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Brief Report: An Exploration of Alexithymia in Autistic and Non-Autistic Transgender Adults

Running Title: Alexithymia in Transgender Adults

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Keywords: alexithymia, gender dysphoria, autism, gender incongruence, transgender, autistic traits

Abstract

Background: Research has shown that many autistic people have alexithymia, a psychological trait characterized by difficulties in identifying and describing emotions. It is also now clear that there is a high rate of autism among transgender people, but we know little about the intersection of autism and gender diversity or about the clinical features of autistic transgender individuals.

Methods: Seventy-eight non-autistic transgender, 56 autistic transgender, 106 non-autistic cisgender, and 107 autistic cisgender adults completed the Toronto Alexithymia Scale-20 and the Autism-spectrum Quotient as part of an online study. We also used the General Alexithymia Factor Score-8 as an additional alexithymia score.

Results: We found that non-autistic transgender participants reported significantly higher mean levels of alexithymia than non-autistic cisgender participants, and that there was a significant overrepresentation of individuals in this group who met the clinical cutoff for alexithymia. The difference in alexithymia between autistic cisgender and autistic transgender participants was nonsignificant, with > 50% of each group scoring above the clinical cutoff point. Of note, When we used the General Alexithymia Factor Score–8, the difference between autistic transgender and autistic cisgender participants was significant, with autistic transgender reporting higher mean levels of alexithymia.

Conclusion: Results suggest that non-autistic transgender individuals might be more prone to experience alexithymia (including at clinically significant levels) than non-autistic cisgender people. When autism occurs in transgender people, the average level and clinical rate of alexithymia is higher than among non-autistic transgender people and potentially higher than among autistic cisgender people. Our findings are in keeping with evidence of a subgroup of transgender people with “subclinical autism” and inconsistent with the notion that autism among

transgender and gender diverse people is a “phenomimic” of autism Lastly, our study highlights the potential importance of screening autistic and non-autistic transgender people for alexithymia.

Keywords: alexithymia, gender identity diversity, autism, gender incongruence, transgender

Community Brief:

Why is this an important issue?

Alexithymia is when a person has difficulty recognizing and describing their emotional feelings. It also includes an externally-oriented thinking style. Research has showed that many autistic people experience alexithymia. Autistic people with alexithymia might require additional and specialized support and care.

What was the purpose of this study?

There is a large number of transgender and gender diverse people who are autistic. However, we know little about the intersection of autism and gender diversity or about the clinical characteristics of autistic people who identify as transgender. The purpose of this study was to explore alexithymia in autistic and non-autistic transgender individuals.

What did the researchers do?

We conducted an online study that included questions about people's ability to recognise and describe their emotional feelings as well as about their preference to engage with the world around them than the world inside them. Participants also answered questions that tap characteristics of autism.

What were the results of the study?

We found that non-autistic transgender adults had more difficulty identifying and describing their emotional feelings than non-autistic cisgender adults. We also found that autistic transgender adults reported significantly higher levels of alexithymia than non-autistic transgender adults and potentially higher than autistic cisgender adults.

What do these findings add to what was already known?

This study showed, for the first time, that a) it is not always easy for non-autistic transgender people to identity and describe their emotional feelings and b) autistic transgender people find at least as difficult as autistic cisgender individuals to describe and identify their emotional feelings.

What are potential weaknesses in the study?

We did not examine depression and anxiety in our participants. People with depression and/or anxiety might score high on the scale we used to measure alexithymia. This was also an exploratory study, so other researchers should replicate our findings before we draw strong conclusions.

How will these findings help autistic adults now or in the future?

Our findings are consistent with the notion that autism in transgender people is "real", meaning that it has the same underlying basis in autistic cisgender and autistic transgender people, and suggest that autistic transgender people might benefit from receiving support for difficulties related to autism independently of the support and treatment they might receive for gender related needs.

Background

Alexithymia, which means “lack of words for emotions”, is a psychological trait that involves difficulties in identifying and describing one’s own emotions and an externally oriented thinking style. [1, 2] Research has established that alexithymia frequently co-occurs with autism, with clinically significant levels of alexithymia present in approximately 50% of autistic people. [3, 4] According to one theory, the alexithymia hypothesis, it is alexithymia rather than autism itself that explains in part the social-cognitive difficulties autistic people frequently experience . [5, 6, 7]

In line with this alexithymia hypothesis, research has shown that it is alexithymia, not autism, that predicts facial, vocal, and musical emotion recognition. [8, 9, 10] Neuroimaging study findings have suggested that alexithymia is also predictive of empathic brain responses to the suffering of others. [5] In keeping with this, Mul et al. (2018) found that alexithymic autistic people have lower cognitive and affective empathy than non-alexithymic autistic individuals, on average. [11] The presence of alexithymia in autistic people is also a risk factor for depression and suicidality. [12, 13] On this basis, the literature has suggested that alexithymic autistic people may represent a subgroup in autism that requires tailored support and targeted interventions. [4, 11].

