or other factors related to symptoms such as social-cognitive impairments which is unknown (Jansen, et al,2020). Magical thinking refers to personal powers to control thoughts beyond cultural and rational laws is central to OCD. Also, numerous studies revealed that thought and action fusion (TAF) refers to assume incorrect causal relationship between thoughts and external world is thought to be related to some psychiatric disorders such as OCD. Psychiatric disorders that feature magical thinking tend to show atypical social cognition (Eddy, et al, 2021).In (Eddy, et al, 2021) study among 273 healthy adults, TAF correlated with higher distress and alexithymia predicted TAF. Both alexithymia and TAF factors related with personal distress.

(Tulaci, et al, 2018) in a study showed that the OCD patients with poor insight had lower TOM abilities than control group and OCD with good insight. Moreover, the study of (Sayın, A., et al, 2010), found that OCD patients do not generally have difficulty with basic mentalizing tasks, but may struggle with more advanced mentalizing abilities due to their reduced memory capacities, leading to a decreased ability to use their memory as a resource

when trying to understand complex social situations. Also, Alexithymia may cause restricted mental representation of emotional states and clinical features of compulsive behaviors in OCD (Robinson& Freeston, 2014). Various psychological concerns, including interpersonal difficulties, aggression, somatization, obsession, depression, and anxiety, are predicted by alexithymia, and individuals with various psychopathologies have been shown to have a higher prevalence of alexithymia. Research has found that individuals with OCD, schizophrenia, and the general population have all shown increased prevalence of alexithymia, which has been linked to suicidal thoughts and behaviors. In addition, a meta-analytic study found a significant correlation between alexithymia and mental illnesses such as obsessive–compulsive syndrome (Akram, Arshad, 2022). Additionally, the study of (Roh, D., et al, 2011), implies that among OCD patients, those with high anxiety levels and early onset of symptoms may be more likely to experience difficulty recognizing and expressing their own emotions, which is a key feature of alexithymia.

(Bankier, et al, 2001) compared alexithymic characteristics in a sample of 234 patients with different psychiatric disorders, including somatoform disorder, panic disorder, OCD, and depression. The study found that patients with OCD coped with emotional stress using an operational thinking approach, which was in contrast to the coping strategies used by patients with panic disorder (Pozza et al, 2015). People with panic disorder often turn to avoidance and distraction as coping mechanisms (Oussi, A., et al, 2023).

Since 25% of OCD patients showed ADHD comorbidity (Masi, et al, 2010), some symptoms including impulsivity and compulsivity are viewed as co-occur constructions in these patients (Berlin et al, 2014). Studies indicate that over 5% of children and 2.5% of adults suffer from this disorder. ADHD is more common in males than females—with a ratio of 6:1 in children and 1, 6:1 in adults— (American Psychiatric Association, 2013). Individuals with OCD may experience strong urges to perform certain rituals or behaviors (compulsions), which they may feel compelled to act on despite being aware of the negative consequences. Similarly, those with ADHD may engage in impulsive behaviors in order to obtain immediate rewards or gratifications, even if they are aware that these behaviors could have negative consequences (Cabarkapa, et al, 2019).

The most investigated domains of social cognition related to ADHD in adults are emotion recognition and processing and theory of mind (TOM). Still the results are ambiguous and there isn't a common line yet. Evidence in social cognition related to ADHD, in particular regarding adults, is very poor. But we know well how social cognition is important in everyday life to have and maintain a good and satisfactory quality of life. For these reasons, it is necessary to deepen and explore more the research topic (Morellini, et al, 2022). On the other hand, ADHD patients with alexithymia tend to take experience more impulsivity traits (Kiraz et al, 2021). In a study with 101 ADHD patients reported 41.5% alexithymia in ADHD group and impulsiveness predicted alexithymia among patients (Kiraz et al, 2021).

METHODOLOGY

Participants

30 Patients with a diagnosis of OCD, 30adult ADHD and 30control group were considered as eligible. Inclusion was aged between 18 to50 and diagnosis was confirmed by clinical interview of DSM-V and cut off above 13 point of Yale-Brown for OCD patients. Exclusion criteria included past or current diagnosis of substance abuse, organic mental disorders and psychotic symptoms and mental disabilities.

