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Traumatic life experiences and post-traumatic stress symptoms in middle-aged and older adults with and without autistic traits

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Abstract

Objectives: Research with younger adults has begun to explore associations between autism/autistic traits and vulnerability to Post Traumatic Stress Disorder (PTSD). Large scale studies and/or examination of age-effects have not been conducted.

Methods: Adults aged 50 years+ from the PROTECT study ($n = 20,220$) completed items about current and childhood socio-communicative difficulties characteristic of autism. Approximately 1% ($n = 251$) endorsed high autistic traits, henceforth the Autism Spectrum Traits (AST) group. Differences between the AST and an age—and sex-matched "Comparison Older Adults" (COA; $n = 9179$) group were explored for lifetime traumatic experiences and current symptoms of PTSD, depression, and anxiety.

Results: Almost 30% of the AST group, compared to less than 8% of the COA, reported severe trauma in childhood/adulthood, including emotional, physical or sexual abuse. Elevated current PTSD symptoms were reported by AST compared to COA. An interaction was observed between autistic traits and trauma severity; the effect of level of trauma on PTSD symptoms was significantly greater for AST versus COA participants. This interaction remained significant when controlling for current depression and anxiety symptoms.

Conclusions: The findings suggest that high autistic traits may increase the likelihood of experiencing trauma across the lifespan, and the impact of severe trauma on PTSD symptoms. Older adults with high (vs. low) autistic traits may be at greater risk of experiencing PTSD symptoms in latter life. Future research should test whether the pattern of results is similar for diagnosed autistic adults.

KEYWORDS
ageing, ASD, autistic traits, gerontautism, mental health, older adults, PTSD, trauma

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Key points

- Using data from PROTECT, a large healthy ageing cohort, approximately 30% of middle-aged and older adults with high autistic traits reported severe trauma in childhood/adulthood compared to less than 8% of a low autistic trait comparison group
- Middle-aged and older adults with high autistic traits also reported elevated current PTSD symptoms when compared to the low autistic trait comparison group
- An interaction was observed between autistic traits and trauma severity; the effect of level of trauma on PTSD symptoms was significantly greater for those with high autistic traits vs. low autistic traits
- Middle-aged and older adults with high autistic traits—especially those who have experienced severe trauma - may need additional support to mitigate this vulnerability to poor mental health later in life

1 | INTRODUCTION

Autism is a neurodevelopmental condition characterised by differences in social communication and restricted-repetitive behaviours.[1] Autism is increasingly seen as lying at one end of a spectrum, with common genetic influences operating on diagnosed autism and subclinical autistic traits in the general population.[2,3] Autism affects approximately 1% of the general population, with an additional 10%–20% endorsing high but sub-clinical autistic traits.[4] Despite autism being a lifelong condition and an ageing demographic in many countries, most autism research has examined children and young adults with little attention on old age.[5]

Research suggests that autistic adults experience higher rates of trauma and post-traumatic stress disorder (PTSD) compared to the general population.[6] The rates of trauma and PTSD in autistic adults in latter life has not yet been explored, despite evidence that effects of trauma persist across the lifespan and into old-age.[7] By examining the association of autistic *traits* with trauma, it is possible to explore the influence of autism in understudied (and possibly under-diagnosed) populations, such as in older age.[8,9]

It has been posited that core features of the symptomology and genetic aetiology of autism may increase the risk of trauma exposure.[6,10] Studies exploring traumatic experiences have typically focused on early life, with elevated rates of emotional and physical abuse and neglect being reported by autistic children and retrospectively by autistic adults.[10–15] Elevated rates of childhood sexual abuse have also been reported, in particular by autistic women and girls.[12,15] This increased vulnerability to traumatic experiences has also been documented in adulthood, with autistic and high autistic trait adults reporting higher rates of emotional and domestic abuse, sexual and physical violence, and victimisation[13,16,17] compared to the general population. The impact that these experiences may have in old age has not yet been explored.

In the general population, the experience of trauma has been identified as a risk factor for subsequent psychiatric difficulties, including the development of PTSD, depression, and anxiety.[17] Post-traumatic stress disorder symptoms include recurrent, involuntary, and intrusive distressing memories following the experience of a traumatic event,[1] and are associated with a wide range of negative physical, psychological, and adaptive outcomes over the life course.[7,18] Clinical PTSD affects approximately 4%–7% of the general population[19,20]; however, in adults aged 55 and over this prevalence has been found to be lower, with rates of approximately 1%–2%.[21,22] The prevalence of clinical PTSD among autistic adult populations has not been widely studied, but estimates suggest prevalence rates up to 17% in childhood[6,23] and 16% in adulthood,[13] while rates among older autistic adults are unknown. Elevated rates of depression (OR = 2.8–5.6) and anxiety (OR = 3.3–6.2) have also been documented in autistic populations across the lifespan,[24,25] and recently in older adults with high autistic traits.[26]

