

Self-compassion as a mediator of the association between autistic traits and depressive/anxious symptomatology

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Abstract

Self-compassion refers to the extension of kindness to oneself when faced with inadequacies, shortcomings or failures. This study examined the mediating role of self-compassion in the relationship between autistic traits and depressive/anxious symptomatology in the general population. Participants included 164 university students (69 males and 95 females) ranging in age from 18 to 51 years (mean = 23.16, standard deviation = 7.81). Participants completed the Autism Spectrum Quotient, the Self-Compassion Scale, and the Hospital Anxiety and Depression Scale. A series of multiple mediation analyses was conducted using the bootstrapping method, and it was found that *Total Self-Compassion* and the two subscales of *Compassionate Self-Responding* and *Uncompassionate Self-Responding* partially mediated the relationship between autistic traits and anxious/depressive symptoms. The indirect effect of self-compassion accounted for 41.9% of the variance in the relationship between autistic traits and depressive symptoms and 50% of the variance in the relationship between autistic traits and anxiety symptoms. It was also further found that the correlation between autistic traits and self-compassion was significantly stronger in males than females. Although preliminary, the current findings suggest that self-compassion could potentially serve as a target for clinical intervention in individuals with elevated autistic traits who experience anxiety and/or depression.

Lay Abstract

In this study, we asked 164 undergraduate students to complete an online questionnaire. The questionnaire measured the students' levels of autistic traits, self-compassion, and experience of anxiety and depression. We were interested in knowing if self-compassion (defined as the extension of kindness to oneself when faced with challenges) had any influence on the relationship between autistic traits and experiences of anxiety and depression. The results of the study indicated that self-compassion may be an important factor influencing the relationship between autistic traits and mental health, with higher levels of self-compassion being related to more positive mental health outcomes. Although the findings should be considered preliminary in nature, they do suggest that self-compassion could potentially be a target for clinical intervention in people with elevated autistic traits and experience anxiety and/or depression.

Keywords

anxiety, autistic spectrum conditions, autistic spectrum disorders, autistic traits, depression, self-compassion

Introduction

Autism spectrum conditions (ASCs) are a group of common heterogeneous neurodevelopmental conditions broadly characterised by social and communication difficulties in addition to restrictive and repetitive behaviours (American Psychiatric Association, 2013). We prefer the term ASC than ASDs (autism spectrum disorders), because 'individuals with an ASC have not only disabilities which

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require a medical diagnosis but also areas of cognitive strength' (Baron-Cohen et al., 2009, p. 500). Researchers commonly examine phenomena relevant to autism by measuring autistic traits – a set of primary symptoms associated with ASCs, which are normally distributed throughout the general population (Baron-Cohen et al., 2001; Ruzich et al., 2015).

Individuals in the general population without a diagnosis of ASC but with subclinical autistic traits show a constellation of cognitive and socio-communicative features that resemble ASC symptoms but that tend to be milder and less impairing, otherwise known as broader autism phenotypic traits (Piven et al., 1997). For these reasons, considerable research attention has focused on the relationships between autistic traits and cognitive and socio-communicative difficulties in samples without a clinical diagnosis of autism. Much of this research has considered how non-autistic people with subclinical autistic traits experience other peoples' feelings, emotions and mental states, as well as how they respond to others in terms of sympathy, empathic interest and compassion. For example, individuals who report high autistic traits in the general population typically show greater difficulties with social interaction (von dem Hagen & Bright, 2017), emotion processing (Cooper et al., 2013), empathy (Zhao et al., 2019) and connecting with others (Stice & Lavner, 2019). However, as autistic traits in non-autistic adults are also associated with social withdrawal (Churchard et al., 2019) and suicidal behaviour (Richards et al., 2019), it is important to not only consider how these individuals relate to others but also how they relate to the self.

Self-compassion refers to the extension of kindness to oneself when faced with feelings of inadequacies, shortcomings or failures (Neff, 2003). It comprises six diametrically opposite elements: three positive (self-kindness, common humanity and mindfulness) and three negative (self-judgement, isolation and over-identification). Self-kindness is the act of being supportive and caring towards the self in times of distress. The opposite of self-kindness is self-judgement, which occurs when an individual is hostile and critical towards aspects of their self during times of distress. Common humanity is a recognition that all people make mistakes and experience hard times throughout life, and that suffering and personal failure are part of a shared human experience. The opposite of common humanity is isolation, when an individual isolates their experiences and believes they are the only one facing hardship. Mindfulness is the state of awareness of, and ability to balance, negative thoughts and emotions in the present moment so that feelings are neither suppressed nor exaggerated. Conversely, over-identification prevents the individual from experiencing the present moment by deliberating on their own limitations (Neff, 2003; Neff & Vonk, 2009). The individual elements of self-compassion are said to interact with each other to generate a self-compassionate frame of mind (Neff

& Costigan, 2014), and research has supported the idea of a higher-order factor for self-compassion (Cleare et al., 2018; Neff et al., 2017).

The ongoing debate regarding the composition of self-compassion

Neff et al. (2018) argued that the six elements of self-compassion are separable and do not covary in a lockstep manner, yet they do mutually impact one another and interact as a system. This includes a positive pole and a negative pole, with the positive elements of self-kindness, common humanity and mindfulness loading highly on one factor and the negative elements of self-judgement, isolation and over-identification loading highly on the other. A considerable amount of research has supported the two-factor solution (e.g. Allen et al., 2020; Bengtsson et al., 2016; Stolorow et al., 2016), and according to Neff (2016), the positive and negative aspects represent compassionate versus uncompassionate behaviours towards the self.

