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The role of alexithymia factors in adults with Autism Spectrum Disorder: An explorative study

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Abstract

Relationships between Autistic Spectrum Disorders (ASD) and alexithymia have been the subject of an amount of studies over the last 20 years, and numerous empirical evidences showed that alexithymia has a substantial prevalence (up to 50%) in ASD subjects. The purpose of this paper was to investigate the role of the alexithymic component on autistic functioning in adults with ASD.

72 subjects (mean age = 28.3 ± 10.1) with IQ > 80 compiled the Ritvo Autism and Asperger's Diagnostic Scale – Revised, the Autism-Spectrum Quotient and the Toronto Alexithymia Scale.

Results showed significant differences between subject with high, borderline and low levels of alexithymia, suggesting that alexithymia:

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(1) does not seem to be pathognomonic of ASD; (2) is associated with a higher severity of some autistic symptoms; (3) is linked to specific ASD dimensions and does not overlap with all autistic dysfunctional areas.
A careful evaluation of alexithymia in ASD may represent a potential marker of a worse outcome of the autistic condition.

Keywords: Autism Spectrum Disorders; Alexithymia; Social functioning; Communication.

1. Introduction

The construct of alexithymia refers to several deficits in emotional processing and awareness, such as difficulties in identifying, differentiating, and describing emotions and feelings (Bagby, Quilty, Taylor, Grabe, Luminet, Verissimo *et al.*, 2009). At least two distinct subtypes of alexithymia have been proposed: Type I alexithymia, characterized by an absence of experience and expression (identification and verbalization) of emotions, and associated with right hemisphere dysfunction, and Type II, consisting in reductions in the expression of emotions despite normal or even increased levels of emotional experience, and subtended by corpus callosum abnormalities (Larsen, Brand, Bermond, & Hijman, 2003). It has been further highlighted that primary alexithymia is a trait feature derived from early traumatic experiences or from a genetic predisposition, whereas secondary alexithymia is rather a consequence of adverse events occurring later in life, which have a direct or indirect effect on brain functioning (Messina, Beadle, & Paradiso, 2014). Furthermore, differently from general affect dysregulation, that includes under-regulation of affects, as seen in states of uncontrolled, unmodulated emotional expression that usually overwhelm reasoning and behavioral self-regulation, alexithymia is characterized by an apparent affective over-regulation associated with suppression or repression of affective awareness or expression (Paivio & Laurent, 2001).

Relationships between Autistic Spectrum Disorders (ASD) and alexithymia have been the subject of an amount of studies over the last 20 years (Silani, Bird, Brindley, Singer, Frith, & Frith, 2008; Bird & Cook, 2013; Bernhardt, Valk, Silani, Bird, Frith, & Singer, 2013; Brewer, Marsh, Catmur, Cardinale, Stoycos, Cook, *et al.*, 2015).

To date, there are numerous empirical evidences that alexithymia has a substantial prevalence (up to 50%) in ASD subjects (Hill & Berthoz, 2006). Tani, Lindberg, Nieminen-von Wendt, von Wendt, Virkkala, Appelberg and Porkka-Heiskanen (2004) demonstrated that individuals with Asperger's syndrome (AS) achieved significantly higher scores of alexithymia, compared with healthy controls. Similarly, Hill, Berthoz and Frith (2004) reported higher levels of alexithymia in high-functioning adults with ASD, when compared with a similar-aged control group. In another study on a group of high-functioning autistic adults, Silani and colleagues (2008) studied impaired emotional awareness, which conventionally characterizes the condition known as alexithymia. The authors found higher levels of

alexithymia in autistic individuals, compared with controls, particularly the dimension "difficulty in describing feelings". Furthermore, Griffin, Lombardo and Auyeung (2016), found that parents of children with ASD, compared with controls, were significantly more impaired in emotional processing, and this impairment was related with a greater severity of symptoms in their children with ASD. Finally, Bird and Cook (2013) in a review about alexithymia and the emotional symptoms of autism summarized that alexithymia was associated with difficulties in recognizing emotional facial expressions, reduced empathy, less motivation to act altruistically to relieve another's distress, concluding that "1) alexithymia is associated with deficits of emotional experience, interpretation and recognition and 2) the incidence of severe alexithymia is substantially elevated in the autistic population".

