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Self-reported cognitive inflexibility mediates autistic traits and anxiety

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Abstract

Autistic traits are dimensionally distributed in adulthood and are associated with elevated anxiety, including in non-clinical populations. This study examined whether self-reported cognitive inflexibility partially mediates the association between autistic traits and anxiety in 108 non-clinical adults. Participants completed self-report measures of autistic traits, anxiety, and detail- and flexibility-related cognitive style. Autistic traits were positively associated with anxiety (r = .68, p < .001) and DFlex Inflexibility (r = .65, p < .001), and DFlex Inflexibility was positively associated with anxiety (r = .69, p < .001). The primary mediation model indicated a significant indirect effect of autistic traits on anxiety through DFlex Inflexibility, while the direct effect remained significant, supporting partial mediation. The indirect pathway accounted for 39.9% of the total effect. Secondary exploratory models using DFlex Attention to Detail and DFlex total score also showed significant indirect effects, accounting for 50.5% and 59.0% of the total effect, respectively. Given the cross-sectional design and exclusive reliance on self-report measures, findings should not be interpreted as evidence of causal mediation. Results suggest that perceived cognitive inflexibility may be one relevant mechanism linking autistic traits and anxiety in non-clinical adults, while broader DFlex-related characteristics may also contribute to this association.

1. Introduction

Autism spectrum disorder (ASD) is defined in the DSM-5-TR as involving persistent differences in social communication and interaction, together with restricted and repetitive patterns of behaviour, interests, or activities [1]. Beyond categorical diagnosis, autistic traits are dimensionally distributed in adulthood and may be present, to varying degrees, in individuals with and without a formal autism diagnosis [2, 3]. This dimensional perspective is particularly relevant to the broader autism phenotype (BAP), which refers to subclinical autistic-like characteristics that do not necessarily meet diagnostic criteria but may nevertheless be associated with psychological distress, including anxiety symptoms [4]. Accordingly, studying autistic traits in non-clinical adults can complement research with clinically diagnosed autistic adults by clarifying whether psychological mechanisms observed in clinical populations are also detectable across the broader autism-trait continuum.

In adulthood, autistic traits and autism diagnosis are consistently associated with elevated anxiety and other co-occurring mental-health difficulties [5, 6]. In a meta-analysis of autistic adults, the pooled prevalence of any anxiety condition was estimated at approximately 27% for current anxiety and 42% for lifetime anxiety, while depression was estimated at approximately 23% current and 37% lifetime [7]. Anxiety may involve generalized worry, social anxiety, specific fears, panic symptoms, avoidance, and heightened distress in uncertain or socially demanding situations. This is particularly relevant because anxiety can interfere with participation in education, employment, relationships, and access to support [6, 7].

Several proximal mechanisms may help explain why adults with elevated autistic traits report greater anxiety. Difficulties anticipating and managing social situations, adapting to routine changes, or coping with unpredictable demands have been associated with heightened anxious arousal [8]. Sensory hyper-responsivity may also increase vigilance, avoidance, and distress in complex or changing environments, particularly when combined with intolerance of uncertainty [9, 10]. Recent models further suggest that anxiety in autistic adults is associated with multiple interacting factors, including intolerance of uncertainty, alexithymia, sensory processing differences, and emotion-regulation difficulties [11]. Nevertheless, these explanatory mechanisms remain insufficiently specified, particularly in non-clinical adult samples.

Anxiety in autism and elevated autistic traits is multifactorial and likely arises from partially overlapping pathways. Intolerance of uncertainty has received particular attention, as it is consistently associated with anxiety and with insistence on sameness, suggesting that difficulty tolerating unpredictable outcomes may be central to anxious distress [12–14]. Sensory differences may further increase anxiety by making everyday environments more demanding and by promoting vigilance or avoidance [10, 12]. Social camouflaging may also contribute to anxiety through sustained cognitive and emotional effort in social contexts [15, 16]. Other cognitive-affective processes, including alexithymia, emotion-regulation difficulties, dichotomous thinking, and repetitive or restricted behaviours, have also been implicated in anxiety among autistic adults or individuals with elevated autistic traits [11, 17]. Although these mechanisms are distinct, they share a common relevance to adaptation under uncertainty, novelty, or changing contextual demands.

Against this background, cognitive inflexibility is a theoretically relevant candidate mechanism. Cognitive inflexibility can be defined as difficulty shifting rules, attentional focus, strategies, or behavioural responses when contextual demands change [18, 19]. In everyday life, such difficulties may be expressed as distress when routines are disrupted, difficulty generating alternative responses, perseveration, or reduced adaptation to unexpected events [20, 21]. In adults with elevated autistic traits, self-reported inflexibility may be associated with anxiety because it can constrain coping repertoires and increase perceived threat or loss of control when situations are novel, ambiguous, or unpredictable [14]. Recent meta-analytic evidence indicates small-to-moderate cognitive-flexibility difficulties in autistic people across the lifespan, although findings are heterogeneous and depend on task type and outcome measures [22]. This heterogeneity is important because everyday inflexibility and performance-based set-shifting tasks may not capture the same construct [20, 23].

In sum, elevated autistic traits in adulthood are associated with greater anxiety, yet the psychological processes underlying this association remain incompletely specified [6, 7]. Cognitive inflexibility is a plausible candidate mechanism because it is closely related to adaptation under changing or uncertain demands and has been identified as a relevant feature in autism research [19, 22]. However, further evidence is needed in non-clinical adult samples, particularly using dimensional approaches that examine autistic traits across the general population.