In recent years, a growing body of the literature indicates an intersection of autism and gender (identity) diversity. The term gender diversity describes “people with gender identities and/or expressions that are different from social and cultural expectations attributed to their sex assigned at birth” (p. S252). [14] A recent meta-analysis found that approximately 11% of transgender and gender diverse adults were autistic (Kallitsounaki & Williams, 2022). [15] Furthermore, research has shown an elevated number of autistic traits in non-autistic transgender and gender diverse people relative to non-autistic cisgender people. [16, 17] There are also a number of transgender and gender diverse people who report clinical levels of autistic traits but do not

meet the full diagnostic criteria for autism, forming a subclinical autistic group. [18, 19] Lastly, research has found evidence of increased rates of transgender and gender diverse people in autistic samples, [20] and increased gender dysphoric feelings in cisgender autistic adults. [16]

Despite the high co-occurrence of autism and gender diversity, we know little about alexithymia in transgender and gender diverse people. To our knowledge, only two studies have examined whether transgender adults have increased alexithymia. Kessler et al. (2006) found that transgender individuals scored significantly higher than cisgender controls on the German version of the Toronto Alexithymia Scale. [21] Mazolli et al. (2022) successfully replicated these findings in a recently published study. [22]

However, neither of these studies controlled for a possible overrepresentation of autistic people in the study's transgender groups. Given the high rate of autism among transgender people, it is likely that the sample of transgender adults in these studies had a significantly higher proportion of autistic individuals than the cisgender samples did. Given this and given that alexithymia is associated with autism, [3,23] the elevated rates of alexithymia among the transgender groups in these studies could have resulted from the confounding presence of autistic individuals (or, at minimum, elevated autistic traits) in these samples. Therefore, the extent to which *non-autistic* transgender people have increased levels of alexithymia remains unclear. Furthermore, to our knowledge, no study has examined alexithymia in autistic transgender people. We conducted an exploratory study to examine, for the first time, alexithymia in autistic and non-autistic transgender adults separately.

Methods

Participants

Seventy-eight non-autistic and 56 autistic transgender adults participated in this study. Comparison control groups consisted of 106 non-autistic and 107 autistic cisgender adults. All autistic participants reported possession of a formal diagnosis of autism. Table 1 shows participant characteristics.

(insert Table 1 here)

There were no significant between-group differences in birth-assigned sex ratio, χ^2 (3, N = 347) = 0.81, p = .846, φ = .05. However, significant between-group differences in age were apparent, $F(3,343) = 26.99$, $p < .001$, $\eta_p^2 = .19$. Given the significant between-group differences in age, we reconducted the main analyses that we report below after matching groups for age. Results remained essentially the same when we matched groups for age (see supplementary information). We recruited participants via the online crowdsourcing platform Prolific Academic, social media platforms, and a database of autistic individuals interested in taking part in psychological research. All participants completed the study online after they gave written, informed consent and received compensation for their time. We should note that the participant groups were the same as those reported in Kallitsounaki and Williams (2022). [16] Yet, we did not report any findings related to alexithymia in the aforementioned paper. The School of Psychology Research Ethics Committee at the University of Kent has approved this study (ID: 201915670711375862).

Materials and Procedure

We used the Toronto Alexithymia Scale-20 to measure participants' awareness and understanding of, and ability to describe, their emotions and feelings. [24] The Toronto Alexithymia Scale comprises 20 self-referential statements (e.g., "I am often confused about what emotion I am feeling"). Participants indicated their level of agreement with each of them,

using a 5-point Likert scale that ranges from “strongly disagree” to “strongly agree”. Scores range from 20 to 100, with higher scores denoting more alexithymia. A score above 60 indicates clinically significant levels of alexithymia. The Toronto Alexithymia Scale-20 has shown good internal reliability in clinical and nonclinical samples (Cronbach’s Alpha around .80), [24, 25] and its test-retest reliability is considered good-to-excellent. [26]

There is a discussion of whether the Toronto Alexithymia Scale-20 measures alexithymia in autistic people in the same way it measures alexithymia in non-autistic people. [27] Thus, to strengthen the findings of our study, a reviewer suggested we use the General Alexithymia Factor Score–8 as an additional way to tap alexithymia. [27] This score, which comprises eight items from the Toronto Alexithymia Scale-20, is increasingly used to index alexithymia. Note that the General Alexithymia Factor Score–8 does not have a clinical cutoff score. We generated *t*-scores using an online score calculator. [28] The General Alexithymia Factor Score–8 has demonstrated high reliability in autistic and general population samples. [27] Lastly, to measure autistic traits, all participants completed the Autism-spectrum Quotient; [29] for more details see Kallitsounaki and Williams 2022. [16] Participants completed both measures online. Data that support the findings of this study are available from the corresponding author upon reasonable request.