Given the evidence of the relationship between alexithymia and ASD, some authors have sought all common denominators between the two conditions (Fitzgerald & Molyneux, 2004). For example, Fitzgerald and Bellgrove (2006) examined different aspects, such as: externally orientated cognitive style or operative thinking; difficulties with social relationships; speech and prosodic abnormalities as impairment in the symbolic function and the difficulties in the perception of facial emotions. The authors concluded that these two conditions were somehow overlapping, since they can be traced both in ASD and in alexithymia, coherently with the hypothesis of the homotypic or heterotypic continuity in psychopathology (Zarrella, Russolillo, Caviglia, & Perrella, 2017).

Even Poquérusse, Pastore, Dellantonio and Esposito (2018) reviewed the literature about the identification of the overlapping fields between alexithymia and ASD, in order to demonstrate their intersectionality in terms of prevalence, etiology, and behaviors, concluding that alexithymia could be both a cause and consequence of autistic behaviors.

In contrast, other authors have focused on possible differences between the two conditions, trying to define the boundaries between the disorder and the co-occurring condition (alexithymia), despite they are both related to reductions in social and emotional information processing.

However, Bird and Cook (2013) argued that, given the wide heterogeneity in emotion processing abnormalities observed in the ASD population, it may be useful to consider two different diagnostic subtypes of ASD with or without alexithymia. This proposal certainly requires further scientific investigation. However, one of the weaknesses of the alexithymia hypothesis is that it fails to explain why individuals with ASD are much

more likely to possess a strong disposition for alexithymia, compared to healthy controls. It has been found that alexithymia, not autistic symptoms severity, was the major contributor for the reduced eye fixation of faces (Bird, Press, & Richardson, 2011). In another experimental study Cook, Brewer, Shah and Bird (2013) explored the relative contributions of alexithymia and autism to expression-recognition ability. Findings showed that face-perception deficits (i.e. the impaired ability to detect variations in facial expressions) attributed by default to autism, were best explained by the co-occurring presence of alexithymia.

Similarly, Trevisan, Bowering and Birmingham (2016) found that many emotion processing abnormalities, such as the diminished production of facial expressions observed in children with ASD, may be best explained by co-occurring alexithymia.

Alexithymia also seems to be implicated in the expressive incoherence, i.e. when different emotion response systems contradict each other such as when the expression does not match the inner experience (e.g. smiling while feeling sad), or the when the emotional expression does not match the physiological response. Costa, Steffgen and Samson (2017) found that alexithymia is implicated in socio-emotional communicative problems in children with ASD.

Still, other studies investigated the empathic brain responses in autistic and control participants with high and low degrees of alexithymia, obtaining no difference in the degree of empathy between autistic and control groups after accounting for alexithymia (Bird, Silani, Brindley, White, Frith, & Singer, 2010; Schneider, Regenbogen, Pauly, Gossen, Schneider, Mevissen *et al.*, 2013). The authors concluded that empathy deficits observed in autism may be due to the large comorbidity with alexithymic traits, rather than a necessary feature of the autistic social impairments.

More recently, ASD has been proposed to be associated with difficulties in perceiving the internal state of one's body (i.e., impaired interoception). Shah, Hall, Catmur and Bird (2016) examined the relative impact of alexithymia and autism on interoceptive accuracy (IA), across two experiments: findings showed that alexithymia, but not autism, was associated with atypical interoception.

The overview of the literature suggests that ASD and alexithymia are theoretically considered independent constructs, but research is needed to explain the reasons why they often co-occur.

Furthermore, the examined investigations were limited to sample of children aged between 3 and 18 years, whereas little is known about the relationships of ASD and alexithymia among adults.

Despite alexithymia includes several aspects, in the majority of the aforementioned studies the construct of alexithymia was considered in its total score, as assessed by the 20-item Toronto Alexithymia Scale and/or by the Bermond-Vorst Alexithymia Questionnaire (Vorst & Bermond, 2001). However, it is well known that alexithymia is a construct consisting of three factors: (1) the "difficulty in identifying feelings"; (2) the "difficulty in describing others feelings"; and (3) the "externally oriented thinking style" (Bagby, Parker, & Taylor, 1994) but their weight in autistic spectrum remains unclear.

Starting from this background, the aim of this paper was to investigate the role of the alexithymic component in a sample of adults with ASD, in order to clarify which aspect/factor of alexithymia is the major contributor to autistic-like impairment.