The primary objective of the present study was to examine, in a non-clinical adult sample, whether self-reported cognitive inflexibility partially mediates the association between autistic traits and anxiety. We hypothesized that autistic traits would be positively associated with anxiety and with self-reported cognitive inflexibility, and that cognitive inflexibility would be positively associated with anxiety. We further expected a significant indirect association between autistic traits and anxiety through cognitive inflexibility, while acknowledging that the cross-sectional design does not allow causal or temporal conclusions. As an exploratory descriptive aim, we also examined whether participants meeting criteria for the BAP showed higher levels of anxiety and inflexibility than non-BAP participants

2. Method

2.1 Participants

A total of 108 adults from the general population in Spain were recruited using non-probability convenience sampling.

The final sample comprised 40 males (37.0%), 67 females (62.0%), and one participant who identified as another gender (0.9%). The mean age was 34.9 years (SD = 13.7). Eight participants (7.4%) reported having a first-degree relative with an autism diagnosis. Table 1 summarizes the demographic characteristics of the total sample and, where applicable, the BAP-high and non-BAP groups.

Table 1
Demographic characteristics

Characteristic	**Total sample N = 108**	**Non-BAP N = 89**	**BAP-high N = 19**
Age, M (SD). range	34.9 (13.7), 18–84	35.7 (13.6), 18–70	31.1 (13.8), 18–84
Male, n (%)	40 (37.0)	27 (30.3)	13 (68.4)
Female, n (%)	67 (62.0)	62 (69.7)	5 (26.3)
Other gender, n (%)	1 (0.9)	0	1 (5.3)
First-degree relative with autism diagnosis, n (%)	8 (7.4)	5 (5.6)	3 (15.8)
- No	91 (84.3)	77 (86.5)	14 (73.7)
- I do not know	9 (8.3)	7 (7.9)	2 (10.5)

Note. BAP = broad autism phenotype. Percentages are calculated within each group. “I do not know” refers to participants who were unsure whether they had a first-degree relative with an autism diagnosis.

Participants were classified according to the broad autism phenotype (BAP) using the Broad Autism Phenotype Questionnaire (BAPQ). Following the sex-specific cut-off scores proposed by Sasson et al. [24], participants were classified as BAP-high when their BAPQ total score was ≥ 3.17 for males and ≥ 3.55 for females. Nineteen participants (17.6%) met BAP-high criteria, whereas 89 participants (82.4%) were classified as non-BAP. Because published BAPQ cut-offs are sex-specific and no validated cut-off is available for participants identifying outside the binary categories, the participant who identified as another gender was retained in the full sample and classified for descriptive BAP grouping using the lower published cut-off. This classification was used only for exploratory descriptive purposes. Because of the small size of the BAP-high subgroup, subgroup analyses were considered exploratory and descriptive

2.2 Materials and procedures

Data were collected online using Google Forms (Google LLC). The survey included an information sheet, eligibility questions, informed consent, and the study questionnaires. Participation was voluntary and no compensation was offered. Before accessing the questionnaires, participants confirmed that they were at least 18 years old and provided informed consent. No identifying information was collected beyond the variables required for the study.

Autistic traits. Autistic traits were assessed using the Broad Autism Phenotype Questionnaire (BAPQ) [25]. The BAPQ includes 36 items rated on a six-point Likert-type scale ranging from 1 (“very rarely”) to 6 (“very often”). It yields a total score and three subscale scores: Aloofness, Pragmatic Language, and Rigidity. Higher scores

indicate higher levels of broad autism phenotype traits. In the present sample, internal consistency was α = .921 for the total score, α = .853 for Aloofness, α = .812 for Pragmatic Language, and α = .771 for Rigidity.

Anxiety. Anxiety was assessed using the Brief Inventory of Situations and Responses of Anxiety (ISRA-B) [26]. The ISRA-B includes 46 items rated on a five-point Likert-type scale ranging from 0 (“almost never”) to 4 (“almost always”). The instrument assesses anxiety responses across cognitive, physiological, and motor domains, and provides a total anxiety score. Higher scores indicate higher frequency or intensity of anxiety responses. In the present sample, internal consistency was α = 0.960 for the total score. No clinical diagnosis of anxiety was established in the present study; therefore, ISRA-B scores were interpreted dimensionally.

Cognitive flexibility/inflexibility. Cognitive inflexibility was assessed using the Detail and Flexibility Questionnaire (DFlex) [27]. The DFlex includes 24 items rated on a six-point Likert-type scale. It includes two subscales: Inflexibility and Attention to Detail. Higher scores indicate greater self-reported inflexibility or detail-focused cognitive style. The Inflexibility subscale was used as the primary mediator because it most directly corresponds to the theoretical construct of cognitive inflexibility examined in this study. The Attention to Detail subscale and the DFlex total score were examined in secondary sensitivity analyses to address the overlap between detail-focused processing, autistic traits, and anxiety. A Spanish version based on forward–backward translation was administered. Because this version has not yet been formally validated in Spanish-speaking adults, findings involving the DFlex should be interpreted with caution. Internal consistency was α = .921 and ω = .919 for the DFlex total score, α = .814 and ω = .832 for DFlex Inflexibility, and α = .880 and ω = .886 for DFlex Attention to Detail.