There is ongoing debate over whether self-compassion should be conceptualised and measured as an overarching construct, or if the compassionate versus uncompassionate dimensions should be considered distinct. Muris and Petrocchi (2017) suggested that the negative scales of self-compassion are problematic because they show stronger relationships with psychopathology and therefore inflate the link between self-compassion and well-being. However, Neff et al. (2018) argued that it is normal for measures to assess increased levels of positive and reduced levels of negative behaviours (e.g. healthy vs unhealthy food choices), and it is common to find that negative behaviours (as opposed to the absence of positive behaviours) have a stronger association with negative outcomes (Bonsaksen et al., 2018; Galili-Weinstock et al., 2020). Indeed, an individual may not engage in vast amounts of compassionate behaviours towards themselves over any given period of time, but they may also not engage in a vast amount of uncompassionate ones either. Therefore, a lack of compassionate behaviours is not necessarily equal to increased uncompassionate behaviours and vice versa.

Sex differences in autistic traits and self-compassion

A meta-analysis conducted by Ruzich et al. (2015) revealed that males typically report higher levels of autistic traits than females. This sex difference is congruent with the somewhat contested (e.g. Schuck et al., 2019; Van Wijngaarden-Cremers et al., 2014), albeit consistent, finding of a higher male to female ratio in people with diagnosed autism (Werling & Geschwind, 2013). The higher prevalence of autistic traits in males could reflect a true difference between the sexes, a distinct phenotypic difference between males and females (Ferri et al., 2018), a

systematic bias towards the typical presentation, diagnosis and measurement of autism (Jamison et al., 2017) or a combination of these factors.

Yarnell et al. (2015) conducted a meta-analysis focused on sex differences in self-compassion in the general population and found a small ($d=0.18$) but significant sex difference, with males reporting on average higher self-compassion than females. This is interesting because females tend to display greater empathic concern and compassion for others than do males (van der Graaff et al., 2014). However, this does not seem to translate to how females treat themselves. Females often prioritise the needs of others over their own (Yarnell et al., 2018), and ruminate over their problems more than males (Shors et al., 2017). Females diagnosed with autism and females undiagnosed but with subclinical autistic traits could be even more vulnerable to low self-compassion because, whereas autistic and subclinical males are more likely to show externalising behaviour (e.g. hyperactivity or problematic behaviours), autistic and subclinical females are more likely to internalise their problems (Bargiela et al., 2016; Mandy et al., 2012; Scherff et al., 2014). Taken together, these findings suggest that the association between autistic traits and self-compassion may operate slightly differently for males and females.

Self-compassion as a mediator of the relationship between autistic traits and anxious/depressive symptoms

To our knowledge, no research to date has considered the possible mediating role of self-compassion in the relationship between autistic traits and anxious and depressive symptoms. This is surprising considering that low self-compassion is associated with higher levels of stress, anxiety and depression (MacBeth & Gumley, 2012) and lower cognitive, affective and psychological well-being (Zessin et al., 2015). Emotion regulation styles, camouflaging and alexithymia are also associated with autistic traits and psychopathology (Dworzynski et al., 2012; Morie et al., 2019) and can be further linked to self-compassion (Aydin et al., 2014; Rusk, 2015).

It is well-documented that autistic people and non-autistic people with elevated autistic traits experience high levels of bullying (Bejerot & Mörtberg, 2009; Zablotsky et al., 2014) and are likely to experience non-acceptance from others (Cage et al., 2018, 2019; Sasson et al., 2017). Such experiences may increase the likelihood of camouflaging symptoms and vulnerability to self non-acceptance. Research in general population samples has found several possible mediators of the relationship between autistic traits and psychopathology, including social connectedness, loneliness, perceived burdensomeness (i.e. *I am a burden*), thwarted belonging (i.e. *I am alone*), social problem-solving ability and teasing history (Pelton &

Cassidy, 2017; Rosbrook & Whittingham, 2010; Stice & Lavner, 2019).

It is possible that low self-compassion relates to certain aspects of a cognitive style akin to autism. For instance, particular facets of self-compassion (such as isolation over common humanity) could be associated with difficulties connecting with others, and a struggle for personal social readjustment. As autistic people often feel that their social difficulties mean others do not understand them (Bogdashina, 2016), this could lead to deliberation on perceived limitations (i.e. over-identification over mindfulness), and result in being hostile and critical towards aspects of their self (i.e. self-judgement over self-kindness). Furthermore, individuals with low self-compassion typically struggle to put their problems into perspective, are more likely to ruminate or suppress negative emotions and tend to demonstrate more extreme emotional reactions (Leary et al., 2007; Neff et al., 2007), all of which are positively correlated with autistic traits in autistic and non-autistic people (Brunyé et al., 2012; Joshi et al., 2018; Zhao et al., 2020).

Objective

This study explored relationships between autistic traits, self-compassion and anxious/depressive symptoms in a non-clinical sample of undergraduate students. It was hypothesised that the following:

1. Autistic traits would be negatively associated with total self-compassion and the compassionate self-responding subscale, and positively associated with the uncompassionate self-responding subscale, and that all three associations would be evident in both males and females, **but moderated by sex**.
2. Total self-compassion, compassionate self-responding and uncompassionate self-responding would mediate the previously established positive association between autistic traits and anxious/depressive symptoms.

Method

Ethical approval was granted by the Department of Psychology at the host institution (PSY_Nov19_023) and participants provided informed consent before taking part. To determine the sample size required for a mediation analysis, an a priori power calculation was conducted using G*Power (Faul et al., 2007). Our sample size calculation was informed by the reported effect sizes from Rosbrook and Whittingham (2010). With a medium effect size (f^2) of 0.15, an alpha of 0.05 and a standard power level of 0.80, this analysis determined that with the inclusion of one predictor variable (autistic traits) plus the mediators in the model (self-compassion total score, compassionate self-responding and uncom-

passionate self-responding), a minimum of 85 participants would be required.