Results

Between-Group Differences in Alexithymia

Toronto Alexithymia Scale-20

We conducted a 2 (birth-assigned sex: male/female) × 2 (autism diagnostic status: non-autistic/autistic) × 2 (gender identity: cisgender/transgender) ANOVA on the Toronto

Alexithymia Scale-20 scores. Table 2 presents mean scores on the Toronto Alexithymia Scale-20 and results of the analysis.

(insert Table 2 here)

Following a reviewer's suggestion, we repeated a 2 × 2 × 2 ANOVA including Gender (male vs female) instead of Birth-assigned Sex as one of the between-subjects factors. The analysis did not show any differences in the key findings (see supplementary information).

The main effect of gender identity was significant, reflecting that transgender participants (marginal M = 58.52, SE = 0.99) reported significantly higher levels of alexithymia than cisgender participants (marginal M = 53.54, SE = 0.78). The main effect of diagnostic category was also significant, reflecting that autistic participants (marginal M = 62.46, SE = 0.93) reported significantly higher levels of alexithymia than non-autistic participants (marginal M = 49.59, SE = 0.85). The Birth-Assigned Sex × Gender Identity interaction, as well as the Gender Identity × Autism Diagnostic Status interaction, were also significant. The main effect of birth-assigned sex and the 3-way interaction were not significant.

To break down the Birth-Assigned Sex × Gender Identity interaction, we conducted a simple main effects analysis. The analysis showed that cisgender birth-assigned males (marginal M = 55.27; SE = 1.11) reported significantly higher levels of alexithymia than cisgender birth-assigned females (marginal M = 51.81, SE = 1.09), $F(1, 339) = 4.98$, $p = .026$, $\eta_p^2 = .01$. In contrast, there was not a significant difference in Toronto Alexithymia Scale-20 scores between transgender birth-assigned males (marginal M = 57.19; SE = 1.40) and transgender birth-assigned females (marginal M = 59. 85; SE = 1.40), $F(1, 339) = 1.80$, $p = .181$, $\eta_p^2 = .01$. The analysis also showed that transgender birth-assigned females (marginal M = 59.85; SE = 1.40) reported significantly higher levels alexithymia than cisgender birth-assigned females (marginal

M = 51.81; *SE* = 1.09), *F*(1, 339) = 20.51, *p* < .001, η_p^2 = .06. In contrast, the difference in Toronto Alexithymia Scale-20 scores between transgender birth-assigned males (marginal *M* = 57.19; *SE* = 1.40) and cisgender birth-assigned males (marginal *M* = 55. 27; *SE* = 1.11) was nonsignificant, *F*(1, 339) = 1.15, *p* = .284, η_p^2 < .01.

To break down the Gender Identity × Autism Diagnostic Status interaction, we conducted a simple main effects analysis. The analysis revealed the following pattern across groups: autistic cisgender = autistic transgender > non-autistic transgender > non-autistic cisgender. Hence, a simple main effects analysis of gender identity within autism diagnostic status showed that the difference in the level of alexithymia between autistic cisgender and transgender participants was nonsignificant, *F*(1, 339) = 1.51, *p* = .220, η_p^2 < .01. The analysis also revealed that non-autistic transgender participants reported significantly higher levels of alexithymia than non-autistic cisgender participants, *F* (1, 339) = 20.58, *p* < .001, η_p^2 = .06. Furthermore, a simple main effects analysis of autism diagnostic status within gender identity showed that autistic cisgender participants reported significantly higher levels of alexithymia than non-autistic cisgender participants, *F*(1,339) = 100.45, *p* < .001, η_p^2 = .23, and that autistic transgender participants reported significantly higher levels of alexithymia than non-autistic transgender participants, *F*(1, 339) = 26.41, *p* < .001, η_p^2 = .07.