2. Methods

2.1. Participants

All subjects (18-55 years old) consecutively admitted to the Outpatient Psychiatry Unit of the University Hospital of Messina, Italy, between January and December 2017, with diagnosis of ASDs as defined by the DSM-5, were included in the study.

Patients with IQ < 80 measured by using the Wechsler Adult Intelligence Scale – Revised (WAIS-R), significant concurrent medical illnesses, organic brain disorder, and any other major psychiatric disorder were excluded. The final study sample was formed by seventy-two subjects with ASD (60 males and 12 females, mean age = 28.3 ± 10.1).

All the patients provided written informed consent after a full explanation of the protocol design, which had been approved by the local ethics committee and was conducted according to the Declaration of Helsinki. Each participant signed an informed consent with research purpose and anonymity was granted according to the Italian law for personal information treatment.

2.2. Instruments

The following psychometric measure were used:

1. The Ritvo Autism and Asperger's Diagnostic Scale – Revised (RAADS-R) (Ritvo, Ritvo, Guthrie, Ritvo, Hufnagel, McMahon *et al.*, 2011) contains 64 items describing specific symptoms of ASD, scored in order of severity (from "true now and when I was young" = 3, to "never true" = 0) and 16 items describing non symptomatic (normative) behaviors, (scored "true now and when I was young" = 0 to "never true" = 3). The items are divided into four subscales according to DSM-IV-TR criteria as follows: (1) *Social Relatedness*: 39 items related to empathy, intimacy and social language; (2) *Circumscribed Interests*: 14 items also with questions relating to social blindness; (3) *Language*: 7 items; and (4) *Sensory Motor*: 20 items. Conventionally, a score > 65 is suggestive of ASD.
2. The Autism-Spectrum Quotient (AQ) (Baron-Cohen, Wheelwright, Skinner, Martin, & Clubley, 2001), a 50-item scale designed to assess ASD traits in both clinical and community samples, exploring 5 different areas: (1) *Social Skill*; (2) *Attention Switching*; (3) *Attention to Detail*; (4) *Communication*; (5) *Imagination*. Items are rated on a four-point scale from "Definitely Disagree" to "Definitely Agree", and include items such as "I enjoy meeting new people" and "I would rather go to a library than a party." Each item is listed above scores 1 point if the respondent records the abnormal or autistic-like behavior either mildly or strongly (see below for scoring each item; Abnormality = poor social skill, poor communication skill, poor imagination, exceptional attention to detail, poor attention-switching/strong focus of attention). A score of 32 or more indicates "clinically significant levels of autistic traits". However, although the test is popularly used for self-diagnosis of Asperger syndrome, the authors caution that it is not intended to be diagnostic.
3. The Toronto Alexithymia Scale (TAS-20) (Bagby *et al.*, 1994), a 20-item self-report scale that assesses alexithymia. Items are scored on a 5-point Likert scale from 1 (strongly disagree) to 5 (strongly agree), with higher scores indicating more alexithymia. The TAS-20 has a 3-factor structure: a) *Difficulty identifying feelings*; b) *Difficulty describing feelings to others*; and c) an *Externally oriented thinking style*. There are 5 items that are negatively keyed (items 4, 5, 10, 18 and 19). The total alexithymia score is the sum of responses to all 20

items, while the score for each subscale factor is the sum of the responses to that subscale. The TAS-20 uses cut-off scoring: equal to or less than 51 = non-alexithymia, equal to or greater than 61 = alexithymia. Scores of 52 to 60 = possible alexithymia. We used the Italian version of the scale (Bressi, Taylor, Parker, Bressi, Brambilla, Aguglia, *et al.*, 1996).

2.3. Statistical analysis

Descriptive statistics were used to summarize the data obtained from the study. Continuous data are expressed as the mean ± *SD* (standard deviation) and significant differences among groups were assessed using the one-way analysis of variance (ANOVA) with post hoc comparisons (Bonferroni). Further, a linear regression analysis and a forward stepwise regression analysis, where RAADS-R and AQ variables that reached statistical significance were taken as dependent variables and all the TAS-20 factors were entered into the equation, were performed in order to investigate which alexithymia dimensions were predictors of the severity of psychopathological symptoms. A significance value of $p < .05$ was chosen. The statistical analysis was performed with Statistical Package for the Social Sciences - SPSS 16.0 software (SPSS Inc, Chicago, IL, USA).

