REDUCED REPORTING OF SOCIAL COMPARISON EMOTIONS AND VALUATION OF GROUP-BASED MORALS IN AUTISTIC PEOPLE

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People's moral values and social emotions play an important role in everyday interactions. We investigated moral values and social emotions in autistic people within in-person ($N = 62$) and online ($N = 443$) samples. Autistic adults and neurotypical adults rated their endorsement of "group-binding" (versus individual-based) moral values (e.g., ingroup loyalty) and responded to vignettes designed to elicit social comparison emotions: envy and schadenfreude. Across studies, autistic participants reported reduced endorsement of binding moral values and reduced levels of social comparison emotions. These findings reveal important associations among social cognition, moral values, and social emotions.

Keywords: autism spectrum disorder, morality, social comparison

INTRODUCTION

People's social cognitive abilities shape their thoughts and feelings toward others across group boundaries (Cikara & Van Bavel, 2014). Conditions such as autism spectrum disorders (ASD) are often characterized by difficulties with social cognitive abilities such as social communication (American Psychiatric Association [APA], 2000), novel social interactions (Crafa, 2012), theory of mind (ToM) (Baron-Cohen, 2000; Richardson et al., 2020; Zhou et al., 2019), empathy (Mazza et al., 2014; Milton, 2012), and coordinating joint attention (Redcay et al., 2013). Limitations

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in social cognitive abilities can make it harder for autistic people[1] to engage in reciprocal social interaction (APA, 2000), recognize and process social emotions (Williams & Happé, 2010a), and understand their own and others' intentions (Williams & Happé, 2010b). These limitations may also influence related social cognitive processes, such as social comparison and endorsement of group-binding moral values ("binding values"). These values, such as loyalty, tie the members of a group together. Little work has investigated moral values in autistic people and, while some work has examined their limited recognition of social comparison emotions such as *envy*, burdensome pain about being inferior (Lange et al., 2018), and *schadenfreude*, pleasure at others' misfortunes (Shamay-Tsoory, 2008), less work has examined their reported experience of these and other antisocial social comparison emotions. The current study aimed to build on this work by investigating how autistic people might be less likely to endorse binding values and report experiencing reduced levels of social comparison emotions.

AUTISM AND MORALITY

Moral cognition hinges on social cognitive skills, such as reasoning about mental states (Ames & Fiske, 2013; Cushman, 2008; Malle, 1999). Inferences about people's intentions and emotions strongly influence blame and punishment (Young & Tsoi, 2013) and moral praise (Yudkin et al., 2019), sometimes even more so than the outcome of the action itself (Young et al., 2010). Moral cognition is also shaped by information about social relationships. For example, perceptions of social obligations influence evaluations of helping behavior in children (Marshall et al., 2020) and adults (McManus et al., 2020, 2021). Additionally, perceptions of group norms like care, hierarchy, and reciprocity vary across different types of relationships (Earp et al., 2021). These findings are complemented by research on the "social brain," revealing that regions of the brain responsible for social processes such as ToM are robustly engaged for processing moral stimuli (Green, 2015; Young & Dungan, 2012). Differences in regions of the social brain have been found to be associated with autism (Chandran et al., 2021; Saponaro et al., 2022). Some prior work suggests that autistic people are less sensitive to intent when evaluating the moral permissibility of actions, compared to neurotypical people (Moran et al., 2011), but other work finds no differences in moral reasoning between autistic and neurotypical people (Schneider et al., 2013). Related work suggests that autistic people rely more on information about the consequences of actions when assigning blame and punishment (Dempsey, Moore, Johnson, et al., 2020).

AUTISM AND BINDING MORAL VALUES

Moral foundations theory (Graham et al., 2018) proposes a distinction between moral values that emphasize the needs and goals of the group, *binding* foundations, and those that emphasize the needs of individuals, *individualizing* foundations.

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1. A recent survey of 654 English-speaking autistic adults found that a majority (79.5%) prefer the term *autistic person* (Keating et al., 2023), so we use that term when discussing them in this article.

The former include loyalty, authority, and purity, while the latter include care and fairness. Only a few studies have directly examined the moral values of autistic people using the MFT framework. Dempsey and colleagues (2022) found similar endorsements across moral foundations for autistic children compared to neurotypical children. However, in qualitative interviews, Dempsey and colleagues (Dempsey, Moore, Richard, et al., 2020) found that autistic people were less likely to bring up binding than individualizing values when discussing moral transgressions. As this study lacked a control group, the researchers were not able to compare these results to neurotypical people. To address this gap, the current study provides an initial quantitative examination of differences in the prioritization of individualizing versus binding values in autistic people and neurotypical controls.