General Alexithymia Factor Score-8

When we conducted a 2 (birth-assigned sex: male/female) × 2 (autism diagnostic status: non-autistic/autistic) × 2 (gender identity: cisgender/transgender) ANOVA on the General Alexithymia Factor Score-8, rather than the Toronto Alexithymia Scale-20 total score, the Gender Identity × Autism Diagnostic Status interaction that was significant in the original analysis, ceased to be significant in the new analysis. Whereas, the difference in alexithymia

between autistic transgender and autistic cisgender participants was nonsignificant when using the Toronto Alexithymia Scale-20 score as the dependent variable, the between-group difference was significant when using the General Alexithymia Factor Score-8 as the dependent variable. That was the only difference in the findings relevant to this paper. In this new analysis, we observed the following pattern across groups: autistic transgender > autistic cisgender > non-autistic transgender > non-autistic cisgender. We provide a full description of the results in the supplementary information.

Alexithymia Cutoff Score Analysis

Fifty-eight out of 107 autistic cisgender (54%) and 36 out of 56 autistic transgender participants (64%) scored above the clinical cutoff point on the Toronto Alexithymia Scale-20. The difference between the two groups was nonsignificant, χ^2 (1) = 1.53, p = .216, φ = .10. In contrast, 12 out of 106 non-autistic cisgender (11%) and 25 out of 78 non-autistic transgender participants (32%) scored above the clinical cutoff point on the Toronto Alexithymia Scale-20. The difference between these two groups was significant in this respect, χ^2 (1) = 12.02, p < .001, φ = .23. Both of the non-autistic groups had significantly fewer participants scoring above the clinical-cut off on the Toronto Alexithymia Scale-20 than either of the autistic groups (all ps ≤ .003).

Correlation Analysis

We conducted a correlation analysis to explore the association between alexithymia and autistic traits, for each group separately. Results showed a positive and significant association between the Toronto Alexithymia Scale-20 and the Autism-spectrum Quotient total score in each group [non-autistic cisgender: r(104) = .42, p < .001; non-autistic transgender: r(76) = .75, p < .001; autistic cisgender: r(105) = .44, p < .001; autistic transgender: r(54) = .45, p < .001].

Interestingly, the strength of the association was significantly higher in the non-autistic transgender group, than in any of the other groups (all Zs ≥ 2.72, all ps $\leq .007$). The analysis did not show any other significant between-group differences = (all ps $\geq .827$).

Given that the Toronto Alexithymia Scale-20 Score was so highly correlated with the Autism-spectrum Quotient total score and that there were significant between-group differences in the Autism-spectrum Quotient total score (see Kallitsounaki & Williams, 2022), [16] it is possible that the between-group differences in the Toronto Alexithymia Scale-20 score in the current study are spurious. That is, the between-group differences in the TAS-20 score observed in the current study may reflect differences in autism traits/features, rather than alexithymia. To evaluate this possibility, we re-examined between-group differences in alexithymia after matching non-autistic transgender with non-autistic cisgender participants, and autistic transgender with autistic cisgender participants for autistic traits. When groups were matched, results about group differences in alexithymia did not change substantively . In other words, even when between-group differences in Autism-spectrum Quotient were small and nonsignificant, between-group differences in alexithymia remained significant. We provide a full description of the matching process and the results of the aforementioned analyses in the supplemental information.

Discussion

We conducted an exploratory study to examine, for the first time, alexithymia in autistic and non-autistic transgender adults. The first notable finding was that *independent of group differences in autistic traits*, non-autistic transgender individuals reported significantly higher mean levels of alexithymia than non-autistic cisgender people. Regardless of whether we used the Toronto Alexithymia Scale-20 or the General Alexithymia Factor Score-8 to tap alexithymia,

results remained the same. Although only two studies have examined alexithymia in the transgender population, our results are in keeping with their findings.[21, 22] We also found a significant overrepresentation of non-autistic transgender individuals in this group who met the clinical cutoff for alexithymia. This is in line with recent findings of a subclinical autistic group among the transgender population. [18, 19] Overall, our study suggests that alexithymia is present in transgender people over and above autistic traits. Future studies mighty usefully examine whether alexithymia is a potential "marker" of autistic traits in transgender people who do not meet full criteria for autism.

The second notable finding was that autistic transgender participants reported significantly higher mean levels of alexithymia than both non-autistic transgender and non-autistic cisgender participants. The difference between autistic transgender and autistic cisgender people in the Toronto Alexithymia Scale-20 was nonsignificant. However, when we used the General Alexithymia Factor Score–8, autistic transgender people scored significantly higher than autistic cisgender individuals, denoting increased levels of alexithymia. It is important to note that the items included in the General Alexithymia Factor Score–8 seem to perform similarly in a number of subgroups of the autistic population. [27] This suggests that the General Alexithymia Factor Score–8 might be more sensitive than the Toronto Alexithymia Scale-20 when it comes to detecting differences between specific autistic subgroups, providing a potential explanation for the discrepancy in our findings.