2.3 Statistical analysis

Analyses were conducted using jamovi 2.3.21. Descriptive statistics were computed for demographic variables and questionnaire scores. Means, standard deviations, ranges, and internal consistency indices were reported for the full sample. Where appropriate, descriptive statistics were also reported separately for the BAP-high and non-BAP groups.

Pearson correlations were computed to examine associations among autistic traits, anxiety, DFlex total score, DFlex Inflexibility, DFlex Attention to Detail, and age. Correlations were reported with 95% confidence intervals. Age was examined in preliminary correlation analyses. Mediation analyses were estimated as simple mediation models in the full sample, without covariates.

The primary mediation model was estimated in the full sample with autistic traits as the independent variable, self-reported cognitive inflexibility as the mediator, and anxiety as the dependent variable. The BAPQ total score was used as the indicator of autistic traits, the DFlex Inflexibility subscale as the primary mediator, and the ISRA-B total score as the anxiety outcome. Indirect effects were tested using 5,000 bootstrap resamples and 95% confidence intervals. Standardized coefficients, unstandardized indirect effects, direct effects, total effects, and the proportion mediated were reported. Evidence of mediation was interpreted as partial mediation when both the indirect and direct effects were statistically significant.

Because correlations in the present sample indicated strong associations involving both DFlex subscales, two additional exploratory mediation models were estimated using DFlex Attention to Detail and DFlex total score as alternative mediators. These analyses were conducted to assess whether the indirect association was specific

to self-reported inflexibility or reflected broader DFlex-related variance. Results from these secondary models were interpreted cautiously and were not treated as confirmatory.

Given the small size of the BAP-high subgroup, mediation analyses were not conducted separately in this subgroup. Instead, BAP-high and non-BAP participants were compared descriptively on autistic traits, anxiety, DFlex total score, DFlex Inflexibility, and DFlex Attention to Detail. Exploratory correlations within the BAP-high subgroup were reported only descriptively and interpreted cautiously.

Statistical assumptions were evaluated before interpreting the models. These included inspection of residual normality, linearity, heteroscedasticity, influential cases, and multicollinearity. Sensitivity analyses using HC3 robust standard errors were conducted when assumption violations were detected. Missing data were handled using listwise deletion when required for a given analysis. All tests were two-tailed, with $\alpha = .05$.

3. Results

3.1 Descriptive statistics and reliability

Descriptive statistics for demographic characteristics are presented in Table 1. The final sample included 108 adults from the general population in Spain, of whom 89 were classified as non-BAP and 19 as BAP-high. The mean age of the total sample was 34.9 years (SD = 13.7). The BAP-high group was descriptively younger than the non-BAP group and included a higher proportion of male participants. Because of the small size of the BAP-high group, subgroup comparisons were interpreted descriptively.

Descriptive statistics and internal consistency estimates for the main study variables are presented in Table 2. In the full sample, the mean BAPQ total score was 2.86 (SD = 0.55), the mean ISRA-B total score was 1.57 (SD = 0.68), and the mean DFlex total score was 3.29 (SD = 0.83). The BAP-high group showed higher mean scores than the non-BAP group on autistic traits, anxiety, DFlex total score, DFlex Inflexibility, and DFlex Attention to Detail.

Table 2
Descriptive statistics and internal consistency for the total sample and BAP groups

Measure	Total sample M (SD)	Non-BAP M (SD)	BAP-high M (SD)	α	ω
BAPQ total	2.86 (0.54)	2.62 (0.38)	3.76 (0.36)	.921	.926
BAPQ Aloofness	2.90 (0.67)	2.63 (0.47)	3.79 (0.56)	.853	.865
BAPQ Pragmatic Language	2.69 (0.61)	2.54 (0.45)	3.60 (0.37)	.812	.824
BAPQ Rigidity	2.89 (0.62)	2.67 (0.45)	3.81 (0.50)	.771	.773
ISRA-B total	1.57 (0.68)	1.43 (0.58)	2.20 (0.72)	.960	.962
DFlex total	3.29 (0.82)	3.10 (0.74)	4.17 (0.58)	.921	.919
DFlex Inflexibility	3.56 (0.81)	3.39 (0.75)	4.28 (0.65)	.814	.832
DFlex Attention to Detail	3.02 (0.95)	2.81 (0.86)	4.01 (0.70)	.880	.886

Note. BAP = broad autism phenotype; BAPQ = Broad Autism Phenotype Questionnaire; ISRA-B = Brief Inventory of Situations and Responses of Anxiety; DFlex = Detail and Flexibility Questionnaire. α = Cronbach's alpha; ω = McDonald's omega. Reliability coefficients are reported for the total sample. Subgroup values are reported descriptively because of the small size of the BAP-high group.

Internal consistency was acceptable to excellent for the main study measures. In the full sample, Cronbach's alpha values ranged from .771 to .960, and McDonald's omega values ranged from .773 to .962. Reliability was high for the BAPQ total score, ISRA-B total score, DFlex total score, DFlex Inflexibility, and DFlex Attention to Detail.

3.2 Correlations

Pearson correlations among age, autistic traits, anxiety, and DFlex scores are presented in Table 3. BAPQ total was strongly and positively correlated with ISRA-B total, DFlex total, DFlex Inflexibility, and DFlex Attention to Detail. ISRA-B total was also strongly and positively correlated with DFlex total and both DFlex subscales. The association between ISRA-B total and DFlex Attention to Detail was slightly stronger than the association between ISRA-B total and DFlex Inflexibility. Similarly, BAPQ total was strongly associated with both DFlex subscales.