Participants

The participants were 164 undergraduate university students (69 males and 95 females), mainly of White ethnicity (87%), and ranging in age from 18 to 51 years (mean (M)=23.16, standard deviation (SD)=7.809). All were enrolled at a higher education institution in the West Midlands, UK. Some participants (30% of the sample) were recruited through the Department of Psychology's Research Participation Scheme (RPS), in which psychology students participated for course credit. As scores on measures of autistic traits and self-compassion are on average higher in males than females (Ruzich et al., 2015; Yarnell et al., 2015), and the sex ratio is considerably female biased in undergraduate psychology students, we also aimed to recruit participants (70% of the sample) by sharing details of the survey on the university social media page.

Materials

Autism Spectrum Quotient. The Autism Spectrum Quotient (AQ; Baron-Cohen et al., 2001) was administered to provide a quantitative measure of autistic traits. The AQ has commonly been used to investigate autistic traits in general population samples (Liu et al., 2017; Rosbrook & Whittingham, 2010), including university students (Reed et al., 2016), and has proven to be a valid and reliable self-report tool that is able to distinguish between those with and without an autism diagnosis (Baron-Cohen et al., 2001; Ruzich et al., 2015). It comprises 50 items that assess five trait subscales (social skill, attention switching, attention to detail, communication and imagination), with the subscales being summed to provide an overall score (Baron-Cohen et al., 2001). The original authors suggested a score of ≥ 32 indicated the likely presence of autism (Baron-Cohen et al., 2001), but scores ≥ 26 are also considered clinically significant (Woodbury-Smith et al., 2005). Internal consistency (calculated from all individual items) for AQ total score in this study was excellent, Cronbach's $\alpha=0.887$.

Self-Compassion Scale. The Self-Compassion Scale (SCS; Neff, 2003) is a 26-item self-report questionnaire comprised of six subscales (self-kindness, self-judgement, common humanity, isolation, mindfulness and over-identification), with the overall self-compassion score calculated as the sum of the subscales (Neff, 2003). Compassionate and uncompassionate self-responding were also calculated by adding the relevant subscale scores: *compassionate self-responding* (sum score of self-kindness, common humanity and mindfulness) and *uncompassionate self-responding* (sum score of self-judgement, isolation and over-identification). Internal consistency for total self-compassion

($\alpha=0.933$), compassionate self-responding ($\alpha=0.925$) and uncompassionate self-responding ($\alpha=0.924$) were each deemed to be excellent.

Hospital Anxiety and Depression Scale. The Hospital Anxiety and Depression Scale (HADS; Zigmond & Snaith, 1983) consists of 14 items – seven measuring anxiety and seven measuring depressive symptoms. The questionnaire is designed to assess an individual's mental state over the previous 2 weeks, and is frequently used as a screening tool for anxiety and depression. The HADS was chosen for this study because it has been shown to be a reliable and valid tool in autistic and non-autistic populations (Boc er an & Dupret, 2014; Uljarevi  et al., 2018). A score of ≥ 11 indicates the probable presence of a clinically meaningful anxiety or depressive condition. Internal consistency for the subscales used in this study was as follows: anxiety symptoms, $\alpha=0.834$ and depressive symptoms, $\alpha=0.830$.

Procedure and data analysis

Data were collected with an online self-report questionnaire hosted by Qualtrics and analysed using IBM SPSS version 25. We initially examined the associations between autistic traits and self-compassion in males and females using Pearson's correlation, and then compared the resulting slopes via Fisher's r -to- z transformation. The latter works by computing z -scores from the correlation coefficients and comparing these across the two analyses (Silver & Dunlap, 1987). We then tested two mediation models with autistic traits (AQ total score) as predictor, self-compassion (SCS total score) as mediator, and depressive (HADS depression subscale) and anxious (HADS anxiety subscale) symptoms as outcomes. We further examined self-compassion as a possible mediator of the association between autistic traits and anxious/depressive symptoms by focusing on specific indirect effects of compassionate and uncompassionate self-responding in a multiple mediation analysis. We used Preacher and Hayes' (2008) bootstrapping method to calculate the direct and indirect effects (Figure 1) and specified 5000 bootstrap resamples. To determine the statistical significance of the indirect effect, 95% confidence intervals (CIs) were obtained. If the CIs do not contain zero, then the indirect effect is considered significant at the $p < 0.05$ level (Preacher & Hayes, 2008).

Results

Preliminary analyses

Table 1 presents participant characteristics, including the mean values, standard deviations and range for each study variable. An independent samples t -test revealed higher AQ scores in males ($M=21.36$, $SD=8.08$) compared to females ($M=19.00$, $SD=6.84$), $t(162)=2.023$, $p=0.045$,

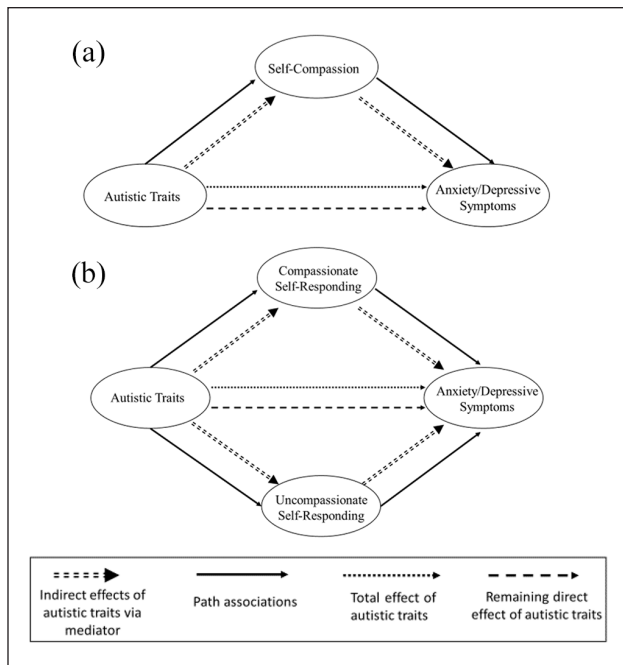


Figure 1. Mediation model of the effect of autistic traits on anxiety/depressive symptoms through (a) total self-compassion, and (b) compassionate and uncompassionate self-responding.

