


Emotion dysregulation is heightened in autistic females: A comparison with autistic males and borderline personality disorder

Women's Health
Volume 19: 1–14
© The Author(s) 2023
Article reuse guidelines:
sagepub.com/journals-permissions
DOI: 10.1177/17455057231174763
journals.sagepub.com/home/whe



Luisa Weiner^{1,2} , Madalina Elena Costache¹, Doha Bemmouna¹,
Juliette Rabot², Sébastien Weibel^{2,3}, Marine Dubreucq^{4,5},
Julien Dubreucq^{4,5,6,7} and Romain Coutelle^{2,3}

Abstract

Background: Emotion dysregulation is increasingly recognized as highly prevalent and impairing in autistic individuals. Yet, a large majority of studies have considered emotion dysregulation in youth only, and most of them did not consider sex differences in emotion dysregulation manifestation.

Objectives: In the present study, we aim to investigate sex differences relative to emotion dysregulation in autistic adults without intellectual disability as well as its relationship with different factors potentially involved in emotion dysregulation (e.g. camouflaging, alexithymia, suicidality, quality of life). Self-reported emotion dysregulation will be assessed in autistic adults but also in females with borderline personality disorder, given that emotion dysregulation is particularly enhanced in this population.

Design: Cross-sectional, prospective, controlled.

Methods: Twenty-eight autistic females, 22 autistic males and 24 females with borderline personality disorder were recruited from a dialectical behavior therapy program waiting list. They completed several self-report questionnaires measuring emotion dysregulation, alexithymia, suicidality, quality of life, camouflaging borderline symptoms and autism severity.

Results: Most emotion dysregulation subscale scores and alexithymia scores were heightened in autistic females compared to females with borderline personality disorder and, to a lesser extent, compared to autistic males. Independently of borderline personality disorder symptoms, emotion dysregulation was related to alexithymia and poorer psychological health in autistic females, whereas it was mostly related to autism severity, poorer physical health and living conditions in autistic males.

Conclusion: Our results suggest that emotion dysregulation is a major difficulty of autistic adults without intellectual disability eligible for dialectical behavior therapy, and this is especially the case for autistic females. There seem to be different sex-specific factors involved in emotion dysregulation found in autistic adults, which highlight the need to target-specific domains (e.g. alexithymia) in the treatment of emotion dysregulation in autistic females. ClinicalTrials.gov Identifier: NCT04737707 <https://clinicaltrials.gov/ct2/show/NCT04737707>

Keywords

alexithymia, autism spectrum disorder, borderline personality disorder, emotion dysregulation, mental health, sex differences

Date received: 1 September 2022; revised: 22 March 2023; accepted: 21 April 2023

¹Laboratoire de Psychologie des Cognitions, Faculté de Psychologie, Université de Strasbourg, Strasbourg, France

²Department of Psychiatry, University Hospital of Strasbourg, Strasbourg, France

³INSERM 1114, Strasbourg, France

⁴Centre référent de réhabilitation psychosociale et de Remédiation Cognitive (C3R), Centre Hospitalier Alpes Isère, Grenoble, France

⁵Fondation FondaMental, Créteil, France

⁶Centre de Neurosciences Cognitive, UMR 5229, CNRS and Université Lyon 1, Lyon, France

⁷Réseau Handicap Psychique, Grenoble, France

Corresponding author:

Luisa Weiner, Laboratoire de Psychologie des Cognitions, Faculté de Psychologie, Université de Strasbourg, 12 rue Goethe, Strasbourg 67000, France.

Email: weiner@unistra.fr



Introduction

Autism spectrum disorder (ASD) is a neurodevelopmental condition characterized by early-onset social communication abnormalities and repetitive, stereotyped behaviors.^{1,2} The prevalence rate of ASD is approximately 1% worldwide, with a higher prevalence in males than females (in this article, we will use the terms “females” and “males” and not “men” and “women,” since our focus is on sex differences and not gender³).⁴ However, the male-to-female ratio in ASD has shown a consistent decrease over the last years. As an example, in a recent systematic review update from 2022, the median male-to-female ratio was estimated at 4:2,⁴ whereas a systematic review published 5 years prior reported a male-to-female ratio at 4:1.⁵ The higher rates of ASD among males reflect sex differences likely to be involved in its etiology but also in potential biases in clinical assessment and diagnoses.^{4,6,7}

Recent research has highlighted a number of reasons for the underdiagnoses of autistic females. Most of them refer to “male-centric” aspects of diagnosis such as females having more socially appropriate special interests than males, or overall higher levels of social skills.^{6,8,9} In addition to neurocognitive and behavioral aspects,¹⁰ cultural factors may also contribute to sex-based differences in ASD as there are greater expectations for females to engage in adaptive social behaviors.¹¹ This may, in turn, be involved in the enhanced use of compensatory behaviors to mitigate social challenges and mask autistic symptoms in autistic females.^{12–14} Indeed, while both autistic males and females without intellectual disability may hide or mask their symptoms to meet everyday social requirements and “look normal,” this has been reported to be more common in females than in males.^{13,15,16} The term *camouflaging* has been used in ASD to refer to the process by which individuals with ASD hide or mask symptoms that may be viewed as socially unacceptable and/or artificially perform social behaviors considered more acceptable.^{12,13}

While short-term consequences of camouflaging might include decreased feelings of loneliness, a number of negative long-term consequences of camouflaging on mental health have been described.¹⁷ In particular, increased self-reported camouflaging in autistic people without intellectual disability has been associated with higher depression and/or anxiety symptoms, but also increased suicidality, especially in females.^{17–21} Irrespective of camouflaging, however, autistic females have been reported to present more frequently with affective symptoms and suicidal behaviors,^{22,23} which has been mainly associated with elevated levels of emotion dysregulation (ED).^{24–29} Nevertheless, to our knowledge, the relationship between camouflaging and ED *per se* has not been investigated in autistic adults.

ED is defined as a deficit in adaptive and efficient emotion regulation that interferes with appropriate goal-directed behavior.²⁸ ED is a core symptom dimension

found in a number of psychiatric and neurodevelopmental disorders, such as Attention Deficit Hyperactivity Disorder (ADHD), mood disorders and borderline personality disorder (BPD).^{30,31} Although ED is not considered to be disorder-specific, BPD is typically seen as the prototypical presentation of ED.¹ In addition to ED, BPD is characterized by a persistent pattern of unstable relationships and self-concept, associated with pronounced impulsive and self-harming behaviors.¹ ED in BPD is characterized by affective instability, uncontrolled anger and impulsive self-harming behaviors which are considered to be a maladaptive way of emotion regulation.^{31,32} Interestingly, using self-report and parent-report measures of ED, similar manifestations of ED have been described in youth and adults with ASD compared to typically developing (TD) individuals^{25,33–35} and youth with ADHD.³⁶ This, along with the growing awareness of the specific presentation of ASD in female adults, has increased the interest in the overlap between ASD and BPD, although research comparing ED in ASD and BPD is lacking.³⁷ In addition to the aforementioned manifestations described in BPD, ED in autism has been significantly linked to alexithymia^{38,39} and anxiety,^{25,40} both dimensions being particularly related to the core dyad of autistic symptoms.

Although ED is increasingly recognized as highly prevalent and impairing in autistic individuals,⁴¹ a large majority of studies have considered ED in children and adolescents^{28,41–43} or autistic individuals with intellectual disability,⁴⁰ and most of them focused on males⁴³ or did not consider sex differences in ED manifestation.⁴⁴ Yet, in typically developing individuals, sex differences in emotion regulation abilities are well-known, as females are less likely to use adaptive strategies to regulate negative emotions compared to males.⁴⁵ This, in turn, is thought to be involved in the higher prevalence of depression, anxiety, BPD and eating disorders in females.⁴⁶

Irrespective of gender and sex differences, very few studies have investigated ED in autistic adults without intellectual disability. In one early study, Samson et al.³⁹ compared the scores of young adults diagnosed with ASD without intellectual disability to that of their TD peers on the Toronto Alexithymia Scale⁴⁷ and the Emotion Regulation Questionnaire.⁴⁸ The authors found that autistic adults had significantly more difficulties in both emotion labeling (i.e. alexithymia) and the use of effective emotion regulation strategies compared to TD individuals. In another study using self-report questionnaires,⁴⁹ the authors found that autistic participants used more maladaptive emotion regulation strategies (i.e. other-blame) and less adaptive strategies (i.e. reappraisal) compared to TD individuals. These results are consistent with those found by Cai et al.⁵⁰ using experience sampling methodology. The authors found that the use of maladaptive emotion regulation strategies (e.g. other-blame) significantly increased negative mood in autistic adults. Overall, despite the lack of studies focusing on ED in autistic adults, these

results suggest that, akin to research conducted in autistic youth, ED is significantly increased in autistic adults compared to TD individuals, on the one hand, and that it has a significant impact on well-being, on the other hand.