Instruments

Reading the Mind in the Eye test (RMET)

This test measures the ability to infer the mental state of eye actors that represent with eye region and four mental states/emotion words. The participants were asked to select the best option to describe the expression of the eye region from four given words (Baron-Cohen et al, 2001). The performance of participants was calculated by dividing the correct response and total number of trials (36 photographs). The psychometric properties of Persian version of the RMET by intra-class correlation coefficient were 0.735 (Khorashad, et al, 2017).

Toronto Alexithymia Scale (TAS-20)

As the most used measure of Alexithymia, has three factor consists of difficulties in identifying feelings, difficulties in describing feelings and external oriented thinking .5-point Likert scoring from 1 (strongly disagree) to 5 (strongly agree) is used to acquire the total score from 20 to 100. Test-retest reliability of total score of TAS and its dimensions by intervals of 4 weeks was appropriate (0.70-0.77) (Bagby et al, 1994). Besharat et al ,2015 examined the concurrent validity of the Persian form of TAS by correlation with psychological well-being and distress measures.

Structured Clinical Interview for DSM-V Disorders (SCID)

The Structured Clinical Interview for DSM-5 (SCID-5) is a diagnostic tool used by mental health professionals to make diagnoses based on the criteria outlined in the DSM by the American Psychiatric Association. The latest version of the SCID, the SCID-5, was released in 2013 to be consistent with DSM-5 criteria. Most diagnoses showed good agreement with the SCID-5 with a kappa coefficient above 0.4. However, the agreement for anxiety disorders was moderate, with a kappa coefficient of0.34. Compared to the psychiatrists' diagnosis, the SCID demonstrated high reliability with kappa values above 0.80 for most diagnoses. The sensitivity of all diagnoses exceeded 0.80, suggesting that the tool is highly effective in diagnosing psychiatric disorders (American Psychiatric Association, 2013).

Yale-Brown Obsessive-Compulsive Scale (YBOCS)

The Yale-Brown Obsessive Compulsive scale (YBOCS) is widely recognized as a reliable and valid tool used by clinicians to measure the severity of obsessive-compulsive symptoms. A higher score on the YBOCS indicates a more severe condition, with total scores ranging from 0 to 40 and subs cores for obsessions and compulsions ranging from 0 to 20. (Goodman et al, 1989).The reliability and consistency of the scale was determined to be optimal, with a Cronbach's alpha value of 0.97 for the Symptom Checklist, 0.95 for the Severity scale, 0.93 for the Split Half Reliability of the symptom checklist, 0.89 for the Split Half Reliability of the Severity Scale, and 0.99 for the Test-Retest Reliability. To establish concurrent reliability YBOCS was correlated with the SCL-90-R-OCS and SCID-I. Exploratory factor analysis was also conducted, which revealed three factors for the Symptom Checklist Scale and two factors for the Symptom Severity Scale. Cutoff point of 9 was determined to be clinically significant (Esfahani et al, 2012).

Procedure

Participants provided demographic information and then filled out self-repot questions including Toronto Alexithymia Scale (TAS), Reading the mind in the eye task (RMET) and Yale-Brown Obsessive-Compulsive Scale (YBOCS). All the participants were informed about the procedure and were encourage asking any question if they needed during the study. The healthy controls were ensured to be free of all psychiatric disorders.

RESULTS

This study compared the theory of mind and alexithymia among individuals diagnosed with attention deficit and hyperactivity disorder, those with obsessive-compulsive disorder, and a control group consisting of healthy individuals. There were thirty individuals in each group, for a total of ninety people in the three cohorts. The average age of the participants in all three groups was 30.75 (SD=6.98, range=18-50). 48.9% of participants identified as women and 51.1% as men. (Table 1) provides a summary of the participants' sociodemographic details in each group.

Table 1.
Participants Sociodemographic Characteristics (n=90)

Characteristics	M		N	%
ADHD (n=30)				
Age	31.33	7.49		
Gender				
Man			20	66.7
Woman			10	33.3
OCD (n=30)				
Age	31.06	7.45		
Gender				
Man			13	43.3
Woman			17	56.7
Healthy Individuals (n=30)				
Age	29.86	6.04		
Gender				
Man			13	43.3
Woman			17	56.7

The theory of mind and alexithymia were examined through descriptive statistics for three groups: OCD, ADHD, and healthy individuals. The descriptive statistics are presented in (Table 2).