Furthermore, we found that the percentage of people who reported clinically significant levels of alexithymia was above 50% in both autistic groups. This was to be expected based on their diagnosis. [30] The percentage of individuals with clinical levels alexithymia in the autistic transgender group is consistent with research evidence of clinical alexithymia in approximately 1

out of 2 autistic people.[3] Our findings are also in keeping with recent studies that have reported difficulties among autistic transgender people in domains of cognition that research has frequently found to be different among autistic cisgender samples. Specifically, Strang et al. (2022) found parent-reported executive function difficulties in autistic transgender youth, [31] and Kallitsounaki and Williams (2022) found mentalizing difficulties in autistic transgender adults. [16] Taken together, these findings suggest that regardless of their gender identity, autistic people experience challenges or concerns in similar domains, as would be expected based on their autism diagnosis. This is inconsistent with the notion that autism among transgender and gender diverse people is a "phenomimic" of autism caused by adverse social experiences. [32, 33] The fact that some of the correlates of autism (in the current study, alexithymia) are the same among transgender and cisgender autistic adults, is more consistent with the notion that autism in transgender people is "real" (i.e., has the same underlying basis in autistic cisgender and autistic transgender people). [34]

Overall, the findings of this study denote the potential importance of screening autistic and non-autistic transgender people for alexithymia-related concerns or difficulties. A number of people from both groups might benefit from attending training programs targeting difficulties related to identifying and articulating emotional feelings. [35, 36] Importantly, research has shown that alexithymia is associated with poor outcomes of mental and physical health treatments. [37, 38] Arguably, appropriate training and support for alexithymia in autistic and non-autistic transgender people with clinical or subclinical levels of alexithymia might improve the effects of physical and psychological treatments these groups frequently receive. Of course, this is a hypothesis that needs further exploration. From a research perspective, our study might provide a methodological framework for conducting research in transgender and gender diverse people. As

seen from previous studies, important findings might be missed if researchers do not account for underlying autistic traits and autism diagnoses in transgender and gender diverse populations.

This was an exploratory study, so our findings await replication before we can draw strong conclusions. We should also note that the sample size of this study did not allow us to test for measurement invariance. Future studies might benefit from examining whether the measures we employed in this study measure alexithymia in the same way across autistic and non-autistic cisgender and transgender adults. Furthermore, researchers have suggested that elevated anxiety and depression might inflate people's scores on the Toronto Alexithymia Scale-20.[26] On this basis, future research in this area should attempt to control for the effect of these conditions by including a control group of cisgender individuals with high levels of depression and anxiety and compare groups well matched on key variables, such as age and levels of support needs.

In sum, this is the first study that examined alexithymia in autistic and non-autistic transgender people. Our findings suggest that both autistic and non-autistic transgender individuals have increased likelihood of alexithymia. Given the potential clinical implications that arise from these findings, we hope our study will provide impetus for further research on this topic.

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Authorship Contribution Statement

Aimilia Kallitsounaki: Conceptualization, Methodology, Formal Analysis, Investigation, Writing-Original Draft, Project Administration, Data Curation, Funding Acquisition. **David Williams:** Conceptualization, Project Administration, Supervision, Writing-Review & Editing.

Authors' Disclosure

The authors have no conflicts of interest to declare.

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Table 1

Participant Characteristics

Groups	Sex (%)		Age
	Male	Female	*M* (*SD*)
Non-autistic cisgender	51.9 (*n* = 55)	48.1 (*n* = 51)	37.10 (12.89)
Autistic cisgender	46.7 (*n* = 50)	53.3 (*n* = 57)	31.55 (7.86)
Non-autistic transgender	47.4 (*n* = 37)	52.6 (*n* = 41)	26.51 (9.02)
Autistic transgender	51.8 (*n* = 29)	48.2 (*n* = 27)	24.73 (6.85)

Note. Sex = birth-assigned sex.

Table 2

Participant Mean Scores on the Toronto Alexithymia Scale-20 and ANOVA Results

Measure	Groups				Effect	*F*	*p*	η_p^2	Direction of the main effects
	Non-autistic cisgender	Non-autistic transgender	Autistic cisgender	Autistic transgender					
	M (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)					
TAS-20	45.82 (11.80)	53.45 (12.61)	61.20 (9.06)	63.54 (12.59)	Sex	0.10	.749	< .01	Female = Male
					Gender Identity	15.63	< .001	.04	Transgender > Cisgender
					Diagnostic Status	104.54	< .001	.24	Autistic > Non-autistic
					Gender Identity × Diagnostic Status	4.54	.034[1]	.01	
					Sex × Gender Identity	5.91	.016[1]	.02	
					Sex × Diagnostic Status	0.18	.671	< .01	
					3-way interaction	0.52	.429	< .01	

Note. TAS-20 = Toronto Alexithymia Scale-20; Sex = Birth-assigned sex.