Regarding the effect of sex on ED, research in autistic adults is lacking and only a few studies have been conducted in children and adolescents.^{44,51,52} The results of these studies converge in showing that ED is more severe in autistic girls than boys, a finding that is in line with those reported in TD children.⁴⁵ For instance, in the only study that focused on sex differences in ED in autistic individuals, Wieckowski et al.⁴⁴ reported in an inpatient ASD children and adolescent sample that ED was significantly increased in females compared to males. Moreover, the authors reported that, beyond sex, increased age and higher verbal ability were also associated with higher ED scores. This is all the truer for adult autistic females without intellectual disability, given that camouflaging has been reported to be more common in females than males, as well as mood and anxiety symptoms and suicidal behaviors.^{23,53} However, probably due to the underrepresentation of females in the research conducted in autistic adults without intellectual disability, gender and sex differences relative to ED in this population as well as its relationships with psychological dimensions and overall well-being have not been investigated thus far.

In the present study, we aim to investigate sex differences relative to ED in autistic adults without intellectual disability as well as its relationship with different factors potentially involved in ED in ASD (e.g. camouflaging, alexithymia, suicidality, quality of life). To do so, self-reported ED will be assessed in male and female autistic adults without intellectual disability, but also in females with BPD, given that ED is particularly enhanced in this population. We hypothesize that self-reported ED will be increased in autistic females compared to autistic males, and, in both groups, ED will be decreased compared to females with BPD. Moreover, we expect camouflaging, alexithymia, suicidality and measures of well-being (e.g. quality of life) to be associated with ED in both ASD groups independently of borderline personality traits.

Methods

Participants

The data used in this study were collected from 2019 to 2022 at the Psychiatric Unit of the University Hospital of Strasbourg, as part of a larger study on ED and dialectical behavior therapy (DBT).⁵⁴ Participants were enrolled because they presented with self-reported ED and were eligible for DBT. There were 85 participants originally recruited, with various primary conditions, that is, ASD, BPD, bipolar disorder (BD), ADHD and eating disorders. Given the goals of the study, we focused on a subset of emotionally dysregulated participants ($N=74$), excluding

patients with disorders other than ASD or BPD. Due to the small sample size of males with BPD in our study ($N=7$), only females with BPD were included in the analysis. The final sample of 74 participants was categorized into three groups: women with a diagnosis of ASD (ASDf; $N=28$; age, $M=29.51$, $SD=8.01$), men with a diagnosis of ASD (ASDm; $N=22$; age, $M=31.64$, $SD=10.85$), and female patients with BPD (BPDF; $N=24$; age, $M=27.50$, $SD=7.16$). Individuals with ASD did not present with BPD, and vice versa, with the exception of three individuals. These three individuals with ASD + BPD were included in the ASD group. However, other co-occurring disorders were observed in both groups (see Table 1).⁵⁵ Autistic participants completed all the self-report questionnaires, while participants with BPD completed all the questionnaires with the exception of the AQ, the CAT-Q, the BSS and the WHOQOL-BREF. Participants did not receive any financial incentive to participate in the study. Nevertheless, after they completed the questionnaires, they benefited from DBT, an empirically validated treatment for ED.⁵⁶ The current study is the preliminary step for a randomized controlled trial (RCT) on DBT being conducted as part of MEC's PhD project that was approved by the regional ethics committee of the East of France (No. SI 21.01.21.41923). Therefore, because participants were included as part of another study, the calculation of the sample size was based on assumptions on the distributions of the DERS score made from the data from a pilot study conducted by our team.²⁷ A sample of 48 autistic participants was needed to demonstrate a decrease of at least 10 points of the score at mid-therapy compared to the baseline with a power of 95% and a decrease of at least 15 points post-therapy and at 6-month follow-up compared to baseline with a power of 91%.

Measures

The Difficulties in Emotion Regulation Scale (DERS)⁵⁷ is a widely used 36-item self-report scale assessing ED. Items are grouped into six subscales: (a) nonacceptance of emotional responses (*Non-acceptance*; "When I'm upset, I feel guilty for feeling that way"); (b) difficulties in engaging in goal-directed behaviors when experiencing negative emotions (*Goals*; "When I'm upset, I have difficulty getting work done"); (c) impulse control difficulties when distressed (*Impulse*; "When I'm upset, I lose control over my behavior"); (d) lack of emotional awareness (*Awareness*; "I am attentive to my feelings"—reversed item) (e) limited access to effective emotion regulation strategies (*Strategies*; "When I'm upset, I believe that I'll end up feeling very depressed"); and lack of emotional clarity (*Clarity*; "I have no idea how I am feeling"). Each item is scored on a Likert-type scale ranging from 1 (almost never) to 5 (almost always). Higher scores indicate greater impairment in emotion regulation. The current

Table 1. Socio-demographic characteristics and health status.

N	ASDf	ASDm	BPDf	Significance	df	p
	28	22	24			
Age, M (SD)	29.51 (8.01)	31.64 (10.85)	27.50 (7.16)	$F = 1.30$	2	0.28
Age at ASD diagnosis, M (SD) ^a	26.48 (7.72)	26.36 ^{1,55}	—	$t = 0.42$	47	0.966
Education, n (%)				$\chi^2 = 13.040$	6	0.042
High school diploma and lower	9 (32%)	13 (59%)	11 ^b (50%)			
Bachelor's degree	15 (54%)	4 (18%)	4 ^b (18%)			
Master's degree	3 (11%)	5 (23%)	7 ^b (32%)			
Doctorate/equivalent	1 (4%)	—	—			
Professional status, n (%)				$\chi^2 = 5.892$	4	0.207
Student	7 (25%)	8 (36%)	3 ^a (13%)			
Employed	10 (36%)	6 (27%)	5 ^a (22%)			
Unemployed	11 (39%)	8 (36%)	15 ^a (65%)			
Living situation, n (%)				$\chi^2 = 15.532$	4	0.004
Own household (alone)	17 (61%)	8 (36%)	17 ^a (74%)			
Own household (with partner/family)	7 (25%)	3 (14%)	5 ^a (22%)			
Parents household	4 (14%)	11 (50%)	1 ^a (4%)			
Marital status, n (%)				$\chi^2 = 4.506$	4	0.342
Single	16 (57%)	15 (68%)	12 ^a (52%)			
Partnered/married	11 (39%)	7 (32%)	8 ^a (35%)			
Separated/divorced	1 (4%)	—	3 ^a (13%)			
Children				$\chi^2 = 0.571$	1	0.45
None	25 (89%)	18 (82%)	—			
3-Jan	3 (11%)	4 (18%)	—			
Somatic disorders, n (%)	11 (39%)	2 (9%)	—	$\chi^2 = 5.838$	1	0.016
Psychotropic medication	21 (75%)	17 (77%)	17 ^c (94%)	$\chi^2 = 2.953$	2	0.228
DSM-5 comorbidities, n (%)	21 (75%)	14 (64%)	15 (62.5%)	$\chi^2 = 1.142$	2	0.565
BPD	3 (11%)	—	—			
ADHD	12 (43%)	9 (41%)	4 (17%)			
Anxiety disorders	9 (32%)	2 (9%)	3 (12.5 %)			
Depression	8 (29%)	2 (9%)	2 (8%)			
BD	1 (4%)	1 (4.5%)	5 (21%)			
Eating disorders	2 (7%)	—	7 (29%)			
Self-harming behaviors, n (%)	26 (93%)	18 (82%)	14 ^d (70%)	$\chi^2 = 4.316$	2	0.116
Suicidal ideation, n (%)	26 (93%)	18 (86%)	24 (100%)	$\chi^2 = 3.58$	2	0.166
History of suicide attempts, n (%)	15 (54%)	12 (54.5%)	18 (75%)	$\chi^2 = 3.006$	2	0.222

Significant values are expressed in bold.

ADHD: attention deficit and/or hyperactivity disorder; ASD: Autism spectrum disorder; BD: bipolar disorder; BPD: borderline personality disorder; DSM: diagnostic and statistical manual of mental disorders; SD: standard deviation.

^aMissing data for $n = 1$.

^bMissing data for $n = 2$.

^cMissing data for $n = 6$.