Table2.
Descriptive Statistics for Theory of Mind and Alexithymia Variables

Variable	Group	N	Mean	Std. Deviation
Theory of Mind	Healthy	30	23.20	3.08
	OCD	30	20.03	2.43
	ADHD	30	19.50	2.86
	Total (N=90)	90	20.91	3.22
Alexithymia	Healthy	30	38.57	5.28
	OCD	30	49.43	4.81
	ADHD	30	56.23	6.17
	Total (N=90)	90	48.08	9.09

The homogeneity of variances for the theory of mind and alexithymia between the ADHD, OCD, and healthy groups was evaluated using the Levene's test. The theory of mind results showed that there were no significant variance differences between the groups ($F(2, 87) = 0.749$, $P = 0.47$). The result for the alexithymia also showed no statistically significant

differences in variance between the groups (F (2, 87) = 0.872, *P* =0.42); indicating that both the theory of mind and alexithymia met the homogeneity of variances assumption. After confirming the homogeneity of variances as a necessary ANOVA assumption, we conducted a separate ANOVA to compare theory of mind and alexithymia across the three groups (ADHD, OCD, and healthy).

The three groups' (ADHD, OCD, and healthy) theory of mind scores were compared using an analysis of variance (ANOVA). The findings showed that group membership had a significant impact on theory of mind scores [F (2, 87) = 15.28, P < 0.001, η2 =0 .26]. The ANOVA results are summarized in (Table 3).

Table3.

ANOVA for comparing groups in for Theory of Mind and Alexithymia

Variable		Df	Mean Square	F	P	Eta
theory of mind	Between Groups	2	120.011	15.281	0.001	0.26
	Within Groups	87	7.854			
	Total	89				
Alexithymia	Between Groups	2	2382.178	80.202	0.001	0.65
	Within Groups	87	29.702			
	Total	89				

Using the Bonferroni test for post hoc comparisons, the three groups' (ADHD, OCD, and healthy) theory of mind scores showed significant mean differences. There were significant differences in theory of mind scores among all three group pairings (ADHD, OCD, and healthy). In comparison to the OCD (M diff = 3.17, p <.001) and ADHD (M diff = 3.70, p <.001) groups, the healthy group showed significantly higher scores. Furthermore, there was no significant difference between the OCD and ADHD group (M diff = 0.533, *P* =0.74). These results highlight the different theory of mind abilities among the groups, with the healthy group showing the highest theory of mind scores compared to the OCD and ADHD groups.

We conducted separate ANOVA analyses to examine the differences between the groups with respect to their alexithymia scores. This made it possible to thoroughly analyze the differences in alexithymia scores between the ADHD, OCD, and healthy groups. The findings of ANOVA analyses showed that group membership had a significant impact on alexithymia scores [F (2, 87) = 80.20, P < 0.001, η2 = 0.65]. The ANOVA results are summarized in Table 3. Significant differences in alexithymia scores were found between the three groups (ADHD, OCD, and healthy) based on post hoc Bonferroni comparisons. In comparison to the ADHD group (M diff = 17.667, *P*<.001) and the OCD group (M diff = -10.87, P <.001), the healthy group showed significantly lower scores. Furthermore, alexithymia scores were lower in the OCD group compared to the ADHD group (M diff = -6.80, *P* <.001). These results highlight the different levels of alexithymia in the studied groups, with the OCD group showing the lowest levels in comparison to the ADHD and healthy groups.

DISCUSSION

According to the results, the alexithymia had significant difference among clinical samples including obsessive-compulsive disorder and adult ADHD. Consideration of comorbid alexithymia in ADHD cases can enhance understanding of both the patients and the disorder, leading to deterioration in social relationships and functionality (Kiraz et al., 2021). Among clinical patients the score of alexithymia for adult ADHD was significantly higher than OCD patients. The results were compatibility with (Kiraz, et al, 2021) which found the relation between ADHD and alexithymia. It has been suggested that the early or current characteristics

of adults diagnosed with ADHD predict emotion processing/alexithymia features of childhood and ongoing ADHD symptoms (Edel, et al, 2015). These results suggest that those who are highly susceptible to negative emotional stimuli may avoid engaging with emotional experiences that they find disturbing (Nam et al, 2020). Some authors were interested in exploring the existence of two types of alexithymia type I, associated with little emotional arousal (affective alexithymia dimension, i.e., schizoid personality trait), and type II, in which emotion liability is present but disconnected from effective emotion regulation at the higher cognitive level (cognitive alexithymia dimension, i.e., borderline personality trait) (Goerlich-Dobre, et al, 2014). According to this perspective, the observed features of alexithymia in our population may be classified as type II, cognitive alexithymia. Indeed, since the TAS-20, which is used in this study, is currently regarded as reflecting the cognitive alexithymia dimension (Goerlich-Dobre, et al, 2014), this pattern of results seems plausible (Nam et al, 2020).