3. Results

According to TAS-20 total score, three subgroups were identified: Alexithymic (n = 30; 41.7%), Borderline (n = 22; 30.5%), and Non-alexithymic subjects (n = 20; 27.8%).

Clinic-demographic features of the study participants are reported in Table 1: the differences among groups in the considered variables did not reach a statistically significant level, although a tendency to a lower age of onset and a greater age at ASD diagnosis in subjects with alexithymia emerged.

Table 2 shows statistical analyses of the psychometric instruments applied in study participants.

Statistical analyses (ANOVA and Bonferroni post hoc tests), showed that subjects with Alexithymia, compared to Non-alexithymic, had worse scores in RAADS-R *"Social Relatedness"* ($F_{(2)} = 4.33$, $p = .02$*; Bonferroni Post-hoc test:* $p = .019$). Furthermore, patients with Alexithymia, compared with Not-alexithymic and Borderline subjects, had greater difficulties in AQ

"Communication" ($F_{(2)}$ = 5.60, *p* = .009*; Bonferroni Post-hoc test: Alexithymic vs Non-alexithymic: p* = .024*; Alexithymic vs Borderline: p* = .027).

Table 1 - *Clinical-demographic features of the study participants*

	Non alexithymic *N* = 20	Borderline *N* = 22	Alexithymic *N* = 30	ANOVA	
				F	*Sig.*
Male	8	9	13	-	-
Age (yrs) *M (SD)*	26.30 (5.94)	25.36 (9.02)	31.80 (12.34)	1.610	.215
Educational level (yrs) *M (SD)*	13.20 (3.93)	14.64 (2.24)	12.40 (3.73)	1.505	.237
Age of onset (yrs) *M (SD)*	9.60 (4.22)	10.36 (5.00)	8.40 (4.25)	.632	.538
Age at ASD diagnosis (yrs) *M (SD)*	25.50 (7.02)	24.27 (10.59)	30.07 (14.56)	.893	.419

Table 2 - *RAADS-R and AQ mean scores in study participants*

	Non alexithymic *N* = 20	Borderline *N* = 22	Alexithymic *N* = 30	ANOVA	
				F	*Sig.*
RAADS-R					
Social Relatedness	44.50 (16.48)	55.55 (23.26)	67.20 (17.14)	4.33	.021
Circumscribed Interests	24.30 (10.02)	25.55 (3.95)	29.93 (7.78)	1.94	.153
Language	12.80 (14.36)	9.00 (5.69)	13.33 (4.62)	.874	.427
Sensory Motor	21.60 (12.75)	26.00 (6.22)	30.53 (12.46)	1.99	.153
AQ					
Social skill	3.40 (1.50)	3.67 (2.39)	5.77 (2.83)	3.49	.044
Attention switching	5.90 (1.66)	5.89 (1.90)	7.31 (1.97)	2.22	.127
Attention to detail	6.30 (1.25)	4.67 (1.87)	4.77 (1.73)	3.15	.058
Communication	3.70 (2.16)	3.67 (2.00)	6.15 (1.99)	5.60	.009
Imagination	3.70 (1.33)	4.89 (2.14)	5.69 (2.65)	2.36	.112

RAADS-R and AQ variables that reached statistical significance (RAADS-R "*Social Relatedness*" and AQ *"Communication"* – as dependent variables) and all TAS-20 variables ("*Difficulty Describing Feelings*",

"*Difficulty Identifying Feeling*" and "*Externally-Oriented Thinking*" – as independent variables) were analyzed in two linear regression models, as reported in Table 3.

Table 3 - *Linear regression analysis*

	Unstandardized coefficients		Standardized coefficients		
Dependent variable	B	S.E.	β	*t*	*p*
RAADS-R "Social Relatedness" [a]					
(Constant)	7.226	16.680		.433	.668
Difficulty Describing Feelings	.196	.495	.071	.396	.695
Difficulty Identifying Feeling	1.527	.701	.380	2.179	.037
Externally-Oriented Thinking	.983	.719	.218	1.368	.181
AQ "Communication" [b]					
(Constant)	-.879	2.051		-.429	.671
Difficulty Describing Feelings	.031	.063	.103	.495	.624
Difficulty Identifying Feeling	.126	.086	.285	1.468	.153
Externally-Oriented Thinking	.136	.091	.268	1.504	.144

[a] $R = .518$; $F = 3.921$; $p = .017$
[b] $R = .490$; $F = 2.951$; $p = .050$

Results from the regression analysis indicate that the predictor models account for 26.9% and 24% of the total variance respectively in RAADS-R "*Social Relatedness*" (*F = 3.921; df = 3; p = .017*) and AQ *"Communication"* (*F* = 2.951*; df* = 3*; p* = .050) factors.