^dMissing data for $n = 4$.

study used the French version of the DERS.⁵⁸ The DERS has been validated in ASD.⁵⁹

The Borderline Symptom List-Short Version⁶⁰ (BSL-23) is a 23-item self-report measure assessing BPD symptoms. In addition to the DSM BPD diagnostic criteria, items evaluate self-criticism, self-disgust, helplessness, loneliness and mistrust, with a total of 25 statements. Scores on each item range from 0 to 4 (the sum of the total score is divided by 23), and higher total scores indicate increased BPD symptom severity. Kleindienst et al.⁶¹

defined six degrees of impairment: 0–0.3, none/low; 0.3–0.7, mild; 0.7–1.7, moderate; 1.7–2.7, high; 2.7–3.5, very high; and 3.5–4 extremely high. The BSL-23 has been validated in French.⁶²

The Beck Depression Inventory-2nd edition⁶³ (BDI) is one of the most widely used tools for assessing depression severity. This self-report questionnaire comprises 21 items with Likert-type scale responses ranging from 0 (not at all) to 3 (severely). Interpretation of scores recommend the following guidelines: 0–9, minimal depression; 10–16,

mild depression; 17–29, moderate depression; 30–63, severe level of depression. The French version of the BDI has been found to be valid and reliable.⁶⁴

The Beck Anxiety Inventory⁶⁵ (BAI) is a 21-item self-report measure of somatic and cognitive anxiety symptoms. Participants score each item on a Likert-type scale ranging from 0 (not at all) to 3 (severely). The French version of the BAI has been validated in French.⁶⁶

The General Alexithymia Factor Score⁶⁷ (GAFS-8) is a subset of eight items of the Toronto Alexithymia Scale⁴⁷ developed to assess difficulty in identifying and describing emotions (alexithymia) in individuals on the autism spectrum. Items are scored on a five-point Likert-type scale (1 = strongly disagree; 5 = strongly agree). For the current study, the total score of the GAFS-8 was calculated by referring to the sum of responses to the items: 1, 2, 6, 9, 11, 12, 13 and 14 indicated in the French version of the TAS-20.⁶⁸

The Autism Spectrum Quotient⁶⁹ (AQ) is a self-report questionnaire designed to assess autistic traits. The 50 items reflect difficulties related to social and communication skills, imagination, attention to detail and attention-switching. Each score was grouped into one of two categories: yes (definitely agree or slightly agree); and no (slightly disagree or definitely disagree), with a value of 1 or 0. The sum of the scores was calculated across all questions, resulting in a total score ranging from 0 to 50. Higher total scores indicate higher levels of autistic-like traits. The French version of the AQ was validated by Lepage et al.⁵⁵

The Camouflaging Autistic Traits Questionnaire⁷⁰ (CAT-Q) is a self-report questionnaire of social camouflaging strategies in adults. The 25 statements relate to a three-factor structure consisting of the following strategies: (a) compensatory behaviors in social situations (*Compensation*, e.g. “When I am interacting with someone, I deliberately copy their body language or facial expressions”), (b) hiding autistic-like characteristics (*Masking*, e.g. “I adjust my body language or facial expressions so that I appear interested by the person I am interacting with”) and (c) attempting to fit in with others (*Assimilation*, e.g. “In social situations, I feel like I’m performing rather than being myself”). Items are scored on a 7-point Likert-type scale ranging from “strongly disagree”⁷¹ to “strongly agree.”⁷ The total CAT-Q score can range from 25 to 175, with higher values indicating increased use of camouflaging behavior. In this study, we used the French translation of the CAT-Q, whose psychometric properties are being assessed in a study led by our team.

The Beck Scale for Suicide Ideation⁷¹ (BSS) is a 21-item clinician-rated scale evaluating suicidal thinking and intent. Each statement is scored on a three-point scale (from 0 to 2). Individuals are instructed to select the statement considered most applicable to them. The total score

ranges from 0 to 38, with a higher score reflecting higher suicide risk. The BSS is validated in French.⁷²

The Abbreviated World Health Organization Quality of Life Questionnaire^{73,74} (WHOQOL-BREF) is a 26-item short version of the WHOQOL-100,⁷³ which provides a brief and adequate assessment of the following quality of life domains: (a) physical health, (b) psychological health, (c) social relationships, and (d) environment (e.g. financial resources, physical safety, home environment, transport). Items refer to the previous 2 weeks, participants respond on a 1–5 Likert-type scale, with higher scores indicating better quality of life. The mean score for each domain was multiplied by 4 and transformed into a 0–100 scale to enable comparisons with the scores used in the WHOQOL-100.⁷³

Procedure

After providing written informed consent, participants were requested to complete a brief form for socio-demographic variables, together with self-report questionnaires. The psychiatric status of participants was evaluated either by a clinical psychologist or a psychiatrist, based on the DSM-5 criteria. Prior to their recruitment, autistic participants had received a diagnosis of ASD, supported by the ADI-R and the ADOS-2. In addition, Wechsler Adult Intelligence Scale, Fourth Edition (WAIS-IV) was administered to verify the absence of intellectual disability. In our sample, IQ scores were superior to 80 in autistic participants. Among the entire sample ($N=74$), 29 participants (39%) presented one comorbid secondary disorder, 16 (22%) presented two comorbidities and 2 patients (3%) had three comorbidities. Detailed demographic information is found in Table 1. Our study followed the STROBE guidelines.

Statistical analysis

For this cross-sectional study, socio-demographic comparisons were performed between the three groups—ASDf, ASDm and BPDF corresponding, respectively, autistic female adults, autistic male adults and female patients with BPD—on the basis of chi-square (χ^2) test for nominal variables. One-way analyses of variance (ANOVAs) were conducted to assess between-group differences in continuous variables. For these analyses, the significance level was set at $p < 0.05$ and was corrected using the Bonferroni post hoc procedure, controlling for multiple comparisons. Independent sample t-tests were performed to compare the mean scores between ASDf and ASDm on autism-related characteristics (e.g. AQ and CAT-Q) and quality of life (i.e. WHOQOL-BREF). Bonferroni adjustment for multiple comparisons was used. The Pearson coefficient was calculated to determine the correlations and partial correlations (controlling for

Table 2. Differences between groups on the DERS, the BSL, the BDI, the BAI and the GAFS-8.

	ASDf, $n=28^1$	ASDm, $n=22^2$	BPDf, $n=24^4$	F	p	1 vs 2 vs 3 ^a
	Mean (SD)	Mean (SD)	Mean (SD)			
Nonacceptance	21.00 (7.22)	18.86 (5.25)	14.79 (4.64)	7.24	0.001	1 > 3
Goals	21.86 (2.93)	21.27 (3.53)	18.46 (5.24)	5.18	0.001	1 > 3
Impulse	20.93 (5.28)	19.68 (5.30)	21.83 (5.96)	.88	0.420	1 = 2 = 3
Awareness	20.93 (5.29)	18.64 (6.88)	21.50 (6.28)	1.42	0.252	1 = 2 = 3
Strategies	31.57 (5.19)	30.41 (5.17)	20.50 (5.07)	34.46	< 0.001	1 > 3
Clarity	17.75 (4.08)	16.36 (3.87)	29.42 (7.46)	42.81	< 0.001	(1 = 2) < 3
DERS total	134.04 (16.35)	125.23 (15.02)	126.50 (19.87)	1.98	0.146	1 = 2 = 3
BSL	41.61 (24.65)	42.18 (20.15)	49.05 (17.89)	.83	0.439	1 = 2 = 3
BDI	26.29 (11.65)	24.36 (10.55)	31.88 (9.47)	3.15	0.049	2 < 3
BAI	30.46 (11.11)	24.91 (12.07)	29.13 (13.32)	1.36	0.264	1 = 2 = 3
GAFS-8	32.18 (6.46)	28.73 (7.03)	25.04 (6.08)	7.75	0.001	1 > 3

Significant values are expressed in bold; p values refer to the ANOVA results.

BAI: Beck anxiety inventory; BDI: Beck depression inventory; BSL: borderline symptom list; GAFS-8: general alexithymia factor score; DERS: difficulties in emotion regulation scale; SD: standard deviation.

^aSignificant values of post hoc comparisons including the three groups.

borderline symptoms) between ED, clinical dimensions and well-being measures in the ASD groups. The listwise deletion method was used in the case of missing data. Statistical analyses were performed using SPSS Version 25 (IBM SPSS Statistics for Windows, Version 25.0.; Armonk, NY: IBM Corp).