A small selection of studies has examined the prevalence of traumatic experiences and PTSD symptoms in younger autistic populations, however, there has yet to be any examination of either autistic or high autistic traits populations in mid-life or older age. Studies examining older adults in the general population have reported that the impact of trauma and subsequent PTSD symptoms often persist throughout the life course.[7,27] Trauma experienced during different developmental periods may lead to different PTSD symptom severities and outcomes.[7] Childhood is a period of rapid cognitive and psychosocial development, making it a vulnerable period for the effects of trauma. Older adults who experience abuse and neglect during childhood often experience more severe PTSD symptoms than those who experience trauma in other developmental periods.[28–31] Furthermore, older adults who report severe trauma in childhood have been found to experience lower subjective happiness and to be less able to cope with stress than those who experience trauma at latter ages.[28] Additionally, severe childhood trauma has been found to lead to a 12-fold increase in the likelihood of mental health crises in adulthood and older age, including higher rates of suicidal ideation and behaviours.[29–32] Therefore, while experiencing trauma at any age can lead to subsequent PTSD symptoms, older adults with high autistic traits who have experienced trauma during childhood may be vulnerable to more severe PTSD symptoms in latter life.

The current study investigates the prevalence of traumatic experiences in childhood and adulthood and current symptoms of PTSD, depression, and anxiety in a large sample of adults aged 50 years and older. It is hypothesised that older adults with high autistic traits (AST) will (1) report a higher prevalence of traumatic childhood and adulthood experiences, (2) report elevated and above clinical cut-off symptoms of PTSD, depression, and anxiety, and that (3) exposure to severe trauma in childhood/adulthood will be associated with elevated symptoms of PTSD, depression, and anxiety, when compared to a matched group who do not endorse any autistic traits Comparison Older Adults (COA).

2 | METHODS

2.1 | Study design and participants

This study uses cross-sectional baseline data from the PROTECT study (www.protectstudy.org.uk). Inclusion criteria for the PROTECT study are: aged over 50 years, resident in the UK, with good working understanding of English, and able to use a computer with Internet access. Participants who have an established diagnosis of dementia are excluded. Participants register online and are required to review the study information sheet and to provide consent via an approved online platform. The PROTECT study received ethical approval from the UK London Bridge National Research Ethics Committee (Ref: 13/LO/1578).

From a total sample of 20,220 participants (Female $n = 14,946\%$, 73.9%), 251 (1.2%) met our cut-off criteria for the Autism Spectrum Traits (AST) group; see Measures section below for inclusion criteria. To create a COA group, from the remaining 19,944 participants, 4269 participants were excluded for endorsing any autistic. To match the AST and COA groups on mean age/range and gender ratio, a further 6522 participants were excluded using random participant selection methods, resulting in 9179 participants in the COA group. Similar results were obtained when comparing the AST group to all other PROTECT participants ($n = 19,969$). It therefore appears that the COA sample selected for no autistic traits was not unrepresentative of the total sample, however analyses including those intermediate in autistic traits (i.e., a three-group comparison of AST, COA and intermediate traits–INT–groups), can be found in the Supplementary Materials, and is very briefly referred to where relevant below. See Table 1 for demographic characteristics of the AST and COA groups.

TABLE 1 Demographic characteristics of the Control Older Adult (COA) and Autism Spectrum Traits (AST) groups

		Control older adults (n = 9179)	AS traits (n = 251)	Group difference	Effect size (d)	Gender differences‡
Age (years)	M (SD)	62.46 (6.67)	63.04 (6.77)	$F(19,427) = 1.87, p = 0.172$	0.08 [0.04–0.21]	Yes (interaction)
	[95% CI]	[62.32–62.59]	[62.2063.88]			
	Range	50–81	50–81			
Gender	male : female	2847 : 6331	86 : 165	$\chi^2 = 1.19, p = 0.275$	0.08 [−0.06–0.22]	-
	%	31.0% : 69.0%	34.3% : 65.7%			
Marital status	Married	6535 (71.4%)	154 (61.4%)	$\chi^2 = 24.07, p < 0.001^{***}$	0.28 [0.15–0.40]	Yes
	Widowed	431 (4.7%)	7 (2.8%)			
	Separated	161 (1.8%)	5 (2.0%)			
	Divorced	890 (9.7%)	36 (14.3%)			
	Civil partnership	51 (0.6%)	0 -			
	Co-habiting	595 (6.5%)	26 (10.4%)			
	Single	492 (5.4%)	23 (9.2%)			
Education history	School to 16	1284 (14.0%)	40 (15.9%)	$\chi^2 = 1.71, p = 0.634$	0.01 [−0.12–0.13]	No
	School to 18	2836 (31.0%)	69 (27.5%)			
	Undergraduate	3105 (33.9%)	88 (35.1%)			
	Postgraduate	1930 (21.1%)	54 (21.5%)			
Current employment status	Employed	5070 (55.4%)	127 (50.6%)	$\chi^2 = 3.58, p = 0.167$	0.11 [−0.01–0.24]	No
	Retired	3795 (41.5%)	112 (44.6%)			
	Unemployed	290 (3.2%)	12 (4.8%)			