Table 3

Correlations among age, autistic traits, anxiety, and DFlex scores

Variable	Age	BAPQ	ISRA	DFlex total	DFlex inflexibility	DFlex attention to detail
Age	-	-	-	-	-	-
BAPQ total	-0.121	-	-	-	-	-
ISRA-B total	-0.251**	0.683***	-	-	-	
DFlex total	-0.104	0.717***	0.762***	-	-	
DFlex inflexibility	-0.071	0.652***	0.686***	0.923***	-	
DFlex attention to detail	-0.119	0.686***	0.735***	0.944***	0.744***	

Note. BAPQ = Broad Autism Phenotype Questionnaire; ISRA-B = Brief Inventory of Situations and Responses of Anxiety; DFlex = Detail and Flexibility Questionnaire. *p < .05, ** p < .01, ***p < .001

Age was negatively correlated with ISRA-B total, indicating that younger participants tended to report higher anxiety. Age was not significantly associated with BAPQ total or DFlex scores. These results supported the primary mediation model using DFlex Inflexibility as the theoretically specified mediator, while also justifying secondary exploratory mediation models using DFlex Attention to Detail and DFlex total score as alternative mediators.

3.3 Primary mediation model: DFlex Inflexibility

The primary mediation model examined whether DFlex Inflexibility mediated the association between autistic traits and anxiety in the full sample. BAPQ total was positively associated with DFlex Inflexibility, B = 11.10, SE = 1.14, 95% CI [8.99, 13.43], z = 9.78, p < .001. In turn, DFlex Inflexibility was positively associated with ISRA-B total, B = 1.26, SE = 0.25, 95% CI [0.78, 1.74], z = 5.06, p < .001.

The indirect effect of BAPQ total on ISRA-B total through DFlex Inflexibility was significant, B = 14.00, SE = 3.38, 95% CI [8.00, 21.10], z = 4.15, p < .001. The direct effect of BAPQ total on ISRA-B total remained significant after including DFlex Inflexibility in the model, B = 21.10, SE = 4.97, 95% CI [10.64, 30.40], z = 4.24, p < .001. The total effect was also significant, B = 35.10, SE = 3.75, 95% CI [27.67, 41.80], z = 9.35, p < .001.

These findings indicate partial mediation. The indirect pathway through DFlex Inflexibility accounted for approximately 39.9% of the total association between autistic traits and anxiety, whereas the direct pathway accounted for 60.1%. Full estimates are presented in Table 4.

Table 4

Primary mediation model with DFlex Inflexibility as mediator

Type				95% C.I.				
	Effect	**Estimate**	**SE**	**Lower**	**Upper**	**z**	**p**	**% Mediation**
Indirect	BAPQ → DFlex Inflexibility → ISRA-B	14.00	3.38	8.00	21.00	4.15	< .001	39.9
Direct	BAPQ→ ISRA-B	21.10	4.97	10.64	30.40	4.24	< .001	60.1
Total	BAPQ → ISRA-B	35.10	3.75	27.67	41.80	9.35	< .001	100.0

Note. BAPQ = Broad Autism Phenotype Questionnaire; ISRA-B = Brief Inventory of Situations and Responses of Anxiety; DFlex = Detail and Flexibility Questionnaire. DFlex Inflexibility was entered as the mediator. Estimates are unstandardized. Confidence intervals are 95%.

Table 5

Secondary exploratory mediation models with DFlex Attention to Detail and DFlex total as mediators

Mediator					95% C.I.				
	Effect	**Path**	**Estimate**	**SE**	**Lower**	**Upper**	**z**	**p**	**% mediation**
DFlex Attention to Detail	Indirect	BAPQ→DFlex Attention to Detail → ISRA-B	17.70	3.19	11.84	24.50	5.56	< .001	50.5
DFlex Attention to Detail	Direct	BAPQ → ISRA-B	17.40	4.47	8.17	25.60	3.89	< .001	49.5
DFlex Attention to Detail	Total	BAPQ → ISRA-B	35.10	3.48	27.90	41.60	10.07	< .001	100
DFlex total	Indirect	BAPQ→DFlex total → ISRA-B	20.70	3.33	14.81	28.00	6.22	< .001	59.0
DFlex total	Direct	BAPQ→ ISRA-B	14.40	4.65	4.21	22.50	3.10	0.002	41.0
DFlex total	Total	BAPQ → ISRA-B	35.10	3.51	27.60	41.60	9.99	< .001	100.0

Note. BAPQ = Broad Autism Phenotype Questionnaire; ISRA-B = Brief Inventory of Situations and Responses of Anxiety; DFlex = Detail and Flexibility Questionnaire. Estimates are unstandardized. Models were estimated as exploratory simple mediation models in the full sample. Confidence intervals are 95%.

3.4 Secondary mediation models

Two secondary exploratory mediation models were estimated to examine whether the indirect association between autistic traits and anxiety was specific to DFlex Inflexibility or was also observed when using DFlex Attention to Detail and DFlex total score as alternative mediators.

In the model with DFlex Attention to Detail as mediator, BAPQ total was positively associated with DFlex Attention to Detail, $B = 13.66$, SE = 1.24, 95% CI [11.34, 16.17], $z = 10.98$, $p < .001$. DFlex Attention to Detail was also positively associated with ISRA-B total, $B = 1.30$, SE = 0.20, 95% CI [0.90, 1.67], $z = 6.65$, $p < .001$. The indirect effect was significant, $B = 17.70$, SE = 3.19, 95% CI [11.84, 24.50], $z = 5.56$, $p < .001$. The direct effect remained significant, $B = 17.40$, SE = 4.47, 95% CI [8.17, 25.60], $z = 3.89$, $p < .001$, indicating partial mediation. The indirect pathway accounted for approximately 50.5% of the total effect.