$d=0.32$. However, there were no significant sex differences for depressive symptoms, anxiety symptoms, total self-compassion score, compassionate self-responding, uncompassionate self-responding, or the six individual SCS subscales of self-kindness, self-judgement, common humanity, isolation, mindfulness and over-identification.

Association between autistic traits and self-compassion in males and females

Hypothesis 1. Autistic traits would be negatively associated with total self-compassion and the compassionate self-responding subscale, and positively associated with the uncompassionate self-responding subscale, and that all three associations would be evident in both males and females, **but moderated by sex.**

A Pearson's correlation test determined that total AQ score was significantly negatively correlated with total SCS score, $r(162)=-0.458$, $p<0.001$. Furthermore, a Fisher's r -to- z transformation determined that the correlation was significantly stronger in males $r(67)=-0.593$, $p<0.001$ than females $r(93)=-0.321$, $p=0.002$, $z=-2.17$, $p=0.03$, two-tailed (Figure 2).

Pearson's correlations for all scales are presented in Table 2. As predicted, total AQ score was negatively correlated with compassionate self-responding ($r(162)=-0.433$, $p<0.001$)

and positively associated with uncompassionate self-responding ($r(162)=0.337$, $p<0.001$). To counteract the problem of multiple comparisons, the p -values reported in Table 2 are adjusted using Holm's (1979) procedure.

Sex differences in the correlations between autistic traits and the individual self-compassion subscales were then examined (Table 3). A Fisher's r -to- z test determined that the slopes for the association between autistic traits and uncompassionate self-responding were significantly different between males and females, with a stronger association present in males. No significant sex difference was observed for the association between autistic traits and compassionate self-responding. When considering the six SCS subscales, a significantly stronger (negative) association was found in males compared to females for the association between autistic traits and self-kindness, as well as significantly stronger (positive) associations in males for all three negative scales (i.e. self-judgement, isolation and over-identification).

Self-compassion as a mediator between autistic traits and depressive symptoms

Hypothesis 2. Total self-compassion, compassionate self-responding and uncompassionate self-responding will mediate the previously established positive association between autistic traits and anxious/depressive symptoms.

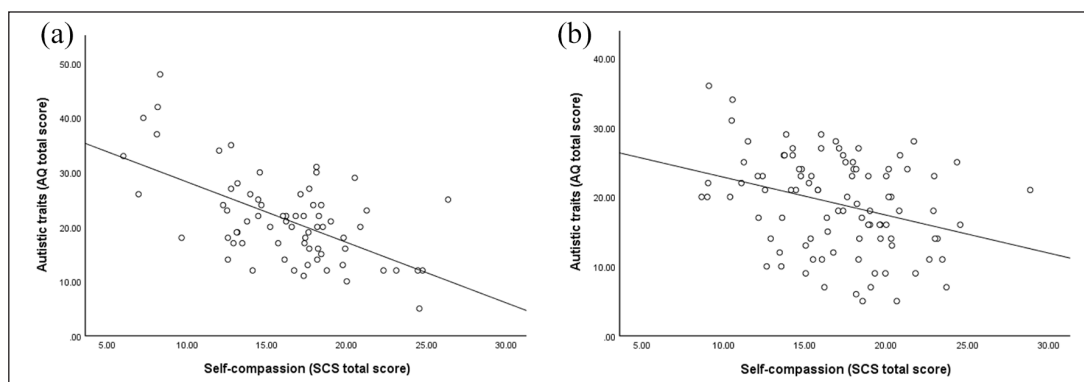
The first mediation model ($N=164$) investigated self-compassion as a mediator between autistic traits and depressive symptoms. The overall model fit was significant $F(2, 161)=47.526$, $p<0.001$, with an adjusted R^2 of 0.37, indicating that 37% of the variance in depressive symptoms was predicted by autistic traits and self-compassion. As shown in Figure 3, the results for the indirect effect of autistic traits on depressive symptoms was statistically significant ($ab=0.13$, 95% CI [(0.0766, 0.1757)]), with 41.9% of the relationship between autistic traits and depressive symptoms being explained through the mediating effect of self-compassion. However, there remained a direct effect of autistic traits on depressive symptoms independent of self-compassion ($c'=0.18$, $p=0.001$), suggesting partial mediation.

The second mediation model ($N=164$) investigated self-compassion as a mediator between autistic traits and anxiety symptoms. This model was statistically significant $F(2, 161)=35.244$, $p<0.001$, adjusted $R^2=0.31$, indicating that 31% of the variance in anxiety symptoms was predicted by variation in autistic traits and self-compassion. The indirect effect on anxiety symptoms was significant, ($ab=0.14$, 95% CI [0.0829, 0.1981]), with 50% of the relationship between autistic traits and anxiety being explained through self-compassion. The direct effect of autistic traits on anxiety

Table 1. Participant characteristics for the overall sample and stratified by sex.