AUTISM AND SOCIAL COMPARISON

Social comparison allows for evaluating one's status relative to group members and learning about group norms (Festinger, 1954; Križan & Gibbons, 2014). Many types of social comparison emotions have been identified, including inspiration, sympathy, empathy, envy, and schadenfreude (Smith, 2000). Prior work on social comparison in autistic people is limited. Autistic people self-report higher levels of general and social anxiety than neurotypical people (Seguin et al., 2021) and those with other neurodevelopmental disorders such as attention deficit hyperactivity disorder (ADHD) (Hennessy et al., 2023). However, it is unclear whether this increased anxiety is associated with increased social comparison. Work on overactive ToM in social anxiety disorder, a condition associated with an increased tendency for negative social comparison, raises the possibility that underactive ToM in autism may reduce the tendency for social comparison (Hezel & McNally, 2014). Dvash and colleagues (2014), using a monetary game in which participants could compare their rewards either to what they could have won (private comparison condition) or to what another participant won (social comparison condition), showed that participants' satisfaction with their reward differed less between conditions for autistic people than for neurotypical people. These results suggest that autistic people may be less sensitive to social comparison information. Autistic people also display difficulty recognizing social comparison emotions (Shamay-Tsoory, 2008). Few studies directly measure the reported experience of social comparison emotions in autistic people. One study on autistic children showed that their expression of social comparison, coded in physical and verbal expressions of jealousy, was similar to that of controls, but that they had a less coherent understanding of and limited ability to explain their jealousy (Bauminger, 2004). The current study directly measured two self-reported social comparison emotions in autistic people: envy and schadenfreude. It is important to explore both positive and negative social emotions in autism, alongside moral values that have been linked in previous work with both positive and negative social orientations. There has been abundant important work on prosocial cognition in autism, including work on theory of mind, empathy, and perspective-taking (e.g., Jameel et al., 2014; Wang et al., 2022), but much less work investigating antisocial social emotions,

such as envy and schadenfreude. Yet, it is important to examine the full space of social emotions in ASD in order to understand the role of conditions such as ASD in influencing social cognition. Furthermore, we aimed to examine both moral values and social comparison emotions within a single paradigm.

CURRENT STUDIES

Moral values and social comparison emotions play a key role in social group functioning. Binding values can bolster social ties and cooperation within existing groups: *ingroup loyalty* promotes helping and trusting ingroup members, *respect for authority* encourages compliance to leaders' instructions and group norms, and *purity and sanctity* facilitate the preservation and protection of group boundaries through the moralization of social norms about food, sex, and the body more generally (Carnes & Lickel, 2018; Graham et al., 2009; Haidt & Joseph, 2004). Similarly, social comparison emotions are key to the operation of group hierarchies; expressing empathy toward those at the top and schadenfreude toward those at the bottom creates and maintains hierarchies, whereas the opposite weakens them (Hudson & Uenal, 2022; Hudson et al., 2019). They can also motivate status-seeking through the embodiment of group ideals and reinforcing what those ideals are by providing information about high-status social referents.

While binding values and social comparison emotions may have some positive effects on groups, they can also have a deep negative impact. Endorsement of binding values can motivate derogation of those who may threaten the security and certainty of the group, leading to prejudice toward outgroup members (Hadarics & Kende, 2018) and victim-blaming (Niemi & Young, 2016). Similarly, social comparison emotions such as envy and schadenfreude can motivate the subversion of others' successes (van de Ven et al., 2009) and collective violence (Cikara, 2015), and can be harmfully directed toward outgroup members (Hudson & Uenal, 2022) and stereotyped groups (van Dijk et al., 2015).

Sensitivity to group boundaries, consideration of group membership, and attention to groups are all likely to influence how people compare themselves to others and their assignment of value to group cohesion. These outcomes may manifest differently in those with social cognitive difficulties, including autistic people. The current studies aimed to investigate the links among autism, moral values, and social comparison emotions. First, we explored these links in an in-person sample of autistic and neurotypical participants (Study 1). Second, to address the limited statistical power of Study 1 due to its small sample size, we examined the effects in a large online sample of autistic and neurotypical participants (Study 2).

Based on the results of Study 1, we preregistered the following hypotheses for Study 2: (H1) Autistic people will display lower endorsement of binding foundations but not less endorsement of individualizing foundations and (H2) autistic people will report lower social comparison emotions than neurotypical people. The methods and results for the two studies largely converge, so we report them together. The preregistration for Study 2 can be found at https://doi.org/10.17605/OSF.IO/WVS8M.

METHOD

SAMPLES

The current research was approved by the Boston College Institutional Review Board and conducted in accordance with human participant guidelines and regulations. Informed consent was obtained from all participants. In Study 1, we recruited 44 neurotypical adults and 18 autistic adults from the Greater Boston Area between 2013 and 2014 for unrelated neuroimaging studies. All autistic participants received a diagnosis of Asperger's syndrome from a trained clinician based on the *DSM-IV* criteria (APA, 2000). For Study 2, we conducted an a priori power analysis using G*Power to determine the minimum sample size required to have 80% power to detect an effect size of $d = 0.28$ for a two-tailed independent samples t test with an alpha of .05. We chose an effect size of $d = 0.28$ based on results from Study 1. The power analysis showed that 202 participants are required per group, so we aimed to recruit 202 autistic participants and 202 neurotypical participants. To account for exclusions due to attention check failures, we recruited 226 participants per group. In our recruitment of autistic participants online, we closely followed the recruitment methods utilized by other researchers who have recruited autistic participants from online recruitment platforms (e.g., Basargekar et al., 2024; Cairney et al., 2023; Galvin & Richards, 2022). In line with this work, we recruited from Prolific, an online recruitment platform, using preselection criteria. Specifically, we recruited 226 participants who indicated that they either (a) have an autism diagnosis, (b) are in the process of receiving a diagnosis, or (c) identify on the autism spectrum. For the control group, we recruited 226 participants who indicated that they do not have a diagnosis, are not in the process of getting one, and do not identify on the spectrum. To ensure a current diagnosis status, we asked the same question within the Qualtrics survey and sorted participants into group categories (autistic vs. neurotypical) based on responses to this survey question. A small number of the participants who were preselected for the autism sample indicated in the Qualtrics survey that none of the autism group inclusion criteria applied to them. As a result, the number of neurotypical participants is slightly larger than the number of autistic participants. After attention check exclusions, there were 205 autistic participants and 238 neurotypical participants. We report sample statistics for all samples in Table 1. Age, gender, and political orientation were controlled for in all analyses. The hypotheses, methods, and planned analyses for Study 2 were preregistered.