[1] When we matched groups for age, the Gender Identity × Diagnostic Status and Sex × Gender Identity interactions ceased to be significant.

Supplemental Information

1. Statistical Analyses After Matching Groups for Age

Between-group Differences in Alexithymia

Table S1 shows participant characteristics after groups were matched for age [see Kallitsounaki and Williams (2022), for more details]. We conducted a 2 (birth-assigned sex: male/female) × 2 (autism diagnostic status: non-autistic/autistic) × 2 (gender identity: cisgender/transgender) ANOVA on the Toronto Alexithymia Scale-20 scores. Table S2 shows the results of the analysis.

Table S1

Participant Characteristics

Groups	Sex (%)		Age
	Male	Female	*M* (*SD*)
Non-autistic cisgender	57.4 (*n* = 39)	42.6 (*n* = 29)	28.84 (5.83)
Autistic cisgender	39.1 (*n* = 27)	60.9 (*n* = 42)	29.16 (2.84)
Non-autistic transgender	57.7 (*n* = 30)	42.3 (*n* = 22)	28.50 (7.32)
Autism transgender	50.0 (*n* = 15)	50.0 (*n* = 15)	28.93 (6.94)

Note. Sex = birth-assigned sex.

As in the unmatched sample, the main effect of gender identity was significant, reflecting that transgender participants (marginal $M = 58.69$, $SE = 1.29$) reported significantly higher levels of alexithymia than cisgender participants (marginal $M = 53.77$, $SE = 0.98$). The main effect of

diagnostic category was also significant, reflecting that autistic participants (marginal M = 62.97, SE = 1.24) reported significantly higher levels of alexithymia than non-autistic participants (marginal M = 49.49, SE = 1.05). In contrast to the unmatched sample, neither the Gender Identity × Autism Diagnostic Status nor the Sex × Gender Identity interaction was significant. For exploratory reasons, we broke down the Gender Identity × Autism Diagnostic Status interaction conducting a simple main effects analysis. Compared to the unmatched sample, results did not change substantively. That is, the difference in mean levels of alexithymia between autistic cisgender and autistic transgender participants was nonsignificant, $F(1, 211) = 1.66$, $p = .199$, $\eta_p^2 < .01$, whereas non-autistic transgender participants reported significantly higher levels of alexithymia than non-autistic cisgender participants, $F(1, 211) = 10.09$, $p = .002$, $\eta_p^2 = .05$. Furthermore, autistic cisgender participants reported significantly higher levels of alexithymia than non-autistic cisgender participants, $F(1,211) = 60.68$, $p < .001$, $\eta_p^2 = .22$, and autistic transgender participants reported significantly higher levels of alexithymia than non-autistic transgender participants, $F(1, 211) = 20.66$, $p < .001$, $\eta_p^2 = .09$.

Alexithymia Cut-Off Score Analysis

Thirty-six out of 69 autistic cisgender (52.2%) and 20 out of 30 autistic transgender participants (66.7%) scored above the clinical cut-off point on the Toronto Alexithymia Scale-20. The difference between the two groups was nonsignificant, $\chi^2(1) = 1.79$, $p = .181$, $\varphi = .13$. In contrast, 10 out of 68 non-autistic cisgender (14.7%) and 18 out of 52 non-autistic transgender participants (34.6%) scored above the clinical cut-off point on the Toronto Alexithymia Scale-20. The difference between these two groups was significant in this respect, $\chi^2(1) = 6.53$, $p = .011$, $\varphi = .23$. Both of the non-autistic groups had significantly fewer participants scoring above the clinical-cut off on the Toronto Alexithymia Scale-20 than the autistic transgender group (all

*p*s ≤ .005). The non-autistic cisgender group had also significantly fewer participants scoring above the clinical-cut off on the Toronto Alexithymia Scale-20 than the autistic cisgender group ($p < .001$), yet the difference between the two groups of transgender individuals was marginally significant ($p = .054$).