	Males (<i>n</i> = 69)	Females (<i>n</i> = 95)	Total sample (<i>N</i> = 164)
Participant characteristics			
Age <i>M</i> , <i>SD</i> (range)	22.50, 7.18 (18–31)	23.64, 8.23 (18–51)	23.16, 7.81 (18–51)
Ethnicity <i>n</i> (%)	White = 60 (87) Indian = 6 (9) African = 2 (3) Mixed White/Asian = 1 (1)	White = 82 (86) Indian = 8 (9) Pakistani = 2 (2) Mixed White/Asian = 2 (2) Mixed White/Black African = 1 (1)	White = 142 (87) Indian = 14 (9) Mixed White/Asian = 3 (2) African = 2 (1) Pakistani = 2 (1) Mixed White/Black African = 1 (1)
Self-reported autism diagnosis <i>n</i> (%)	0 (0)	1 (1)	1 (1)
No current autism diagnosis, but the participant suspects that they are autistic <i>n</i> (%)	1 (1)	2 (2)	3 (2)
AQ scores ≥ 26 <i>n</i> (%)	14 (20)	32 (34)	46 (28)
AQ scores ≥ 32 <i>n</i> (%)	7 (10)	2 (2)	9 (5)
Depressive symptoms ≥ 11 <i>n</i> (%)	34 (49)	34 (36)	68 (41)
Anxiety symptoms ≥ 11 <i>n</i> (%)	41 (59)	41 (43)	82 (50)
Study variables <i>M</i>, <i>SD</i> (range)			
Total AQ score	21.36, 8.08 (43.00)	19.00, 6.84 (31.00)	20.00, 7.45 (43.00)
Total self-compassion score	16.19, 4.31 (20.35)	17.03, 4.01 (20.20)	16.68, 4.15 (22.85)
Compassionate self-responding	8.77, 2.52 (10.65)	9.07, 2.34 (11.80)	8.94, 2.42 (11.80)
Uncompassionate self-responding	7.43, 2.36 (10.95)	7.97, 2.64 (11.10)	7.74, 2.53 (11.10)
Self-kindness	2.77, 0.82 (4.00)	2.90, 0.84 (4.00)	2.84, 0.83 (4.00)
Self-judgement	2.50, 0.81 (4.00)	2.63, 0.95 (4.00)	2.57, 0.89 (4.00)
Common humanity	3.00, 0.99 (4.00)	3.06, 0.94 (4.00)	3.04, 0.96 (4.00)
Isolation	2.50, 0.89 (4.00)	2.67, 0.98 (4.00)	2.60, 0.95 (4.00)
Mindfulness	3.00, 0.90 (4.00)	3.11, 0.85 (4.00)	3.01, 0.87 (4.00)
Over-identification	2.42, 0.92 (4.00)	2.67, 0.92 (4.00)	2.57, 0.92 (4.00)
Anxiety symptoms	10.99, 4.62 (21.00)	10.24, 4.77 (21.00)	10.54, 4.71 (21.00)
Depressive symptoms	10.25, 2.92 (16.00)	9.67, 2.95 (16.00)	9.91, 2.94 (17.00)

M: mean; *SD*: standard deviation; AQ: Autism Spectrum Quotient.

**Figure 2.** Association between AQ (total) and SCS (total) in males (a) and females (b).

symptoms was also significant, ($c' = 0.14$, $p = 0.008$), indicating partial mediation (Figure 3).

To assess the specific indirect effects of compassionate and uncompassionate self-responding, we conducted two multiple mediation analyses (Figure 4). The first examined the relationship between autistic traits and depressive symptoms. The combined indirect effect of compassionate and

uncompassionate self-responding was significant $F(3, 160) = 31.821$, $p < 0.001$, adjusted $R^2 = 0.37$, and therefore indicated that the relationship was explained by the set of mediators as a whole. To determine whether either individual variable significantly mediated the association between AQ and depressive symptoms, the specific indirect effects were then examined. Significant indirect effects were

Table 2. Mean values, standard deviations and intercorrelations for study variables.

Variable	Depressive symptoms	Anxiety symptoms	Total AQ	Total SCS	Self-kindness	Self-judgement	Common humanity	Isolation	Mindfulness	Over-identification	Compassionate self-responding
Anxiety	0.75**										
Total AQ	0.48**	0.40**									
Total SCS	-0.56**	-0.52**	-0.46**								
Self-kindness	-0.42**	-0.38*	-0.36*	0.78**							
Self-judgement	0.43**	0.40**	0.27*	-0.79**	-0.41**						
Common humanity	-0.42**	-0.40**	-0.42**	0.73**	0.70**	-0.32*					
Isolation	0.48**	0.42**	0.30*	-0.78**	-0.40**	0.74**	-0.33*				
Mindfulness	-0.39*	-0.38*	-0.40**	0.76**	0.79**	-0.33*	0.75**	-0.32*			
Over-identification	0.42**	0.42**	0.36*	-0.77**	-0.32*	0.80**	-0.27*	0.75**	-0.36*		
Compassionate self-responding	-0.45**	-0.42**	-0.43**	0.83**	0.90**	-0.39*	0.90**	-0.38*	0.93**	-0.34*	
Uncompassionate self-responding	0.48**	0.45**	0.34*	-0.85**	-0.41**	0.92**	-0.33*	0.91**	-0.37*	0.92**	-0.40**

AQ: Autism Spectrum Quotient; SCS: Self-Compassion Scale.

* $p < 0.05$; ** $p < 0.01$.

observed for both compassionate ($ab=0.06$, 95% CI [0.0074, 0.1083]) and uncompassionate self-responding ($ab=0.07$, 95% CI [0.0282, 0.1088]). The second multiple mediation analysis examined the association between autistic traits and anxiety symptoms. A significant combined indirect effect of compassionate and uncompassionate self-responding was observed, $F(3, 160)=23.522$, $p < 0.001$, adjusted $R^2=0.31$, indicating that the relationship was explained by the set of mediators. Further analysis revealed significant indirect effects for both compassionate self-responding ($b=0.06$, 95% CI [0.0138, 0.1241]) and uncompassionate self-responding ($b=0.07$, 95% CI [0.0243, 0.1240]).