PROCEDURE

Studies 1 and 2 followed the same procedure. Participants were asked to read a scenario and imagine themselves as the subject of the scenario (see the Supplementary Materials available at https://osf.io/ndmrg/?view_only=219c9db32520434a bf1d507b264a9eeb). The vignette described their goals and hobbies and struggles to pursue them. Next, participants read two vignettes adapted from Takahashi

TABLE 1. Sample Statistics Across Studies

	Study 1 (In-Person)		Study 2 (Online)	
	Autism Subset (*n* = 18)	NT Subset (*n* = 44)	Autism Subset (*n* = 205)	NT Subset (*n* = 238)
Age, years	31.61 (8.05)	24.98 (5.53)	37.61 (10.90)	43.21 (14.30)
Male	16	24	89	94
Female	2	20	90	140
Nonbinary	0	0	27	4
AQ	32.31 (7.59)	16.36 (6.24)	30.31 (7.30)	19.22 (7.40)
IQ	116.56 (15.62)	112.39 (15.55)	na	na
Political orientation	3.00 (1.28)	3.1 (1.20)	2.59 (1.83)	3.16 (1.75)

Note. Neurotypical (NT) participants scored lower than autistic participants on the Autism Spectrum Quotient (AQ; Baron-Cohen et al., 2001) in Study 1, $t(58) = -8.26$, $p < .001$, $d = 2.40$, and Study 2, $t(441) = -15.82$, $p < .001$, $d = 1.51$. Autistic participants were older than neurotypical participants in Study 1, $t(60) = 3.73$, $p < .001$, and younger in Study 2, $t(441) = -4.58$, $p < .001$. Autistic participants were more likely to be male in Study 1, $\chi^2 (1, N = 62) = 5.17$, $p = .023$, and marginally more likely to be male in Study 2, $\chi^2 (1, N = 443) = 3.37$, $p = .066$. Autistic participants were more likely to be nonbinary in Study 2, $\chi^2 (1, N = 441) = 16.45$, $p < .001$. Since political conservativism is often associated with greater endorsement of binding moral values (Graham et al., 2009), we also examined differences in political orientation between groups. Autistic participants were no more politically conservative in Study 1, $t(55) = -.29$, $p = .771$, and were less politically conservative in Study 2, $t(441) = -3.37$, $p < .001$, $d = 0.32$. IQ was measured in Study 1 using the Kaufman Brief Intelligence Test 2nd Edition (Kaufman, 1990). Neurotypical participants and autistic participants did not differ in IQ, $t(45) < 1.0$, $p > .350$) in Study 1. Since in-person assessment of IQ was not possible in Study 1, IQ was not measured in Study 2.

and colleagues (2009). Participants read about two hypothetical people: a gender-matched target person (Sam/Samantha) meant to elicit social comparisons and an opposite-gender control person (Don/Donna) meant to serve as a baseline. Participants who identified as nonbinary were randomly shown one of these two pairs of targets. The target was described as similar to the participant in terms of goals and interests, but significantly more successful. The baseline was described as different from the participant in terms of goals and interests, but similar in terms of success.

Participants then responded to 14 items: seven measuring envy and seven measuring schadenfreude on 6-point scales from *No envy/pleasure* to *Extreme envy/pleasure*. Envy items were designed to elicit upward social comparisons, providing information about the target's good fortunes (e.g., "Sam has a high salary. You feel . . ."). Schadenfreude items were designed to elicit downward social comparisons, providing information about the target's misfortunes (e.g., "Sam's financial bonus turns out to be very small. You feel . . ."). Participants responded to each question twice, once for the target and once for the control. Ratings for the control were subtracted from ratings for the target to get a measure of social comparison emotions for each question.

Next, participants completed the Moral Foundations Questionnaire (MFQ; Graham et al., 2011), rating each of 30 considerations on their relevance to deciding whether something is right or wrong (6-point scale from *Not at all relevant* to *Extremely relevant*). Responses on binding items (Study 1: α = .893, Study 2:

α = .927) and individualizing items (Study 1: α = .668, Study 2: α = .800) were largely consistent. Although we observed a relatively low alpha for individualizing items in Study 1, Graham and colleagues (2011) propose that low alphas on these subscales reflect a tradeoff between consistency and content validity. In addition to the social comparison emotion and moral foundations measures, we also collected data from an implicit association task (IAT) in Study 1, but due to coding errors, these data were unusable. The survey ended with a short demographics questionnaire. Political orientation was measured by asking participants to rate how liberal or conservative they are on a 7-point scale from *Very liberal* to *Very conservative*. All study data and data analyses scripts are available through OSF: https://osf.io/ndmrg/?view_only=219c9db32520434abf1d507b264a9eeb.

RESULTS

We conducted a series of linear mixed-effects models (LMEs) to examine the effect of group (autistic participants vs. neurotypical participants) on moral values and social comparison emotions for each study. We report t values and corresponding p values obtained using Satterthwaite's method as provided by the lmer package in R (Kuznetsova et al., 2017). Effect sizes are calculated as the estimate for the fixed effect divided by the square root of the sum of variances of random effects (Westfall et al., 2014). LMEs included participant and item as random intercepts. Correlations among variables are reported in Table 2.