In the model with DFlex total score as mediator, BAPQ total was positively associated with DFlex total, $B = 24.76$, SE = 2.11, 95% CI [20.88, 29.22], $z = 11.73$, $p < .001$. DFlex total was positively associated with ISRA-B total, $B = 0.84$, SE = 0.11, 95% CI [0.63, 1.05], $z = 7.90$, $p < .001$. The indirect effect was significant, $B = 20.70$, SE = 3.33, 95% CI [14.81, 28.00], $z = 6.22$, $p < .001$. The direct effect remained significant, $B = 14.40$, SE = 4.65, 95% CI [4.21, 22.50], $z = 3.10$, $p = .002$, again supporting partial mediation. The indirect pathway accounted for approximately 59.0% of the total effect.

Overall, the secondary models showed significant indirect effects for both DFlex Attention to Detail and DFlex total score. The larger proportion mediated in the DFlex total model suggests that the association between autistic traits and anxiety may reflect broader DFlex-related variance rather than cognitive inflexibility alone. Therefore, these secondary models were interpreted as exploratory and complementary to the theoretically specified primary mediation model.

3.5 Exploratory BAP-high descriptive analyses

Given the small size of the BAP-high subgroup, no separate mediation models were estimated for this group. Instead, BAP-high and non-BAP participants were compared descriptively on the main study variables. As shown in Table 2, the BAP-high group showed higher mean scores than the non-BAP group on BAPQ total, ISRA-B total, DFlex total, DFlex Inflexibility, and DFlex Attention to Detail. These subgroup findings should be interpreted cautiously because of the small BAP-high sample size and the descriptive nature of the analysis. Accordingly, no inferential conclusions about mediation within the BAP-high subgroup were drawn.

4. Discussion

The aim of this study was to examine whether self-reported cognitive inflexibility partially mediated the association between autistic traits and anxiety in a non-clinical adult sample. The findings showed strong positive associations among autistic traits, anxiety, and DFlex scores. In the primary mediation model, DFlex Inflexibility partially mediated the association between autistic traits and anxiety, accounting for 39.9% of the total effect. Secondary exploratory models showed significant indirect effects for DFlex Attention to Detail and DFlex total score, accounting for 50.5% and 59.0% of the total effect, respectively. These findings suggest that self-reported inflexibility is one relevant candidate mechanism linking autistic traits and anxiety, while also indicating that this association may reflect broader DFlex-related characteristics rather than cognitive inflexibility alone.

The primary mediation model is consistent with previous evidence linking autistic traits to greater anxiety in adulthood [5, 6] and with research showing that cognitive flexibility difficulties are relevant in autism research [18–22]. From a cognitive perspective, inflexibility involves difficulty shifting rules, attentional focus, strategies, or behavioural responses when contextual demands change [17]. In everyday life, such difficulties may reduce the perceived ability to cope with unexpected events, changes in routine, ambiguous social demands, or competing information. In this sense, self-reported inflexibility may contribute to anxiety by limiting adaptive coping options and increasing distress when situations require flexible adjustment. However, given the cross-sectional design, these findings should be interpreted as evidence of an indirect statistical association, not as evidence of a causal pathway.

The exploratory models provide an important nuance. The indirect effect was not limited to the DFlex Inflexibility subscale; it was also observed for DFlex Attention to Detail and was largest when the DFlex total score was used as the mediator. This pattern suggests that the association between autistic traits and anxiety may not be explained by perceived inflexibility alone. Instead, it may reflect a broader detail-focused and inflexibility-related cognitive style captured by the DFlex. Attention to detail may contribute to anxiety when highly focused processing, difficulty disengaging from details, or strong preferences for precision and predictability increase distress in ambiguous or changing situations. However, because these secondary models were exploratory and no formal comparison between indirect effects was conducted, these findings should be interpreted cautiously.

The BAP-high subgroup showed descriptively higher scores on autistic traits, anxiety, DFlex Inflexibility, DFlex Attention to Detail, and DFlex total score than the non-BAP group. However, because of the small size of the BAP-high subgroup, no separate mediation model was estimated or interpreted. These subgroup findings should therefore be considered descriptive and preliminary. They suggest that adults meeting BAP criteria may report higher anxiety and DFlex-related difficulties, but no conclusions can be drawn about whether the mediating processes operate differently in this subgroup.

These findings are consistent with a multi-route framework of anxiety in autism and elevated autistic traits. Intolerance of uncertainty may increase distress in unpredictable contexts, sensory differences may heighten vigilance and avoidance, and social camouflaging may increase cognitive and emotional load [9–12]. Self-reported inflexibility and attention to detail may interact with these processes by limiting the ability to shift strategies, disengage from perceived inconsistencies, or tolerate ambiguity. Thus, DFlex-related characteristics should not be interpreted as the only pathway linking autistic traits and anxiety, but rather as one component within a broader network of cognitive-affective and contextual mechanisms.