Discussion

To our knowledge, this is the first study to examine the mediating role of self-compassion on the relationship between autistic traits and anxious and depressive symptoms. The findings support our first hypothesis; autistic traits are negatively correlated with self-compassion and this relationship was moderated by sex. We also found support for our second hypothesis: self-compassion is a partial mediator in the previously established positive relationship between autistic traits and anxiety/depressive symptoms. Although preliminary, the current findings suggest that self-compassion could potentially serve as a target for clinical intervention in individuals with elevated autistic traits who experience anxiety and/or depression.

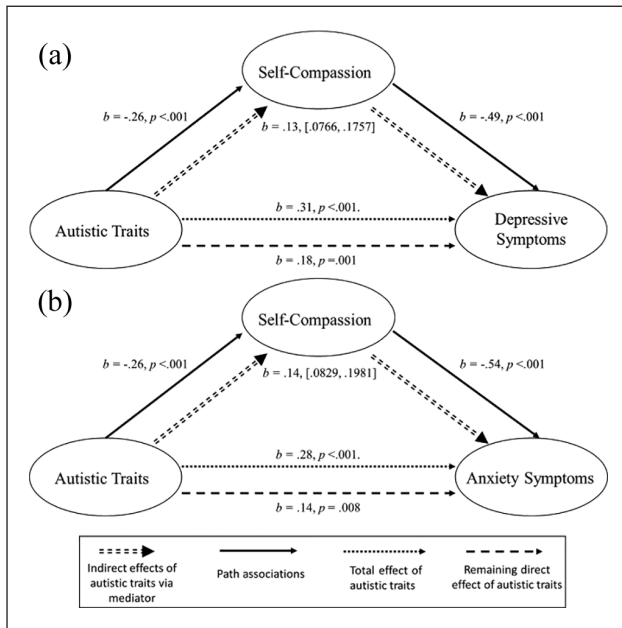
The finding of a negative association between autistic traits and self-compassion suggests that individuals with elevated autistic traits may have limited self-compassion capabilities. This insight is relevant to clinicians working with anxious and/or depressed patients with elevated autistic traits, for example, when providing psychoeducation to patients and families and/or when considering suitable treatment options. The mediation analyses revealed that the partially mediating role of self-compassion in the autistic traits and anxiety/depression pathway operates roughly equally through both compassionate and uncompassionate self-responding. This suggests a need to both increase compassionate self-responding and decrease uncompassionate self-responding when designing targeted interventions for reducing anxious/depressive symptoms in individuals with elevated autistic traits. Indeed, the inclination for clinicians working with such patients could be to focus on reducing the negative behaviours with which the patient presents (e.g. self-destructive behaviours), and this could inform discussions and treatment planning. This may additionally be true of the patient's family or significant others, who may also be focused on reducing or eradicating negative behaviours.

The findings of this study suggest that an equivalent therapeutic benefit could be possible through a combined effort of increasing positive self-responding (i.e. increasing

Table 3. Pearson's correlations and Fisher's *r*-to-*z* tests (two-tailed) for associations between autistic traits and self-compassion scales stratified by sex.

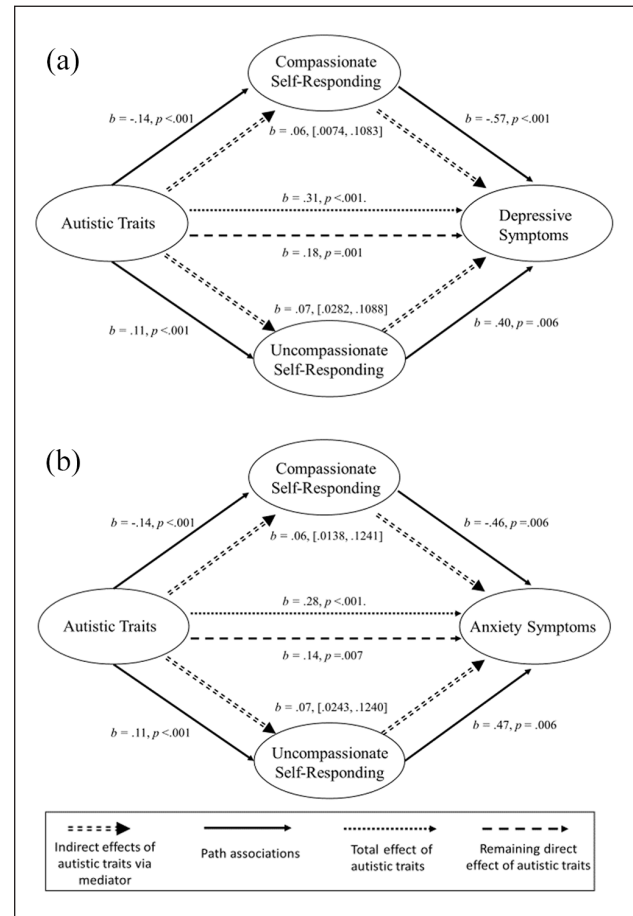
	Total SCS	Compassionate self-responding	Uncompassionate self-responding	Self-kindness	Self-judgement	Common humanity	Isolation	Mindfulness	Over-identification
Male Pearson's <i>r</i>	-.59**	-.515**	0.531**	-.050**	0.50**	-.048**	0.43**	-.047**	0.51**
Female Pearson's <i>r</i>	-.032**	-.0352**	0.175*	-.023**	0.092	-.036**	0.19*	-.034**	0.20*
Fisher's <i>r</i> -to- <i>z</i> (<i>z</i>)	-2.15*	0.105	-2.571**	-1.95*	2.85**	-0.91	1.67*	-0.97	2.23*

* $p < 0.05$; ** $p < 0.01$.