MORAL VALUES

Here, we use the term *endorsement* to refer to participants' scores on each item of the MFQ. To test whether endorsement of moral values differed between groups, we fitted models for each study predicting endorsement with group (coded as 0 = neurotypical participants, 1 = autistic participants), value (coded as 0 = individualizing, 1 = binding), the group × value interaction, age, gender (coded as 0 = male, 1 = female), and political orientation as fixed effects (Table 3). In both

TABLE 2. Pairwise Correlations With 95% Confidence Intervals Across Studies

Variable	Individualizing	Envy	Schadenfreude
	Study 1 (In-Person)		
Binding	.38** [0.14, 0.57]	.26* [0.01, 0.48]	.20 [–0.05, 0.44]
Individualizing	—	.05 [–0.21, 0.30]	.20 [–0.06, 0.43]
Envy	—	—	.56*** [0.36, 0.71]
	Study 2 (Online)		
Binding	< .01 [–0.09, 0.09]	.06 [–0.04, 0.15]	.01 [–0.09, 0.10]
Individualizing	—	.19*** [0.10, 0.28]	.03 [–0.06, 0.12]
Envy	—	—	.43*** [0.35, 0.51]

*p < .05. **p < .01. ***p < .001.

TABLE 3. Estimates of Fixed Effects on Endorsement of Moral Values Across Studies

	Estimate	SE	df	t	d	p	95% CI Lower	95% CI Upper
Study 1 (In Person)								
Intercept	3.34	0.49	63.98	6.81	2.20	< .001	2.40	0.39
Group	−0.03	0.22	69.83	−0.14	−0.02	.893	−0.45	0.39
Value	−1.20	0.22	30.34	−5.54	−0.79	< .001	−1.63	−0.78
Age	0.03	0.01	52.09	2.32	0.02	.024	0.01	0.06
Gender	0.05	0.20	52.00	0.28	0.04	.783	−0.32	0.43
Poli Orientation	0.15	0.07	52.01	2.15	0.10	.036	0.02	0.29
Group*Value	−0.53	0.14	1622.03	−3.90	−0.35	< .001	−0.80	−0.26
Study 2 (Online)								
Intercept	3.92	0.19	77.75	20.62	2.60	< .001	3.55	4.29
Group	0.30	0.07	625.50	4.40	0.20	< .001	0.17	0.43
Value	−1.35	0.19	28.72	−7.09	−0.89	< .001	−1.72	−0.97
Age	0.01	0.00	437.00	3.69	0.01	< .001	0.00	0.01
GenderWoman	0.07	0.06	437.00	1.17	0.05	.243	−0.05	0.20
GenderNB	−0.09	0.13	437.00	−0.73	−0.06	.469	−0.34	0.16
Poli Orientation	0.14	0.02	437.00	8.29	0.01	< .001	0.11	0.18
Group*Value	−0.66	0.05	12820.00	−14.24	−0.44	< .001	−0.75	−0.57

Note. In Study 2, gender had three levels, so we controlled for gender in all models by including genderWoman (coded as 0 = male, 1 = female), and genderNB (coded as 0 = male, 1 = nonbinary) as separate predictors.
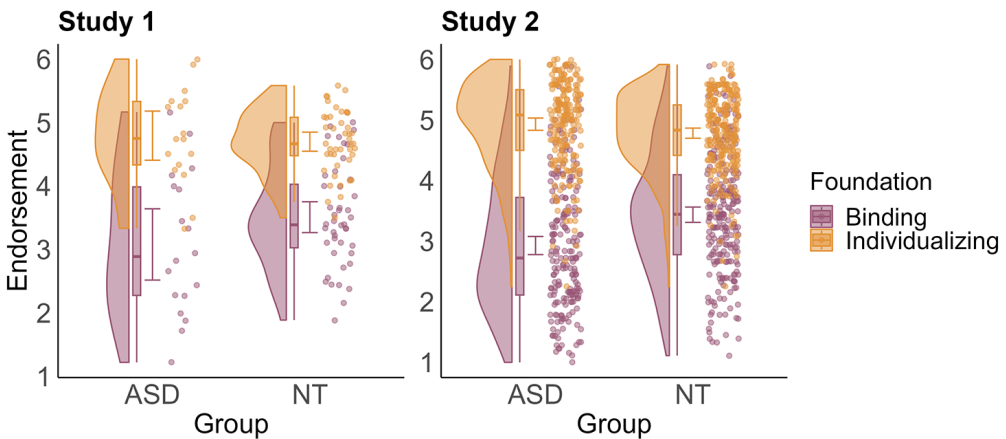

FIGURE 1. Distribution of mean endorsement of binding and individualizing value per group. This figure demonstrates the distribution of mean endorsement of binding and individualizing values for autistic (ASD) and neurotypical (NT) participants with standard error bars. The results for Study 1 are shown in the left panel, and the results for Study 2 are shown in the right panel.

studies, we observed a significant group × value interaction (Figure 1). Supporting H1, follow-up analyses (Table 4a) confirmed that this interaction effect was largely driven by autistic participants reporting weaker endorsement of binding foundations than neurotypical participants. In Study 1, autistic participants reported significantly weaker endorsement of authority and purity and marginally ($p = .116$) weaker endorsement of loyalty. In Study 2, autistic participants reported significantly weaker endorsement of all three binding values.