Results

Socio-demographic characteristics

Table 1 summarizes the socio-demographic characteristics of the three groups. There were no differences between ASDf, ASDm and BPDf with respect to age distribution ($F = 1.30$, $df=2$, $p=0.280$), age at diagnosis ($t=0.42$, $df=47$, $p=0.966$), professional ($\chi^2=0.207$, $df=4$, $p=0.207$) or marital ($\chi^2=0.342$, $df=4$, $p=4.506$) status. However, ASDf had higher educational levels ($\chi^2=13.040$, $df=6$, $p=0.042$), with 15 of them (54%) having completed at least a bachelor's degree, compared to 4 ASDm (18%) and 4 BPDf (18%). In addition, there was a significant difference in the living situation status between subjects, as ASDf: $n=4$ (14%) and BPDf: $n=1$ (4%) were less likely to live with their parents, when compared to ASDm: $n=11$ (50%). Moreover, ASDf had significantly more somatic disorders compared to ASDm. No other differences were found between groups in terms of health and socio-demographic characteristics.

Emotion dysregulation scores between groups

The three groups did not differ on the total score of the DERS ($F=1.98$, $p=0.146$; Table 2), but ASDf tended to have significantly higher scores compared to ASDm with a moderate effect size ($t=1.96$, $p=0.056$, $d=0.56$); Table 3). On the subscale level, compared to BPDf, ASDf had

significantly higher scores on the "nonacceptance," "goals" and "strategies" subscales of the DERS (respectively, $F=7.24$, $p=0.001$, $F=5.18$, $p=0.001$, $F=34.46$, $p<0.001$). By contrast, BPDf had significantly higher scores on the "clarity" DERS subscale compared to both ASDf and ASDm ($F=42.81$, $i < 0.001$). On the "impulse" and "awareness" DERS subscales, there were no differences between groups ($F=0.88$, $p=0.420$, $F=0.141$, $p=0.252$, respectively). Results were unchanged when patients presenting with ASD and co-occurring BPD were excluded from the analyses ($N=3$).

Psychological and well-being dimensions

Regarding other psychological dimensions, ASDm had significantly fewer depressive symptoms compared to BPDf and ASDf ($F=3.15$, $p=0.049$), whereas alexithymia scores were lower in BPDf compared to ASDf ($F=7.75$, $p<0.001$). Compared to ASDm, ASDf had significantly higher scores on the CAT-Q (camouflaging) "assimilation" subscale ($t=2.32$, $p=0.024$) and on the AQ "communication" subscale ($t=2.03$, $p=0.048$). In other words, autistic females reported having greater communication difficulties and making more efforts to fit in compared to autistic males. In terms of quality of life, ASDf report having poorer physical health compared to ASDm ($t=-2.17$, $p=0.035$). Results on other measures (borderline personality traits, suicidality and anxiety) were similar between groups (see Tables 2 and 3 for detailed results).

Correlation analyses

Results of correlation and partial correlation analyses are reported in Tables 4 and 5. In ASDf, DERS total score was positively correlated to increased depressive, borderline

Table 3. Differences between autistic groups on the self-report questionnaires.

	ASDf, <i>n</i> = 28 ¹	ASDm, <i>n</i> = 22 ²	<i>t</i>	<i>P</i>	Cohen's <i>d</i> _s
	M (SD)	M (SD)			
DERS	134.04 (16.35)	125.23 (15.02)	1.96	0.056	0.56
BSL	41.61 (24.65)	42.18 (20.15)	-0.09	0.930	-0.02
BDI	26.29 (11.65)	24.36 (10.55)	0.60	0.549	0.17
BAI	30.46 (11.11)	24.91 (12.07)	1.69	0.098	0.48
GAFS-8	32.18 (6.46)	28.73 (7.03)	1.80	0.078	0.51
AQ	38.25 (4.73)	37.55 (5.91)	0.47	0.641	0.13
Social skills	8.61 (1.66)	7.73 (2.07)	1.66	0.102	0.47
Attention switching	8.96 (1.35)	8.59 (1.05)	1.07	0.291	0.30
Attention to details	6.50 (1.88)	7.27 (1.88)	-1.44	0.155	-0.41
Communication	8.50 (1.35)	7.59 (1.82)	2.03	0.048	0.58
Imagination	5.68 (2.14)	6.36 (2.01)	-1.15	0.255	-0.33
CAT-Q	107.54 (15.05)	102.64 (13.11)	1.45	0.152	0.34
Compensation	42.00 (10.78)	40.36 (7.20)	0.61	0.543	0.17
Mask	31.43 (5.74)	30.23 (5.36)	0.76	-0.454	0.21
Assimilation	34.11 (3.73)	31.05 (5.56)	2.32	0.024	0.66
WHOQ					
Physical health	36.89 (16.27)	46.45 (14.32)	-2.17	0.035	-0.62
Psychological health	31.00 (17.31)	28.18 (13.40)	0.63	0.532	0.18
Social relationships	36.18 (19.82)	32.91 (23.83)	0.43	0.668	0.15
Environment	52.57 (17.28)	53.95 (17.80)	-0.278	0.78	-0.08
BSS	10.85 (8.81)	10.57 (8.79)	0.110	0.913	0.03

AQ: autism spectrum quotient; BAI: Beck anxiety inventory; BDI: Beck depression inventory; BSL: borderline symptom list; BSS: Beck scale for suicide ideation; CAT-Q: camouflaging of autistic traits questionnaire; DERS: difficulties in emotion regulation scale; GAFS-8: general alexithymia factor score; SD: standard deviation; WHOQ: World Health Organization Quality. Significant values ($p < 0.05$) are expressed in bold.

and anxiety symptoms, but also alexithymia score. In ASDf, greater ED was associated with poorer psychological health. In ASDm, a slightly different pattern was found as elevated ED score, measured by the DERS, was associated with increased suicidality, depressive scores, borderline symptoms and anxiety symptoms, but not with alexithymia. Regarding quality of life, higher levels of ED were related to poorer physical health and quality of the environment in ASDm. When controlling for borderline symptoms, higher ED scores remained significantly associated with increased alexithymia and anxiety symptoms in ASDf. In contrast, in ASDm, ED was related to increased autistic traits, and decreased quality of life in two domains: poorer physical health and environment.

Discussion

The aim of the present study was to assess sex differences relative to ED in autistic adults in comparison to a control group of females with BPD. First of all, contrary to our predictions, female autistic adults presented with ED scores that were either higher (3 of the 6 subscales of the DERS) or comparable to that of females with BPD (with the exception of the “clarity” subscale of the DERS). In autistic males, however, ED scores were overall similar to those of females with BPD and tended to be lower compared to autistic females. This suggests that ED is

particularly heightened in autistic females compared to autistic males, but also, surprisingly, compared to females with BPD. Moreover, we found that ED was mainly associated with alexithymia and psychological difficulties in autistic females, whereas in autistic males, ED was associated with the severity of autism, suicidal ideation as well as physical and environmental difficulties. Overall, these results suggest that ED is a major difficulty for autistic adults without intellectual disability, and this is all the more the case for autistic females.

Our results are consistent with previous research which found that ED was particularly marked in autistic adults without intellectual disability compared to TD individuals.^{39,49} Strikingly, our results suggest that many facets of ED are also particularly marked in autistic adults, especially females, compared to people with BPD.⁷⁵ More specifically, we found that the “nonacceptance,” “goals” and “strategies” subscale scores of the DERS were significantly elevated compared to BPDf. Although discrepant findings have been reported in the literature, probably due to the variety of methods used to measure ED,⁷⁶ these results are inconsistent with a number of studies which found that, although ED is not disorder-specific, higher DERS scores were specifically related to BPD. However, with the exception of one study⁷⁵ which focused on emotion regulation strategies used during interpersonal situations, none of these studies focused on the difference

Table 4. Correlation matrix per group.