An important consideration is that the DFlex is a self-report measure. Therefore, the present findings refer to perceived inflexibility and detail-focused cognitive style in everyday life, rather than to objective performance on executive-function tasks. Previous research has shown that subjective ratings of executive difficulties do not always align with performance-based measures, such as set-shifting tasks or the Wisconsin Card Sorting Test [20, 23]. This distinction is relevant because self-report measures may capture the perceived functional impact of rigidity or inflexibility in daily contexts, whereas laboratory tasks may capture more specific cognitive operations under structured conditions. Future studies should combine self-report and performance-based measures to clarify whether the indirect association observed here reflects subjective experience, objective flexibility difficulties, or both.

4.1 Implications and future directions

Although the present study was not designed to test intervention effects, the findings may inform future research on psychological support for adults with elevated autistic traits and anxiety. In particular, they suggest that perceived inflexibility, attention to detail, and broader DFlex-related characteristics may be relevant to assess when formulating anxiety difficulties. Future intervention studies could examine whether strategies targeting flexibility, tolerance of uncertainty, and adaptation to change are associated with reductions in anxiety. However, given the cross-sectional and self-report design, the present findings should not be interpreted as evidence that modifying cognitive flexibility would reduce anxiety.

Future research should also examine whether the relative contribution of DFlex Inflexibility and Attention to Detail differs across trait profiles, clinical status, anxiety presentations, and environmental contexts. Longitudinal and experimental designs would be particularly useful to clarify temporal ordering and to determine whether changes in flexibility-related processes precede changes in anxiety.

4.2 Strengths of the study

The study has several strengths. First, it adopted a dimensional approach in a non-clinical adult sample, thereby extending evidence beyond diagnosed clinical groups. Second, it examined autistic traits, anxiety, and DFlex-related characteristics using standardized self-report instruments with adequate to excellent internal consistency in the present sample. Third, the analytic strategy distinguished between a theoretically specified primary mediation model using DFlex Inflexibility and secondary exploratory models using DFlex Attention to Detail and DFlex total score. This approach allowed us to test the hypothesized role of inflexibility while also addressing whether the indirect association reflected broader DFlex-related variance.

4.3. Limitations

Several limitations should be acknowledged. First, the cross-sectional design precludes conclusions about temporal ordering or causality. Although mediation analysis can test indirect statistical associations, it does not establish causal mediation. Second, all variables were assessed using self-report measures, which may increase common-method variance. Third, the DFlex captures perceived inflexibility and attention to detail rather than objective performance-based cognitive flexibility. Future studies should combine self-report questionnaires with behavioural tasks such as set-shifting paradigms or the Wisconsin Card Sorting Test.

Fourth, anxiety was assessed using the ISRA-B. This instrument captures anxiety responses across situations and response domains, including cognitive, physiological, and motor components. Therefore, the present findings may be most applicable to situational and multidimensional anxiety responses. Results might differ if globally standardized measures such as the GAD-7 or the Penn State Worry Questionnaire were used, because these instruments focus more specifically on generalized anxiety symptoms and pathological worry. Future studies should examine whether the same mediation pattern is observed across different anxiety measures.

Fifth, the BAP-high subgroup was small, so subgroup analyses were descriptive only. Sixth, the use of sex-specific BAPQ cut-offs requires caution when including participants with gender diversity. Seventh, the Spanish version of the DFlex used in this study was based on forward–backward translation, but further validation in Spanish-speaking adults is needed. Finally, the sample was recruited from the general population in Spain using non-probability sampling, which may limit generalisability.

4.4. Conclusion

In conclusion, this study found that autistic traits, anxiety, and DFlex-related characteristics were strongly associated in a non-clinical adult sample. In the primary model, DFlex Inflexibility partially mediated the association between autistic traits and anxiety, accounting for 39.9% of the total effect. Secondary exploratory models showed significant indirect effects for DFlex Attention to Detail and DFlex total score, suggesting that the association between autistic traits and anxiety may reflect broader self-reported DFlex-related characteristics rather than inflexibility alone. These findings should be interpreted cautiously given the cross-sectional and self-report design, but they support further investigation of perceived inflexibility, attention to detail, and flexibility-related processes as candidate mechanisms in the relationship between autistic traits and anxiety.

Declarations

Clinical trial number

not applicable.

Ethics approval and consent to participate

The study was approved by the Research Ethics Committee of Camilo Jose Cela University (01_25_ANSITEA), conducted in accordance with the Declaration of Helsinki and ICMJE recommendations. All participants gave informed consent and confidentiality was preserved.

Consent to publish

Not applicable.

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Pre-registration statement

This study was not pre-registered. The reasons for not pre-registering were that the data were collected as part of an exploratory observational study not originally designed for preregistered hypothesis testing.

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Data availability

The data that support the findings of this study are available from the corresponding author upon reasonable request.

TOP standards

This study did not formally follow TOP guidelines. The reasons are related to ethical restrictions concerning participant confidentiality and consent limitations.

Competing Interests statement

The authors declare no competing interests.

AI statement

No generative artificial intelligence tools were used in the design of the study, data collection, data analysis, or interpretation of results. AI tools were not used to generate the manuscript text.

Author Contribution

L.T. contributed to the conceptualization of the study, study design, data collection, data analysis, interpretation of results, and drafting of the manuscript. M.P. contributed to the conceptualization and design of the study, supervised the research process, contributed to the interpretation of findings, and critically reviewed and revised the manuscript. Both authors approved the final version of the manuscript and agree to be accountable for all aspects of the work.