As expected, we observed no main effect of group on endorsement of moral values in Study 1. While we did observe a significant main effect of group in Study 2, this effect should be interpreted in the context of the group × value interaction effect, which is robust across studies and suggests that the main effect of group in Study 2 is driven by the effect of group on endorsement of binding values. These results do not suggest that autistic people display less endorsement of moral values generally. Indeed, autistic participants endorsed individualizing values no less than neurotypical participants in Study 1 and, in fact, endorsed individualizing values more than neurotypical participants in Study 2. Specifically, follow-up analyses (Table 4b) show that autistic participants reported significantly greater endorsement of fairness and no less endorsement of harm/care.

SOCIAL COMPARISON

Here, we use the term *social comparison emotions* (SCEs) to refer to participants' self-reported envy and schadenfreude, calculated as the emotion rating for each control question subtracted from the emotion rating for each corresponding target question. To test whether SCEs differed between groups, we fitted models for each study predicting SCEs with group (coded as 0 = neurotypical participants, 1 = autistic participants), emotion (coded as 0 = envy, 1 = schadenfreude), the group × emotion interaction, age, gender (coded as 0 = male, 1 = female), and political orientation entered as fixed effects (Table 5). Supporting H2, autistic participants in both studies tended to report lower social comparison emotions than neurotypical participants. The main effect of group on social comparison emotions was marginal ($p = .100$) in Study 1 and significant in Study 2. In both studies, we observed a significant group × emotion interaction (Figure 2). Follow-up analyses (Table 6) showed that the effect of group on social comparison emotions was strongest for schadenfreude in Study 1 and strongest for envy in Study 2. The main effect of group on schadenfreude was significant in Study 1, but not Study 2, whereas the main effect of group on envy was significant in Study 2, but not Study 1.

DISCUSSION

In the present work, we investigated the links among ASD, moral values, and social comparison emotions in an in-person (Study 1) and online (Study 2) sample. In line with our preregistered hypotheses for Study 2, we found that autistic people were less likely to endorse binding moral values and reported less social comparison emotions.

TABLE 4a. Estimates of Fixed Effects on Binding Values Across Studies

	Estimate	SE	df	t	d	p	95% CI Lower	95% CI Upper
Study 1 (Online)								
Estimates of Fixed Effects on Binding Values								
Intercept	1.36	0.60	56.88	2.28	0.86	.027	0.22	2.49
Group	−0.63	0.26	52.00	−2.43	−0.39	.018	−1.12	−0.13
Age	0.05	0.02	52.00	2.62	0.03	.011	0.01	0.08
Gender	0.06	0.25	52.00	0.24	0.04	.814	−0.41	0.53
Poli Orientation	0.29	0.09	52.00	3.26	0.18	.002	−0.12	0.46
Estimates of Fixed Effects on Loyalty								
Intercept	2.81	0.81	54.61	3.46	1.67	.001	1.26	4.35
Group	−0.54	0.34	52.00	−1.60	−0.32	.116	−1.18	0.11
Age	0.02	0.02	52.00	1.00	0.01	.320	−0.02	0.07
Gender	−0.27	0.32	52.00	−0.83	−0.16	.409	−0.88	0.35
Poli Orientation	0.08	0.12	52.00	0.70	0.05	.485	−0.14	0.30
Estimates of Fixed Effects on Authority								
Intercept	1.19	0.68	53.89	1.75	0.77	.086	−0.11	2.48
Group	−0.75	0.28	52.00	−2.68	−0.49	.009	−1.29	0.21
Age	0.06	0.02	52.00	3.10	0.04	.003	0.02	0.10
Gender	0.05	0.27	52.00	0.19	0.03	.847	−0.46	0.57
Poli Orientation	0.29	0.10	52.00	2.98	0.19	.004	0.10	0.47
Estimates of Fixed Effects on Purity								
Intercept	0.07	0.64	53.81	0.11	0.05	.914	−1.15	1.29
Group	−0.59	0.28	52.00	−2.11	−0.39	.040	−1.13	−0.06
Age	0.06	0.02	52.00	2.92	0.04	.005	0.02	0.09
Gender	0.39	0.27	52.00	1.46	0.26	.152	−0.12	0.90
Poli Orientation	0.50	0.10	52.00	5.18	0.33	< .001	0.31	0.68
Study 2 (Online)								
Estimates of Fixed Effects on Binding Values								
Intercept	2.11	0.20	118.73	10.34	1.37	< .001	1.71	2.51
Group	−0.24	0.08	437.00	−2.87	−0.16	.004	−0.41	−0.08
Age	0.01	0.00	437.00	2.52	0.01	.012	0.00	0.01
GenderWoman	−0.01	0.08	437.00	−0.08	−0.00	.937	−0.17	0.16
GenderNB	−0.38	0.17	437.00	−2.20	−0.24	.029	−0.71	−0.04
Poli Orientation	0.31	0.02	437.00	13.54	0.20	< .001	0.27	0.36
Estimates of Fixed Effects on Loyalty								
Intercept	2.42	0.28	13.27	8.68	1.60	< .001	1.86	2.97
Group	−0.20	0.09	437.00	−2.21	−0.13	.028	−0.37	−0.02
Age	0.00	0.00	437.00	0.81	0.00	.417	−0.00	0.01
GenderWoman	−0.20	0.09	437.00	−2.25	−0.13	.025	−0.38	−0.03
GenderNB	−0.25	0.18	437.00	−1.36	−0.17	.174	−0.61	0.11
Poli Orientation	0.26	0.02	437.00	10.51	0.17	< .001	0.21	0.31
Estimates of Fixed Effects on Authority								
Intercept	2.19	0.30	11.53	7.20	1.44	< .001	1.58	2.80
Group	−0.31	0.09	437.00	−3.37	−0.20	< .001	−0.49	−0.13
Age	0.01	0.00	437.00	3.19	0.01	.002	0.00	0.02
GenderWoman	0.09	0.09	437.00	1.03	0.06	.305	−0.09	0.28
GenderNB	−0.45	0.19	437.00	−2.42	−0.30	.016	−0.82	−0.09
Poli Orientation	0.31	0.03	437.00	12.09	0.20	< .001	0.26	0.36
Estimates of Fixed Effects on Purity								
Intercept	1.72	0.28	31.20	6.24	1.09	< .001	1.19	2.26
Group	−0.22	0.11	437.00	−1.96	−0.14	.050	−0.43	−0.00
Age	0.01	0.00	437.00	2.43	0.01	.016	0.00	0.02
GenderWoman	0.09	0.11	437.00	0.78	0.06	.433	−0.13	0.30
GenderNB	−0.43	0.23	437.00	−1.90	−0.27	.058	−0.87	0.01
Poli Orientation	0.38	0.03	437.00	12.35	0.24	< .001	0.32	0.44