Forward stepwise regression analysis indicated that only TAS-20 "*Difficulty Identifying Feeling*" was the unique predictor of RAADS-R "*Social Relatedness*" ($R^2 = .214$*;* $\beta = .462$*;* $t = 3.039$*;* $p = .005$) and AQ *"Communication"* ($R^2 = .146$*;* $\beta = .383$; $t = 2.269$*;* $p = .031$) factors, whereas other TAS-20 variables did not give a significant additional contribution to the prediction of psychopathological symptoms.

4. Discussion

Several authors have questioned whether alexithymia, as a general inability in identifying one's own and others' emotions, should be

considered as a core feature of autism or a condition that co-occurs with autism.

Our findings suggest that alexithymia, which would seem to be easily embedded as one of the autistic phenotypes, could be considered independent from ASD and hence, it does not seem to be pathognomonic of autism: one should consider the clinical condition of "autism with alexithymia". For these reasons it becomes useful to identify how alexithymia can involve any deficit worsening autistic condition. We found that the presence of alexithymia was associated with a higher severity of several autistic symptoms. In particular, autistic subjects with alexithymia reported worse social relatedness, i.e. poor empathy, intimacy and social language and worse communication abilities, suggesting that the emotional deficits and the poor emotional reciprocity are strictly linked to specific ASD dimensions and they do not overlap with all autistic dysfunctional areas.

As suggested by the recent review of Kinnaird, Stewart and Tchanturia (2019), alexithymia is common, and not universal, in ASD population, and a growing body of evidence supports that co-occurring autism and alexithymia represent a peculiar subgroup with specific clinical needs.

The most interesting finding of our study was that the main predictor for the impairments in social relatedness was the "difficulty in identifying feelings", known as one of the three factors explaining alexithymia construct.

Autistic subjects who reported difficulties in identifying if they are experiencing anger or sadness or fear, similarly reported greater difficulty to understand when someone is embarrassed or jealous. This would mean that the subjective experience of emotions recognition is recruited when recognizing the same emotions in others; this would strengthen the hypothesis of an interoceptive deficit related to alexithymia. On the other hand, this finding is not congruent with the results obtained by Silani and colleagues (2008), who found higher levels of "difficulty in describing feelings" in high-functioning autistic adults. This merely raises the question of the need for further studies aimed to explore the role of alexithymia factors on ASD subgroups divided according to the levels of functioning.

In any case, this result confirms the independence of the examined constructs, congruently with the evidence that alexithymia is a trans-nosographical dimension occurring in many clinical conditions other than autism (Scimeca, Bruno, Pandolfo, Micò, Romeo, Abenavoli *et al.*, 2013; Scimeca, Bruno, Cava, Pandolfo, Muscatello, & Zoccali, 2014; Mento,

Rizzo, Barberis, & Settineri, 2016).

Another outwardly minor result is that the presence of alexithymia seems to result in a greater delay of diagnosis. ASD is often misdiagnosed and overlooked in adult patients (Crucitti, Dritto, Di Perri, Gallo, Conti, Bruno *et al.*, 2015). Takara, Kondo and Kuba (2015) conducted a research on the causes of misdiagnosis, identifying five psychiatric diseases or comorbidities (i.e. schizophrenia, psychotic disorders, bipolar disorder, major depressive disorder, and personality disorders) often manifested as prominent symptoms, in contrast with mild or atypical autistic traits, which remain underestimated. Misdiagnosis could also depend on the difficulties in accurately reconstructing developmental history, or on insufficient experience among psychiatrists detecting ASD in adult patients.

5. Conclusions

Despite being aware that the main limitation of this study is the small sample size, and that future studies are needed to confirm our findings on larger clinical populations, this study suggests: a) the need to fully introduce a standardized measure of alexithymia in the assessment battery for autism; b) that clinicians working in adulthood mental health services should take into account the role of alexithymia in ASD as a contributing factor responsible for the difficulty in identifying one's own and others' emotions, with the aim to design more specific and effective treatments and skill training therapies.

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