**Figure 3.** Partial mediation effect of self-compassion on the associations between autistic traits and (a) depressive symptoms and (b) anxiety symptoms.

mindfulness, self-kindness and common humanity) and reducing negative self-responding (i.e. decreasing over-identification, self-judgement and isolation). For example, an unbalanced focus on the negative (what you are doing wrong and needs to be reduced) and not the positive (what can be increased to make you feel better) may cause further deliberation on perceived limitations (i.e. over-identification over mindfulness), increased self-criticality (i.e. self-judgement over self-kindness) and a reduced belief that we all make mistakes (i.e. isolation over common humanity). It may also influence other known mediators of the relation between autistic traits and psychopathological outcomes, such as reinforcing the belief that other people do not understand them, and increasing feelings of non-acceptance, perceived burdensomeness and thwarted belonging, which, as previously mentioned, are all potential risk factors for anxiety, depression and suicidality (Cage et al., 2018; Pelton & Cassidy, 2017).

As a first step in the investigation of autistic traits, self-compassion and anxious/depressive symptoms, it seemed

**Figure 4.** Mediation model of (a) autistic traits and depressive symptoms and (b) autistic traits and anxiety symptoms through compassionate and uncompassionate self-responding.

appropriate to consider self-compassion as a unidimensional construct when investigating its association with autistic traits. This is why this study considered self-compassion as a higher-order construct before examining it in terms of a more nuanced two-factor structure. Such an approach is strengthened by studies which show a simultaneous increase in the positive and decrease in the negative subscales of self-compassion (Halámová et al., 2020; Krieger et al., 2016). However, although some individuals (e.g. autistic people) may not exhibit the same theorised combinations of self-compassion components as found in

our undergraduate student sample, the findings of this study do support Neff's proposition that a self-compassionate frame of mind is an interactive and synergistic system that influences outcomes through both a positive and negative pole (Neff, 2016).

The strength of association between autistic traits and self-compassion differed significantly between males and females. There are several reasons to expect a stronger association between AQ and SCS scores in males. First, it could be that the observed differences are reflective of a systematic male bias in the measures used, and, as previously mentioned, this has been a target for criticism particularly in the autism literature (e.g. Van Wijngaarden-Cremers et al., 2014). However, it could equally be argued that the findings are reflective of a sex difference in the associations between males and females on these measures. This is supported by research which found that correlations between self-compassion and mental illness were stronger in males compared to females (Neff & Pommier, 2013), as well as research showing that self-compassion had a greater protective effect on anxiety for males than for females (Bluth et al., 2017). The findings of our study are therefore reflective of a wider pattern of results in the literature, with sex differences being found in the associations between self-compassion and a range of psychopathological outcomes.

Further investigation is required to consider whether the sex difference observed in the general population (i.e. slightly higher on average self-compassion in males than females; Yarnell et al., 2015) also exists in autistic populations. Although speculative at this point, if this sex difference does exist, then self-compassion could be one mechanism, in part, which helps to explain earlier presentation and diagnosis of autism in males. For example, high self-compassion involves a greater understanding, expression and verbalisation of the challenges faced (Neff, 2003), as well as reductions in perceived public and anticipated stigma of seeking help (Heath et al., 2018). Self-compassion could therefore increase help seeking behaviours in autistic people and/or result in autistic symptomatology being more evident to social contacts (e.g. family, friends and teachers) and at an earlier stage of development for males compared to females. If the predicted associations between self-compassion and masking/help-seeking behaviours do exist, this could suggest an important role for self-compassion interventions given the previously established associations between autistic traits, camouflaging/help-seeking, and anxiety, depression and suicidality (e.g. Cassidy et al., 2020; Somerville et al., 2019).

Self-compassion is a relatively new area of research in psychology, spanning less than a couple of decades, and largely dominated by the Neff (2003) model thus far. As the area expands and more measures of self-compassion are developed, self-compassion in autistic populations can be better understood. Research suggests that autistic people may interpret measures/wording of questions

differently than non-autistic people (Cassidy et al., 2018; Pelton et al., 2020), highlighting the need to investigate whether specific self-compassion measures will need to be developed for use with autistic populations. However, these concerns may be unfounded, as the SCS has shown to be a reliable and valid scale in clinical and non-clinical samples (e.g. Castilho et al., 2015; Neff, 2016), and a number of other psychological measures, including the AQ and the HADS, have shown to be suitable for use in both autistic and non-autistic populations (Baron-Cohen et al., 2001; Uljarević et al., 2018). Either way, if the relationships observed in this study between autistic traits, self-compassion and psychopathology are also found in autistic people, future studies could then investigate the psychometric properties of the SCS to confirm if it is a reliable and valid measure for use in autistic samples.

A recent meta-analysis of available randomised controlled trials on self-compassion interventions showed significant improvements across a range of psychological outcomes, including stress, self-criticism, anxiety and depression (Ferrari et al., 2019). However, no studies to date have specifically looked at self-compassion as a possible underlying mechanism in the treatment process for people with elevated autistic traits or people with a diagnosis of autism. Despite this, several mindfulness and acceptance-based intervention studies have supported the efficacy of compassion training in lessening anxious/depressive symptoms in autistic populations (e.g. Singh et al., 2011a, 2011b; Spek et al., 2013), suggesting that self-compassion could play a role in the treatment process. For example, Spek et al. (2013) found a significant reduction in anxiety, depression and rumination in autistic adults following a 9-week mindfulness-based therapy. Furthermore, in non-autistic adults, simultaneous improvements in positive and negative aspects of self-compassion have been reported in a variety of interventions, including compassion-focused therapy (Beaumont et al., 2016), acceptance and commitment therapy (Yadavaia et al., 2014), affect training (Hildebrandt et al., 2017) and mindfulness-based self-compassion training (Duarte & Pinto-Gouveia, 2017).