Note: ‡ See supplementary materials for gender differences analyses. *p < 0.05, **p < 0.01, ***p < 0.001.

2.2 | Measures

Autism Spectrum Traits were measured using the PROTECT Autism Spectrum Traits questionnaire.[26] Constraints on the number of items in the PROTECT battery of questionnaires required the construction of a very short, 5-item measure to assess childhood and current socio-communicative traits characteristic of autism. Using a yes/no format, the participant was asked if as a child they had "struggled compared to [their] peers (socially or at school) with: (1) knowing how to get along with other children; (2) understanding other kids' jokes, sarcasm or deception". Further questions asked if the participant "currently find[s] it more difficult than other people to: (1) make and keep friends; (2) understand other people's perspectives; (3) recognise if someone means something different from what they are saying". Participants who endorsed both childhood traits plus at least two of the three current traits met inclusion criteria for the AST group. Those in the COA group did not endorse any traits. In a separate validation sample, this autism traits measure showed good internal consistency (Cronbach's a = 0.82) and had excellent sensitivity (82%) and specificity (94%) for identifying adults with an autism diagnosis. The measure also had moderate-to-strong positive associations with existing and widely used autistic trait measures. See Stewart et al. (2020)[26] for full measure validation information and analyses.

Demographic information was collected, including age, gender, marital status, education history, and employment status.

Childhood and adulthood trauma were measured using the Childhood Trauma Screener (CTS-5[33]) and Adult Trauma Screener (ATS-5[34]), respectively. The CTS-5 and ATS-5 are both five-item questionnaires (rated on a 5-point scale, maximum score = 20) relating to trauma experiences including emotional/physical abuse/neglect, and sexual abuse. For each item on the CTS-5 and ATS-5, those who responded "2 = sometimes true" to "4 = very often true" were identified as experiencing the trauma. To identify those who had experienced severe trauma, a cut-off for both measures was placed at the 95th percentile, which equated to scores ≥8 on the CTS or ATS.

Recent PTSD symptoms were measured using the PTSD Checklist–Civilian Short Form (PCL-CSF[35]). The PCL-CSF is a five-item questionnaire (rated on a 5-point scale, maximum score = 20) relating to having been bothered by a range of problems over the past two weeks. On the original 20-item PCL participants who on average across items report "2 = moderate" or above are considered to meet criteria for probable clinical PTSD symptoms. Using this criterion, those with scores ≥10 were identified as likely to be experiencing probable clinical PTSD symptoms.

Recent depression was measured using the Patient Health Questionnaire (PHQ-9[36]). The PHQ-9 is a nine-item questionnaire (rated on a 4-point scale, maximum score = 27) examining low mood over the past two weeks. Using the conventional cut-off score of ≥10, the PHQ-9 has 88% sensitivity and 88% specificity for major depressive disorder.

Recent anxiety was measured using the General Anxiety Disorder questionnaire (GAD-7[37]). The GAD-7 is a seven-item questionnaire (rated on a 4-point scale, maximum score = 21) examining anxiety symptoms over the past two weeks. Using the conventional cut-off score of ≥10, the GAD-7 has 89% sensitivity and 82% specificity for generalised anxiety disorder.

2.3 | Statistical analyses

All statistical analyses were performed using SPSS (version 25.0; IBM Corp., 2017). Multiple comparisons were controlled for using the False Discovery Rate method,[38] with an α of 0.05 being used.

3 | RESULTS

3.1 | Demographics

Table 1 shows full demographic characteristics for the participants. Age, gender ratio, education history and employment status did not differ between the AST and COA groups. The AST and COA groups differed in marital status, with AST more often being divorced, cohabiting, or single. Gender differences were observed in marital status, with females being more often widowed, divorced, separated or single, while males were more often married, χ^2 = 16.39, p < 0.001.

The only significant interaction of group (AST vs. COA) with gender was observed for age, with males being older in the COA group compared to the AST group, and females being younger in the COA group compared to the AST group, $F(19,429)$ = 58.73, p < 0.001.