ASDf	1	2	3	4	5	6	7	8	9	10	11	12
1 DERS	—											
2 BSL	0.560**	—										
3 BDI	0.539**	0.647**	—									
4 BAI	0.687**	0.580**	0.674**	—								
5 GAFS-8	0.648**	0.433*	0.327	0.529**	—							
6 AQ	0.258	-0.021	0.141	0.054	0.100	—						
7 CAT-Q	0.326	0.490**	0.413*	0.349	0.169	-0.039	—					
8 Physical health	-0.216	-0.346	-0.519**	-0.162	0.153	0.153	-0.165	—				
9 Psychological health	-0.496**	-0.696**	-0.670**	-0.506**	-0.397*	0.072	-0.360	0.372	—			
10 Social relationships	-0.048	-0.208	-0.232	0.085	-0.096	0.223	0.043	0.135	0.455*	—		
11 Environment	-0.190	0.052	-0.116	-0.269	-0.054	0.115	-0.030	0.446*	0.044	0.031	—	
12 BSS	0.149	0.245	0.551**	0.315	-0.039	-0.216	0.295	-0.469*	-0.472*	-0.301	-0.201	—
ASDm	1	2	3	4	5	6	7	8	9	10	11	12
1 DERS	—											
2 BSL	0.648**	—										
3 BDI	0.481*	0.665**	—									
4 BAI	0.224	0.159	0.474*	—								
5 GAFS-8	0.412	0.227	0.475*	0.269	—							
6 AQ	0.585**	0.378	0.540**	0.385	0.196	—						
7 CAT-Q	-0.200	0.001	0.065	0.137	-0.125	0.226	—					
8 Physical health	-0.502*	-0.208	-0.347	-0.427*	0.016	-0.614**	-0.025	—				
9 Psychological health	-0.375	-0.661**	-0.570**	0.103	-0.172	-0.305	0.003	0.123	—			
10 Social relationships	-0.248	-0.488*	-0.107	0.051	-0.008	-0.087	-0.094	-0.009	0.335	—		
11 Environment	-0.486*	-0.049	-0.239	-0.342	0.033	-0.645**	-0.279	0.681**	0.101	0.108	—	
12 BSS	0.438*	0.331	0.323	0.045	0.197	0.190	-0.222	-0.289	-0.220	-0.160	-0.282	—
BPDF	1	2	3	4	5							
1 DERS	—											
2 BSL	0.133	—										
3 BDI	-0.043	0.549**	—									
4 BAI	-0.304	0.355	0.317	—								
5 GAFS-8	0.410*	0.366	0.045	0.194	—							

AQ: autism spectrum quotient; ASD: autism spectrum disorder; BAI: Beck anxiety inventory; BDI: Beck depression inventory; BSL: borderline symptom list; BSS: Beck scale for suicide ideation; CAT-Q: camouflaging of autistic traits questionnaire; DERS: difficulties in emotion regulation scale; GAFS-8: general alexithymia factor score.

* $p < 0.01$; ** $p < 0.001$.

Table 5. Partial correlation between clinical measures and DERS, controlling for borderline symptoms.

	ASDf	ASDm
BAI	0.537**	0.161
BDI	0.279	0.088
GAFS-8	0.543**	0.357
AQ	0.326	0.483*
CAT-Q	0.072	-0.263
Physical health	-0.029	-0.493*
Psychological health	-0.186	0.094
Social relationships	0.085	0.102
Environment	-0.287	-0.579**
BSS	-0.029	0.224

AQ: autism spectrum quotient; BAI: Beck anxiety inventory; BDI: Beck depression inventory; BSS: Beck scale for suicide ideation; CATQ: camouflaging of autistic traits questionnaire; GAFS-8: general alexithymia factor score.

* $p < 0.01$; ** $p < 0.001$.

between BPD and ASD. As an example, in a study conducted on adolescents, the DERS total score, and the “impulse” and “strategies” subscale scores in particular, were found to be higher in inpatients with BPD compared to controls with other psychiatric disorders.⁷⁶ In another study conducted in adults with BPD and major depressive disorder (MDD),⁷⁷ the authors found that ED was significantly associated with BPD, as DERS scores were significantly increased in patients with BPD + MDD, compared to the group with MDD and healthy controls. Interestingly, in this study, only three DERS subscale scores did not differ between BPD + MDD and MDD groups: that is, “nonacceptance,” “goals” and “awareness.” This might suggest that nonacceptance of emotional responses and the interference of emotions with goal-directed behaviors are equally involved in ED in BPD and MDD.

By comparison, in our study, we found that “non-acceptance,” “goals,” but also “strategies” scores were significantly heightened in our sample of ASDf compared to BPDF. While these results are supportive of ED being particularly present in autistic females,⁴⁴ they also suggest that, compared to BPDF, ED is even more characterized by the non-acceptance of emotions, the lack of effective strategies to regulate them, and it highly interferes with goal-directed behaviors. Interestingly, these dimensions have been linked to a number of psychiatric disorders in nonautistic and autistic individuals (e.g. generalized anxiety disorder, depression, eating disorders).^{43,77-79} This supports the idea of ED as a transdiagnostic factor involved in the emergence and the maintenance of psychological difficulties independently of BPD comorbidity.⁴³ Consistent with these findings, in our study, we found that increased ED scores were related to poorer psychological health in autistic females, but not in autistic males. Relatedly, compared to autistic males, autistic females presented with increased

self-reported communication difficulties, camouflaging and depressive symptoms compared to autistic males, a finding consistent with those from previous studies.^{17,80,81} Given the relationship between ED and psychopathology in people with disorders other than ASD,⁵⁶ but also in children and adults with ASD,^{40,41} it is likely that ED might play a role in the diminished psychological well-being reported by autistic females. Indeed, since ED is elevated in autistic children and seems to be a predisposing factor for a number of psychological difficulties in adulthood,⁴³ it is possible that ED might be a predisposing factor for depression, especially in autistic female adults. However, it is also possible that there is a reciprocal relationship between ED, depression and diminished psychological well-being in autistic females.

Contrary to our predictions, we did not find any links between ED and self-reported camouflaging in ASDf and ASDm. However, consistent with one previous study by Hull et al.,¹⁶ the score on the “assimilation” subscale of the CAT-Q was higher in ASDf compared to ASDm. The “assimilation” subscale of CAT-Q taps into the behavioral strategies people use to better fit in with others (e.g. forcing oneself to interact by pretending or putting a performance).⁷⁰ Interestingly, “assimilation” has been found to mediate the relationship between autistic traits, thwarted belongingness and lifetime suicidality,⁸² suggesting its key role in the interpersonal difficulties (e.g. feelings that social interactions are not natural or genuine and one has to pretend to fit in) and overall well-being in ASD. In our study, camouflaging was associated with increased borderline symptoms (and to a lesser extent with depressive symptoms), but not ED, in autistic females only. It is therefore likely that, rather than ED per se, in autistic females, camouflaging is more directly related to other symptoms of BPD, for example, the feeling of alienation due to interpersonal difficulties. It should be noted, however, that in the latest version of the International Classification of Diseases, 11th Revision (ICD-11), disturbances in the functioning of aspects of the self and/or problems in interpersonal functioning are the main diagnostic requirement shared by personality disorders, irrespective of the associated trait domain specifiers and the addition or not of the Borderline pattern.² This increasingly dimensional approach to personality disorders points to the need for investigating the specificities of ED, but also the functioning of the self and the social relationships, in ASD compared to personality disorders as a whole, through the use of instruments other than the BSL-23.⁸³

When BPD symptoms were controlled for, we found that heightened alexithymia and anxiety symptoms remained highly correlated with ED in autistic females but not in autistic males. Elevated anxiety scores, as measured by the BAI, have been associated with hyperarousal in a number of disorders.⁸⁴ Our results thus suggest that ED in autistic females is characterized by increased arousal/

reactivity than it is in autistic males, consistent with Wieckowski et al.'s⁴⁴ results in autistic youth. Regarding alexithymia, while two recent meta-analyses have highlighted that alexithymia is particularly heightened in autistic people^{85,86} none have considered the effects of sex on this ability. Our results suggest that self-reported alexithymia is significantly increased in autistic females compared to females with BPD, even though alexithymia is also particularly heightened in the latter population.⁸⁷ These results contrast with the higher "clarity" scores of the DERS found in BPDf compared to ASD, suggesting that female participants with BPD have more difficulties understanding and labeling their emotions than autistic adults. As a matter of fact, these results may not be contradictory since alexithymia encompasses not only the identification of one's own emotions, but also describing them, external oriented thinking and constricted imaginal processes.⁸⁸ It is therefore possible that the latter dimensions, which are more related to social relationships, are particularly impacted in autistic females. Interestingly, in our study, in both BPDf and ASDf, ED was associated with alexithymia, which has been linked to interpersonal and mentalizing difficulties, but also emotion processing abnormalities in both disorders.^{87,89-93}

Our study is the first to show that alexithymia is particularly heightened in autistic females compared to females with BPD, on the one hand, and that it is associated with ED in autistic females, but not autistic males, on the other hand. The results concur with the growing awareness of the overlap between behavioral (e.g. interpersonal difficulties) and cognitive (e.g. theory of mind peculiarities) aspects of BPD and ASD without intellectual disability.³⁷ However, very few studies thus far have directly compared core dimensions potentially involved in this overlap. Since many facets of ED and alexithymia are more pronounced in female autistic adults compared to female patients with BPD, clinicians should consider these dimensions when designing tailored interventions for autistic females.^{90,94} This is particularly important given the relationship between alexithymia, ED, social difficulties and mental health in autistic adults, especially women.^{85,92}

In autistic males, it is noteworthy that ED scores were mostly similar to those of BPDf and tended to be lower than those found in autistic females. Moreover, while ED in autistic females is particularly linked to alexithymia and poorer psychological health, in autistic males, ED was found to be related to the severity of autism, poorer physical health, increased suicidal ideation and environmental living conditions. While these results are consistent with the higher percentage of ASDm participants living with their parents compared to ASDf, they contrast with the fact that the ASDf group presented with more physical conditions than the ASDm group in our study.⁹⁵ These findings likely reflect challenges which are related to sex differences in ASD and might be differentially linked to ED in females and males. Taken together, these results suggest

that ED is associated with alexithymia, poorer psychological health and probably more interpersonal difficulties in autistic females, whereas, in autistic males, autism severity (at the clinical and functional levels) seems to be particularly linked to ED. Based on these findings, it is likely that therapeutic interventions for ED in autistic females should target preferentially alexithymia and social relationships while in autistic males, and it should target the severity of autism and its functional impact on independent living.