Research on emotion differentiation has found that autistic and non-autistic individuals with elevated autistic traits make less subtle distinctions between negative emotions than do neurotypical individuals (Erbas et al., 2013; Huggins et al., 2019). Emotion differentiation refers to the ability to make fine-grained, nuanced distinctions between similar emotions, with lower emotion differentiation linked to poorer well-being (Smidt & Suvak, 2015). A recent study of psychotherapy clients (Galil-Weinstock et al., 2019) showed that those with relatively high levels of self-compassion were better at distinguishing between negative (but not positive) emotional states, and a study conducted at a Stress Clinic in Belgium (Van der Gucht et al., 2019) reported that a mindfulness-based

intervention led to a significant improvement in negative emotion differentiation at 4-month follow-up.

Considering the above observations, it is possible that emotion differentiation moderates the self-compassion mediation pathway, that is, a bi-directional relationship may exist in which self-compassion training improves emotion differentiation and emotion differentiation improves the ability to be self-compassionate. Emotions are experienced by some individuals in a granular manner and described using discrete emotional terms (e.g. 'worried', 'afraid' or 'upset'), whereas for other people, emotions are more abstract and described in more general terms (e.g. 'good' and 'bad') (Galili-Weinstock et al., 2020). Therefore, individuals high in autistic traits who can identify and articulate their feelings with greater precision (e.g. 'I am not flustered, I am not embarrassed, but I am ashamed') will also have enhanced capabilities to reflect on, make sense of, and deal with, negative thoughts, feelings and emotions. This can result in greater self-compassion, and, in clinically anxious/depressed individuals, could improve the clinician–patient relationship by allowing more productive and dynamic discussions around emotional experiences. In addition, a study by Israelashvili et al. (2019) showed that improvements in emotion differentiation are also related to improved recognition of other peoples' emotions. A key point here is that self-compassion *can be learned* (Neff et al., 2018), and learning to be more self-compassionate enables people to be more self-aware and better able to distinguish between their own and others' thoughts, feelings and emotions. Future research should therefore investigate possible mechanisms that contribute to poor emotion differentiation in individuals with elevated autistic traits (e.g. differences in processing/perception, alexithymia and/or cognitive inflexibility) and their possible links with self-compassion.

Given the high rates of anxiety and depression found in autistic people (Hollocks et al., 2019), future research should prioritise extending this study to a clinical sample of autistic people. It should be noted that there are several unmeasured variables in this study which could explain the relationships observed and are highly relevant to difficulties related to autism (e.g. sensory insensitivities or emotion regulation styles). Future research on autistic populations would therefore benefit from including these and additional measures to determine how self-compassion relates to other possible mediators between autistic traits and psychopathology.

In addition to the need to investigate these relationships in autistic people, future research could also recruit samples from more divergent groups in the general population. Indeed, the meta-analysis by Yarnell et al. (2015) revealed that a larger sex difference in self-compassion is present in more ethnically diverse samples. Another important factor is age. Bluth et al. (2017), in a middle- and high-school student population ($N=765$), found that older females (high-school age) had lower self-compassion than younger females

(middle-school age) and all-age males. This may therefore suggest that early intervention with females is important, as it could help protect against future anxiety that is mediated by the age-related decrease in self-compassion.

We had a relatively young sample ($Mean\ age=23.16$ years, $SD=7.809$) taken from an undergraduate student population of predominantly White ethnicity. This limits generalisability of the findings to the wider population, and possibly to autistic individuals. However, as autism may be under-diagnosed in females (Giarelli et al., 2010; Rutherford et al., 2016) and females typically report higher rates of anxious/depressive disorders (Eid et al., 2019), this is a group at high risk for low self-compassion and poor mental health. Another limitation of the present research is its cross-sectional nature. Future research should adopt longitudinal designs before causality can be inferred in regard to the observed mediations found in this study.

Interestingly, this study had a high percentage of participants who reached clinically relevant cut-off scores on the AQ ($\geq 26=28\%$), as well as the HADS subscales (anxiety: 50%, depression: 41%). A potential explanation for this is that the institution from which our sample was drawn is a post-92 (old polytechnic) university which recruits a high proportion of students from low socio-economic backgrounds living in the poorest areas of the West Midlands, UK. This could explain why the scores are higher than other similar studies adopting these measures. For example, Pelton and Cassidy (2017) measured AQ in a student and general population sample and found that 16% reported clinically relevant AQ scores, and a study by Akram et al. (2019) administered the HADS to a sample of students in the UK and reported anxiety and depressive symptoms at 36% and 13%, respectively. Furthermore, the AQ data from the present research are more in line with recent findings from a clinical sample of individuals experiencing a first episode of psychosis (Chisholm et al., 2019: $M=20.8$, $cases \geq 26=29\%$). It could therefore be argued that the high scores reported in this study may reduce generalisability to the general population and/or improve the generalisability to clinically anxious and/or depressed populations with elevated autistic traits.


Conclusion and implications

Although preliminary, this study presents the first evidence that self-compassion mediates the previously established association between autistic traits and anxious/depressive symptoms in non-autistic adults. It provides a foundation for future work in this area and underlines the need for clinicians to be aware of how elevated autistic traits and low levels of self-compassion translate into anxiety and depressive symptomatology. A greater understanding of these relationships could improve treatment for anxious and depressive disorders in people with and without a diagnosis of autism.

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