TABLE 4b. Estimates of Fixed Effects on Individualizing Values Across Studies

	Estimate	SE	df	t	d	p	95% CI Lower	Upper
							95% CI	
	Estimate	*SE*	*df*	*t*	*d*	*p*	**Lower**	**Upper**
Study 1 (In Person)								
Estimates of Fixed Effects on Individualizing Values								
Intercept	4.52	0.46	60.83	9.83	3.31	< .001	3.64	5.40
Group	−0.07	0.19	52.00	−0.34	−0.05	.733	−0.43	5.56
Age	0.01	0.01	52.51	0.90	0.01	.370	−0.01	0.04
Gender	0.05	0.18	52.01	0.26	0.03	.789	−0.30	0.40
Poli Orientation	−0.05	0.07	52.05	−0.81	−0.04	.422	−0.18	0.07
Estimates of Fixed Effects on Harm/Care								
Intercept	4.19	0.57	54.56	7.34	3.03	< .001	3.10	5.27
Group	0.04	0.24	52.00	0.16	0.03	.875	−0.42	0.49
Age	0.02	0.02	52.00	1.41	0.02	.164	−0.01	0.05
Gender	0.17	0.23	52.00	0.73	0.12	.467	−0.27	0.60
Poli Orientation	−0.06	0.08	52.00	−0.78	−0.05	.440	−0.22	0.09
Estimates of Fixed Effects on Fairness								
Intercept	4.86	0.53	43.00	9.12	3.55	< .001	3.85	5.88
Group	0.09	0.21	52.00	0.46	0.07	.650	−0.30	0.49
Age	< 0.01	0.01	53.69	0.03	< 0.01	.973	−0.03	0.03
Gender	−0.07	0.20	52.04	−0.37	−0.05	.713	−0.45	0.30
Poli Orientation	−0.04	0.07	52.15	−0.60	−0.03	.550	−0.18	0.09
Study 2 (Online)								
Estimates of Fixed Effects on Individualizing Values								
Intercept	4.61	0.19	34.42	24.46	3.51	< .001	4.24	4.98
Group	0.13	0.06	437.00	1.99	0.10	.047	0.00	0.26
Age	0.01	0.00	437.00	3.98	0.01	< .001	0.00	0.01
GenderWoman	0.19	0.06	437.00	2.97	0.15	.003	0.07	0.32
GenderNB	0.34	0.13	437.00	2.55	0.26	.011	0.08	0.59
Poli Orientation	−0.12	0.02	437.00	−6.54	−0.09	< .001	−0.15	−0.08
Estimates of Fixed Effects on Harm/Care								
Intercept	4.44	0.24	11.91	18.52	3.42	< .001	3.96	4.92
Group	0.10	0.07	437.00	1.31	0.07	.190	−0.05	0.24
Age	0.01	0.00	437.00	4.25	0.01	< .001	0.01	0.02
GenderWoman	0.26	0.07	437.00	3.48	0.20	< .001	0.11	0.40
GenderNB	0.31	0.15	437.00	2.05	0.24	.041	0.01	0.60
Poli Orientation	−0.08	0.02	437.00	−3.86	−0.06	< .001	−0.12	−0.04
Estimates of Fixed Effects on Fairness								
Intercept	4.78	0.26	9.36	18.33	3.58	< .001	4.25	5.30
Group	0.16	0.07	437.00	2.27	0.12	.023	0.02	0.30
Age	0.01	0.00	437.00	2.83	0.01	.005	0.00	0.01
GenderWoman	0.13	0.07	437.00	1.80	0.10	.073	−0.01	0.26
GenderNB	0.36	0.14	437.00	2.54	0.27	.012	0.08	0.64
Poli Orientation	−0.15	0.02	437.00	−7.95	−0.11	< .001	−0.19	−0.12