Table S2

Participant Mean Scores on the Toronto Alexithymia Scale-20 and ANOVA Results

Measure	Groups				Effect	F	p	η_p^2	Direction of the main effects
	Non-autistic cisgender	Non-autistic transgender	Autistic cisgender	Autistic transgender					
	M (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)					
TAS-20	46.47 (12.18)	52.94 (12.54)	60.99 (9.37)	64.57 (10.61)	Sex	1.32	.252	< .01	Male = Female
					Gender Identity	9.21	.003	.04	Transgender > Cisgender
					Diagnostic Status	69.25	< .001	.25	Autistic > Non-autistic
					Gender Identity × Diagnostic Status	1.14	.287	.01	
					Sex × Gender Identity	1.58	.210	.01	
					Sex × Diagnostic Status	0.45	.503	< .01	
					3-way interaction	0.24	.622	< .01	

Note. TAS-20 = Toronto Alexithymia Scale-20; Sex = Birth-assigned sex.

2. Analysis of Variance Based on Gender

We conducted a 2 (gender: male/female) × 2 (autism diagnostic status: non-autistic/autistic) × 2 (gender identity: cisgender/transgender) ANOVA on the Toronto Alexithymia Scale-20 scores. Table S3 shows mean scores on the Toronto Alexithymia Scale-20 and results of the analysis. The main effect of gender was significant, reflecting that male participants (marginal $M = 57.56$, $SE = 0.89$) reported significantly higher levels of alexithymia than female participants (marginal $M = 54.50$, $SE = 0.88$). The main effect of gender identity was significant, reflecting that transgender participants (marginal $M = 58.52$, $SE = 0.99$) reported significantly higher levels of alexithymia than cisgender participants (marginal $M = 53.54$, $SE = 0.78$). The main effect of diagnostic category was also significant, reflecting that autistic participants (marginal $M = 62.46$, $SE = 0.93$) reported significantly higher levels of alexithymia than non-autistic participants (marginal $M = 49.59$, $SE = 0.85$). The Gender Identity × Autism Diagnostic Status was the only significant interaction we found. To break down the interaction, we conducted a simple main effects analysis. Results of the analysis are presented in the manuscript.

Table S3

ANOVA Results

Measure	Effect	*F*	*p*	η_p^2	Direction of the main effects
TAS-20	Gender	5.91	.016	.02	Males > Females
	Gender Identity	15.63	< .001	.04	Transgender > Cisgender
	Diagnostic Status	104.54	< .001	.24	Autistic > Non-autistic
	Gender × Diagnostic Status	0.52	.470	< .01	
	Gender × Gender Identity	0.10	.749	< .01	
	Gender Identity × Diagnostic Status	4.54	.034	.01	
	3-way interaction	0.30	.584	< .01	

Note. TAS-20 = Toronto Alexithymia Scale-20.

3. General Alexithymia Factor Score-8 Analysis

We conducted a 2 (birth-assigned sex: male/female) × 2 (autism diagnostic status: non-autistic/autistic) × 2 (gender identity: cisgender/transgender) ANOVA on the General Alexithymia Factor Score-8. Table S3 shows mean scores and results of the analysis. Both the main effect of gender identity and autism diagnostic category remained significant. Transgender participants (marginal $M = 59.29$, $SE = 0.90$) reported significantly higher levels of alexithymia than cisgender participants (marginal $M = 52.29$, $SE = 0.90$) and autistic participants (marginal $M = 61.20$, $SE = 0.87$) reported significantly higher levels of alexithymia than non-autistic participants (marginal $M = 50.46$, $SE = 0.76$). The Birth-Assigned Sex × Gender Identity interaction also remained significant. The main effect of birth-assigned sex and the 3-way interaction remained nonsignificant, whereas the Gender Identity × Autism Diagnostic Status interaction ceased to be significant.

Results of the analysis indicate the following pattern across groups: autistic transgender > autistic cisgender > non-autistic transgender > non-autistic cisgender. To examine the size of the between-group differences in the General Alexithymia Factor Score-8, we conducted a series of pairwise comparisons. Results showed that autistic transgender participants reported significantly higher levels of alexithymia than autistic cisgender participants, $t(92.98) = 3.49$, $p = .002$, $d = .59$. Autistic cisgender participants reported significantly higher levels of alexithymia than non-autistic transgender participants, $t(132.70) = 2.31$, $p = .002$, $d = .37$, and non-autistic transgender participants reported significantly higher levels of alexithymia than non-autistic cisgender participants, $t(182) = 5.24$, $p < .001$, $d = .78$.