Our study has a number of limitations. First, our participants were enrolled because they presented with self-reported ED and were eligible for DBT; hence, it is possible that our results cannot be generalized more broadly to all autistic adults without intellectual disability. However, ED has been reported to be particularly heightened in other samples of autistic youth and adults^{41,81} suggesting that these results are not limited to a specific sample of autistic individuals. Moreover, our control group (BPDf) also had self-reported ED and were eligible for DBT and, despite this, ASDf presented with overall greater ED and alexithymia compared to BPDf and ASDm. Second, because of the aforementioned selection bias (i.e. participants were enrolled as part of another study), the sample size is relatively small. Future studies should include larger samples of autistic adults and people with BPD recruited from the general population, to determine whether our results can be generalized more broadly. Third, in our study, we focused on sex differences, and it is likely that gender differences might also be involved in ED.¹⁶ Future studies should investigate ED in gender-diverse autistic individuals, given the specific challenges they might encounter (e.g. camouflaging, discrimination, mental health) and their specific needs. Fourth, in our study, we focused on ED in ASD compared to BPD, based on the more categorical approach of the DSM-5 compared to the latest version of the ICD. Given that ED is also found in other subtypes of personality disorders (e.g. Kasse et al.⁹⁵), and that anankastic, detached and narcissistic trait dimensions have been found to be associated with ASD⁹⁶⁻⁹⁸ future studies should focus on the specificities of ED in ASD compared to other personality subtypes. Finally, we did not assess post-traumatic stress disorder symptoms, which are highly prevalent in BPDf and ASDf,^{31,95} although they are related to ED.³¹ Future studies should consider the relationship between childhood adversity, trauma and ED in autistic adults, especially in females.

Conclusion

Our study is the first to show that ED is particularly marked in autistic females compared to autistic males eligible for DBT (i.e. presenting with self-harming behaviors and/or suicidal behaviors), but also female patients with BPD. Given the relationship between ED, self-harm, suicidality and overall well-being and quality of life,²⁷ it is of the utmost importance to better understand the determinants

and manifestations of ED in autistic individuals, including sex and gender-related specificities, to tailor pertinent and individualized treatments.

Declarations

Ethics approval and consent to participate

This study was approved by the regional ethics committee of the East of France (No. SI 21.01.21.41923). Written informed consent to participate was obtained from all the participants.

Consent for publication

Not applicable.

Author contribution(s)

Luisa Weiner: Conceptualization; Data curation; Formal analysis; Funding acquisition; Investigation; Methodology; Project administration; Resources; Software; Supervision; Validation; Visualization; Writing—original draft; Writing—review & editing.

Madalina Elena Costache: Data curation; Formal analysis; Investigation; Methodology; Software; Writing—original draft; Writing—review & editing.

Doha Bemmouna: Conceptualization; Data curation; Investigation; Methodology; Project administration; Resources; Validation; Writing—review & editing.

Juliette Rabot: Investigation; Resources; Validation; Writing—review & editing.

Sébastien Weibel: Data curation; Funding acquisition; Project administration; Supervision; Validation; Writing—review & editing.

Marine Dubreucq: Conceptualization; Project administration; Supervision; Validation; Visualization; Writing—review & editing.

Julien Dubreucq: Conceptualization; Project administration; Supervision; Validation; Visualization; Writing—review & editing.

Romain Coutelle: Conceptualization; Investigation; Methodology; Supervision; Validation; Visualization; Writing—review & editing.

Acknowledgements

Not applicable.

Funding

The author(s) disclosed receipt of the following financial support for the research, authorship and/or publication of this article: This study was funded by Fonds de Dotation Neuroglia 2020–2023 and the John Bost Foundation.

Competing interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship and/or publication of this article.

Availability of data and materials

The data are available upon email request to the corresponding author.

ORCID iD

Luisa Weiner  <https://orcid.org/0000-0002-1178-5929>

Supplemental material

Supplemental material for this article is available online.

References

1. American Psychiatric Association. *Diagnostic and statistical manual of mental disorders (DSM-5®)*. Washington, DC: American Psychiatric Association, 2013.
2. WHO. *ICD-11 clinical descriptions and diagnostic guidelines for mental and behavioural disorders*. Geneva: World Health Organization, 2022.
3. Jenkins K. Amelioration and inclusion: gender identity and the concept of woman. *Ethics* 2016; 126(2): 394–421.
4. Zeidan J, Fombonne E, Scora J, et al. Global prevalence of autism: a systematic review update. *Autism Res off J Int Soc Autism Res* 2022; 15(5): 778–790.
5. Loomes R, Hull L and Mandy WPL. What is the male-to-female ratio in autism spectrum disorder? A systematic review and meta-analysis. *J Am Acad Child Adolesc Psychiatry* 2017; 56(6): 466–474.
6. Lockwood Estrin G, Milner V, Spain D, et al. Barriers to autism spectrum disorder diagnosis for young women and girls: a systematic review. *Rev J Autism Dev Disord* 2021; 8(4): 454–470.
7. Beggiano A, Peyre H, Maruani A, et al. Gender differences in autism spectrum disorders: divergence among specific core symptoms. *Autism Res* 2017; 10(4): 680–689.
8. Frazier TW, Georgiades S, Bishop SL, et al. Behavioral and cognitive characteristics of females and males with autism in the Simons Simplex Collection. *J Am Acad Child Adolesc Psychiatry* 2014; 53(3): 329–340.e3.
9. Chaaya M, Saab D, Maalouf FT, et al. Prevalence of autism spectrum disorder in nurseries in Lebanon: a cross sectional study. *J Autism Dev Disord* 2016; 46(2): 514–522.
10. Corbett BA, Schwartzman JM, Libsack EJ, et al. Camouflaging in Autism: examining sex-based and compensatory models in social cognition and communication. *Autism Res* 2021; 14(1): 127–142.
11. Robinson EB, Lichtenstein P, Anckarsäter H, et al. Examining and interpreting the female protective effect against autistic behavior. *Proc Natl Acad Sci U S A* 2013; 110(13): 5258–5262.
12. Hull L, Petrides KV, Allison C, et al. “Putting on my best normal”: social camouflaging in adults with autism spectrum conditions. *J Autism Dev Disord* 2017; 47(8): 2519–2534.
13. Lai MC, Lombardo MV, Ruigrok AN, et al. Quantifying and exploring camouflaging in men and women with autism. *Autism* 2017; 21(6): 690–702.
14. Tubío-Funqueiriño M, Cruz S, Sampaio A, et al. Social camouflaging in females with autism spectrum disorder: a systematic review. *J Autism Dev Disord* 2021; 51(7): 2190–2199.
15. Schuck RK, Flores RE and Fung LK. Brief report: sex/gender differences in symptomology and camouflaging in