References

1. American Psychiatric Association. Diagnostic and statistical manual of mental disorders. 5th ed, text rev. Washington, DC: American Psychiatric Publishing; 2022.
2. Dell'Osso L, Dalle Luche R, Gesi C, Moroni I, Carmassi C, Maj M. From Asperger's autistischen Psychopathen to DSM-5 autism spectrum disorder and beyond: a subthreshold autism spectrum model. Clin Pract Epidemiol Ment Health. 2016;12:120–31. https://doi.org/10.2174/1745017901612010120.
3. Carpita B, Carmassi C, Calderoni S, et al. The broad autism phenotype in real life: clinical and functional correlates of autism spectrum symptoms and rumination among parents of patients with autism spectrum disorder. CNS Spectr. 2020;25(6):765–73. https://doi.org/10.1017/S1092852919001473.
4. Torices Callejo L, Herrero L, Pérez Nieto MÁ. Anxiety and autistic traits in adults: a systematic review and meta-analysis. Front Psychol. 2025;16:1680267. https://doi.org/10.3389/fpsyg.2025.1680267.
5. Lever AG, Geurts HM. Psychiatric co-occurring symptoms and disorders in young, middle-aged, and older adults with autism spectrum disorder. J Autism Dev Disord. 2016;46(6):1916–30. https://doi.org/10.1007/s10803-016-2722-8.
6. Lai MC, Kassee C, Besney R, et al. Prevalence of co-occurring mental health diagnoses in the autism population: a systematic review and meta-analysis. Lancet Psychiatry. 2019;6(10):819–29. https://doi.org/10.1016/S2215-0366(19)30289-5.
7. Hollocks MJ, Lerh JW, Magiati I, Meiser-Stedman R, Brugha TS. Anxiety and depression in adults with autism spectrum disorder: a systematic review and meta-analysis. Psychol Med. 2019;49(4):559–72. https://doi.org/10.1017/S0033291718002283.

8. Gillott A, Standen PJ. Levels of anxiety and sources of stress in adults with autism. J Intellect Disabil. 2007;11(4):359–70. https://doi.org/10.1177/1744629507083585.
9. Vasa RA, Kalb LG, Mazurek MO, et al. Age-related differences in the prevalence and correlates of anxiety in youth with autism spectrum disorders. Res Autism Spectr Disord. 2014;8(4):133–41. https://doi.org/10.1016/j.rasd.2013.11.006.
10. Normansell-Mossa KM, Top DN Jr, Russell N, Freeston M, Rodgers J, South M. Sensory sensitivity and intolerance of uncertainty influence anxiety in autistic adults. Front Psychol. 2021;12:731753. https://doi.org/10.3389/fpsyg.2021.731753.
11. Riedelbauch S, Gaigg SB, Thiel T, Roessner V, Ring M. Examining a model of anxiety in autistic adults. Autism. 2024;28(3):565–79. https://doi.org/10.1177/13623613231177777.
12. South M, Rodgers J. Sensory, emotional and cognitive contributions to anxiety in autism spectrum disorders. Front Hum Neurosci. 2017;11:20. https://doi.org/10.3389/fnhum.2017.00020.
13. Jenkinson R, Milne E, Thompson A. The relationship between intolerance of uncertainty and anxiety in autism: a systematic review and meta-analysis. Autism. 2020;24(8):1933–44. https://doi.org/10.1177/1362361320932437.
14. Gotham K, Bishop SL, Hus V, et al. Exploring the relationship between anxiety and insistence on sameness in autism spectrum disorders. Autism Res. 2013;6(1):33–41. https://doi.org/10.1002/aur.1263.
15. Hull L, Petrides KV, Allison C, et al. Putting on my best normal: social camouflaging in adults with autism spectrum conditions. J Autism Dev Disord. 2017;47(8):2519–34. https://doi.org/10.1007/s10803-017-3166-5.
16. Livingston LA, Happé F. Conceptualising compensation in neurodevelopmental disorders: reflections from autism spectrum disorder. Neurosci Biobehav Rev. 2017;80:729–42. https://doi.org/10.1016/j.neubiorev.2017.06.005.
17. Shi H, Hirai M. Autistic traits linked to anxiety and dichotomous thinking: sensory sensitivity and intolerance of uncertainty as mediators in non-clinical population. Sci Rep. 2024;14:23334. https://doi.org/10.1038/s41598-024-73628-w.
18. Hill EL. Evaluating the theory of executive dysfunction in autism. Dev Rev. 2004;24(2):189–233. https://doi.org/10.1016/j.dr.2004.01.001.
19. Dajani DR, Uddin LQ. Demystifying cognitive flexibility: implications for clinical and developmental neuroscience. Trends Neurosci. 2015;38(9):571–8. https://doi.org/10.1016/j.tins.2015.07.003.
20. Geurts HM, Corbett B, Solomon M. The paradox of cognitive flexibility in autism. Trends Cogn Sci. 2009;13(2):74–82. https://doi.org/10.1016/j.tics.2008.11.006.
21. D'Cruz AM, Ragozzino ME, Mosconi MW, Shrestha S, Cook EH Jr, Sweeney JA. Reduced behavioral flexibility in autism spectrum disorders. Neuropsychology. 2013;27(2):152–60. https://doi.org/10.1037/a0031721.
22. Lage C, Smith ES, Lawson RP. A meta-analysis of cognitive flexibility in autism spectrum disorder. Neurosci Biobehav Rev. 2024;157:105511. https://doi.org/10.1016/j.neubiorev.2023.105511.
23. Toplak ME, West RF, Stanovich KE. Practitioner review: do performance-based measures and ratings of executive function assess the same construct? J Child Psychol Psychiatry. 2013;54(2):131–43. https://doi.org/10.1111/jcpp.12001.