To break down the Birth-Assigned Sex × Gender Identity interaction, we conducted a simple main effects analysis. The difference between cisgender birth-assigned males (marginal

M = 53.33, SE = 1.08) and cisgender birth-assigned females (marginal *M* = 51.41, SE = 0.99) was no longer significant, $F(1, 326) = 1.740$, $p = .188$, $\eta_p^2 = .01$, and the difference between transgender birth-assigned males (marginal *M* = 57.74, *SE* = 1.27) and transgender birth-assigned females (marginal *M* = 60.84; *SE* = 1.27), remained nonsignificant, $F(1, 326) = 3.00$, $p = .084$, $\eta_p^2 = .01$. The difference between transgender birth-assigned females and cisgender birth-assigned females remained significant, $F(1, 326) = 34.55$, $p < .001$, $\eta_p^2 = .10$, whereas the difference between transgender and cisgender birth-assigned males turned from nonsignificant to significant, $F(1, 326) = 7.03$, $p = .008$, $\eta_p^2 < .02$.

Table S4

Participant Mean Scores on the General Alexithymia Factor Score-8 and ANOVA Results

Measure	Groups				Effect	F	p	η_p^2	Direction of the main effects
	Non-autistic cisgender	Non-autistic transgender	Autistic [a] cisgender	Autistic transgender					
	M (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)					
GAFS-8	46.15 (10.80)	54.85 (11.56)	58.41 (7.97)	63.69 (10.47)	Sex	0.26	.612	< .01	Male = Female
					Gender Identity	35.88	< .001	.10	Transgender > Cisgender
					Diagnostic Status	86.56	< .001	.21	Autistic > Non-autistic
					Gender Identity × Diagnostic Status	2.33	.128	.01	
					Sex × Gender Identity	4.74	.030	.01	
					Sex × Diagnostic Status	0.27	.601	< .01	
					3-way interaction	0.67	.413	< .01	

Note. GAFS-8 = General Alexithymia Factor Score-8; Sex = Birth-assigned sex.

[a] n = 94. A GAFS-8 could not be calculated for 13 autistic cisgender participants because their raw data on the Toronto Alexithymia Scale-20 were not available.

4. Matching Participant Groups for Autistic Traits and Statistical Analyses

To rule out that between-group differences in alexithymia resulted from differences in autistic traits, rather than from differences in diagnostic status (autistic/non-autistic) and gender identity (transgender/cisgender), we matched the autistic transgender with the autistic cisgender group and the non-autistic transgender with the non-autistic cisgender group on this variable. Groups were considered matched when the *p* value of the between-group differences in autistic traits was equal or greater than .50 (Mervis & Klein-Tasman, 2004). To achieve this, we gradually removed the autistic and non-autistic transgender participants with the highest scores on the Autism-spectrum Quotient and the autistic and non-autistic cisgender participants with the lowest scores on the measure, until the autistic transgender group was matched with the autistic cisgender group and the non-autistic transgender group was matched with the autistic cisgender group (see Table S5). As shown below, results remained essentially the same when we matched groups for autistic traits.

As in the unmatched sample, there was a nonsignificant difference in the Toronto Alexithymia Scale-20 between autistic transgender (M = 62.48; SD = 12.60) and autistic cisgender participants (M = 61.89), $t(65.96) = 0.29$, $p = .744$, $d = -.06$, and a significant between-group difference (autistic transgender: M = 62.48, SD = 12.60; autistic cisgender: M = 61.89, SD = 8.68) in the General Alexithymia Factor Score-8, $t(71.97) = 2.35$, $p = .022$, $d = 0.47$. The difference in the Toronto Alexithymia Scale-20 between non-autistic transgender (M = 51.35; SD = 12.28) and non-autistic cisgender participants (M = 46.89, SD = 11.65) remained significant, $t(158) = 2.31$, $p = .021$, $d = .37$. The difference between these two groups (non-autistic transgender: M = 53.06, SD = 11.56; non-autistic cisgender: M = 47.25, SD = 10.57),

$t(158) = 3.29$, $p = .001$, $d = -.529$, also remained significant for the General Alexithymia Factor Score-8.

Table S5

Descriptive and Matching Statistics

Variable	Groups				Comparisons		
	Autistic transgender *n* = 46	Autistic cisgender *n* = 97	Non-autistic transgender *n* = 66	Non-autistic cisgender *n* = 94	*t*-tests	*p*	Cohen's *d*
	M(*SD*)	*M*(*SD*)	*M*(*SD*)	*M*(*SD*)			
AQ	33.11 (5.59)	32.63 (6.49)	21.36 (6.70)	22.09 (7.68)			
					autistic transgender = autistic cisgender	.667	-0.08
					non-autistic transgender = non-autistic cisgender	.524	-0.10

Note. AQ = Autism-spectrum Quotient.