- adults with autism spectrum disorder. *J Autism Dev Disord* 2019; 49(6): 2597–2604.
16. Hull L, Lai MC, Baron-Cohen S, et al. Gender differences in self-reported camouflaging in autistic and non-autistic adults. *Autism* 2020; 24(2): 352–363.
 17. Cook J, Hull L, Crane L, et al. Camouflaging in autism: a systematic review. *Clin Psychol Rev* 2021; 89: 102080.
 18. Cage E, Di Monaco J and Newell V. Experiences of autism acceptance and mental health in autistic adults. *J Autism Dev Disord* 2018; 48(2): 473–484.
 19. Bernardin CJ, Lewis T, Bell D, et al. Associations between social camouflaging and internalizing symptoms in autistic and non-autistic adolescents. *Autism* 2021; 25(6): 1580–1591.
 20. Hull L, Levy L, Lai MC, et al. Is social camouflaging associated with anxiety and depression in autistic adults? *Mol Autism* 2021; 12(1): 13.
 21. Cassidy S, Bradley L, Shaw R, et al. Risk markers for suicidality in autistic adults. *Mol Autism* 2018; 9: 42.
 22. So P, Wierdsma AI, van Boeijen C, et al. Gender differences between adolescents with autism in emergency psychiatry. *Autism* 2021; 25(8): 2331–2340.
 23. Rynkiewicz A, Janas-Kozik M and Słopień A. Girls and women with autism. *Psychiatr Pol* 2019; 53(4): 737–752.
 24. Conner CM, Golt J, Righi G, et al. A comparative study of suicidality and its association with emotion regulation impairment in large ASD and US census-matched samples. *J Autism Dev Disord* 2020; 50(10): 3545–3560.
 25. Conner CM, White SW, Scahill L, et al. The role of emotion regulation and core autism symptoms in the experience of anxiety in autism. *Autism* 2020; 24(4): 931–940.
 26. Moseley RL, Gregory NJ, Smith P, et al. Links between self-injury and suicidality in autism. *Mol Autism* 2020; 11(1): 14.
 27. Bemmoura D, Coutelle R, Weibel S, et al. Feasibility, acceptability and preliminary efficacy of dialectical behavior therapy for autistic adults without intellectual disability: a mixed methods study. *J Autism Dev Disord* 2022; 52: 4337–4354.
 28. Mazefsky CA. Emotion regulation and emotional distress in autism spectrum disorder: foundations and considerations for future research. *J Autism Dev Disord* 2015; 45(11): 3405–3408.
 29. Swain D, Scarpa A, White S, et al. Emotion dysregulation and anxiety in adults with ASD: does social motivation play a role? *J Autism Dev Disord* 2015; 45(12): 3971–3977.
 30. Rüfenacht E, Euler S, Prada P, et al. Emotion dysregulation in adults suffering from attention deficit hyperactivity disorder (ADHD), a comparison with borderline personality disorder (BPD). *Borderline Personal Disord Emot Dysregul* 2019; 6: 11.
 31. Weiner L, Perroud N and Weibel S. Attention deficit hyperactivity disorder and borderline personality disorder in adults: a review of their links and risks. *Neuropsychiatr Dis Treat* 2019; 15: 3115–3129.
 32. Moukhtarian TR, Mintah RS, Moran P, et al. Emotion dysregulation in attention-deficit/hyperactivity disorder and borderline personality disorder. *Borderline Personal Disord Emot Dysregul* 2018; 5: 9.
 33. Mazefsky CA and White SW. Emotion regulation: concepts & practice in autism spectrum disorder. *Child Adolesc Psychiatr Clin N Am* 2014; 23(1): 15–24, <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3830422/> (accessed 20 September, 2020).
 34. Samson AC, Wells WM, Phillips JM, et al. Emotion regulation in autism spectrum disorder: evidence from parent interviews and children's daily diaries. *J Child Psychol Psychiatry* 2015; 56(8): 903–913.
 35. Samson AC, Hardan AY, Podell RW, et al. Emotion regulation in children and adolescents with autism spectrum disorder. *Autism Res off J Int Soc Autism Res* 2015; 8(1): 9–18.
 36. Joshi G, Wozniak J, Fitzgerald M, et al. High risk for severe emotional dysregulation in psychiatrically referred youth with autism spectrum disorder: a controlled study. *J Autism Dev Disord* 2018; 48: 3101–3115.
 37. May T, Pilkington PD, Younan R, et al. Overlap of autism spectrum disorder and borderline personality disorder: a systematic review and meta-analysis. *Autism Res* 2021; 14(12): 2688–2710.
 38. Bird G and Cook R. Mixed emotions: the contribution of alexithymia to the emotional symptoms of autism. *Transl Psychiatry* 2013; 3(7): e285.
 39. Samson AC, Huber O and Gross JJ. Emotion regulation in Asperger's syndrome and high-functioning autism. *Emotion* 2012; 12(4): 659–665.
 40. Sáez-Suanes GP, García-Villamizar D, Del Pozo Armentia A, et al. Emotional dysregulation and uncertainty intolerance as transdiagnostic mediators of anxiety in adults with autism spectrum disorders and intellectual disability. *Res Dev Disabil* 2020; 106: 103784.
 41. Conner CM, Golt J, Shaffer R, et al. Emotion dysregulation is substantially elevated in autism compared to the general population: impact on psychiatric services. *Autism Res* 2021; 14(1): 169–181.
 42. Keluskar J, Reicher D, Gorecki A, et al. Understanding, assessing, and intervening with emotion dysregulation in autism spectrum disorder: a developmental perspective. *Child Adolesc Psychiatr Clin N Am* 2021; 30(2): 335–348.
 43. Cai RY, Richdale AL, Uljarević M, et al. Emotion regulation in autism spectrum disorder: where we are and where we need to go. *Autism Res* 2018; 11(7): 962–978.
 44. Wieckowski AT, Luallin S, Pan Z, et al. Gender differences in emotion dysregulation in an autism inpatient psychiatric sample. *Autism Res* 2020; 13(8): 1343–1348.
 45. Bender PK, Reinholdt-Dunne ML, Esbjørn BH, et al. Emotion dysregulation and anxiety in children and adolescents: gender differences. *Personal Individ Differ* 2012; 53(3): 284–288.
 46. Nolen-Hoeksema S. Emotion regulation and psychopathology: the role of gender. *Annu Rev Clin Psychol* 2012; 8: 161–187.
 47. Bagby RM, Taylor GJ and Parker JD. The twenty-item Toronto Alexithymia scale—II. Convergent, discriminant, and concurrent validity. *J Psychosom Res* 1994; 38(1): 33–40.
 48. Gross JJ and John OP. Individual differences in two emotion regulation processes: implications for affect, relationships, and well-being. *J Pers Soc Psychol* 2003; 85(2): 348–362.
 49. Bruggink A, Huisman S, Vuijk R, et al. Cognitive emotion regulation, anxiety and depression in adults with autism