24. Sasson NJ, Lam KSL, Childress D, Parlier M, Daniels JL, Piven J. The Broad Autism Phenotype Questionnaire: prevalence and diagnostic classification. Autism Res. 2013;6(2):134–43. https://doi.org/10.1002/aur.1272.
25. Hurley RSE, Losh M, Parlier M, Reznick JS, Piven J. The Broad Autism Phenotype Questionnaire. J Autism Dev Disord. 2007;37(9):1679–90. https://doi.org/10.1007/s10803-006-0299-3.
26. Miguel-Tobal JJ, Cano-Vindel A. ISRA: Inventario de Situaciones y Respuestas de Ansiedad. Madrid: TEA Ediciones; 1986.
27. Roberts ME, Barthel FMS, Lopez C, Tchanturia K, Treasure JL. Development and validation of the Detail and Flexibility Questionnaire (DFlex) in eating disorders. Eat Behav. 2011;12(3):168–74. https://doi.org/10.1016/j.eatbeh.2011.01.011.

Figures

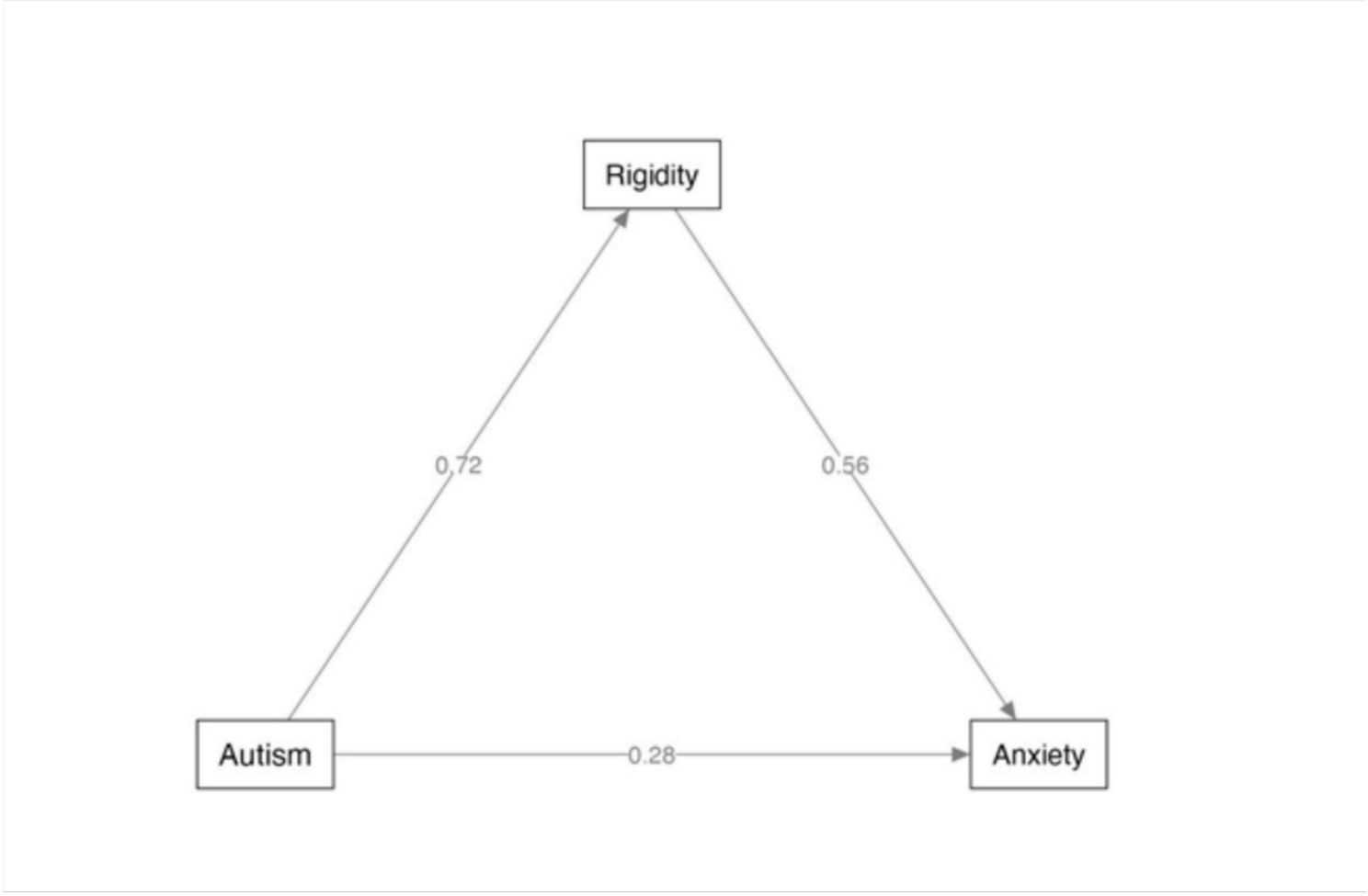


Figure 1

Primary mediation model with BAPQ total as predictor, DFlex Inflexibility as mediator, and ISRA-B total as outcome. Values represent unstandardized estimates. The indirect effect was significant, B = 14.00, 95% CI [8.00, 21.10], p < .001.