TABLE 5. Estimates of Fixed Effects on Social Comparison Emotions Across Studies

|	Estimate	SE	df	t	d	p	95% CI Lower	95% CI Upper
Study 1 (In-Person)								
Intercept	4.30	0.86	54.33	4.98	2.59	< .001	2.65	5.94
Group	−0.65	0.39	57.88	−1.67	−0.39	.100	−1.39	0.09
Emotion	−1.50	0.19	14.25	−7.72	−0.90	< .001	−1.88	−1.11
Age	−0.02	0.03	52.22	−0.59	−0.01	.555	−0.07	0.03
Gender	−0.25	0.36	52.00	−0.69	−0.15	.491	−0.94	0.44
Poli Orientation	−0.17	0.13	52.02	−1.29	−0.10	.201	−0.42	0.08
Group*Emotion	−0.45	0.18	724.02	−2.53	−0.27	.012	−0.80	−0.10
Study 2 (Online)								
Intercept	2.26	0.24	154.00	9.58	1.46	< .001	1.80	2.71
Group	−0.54	0.11	505.90	−4.99	−0.35	< .001	−0.76	−0.33
Emotion	−1.62	0.17	12.63	−9.59	−1.05	< .001	−1.95	−1.29
Age	−0.00	0.00	437.00	−1.13	−0.00	.261	−0.01	0.00
GenderWoman	0.16	0.11	437.00	1.49	0.10	.136	−0.05	0.36
Gender NB	−0.13	0.21	437.00	−0.59	−0.08	.553	−0.54	0.29
Poli Orientation	0.01	0.03	437.00	0.30	0.01	.762	−0.05	0.06
Group*Emotion	0.51	0.06	5745.00	8.75	−0.33	< .001	0.39	0.62
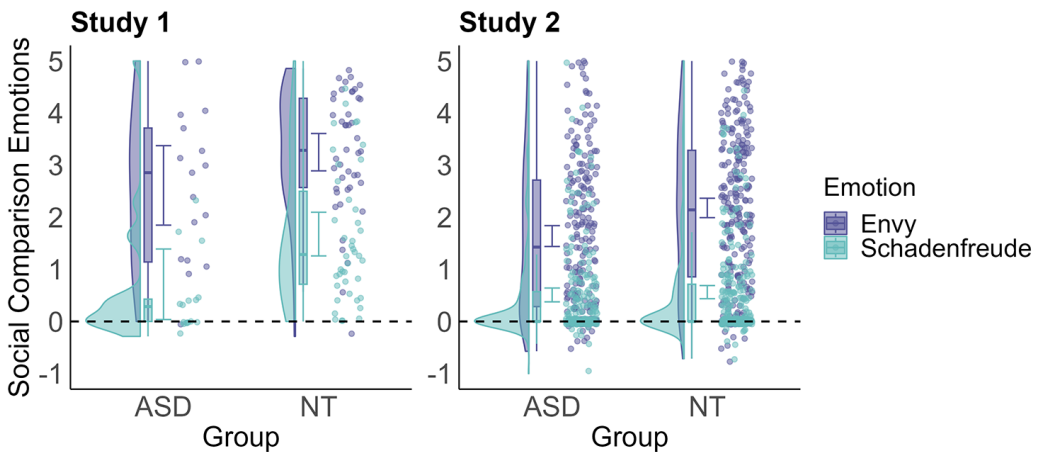
FIGURE 2. Distribution of mean reported social comparison emotions per group. This figure demonstrates the distribution of mean reported envy and schadenfreude for autistic (ASD) and neurotypical (NT) participants with standard error bars. The results for Study 1 are shown in the left panel, and the results for Study 2 are shown in the right panel.

TABLE 6. Estimates of Fixed Effects on Schadenfreude and Envy

	Estimate	SE	df	t	d	p	95% CI Lower	Upper
Study 1 (In-Person)								
Estimates of Fixed Effects on Schadenfreude								
Intercept	3.11	0.99	53.70	3.15	1.90	.003	1.22	4.99
Group	−1.20	0.43	51.99	−2.77	−0.74	.008	−2.03	−0.37
Age	−0.01	0.03	52.18	−0.34	−0.01	.736	−0.07	0.05
Gender	−0.42	0.41	51.98	−1.00	−0.25	.320	−1.20	0.37
Poli Orientation	−0.29	0.15	52.00	−1.94	−0.18	.058	−0.57	−0.004
Estimates of Fixed Effects on Envy								
Intercept	4.00	0.97	53.52	4.14	2.37	< .001	2.15	5.84
Group	−0.54	0.43	51.99	−1.27	−0.32	.208	−1.35	0.27
Age	−0.02	0.03	52.29	−0.72	−0.01	.473	−0.08	0.03
Gender	−0.08	0.41	52.00	−0.21	−0.05	.839	−0.86	0.69
Poli Orientation	−0.05	0.15	52.02	−0.34	−0.03	.738	−0.33	0.23
Study 2 (Online)								
Estimates of Fixed Effects on Schadenfreude								
Intercept	0.70	0.20	283.80	3.48	0.59	< .001	0.31	1.09
Group	−0.04	0.10	437.00	−0.43	−0.04	.665	−0.23	0.15
Age	−0.00	0.00	437.00	−0.25	−0.00	.804	−0.01	0.01
GenderWoman	−0.11	0.10	437.00	−1.10	−0.09	.273	−0.30	0.08
GenderNB	−0.34	0.20	437.00	−1.71	−0.29	.089	−0.73	0.05
Poli Orientation	−0.01	0.03	437.00	−0.29	−0.01	.769	−0.06	0.04
Estimates of Fixed Effects on Envy								
Intercept	2.20	0.32	100.58	6.80	1.20	< .001	1.57	2.82
Group	−0.54	0.15	437.00	−3.67	−0.29	< .001	−0.82	−0.25
Age	−0.01	0.01	437.00	−1.45	−0.00	.149	−0.02	0.00
GenderWoman	0.42	0.15	437.00	2.87	0.23	.004	0.13	0.71
GenderNB	0.09	0.30	437.00	0.29	0.05	.770	−0.50	0.67
Poli Orientation	0.03	0.04	437.00	0.63	0.01	.529	−0.05	0.10