- spectrum disorder. *Res Autism Spectr Disord* 2016; 22: 34–44.
50. Cai RY, Richdale AL, Dissanayake C, et al. How does emotion regulation strategy use and psychological wellbeing predict mood in adults with and without autism spectrum disorder? A naturalistic assessment. *J Autism Dev Disord* 2020; 50(5): 1786–1799.
 51. Northrup JB, Patterson MT and Mazefsky CA. Predictors of severity and change in emotion dysregulation among children and adolescents with ASD. *J Clin Child Adolesc Psychol* 2021; 50(6): 708–729.
 52. Neuhaus E, Webb SJ and Bernier RA. Linking social motivation with social skill: the role of emotion dysregulation in autism spectrum disorder. *Dev Psychopathol* 2019; 31(3): 931–943.
 53. Hedley D and Uljarević M. Systematic review of suicide in autism spectrum disorder: current trends and implications. *Curr Dev Disord Rep* 2018; 1(5): 65–76.
 54. Linehan MM. *Cognitive-behavioral treatment of borderline personality disorder*. New York: Guilford Press, 1993.
 55. Lepage JF, Lortie M, Taschereau-Dumouchel V, et al. Validation of French-Canadian versions of the empathy quotient and autism spectrum quotient. *Can J Behav Sci Rev Can Sci Comport* 2009; 41(4): 272–276.
 56. Neacsiu AD, Eberle JW, Kramer R, et al. Dialectical behavior therapy skills for transdiagnostic emotion dysregulation: a pilot randomized controlled trial. *Behav Res Ther* 2014; 59: 40–51.
 57. Gratz KL and Roemer L. Multidimensional assessment of emotion regulation and dysregulation: development, factor structure, and initial validation of the difficulties in emotion regulation scale. *J Psychopathol Behav Assess* 2004; 26(1): 41–54.
 58. Dan-Glauser ES and Scherer KR. The difficulties in emotion regulation scale (DERS): factor structure and consistency of a French translation. *Swiss J Psychol* 2012; 72(1): 5–11.
 59. McVey AJ, Schiltz HK, Coffman M, et al. A preliminary psychometric analysis of the difficulties with emotion regulation scale (DERS) among autistic adolescents and adults: factor structure, reliability, and validity. *J Autism Dev Disord* 2022; 52(3): 1169–1188.
 60. Bohus M, Limberger MF, Frank U, et al. Psychometric properties of the borderline symptom list (BSL). *Psychopathology* 2007; 40(2): 126–132.
 61. Kleindienst N, Jungkunz M and Bohus M. A proposed severity classification of borderline symptoms using the borderline symptom list (BSL-23). *Borderline Personal Disord Emot Dysregul* 2020; 7(1): 11.
 62. Nicastro R, Prada P, Kung AL, et al. Psychometric properties of the French borderline symptom list, short form (BSL-23). *Borderline Personal Disord Emot Dysregul* 2016; 3: 4.
 63. Beck AT, Steer RA and Carbin MG. Psychometric properties of the beck depression inventory: twenty-five years of evaluation. *Clin Psychol Rev* 1988; 8(1): 77–100.
 64. Bourque P and Beaudette D. Étude psychométrique du questionnaire de dépression de Beck auprès d'un échantillon d'étudiants universitaires francophones [Psychometric study of the beck depression inventory on a sample of French-speaking university students]. *Can J Behav Sci Rev Can Sci Comport* 1982; 14(3): 211–218.
 65. Beck AT, Epstein N, Brown G, et al. An inventory for measuring clinical anxiety: psychometric properties. *J Consult Clin Psychol* 1988; 56(6): 893–897.
 66. Freeston MH, Ladouceur R, Thibodeau N, et al. [The beck anxiety inventory. Psychometric properties of a French translation]. *Encephale* 1994; 20(1): 47–55.
 67. Williams ZJ and Gotham KO. Improving the measurement of alexithymia in autistic adults: a psychometric investigation of the 20-item Toronto Alexithymia Scale and generation of a general alexithymia factor score using item response theory. *Mol Autism* 2021; 12(1): 56.
 68. Loas G, Fremaux D and Marchand MP. [Factorial structure and internal consistency of the French version of the twenty-item Toronto Alexithymia Scale in a group of 183 healthy probands]. *Encephale* 1995; 21(2): 117–122.
 69. Baron-Cohen S, Wheelwright S, Skinner R, et al. The autism-spectrum quotient (AQ): evidence from Asperger syndrome/high-functioning autism, males and females, scientists and mathematicians. *J Autism Dev Disord* 2001; 31(1): 5–17.
 70. Hull L, Mandy W, Lai MC, et al. Development and validation of the camouflaging autistic traits questionnaire (CAT-Q). *J Autism Dev Disord* 2019; 49(3): 819–833.
 71. Beck AT, Kovacs M and Weissman A. Assessment of suicidal intention: the scale for suicide ideation. *J Consult Clin Psychol* 1979; 47(2): 343–352.
 72. de Man AF, Balkou ST and Iglésias RI. A French-Canadian adaptation of the scale for suicide ideation. *Can J Behav Sci Rev Can Sci Comport* 1987; 19(1): 50–55.
 73. The WHOQOL Group. The World Health Organization quality of life assessment (WHOQOL): development and general psychometric properties. *Soc Sci Med* 1998; 46(12): 1569–1585.
 74. O'Carroll RE, Smith K, Couston M, et al. A comparison of the WHOQOL-100 and the WHOQOL-BREF in detecting change in quality of life following liver transplantation. *Qual Life Res* 2000; 9(1): 121–124.
 75. López-Pérez B, Ambrona T and Gummerum M. Interpersonal emotion regulation in Asperger's syndrome and borderline personality disorder. *Br J Clin Psychol* 2017; 56(1): 103–113.
 76. Ibraheim M, Kalpakci A and Sharp C. The specificity of emotion dysregulation in adolescents with borderline personality disorder: comparison with psychiatric and healthy controls. *Borderline Personal Disord Emot Dysregul* 2017; 4: 1.
 77. Kim MK, Kim JS, Park HI, et al. Early life stress, resilience and emotional dysregulation in major depressive disorder with comorbid borderline personality disorder. *J Affect Disord* 2018; 236: 113–119.
 78. Mennin DS, McLaughlin KA and Flanagan TJ. Emotion regulation deficits in generalized anxiety disorder, social anxiety disorder, and their co-occurrence. *J Anxiety Disord* 2009; 23(7): 866–871.
 79. Lavender JM, Wonderlich SA, Peterson CB, et al. Dimensions of emotion dysregulation in bulimia nervosa. *Eur Eat Disord Rev* 2014; 22(3): 212–216.

80. Uljarević M, Hedley D, Rose-Foley K, et al. Anxiety and depression from adolescence to old age in autism spectrum disorder. *J Autism Dev Disord* 2020; 50(9): 3155–3165.
81. McGillivray JA and Evert HT. Exploring the effect of gender and age on stress and emotional distress in adults with autism spectrum disorder. *Focus Autism Dev Disabil* 2018; 33(1): 55–64.
82. Cassidy SA, Gould K, Townsend E, et al. Is camouflaging autistic traits associated with suicidal thoughts and behaviours? Expanding the interpersonal psychological theory of suicide in an undergraduate student sample. *J Autism Dev Disord* 2020; 50(10): 3638–3648.
83. Bach B, Kramer U, Doering S, et al. The ICD-11 classification of personality disorders: a European perspective on challenges and opportunities. *Borderline Personal Disord Emot Dysregulation* 2022; 9(1): 1–11.
84. Weiner L, Ossola P, Causin JB, et al. Racing thoughts revisited: a key dimension of activation in bipolar disorder. *J Affect Disord* 2019; 255: 69–76.
85. Kinnaird E, Stewart C and Tchanturia K. *Investigating alexithymia in autism: a systematic review and meta-analysis*. European Psychiatry Cambridge Core, <https://www.cambridge.org/core/journals/european-psychiatry/article/investigating-alexithymia-in-autism-a-systematic-review-and-metaanalysis/06F8AA96D03679353022A52E6ACE2F50> (accessed 30 August, 2022).
86. Huggins CF, Donnan G, Cameron IM, et al. Emotional self-awareness in autism: a meta-analysis of group differences and developmental effects. *Autism* 2021; 25(2): 307–321.
87. New AS, aan het Rot M, Ripoll LH, et al. Empathy and alexithymia in borderline personality disorder: clinical and laboratory measures. *J Pers Disord* 2012; 26(5): 660–675.
88. Goerlich KS. The multifaceted nature of alexithymia—a neuroscientific perspective. *Front Psychol*. 2018; 9: 1614, <https://www.frontiersin.org/articles/10.3389/fpsyg.2018.01614> (accessed 30 August, 2022).
89. Cook R, Brewer R, Shah P, et al. Alexithymia, not autism, predicts poor recognition of emotional facial expressions. *Psychol Sci* 2013; 24(5): 723–732.
90. Cuve HC, Murphy J, Hobson H, et al. Are autistic and alexithymic traits distinct? A factor-analytic and network approach. *J Autism Dev Disord* 2022; 52(5): 2019–2034.
91. Meaney R, Hasking P and Reupert A. Borderline personality disorder symptoms in college students: the complex interplay between alexithymia, emotional dysregulation and rumination. *PLoS ONE* 2016; 11(6): e0157294, <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4922551/> (accessed 30 August, 2022).
92. Gerber AH, Girard JM, Scott SB, et al. Alexithymia—not autism—is associated with frequency of social interactions in adults. *Behav Res Ther* 2019; 123: 103477.
93. Vegni N, D’Ardia C and Torregiani G. Empathy, mentalization, and theory of mind in borderline personality disorder: possible overlap with autism spectrum disorders. *Front Psychol* 2021; 12: 626353.
94. Cumin J, Pelaez S and Mottron L. Positive and differential diagnosis of autism in verbal women of typical intelligence: a Delphi study. *Autism* 2022; 26(5): 1153–1164.
95. Kassee C, Babinski S, Tint A, et al. Physical health of autistic girls and women: a scoping review. *Mol Autism* 2020; 11(1): 84.
96. Velotti P, Garofalo C, Dimaggio G, et al. Mindfulness, alexithymia, and empathy moderate relations between trait aggression and antisocial personality disorder traits. *Mindfulness* 2019; 10: 1082–1090.
97. Gadelkarim W, Shahper S, Reid J, et al. Overlap of obsessive–compulsive personality disorder and autism spectrum disorder traits among OCD outpatients: an exploratory study. *Int J Psychiatry Clin Pract* 2019; 23(4): 297–306.
98. Strunz S, Westphal L, Ritter K, et al. Personality pathology of adults with autism spectrum disorder without accompanying intellectual impairment in comparison to adults with personality disorders. *J Autism Dev Disord* 2010; 45: 4026–4038.