Higher score of alexithymia in OCD patients than control group was consistence with Kang and colleagues (2012) that reported OCD patients had lower perspective-taking and higher levels of alexithymia compared to sex-matched healthy controls. In addition, OCD patients had poorer empathic perspective-taking and perceived disgust in response to ambiguous facial expressions.Difficulty in identifying and expressing emotions in obsessive-compulsive patients causes them to have problems in regulating their emotions and cannot cope properly in stressful situations (Cerutti, et al, 2018). (Pozza, et al, 2015) investigate which OCD symptom dimensions are uniquely predicted by Alexithymia domains in a large community sample after controlling for anxiety and depression. Findings suggested that global Alexithymia may be specifically associated only with Ordering and Pure Obsessing OCD symptoms but not with the other OCD dimensions. In addition, moderate correlations emerged between Difficulty Identifying Feelings, Hoarding, and checking symptoms. (Doron, et al, 2005) and (Nedelisky,Steel (2009) in explanation of the finding believed that individuals with Hoarding and Checking symptoms tend to use compulsive behaviors as a coping strategy for negative emotions due to their strong intolerance for negative feelings. An alternative explanation could be that individuals with Hoarding symptoms, who often have excessive emotional attachment to inanimate objects, have impaired emotional awareness and mental representations about the self and others (Pozza,Giaquinta,& Dèttore, 2015).The results showed the significant differences between adult ADHD and OCD patients with control group in theory of mind variable. Well-known cognitive deficits seen in OCD may be related to TOM abilities (Sayrin, 2010). Executive dysfunctions and impairment in nonverbal memory have been the most frequently shown cognitive deficits in OCD (Kuelz, et al, 2004).

Developmental studies suggest that development of executive functions might be important as a predecessor of either the ability to understand false beliefs or the ability to express that understanding (Goukan, et al,2006). Executive functions which are important cognitive processes that support “TOM” skills (Sayrin, 2010) have been found to be affected in patients with ADHD. Imaging studies including patients with ADHD have demonstrated brain dysfunction in brain regions that are essential for mentalizing, such as the PFC and basal ganglia. Results from imaging studies have suggested that these regions may play a crucial role in ADHD (Brennan, A. R., & Arnsten, A. F. (2008)). According to the study of (Dağdelen, F. (2020)) the ADHD group showed lower TOM abilities than the OCD group, particularly on the “Reading the Mind in the Eyes” task. This could indicate that the ability to understand others’ mental states is more impaired in ADHD than in OCD.

The limitation of our study included the lack of abstract measures for theory of mind which would helpful to infer more about the relationship between theory of mind and alexithymia.

Further study with experimental designed is required to more explore the causality relation between variables especially among subgroup of OCD patients. Due to the fact that OCD is presented as an independent disorder in DSM-5 and the subgroups of this disorder have been separated, as well as the results of previous studies investigating the subgroups of OCD in alexithymia and theory of mind can contribute to the enrichment of information.

Alexithymia and ED (defined as a difficulty in managing emotions) may share a common underlying neurobiological mechanism and this overlap suggests a potential connection between the two conditions. While emotional dysregulation (ED) and difficulties in emotional self-regulation are considered central symptoms of ADHD, there is no consensus on how to operationalize and measure these constructs in a way that is specific to ADHD. A specialized instrument to asses these symptoms, which can distinguish them from other emotional symptoms like irritability, could improve the accuracy of ADHD diagnostic criteria. Our understanding of ED may lead to better understanding of alexithymia in ADHD (Faraone, S. V., et al, 2019)

CONCLUSIONS

Alexithymia is considered as a defense mechanism resulting from periods of the inability to identify the emotions. Given to some overlapping brain regions, to be involved both in theory of mind abilities and neurobiology of OCD significant differences observed between theory of mind in two clinical groups and healthy group. Individuals with obsessive-compulsive disorders (OCD) who have symptoms of hoarding have been found to exhibit alexithymia, a condition characterized by impaired awareness and difficulties in mental representation of self and others. Also people with ADHD may be more likely to experience alexithymia because of the challenges they face with emotional regulation and social functioning.

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This issue does not apply to us.

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