First, autistic people were less likely to endorse binding foundations, even after controlling for age, gender, and political orientation. Specifically, autistic people reported less endorsement of authority and purity in Study 1 and less endorsement of authority, purity, and loyalty in Study 2. This finding adds quantitative support to previous qualitative work demonstrating a weaker emphasis on binding versus individualizing foundations in autistic people (Dempsey, Moore, Richard, et al., 2020). We suggest two possible explanations for future work to explore. First, autistic people may devalue binding values because they are less attuned to

group information. Autistic people demonstrate difficulty with social categorization (Skorich et al., 2016) and display fewer stereotypical attitudes (Kirchner et al., 2012), suggesting reduced sensitivity to group membership. Alternatively, autistic people may devalue binding values due to ambiguity aversion (Fujino et al., 2017). While violations of individualizing values often involve clear perpetrators and victims (Schein & Gray, 2018), violations of binding values can be arbitrary and context-specific (Gray et al., 2022), lacking clear victims or clear harm, and our reactions to them can be more difficult to explain (Haidt et al., 2000).

Our results do not suggest that autistic people place less weight on moral values generally. Indeed, autistic people reported no less endorsement of individualizing foundations in Study 1 and even greater endorsement of individualizing foundations in Study 2. The latter effect was largely driven by greater endorsement of fairness than neurotypical participants. These results are somewhat inconsistent with prior work that finds that autistic children are often more likely to accept unfair offers in economic games and less likely to reciprocate fair offers (Hartley & Fisher, 2018; Sally & Hill, 2006), suggesting lower sensitivity to fairness in practice. A lower propensity for social comparison emotions may contribute to weaker enforcement of fairness in situations such as economic games. However, as this effect was not robust across studies, more work is needed to clarify the impact of ASD on endorsement of individualizing values.

Second, autistic people reported reduced social comparison emotions, even after controlling for age, gender, and political orientation. This finding extends prior work suggesting that autistic people may be less sensitive to information about how they compare to others (Dvash et al., 2014). Although autistic people report higher rates of social anxiety (Seguin et al., 2021), these results suggest that this anxiety likely does not correspond to greater social comparison emotions. These results add breadth to existing literature demonstrating that ASD influences prosocial cognition, such as work on reduced empathy (Mazza et al., 2014), by showing that ASD may also influence antisocial cognition by mitigating negative social comparison emotions such as envy and schadenfreude.

Since the effects for envy and schadenfreude differed between studies, it remains unclear whether reduced sensitivity to social comparison in autistic people is driven by decreased downward social comparisons (i.e., schadenfreude, pleasure at others' misfortune) and/or decreased upward social comparisons (i.e., envy, jealousy of others' good fortune). In Study 1, autistic people reported less *schadenfreude*, but not significantly less envy. In Study 2, they reported less *envy*, but not significantly less schadenfreude. These contrasting hypotheses would predict that, if this effect is driven by decreased downward comparisons, autistic participants would be especially less sensitive to social comparison information when they experienced a relative gain, whereas, if this effect is driven by decreased upward comparisons, autistic participants would be especially less sensitive to social comparison information when they experienced a relative loss. Future work should replicate and clarify the links between ASD and different social comparison emotions.

The two constructs that we examined in the current study have multifaceted impacts on social cognition. Previous work has explored the dual nature of binding

values, which can both *bind and build* but also *blind and divide* (Haidt, 2012). Binding values motivate some prosocial behaviors, consistent with loyalty to group members, respect for group leaders, and adherence to group standards for purity. Binding values also have a "dark" side, motivating antisocial attitudes and actions, in line with outgroup prejudice (Monroe & Plant, 2019) and social dominance orientation (Niemi & Young, 2013). Similarly, contrastive social comparison emotions such as envy and schadenfreude can be useful for maintaining group cohesion by motivating upward movement in the group but can also be harmful by motivating subversion of others' success (Lange & Crusius, 2015) and preferences for inequality (Sheskin et al., 2014). Certain conditions, such as ASD, might buffer against moral values and social emotions that have been linked to intergroup conflict. Autistic people are not immune to these effects; they still display implicit social biases (Birmingham et al., 2015); however, our work suggests they may be less susceptible.

The current study is limited in its reliance on the self-report of only two social comparison emotions. Future work should examine a wider range of social comparison emotions among autistic people. Such work may focus on positive emotions such as inspiration, which can be measured as self-improvement motivation (Diel & Hofmann, 2019). Additionally, as the current study is cross-sectional, future work is needed to clarify the directional nature of the relationship between moral values and social comparison.

Taken together, these findings build upon an existing literature on the social cognitive characteristics of autism spectrum disorders, suggesting that these characteristics may have a strong influence on two social psychological processes: reduced social comparison emotions and underemphasis of binding moral values.

Author contributions. JD and LY designed the study and collected the data for Study 1. TL and LY designed the study and collected the data for Study 2. TL conducted the analyses and wrote the manuscript. All authors reviewed the manuscript.

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