3.2 | Specific types of traumatic events in childhood and adulthood

For trauma in childhood, the AST group reported significantly higher rates on all items compared to COA, including emotional, physical, and sexual abuse. For trauma in adulthood, the AST group reported significantly higher rates on items concerning emotional, physical, and sexual abuse, but not financial hardship (see Table 2).

3.3 | Gender differences

Some gender differences were observed in the types of trauma experienced. In childhood, more COA females than males reported experiencing emotional and sexual abuse. In adulthood, both COA and AST females reported experiencing more physical, emotional and sexual abuse than COA and AST males. Additionally, more COA females reported experiencing financial hardship than COA males (see Supplementary Table S1).

TABLE 2 Prevalence of self-reported childhood and adulthood trauma in the Control Older Adult (COA) and Autism Spectrum Traits (AST) groups

		Control older adults (n = 9179)	AS traits group (n = 251)	Group difference	Effect size (d)	Odds ratio
Childhood	I [never] felt loved (R: emotional neglect)	1859 (20.3%)	166 (66.1%)	χ^2 = 304.98, $p < 0.001^{***}$	1.12 [0.98–1.27]	7.69 [5.89–10.04]
	My family hit me so hard it left bruises or marks (physical abuse)	721 (7.9%)	64 (25.5%)	χ^2 = 99.64, $p < 0.001^{***}$	0.77 [0.60–0.93]	4.01 [2.99–5.38]
	I felt someone in my family hated me (emotional abuse)	843 (9.2%)	101 (40.2%)	χ^2 = 261.52, $p < 0.001^{***}$	1.05 [0.90–1.19]	6.66 [5.12–8.65]
	Someone sexually molested me (sexual abuse)	419 (4.6%)	37 (14.7%)	χ^2 = 54.97, $p < 0.001^{***}$	0.71 [0.51–0.91]	3.61 [2.52–5.19]
	Someone was [not] there to take me to the doctor when needed (R: physical neglect)	391 (4.3%)	30 (12.0%)	χ^2 = 33.89, $p < 0.001^{***}$	0.62 [0.40–0.83]	3.05 [2.06–4.53]
Adulthood	I have [not] been in a confiding relationship (R; emotional neglect)	2743 (29.9%)	151 (60.2%)	χ^2 = 105.26, $p < 0.001^{***}$	0.70 [0.56–0.84]	3.54 [2.74–4.58]
	My partner/ex-partner hit me or used violence against me (physical abuse)	619 (6.7%)	42 (16.7%)	χ^2 = 37.39, $p < 0.001^{***}$	0.56 [0.38–0.75]	2.78 [1.98–3.90]
	My partner/ex-partner belittled me or made me feel worthless (emotional abuse)	1160 (12.6%)	104 (41.4%)	χ^2 = 174.51, $p < 0.001^{***}$	0.88 [0.73–1.01]	4.89 [3.78–6.33]
	My partner/ex-partner sexually interfered with me or forced sex against my wishes (sexual abuse)	253 (2.8%)	29 (11.6%)	χ^2 = 65.17, $p < 0.001^{***}$	0.84 [0.61–1.06]	4.61 [3.07–6.92]
	I've [not] had money for rent or mortgage payments (R; financial hardship)	673 (7.3%)	26 (10.4%)	χ^2 = 3.21, $p = 0.072$	0.21 [−0.02–0.43]	1.46 [0.96–2.21]

Note: N (%) endorsing "sometimes" or more frequently. "R" items are reverse coded, with square bracketed words for context. $^*p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$.

3.4 | Self-reported trauma and psychiatric difficulties

The AST group reported significantly higher trauma scores in childhood and adulthood than individuals in the COA group. Additionally, the AST group reported significantly more current symptoms of PTSD, depression, and anxiety than the COA group (see Table 3).

3.5 | Gender differences

Some gender differences were observed in trauma and psychiatric difficulties. Females reported more trauma in childhood and adulthood than males. Females also reported more symptoms of current depression than males. No gender differences were observed in current PTSD symptoms or anxiety.

Some significant interactions of Trait group (AST vs. COA) and gender were observed. For adulthood trauma, AST females reported elevated rates compared to all other groups. For both PTSD symptoms and anxiety, COA females reported elevated rates of symptoms when compared to COA males, but no

differences were found between AST males and females (see Supplementary Table S2).

3.6 | Experiences of above cut-off trauma and psychiatric difficulties

More individuals in the AST versus COA group met cut-off criteria for childhood trauma, adulthood trauma, and current symptoms of PTSD, depression, and anxiety (see Table 3). Twenty-two (8.8%) of the AST group and 213 (2.3%) of the COA group met cut-off criteria for both childhood and adulthood trauma (see Supplementary Figure S1 Venn diagram showing overlap).

3.7 | Gender differences

More COA females than males met cut-off criteria for childhood and adulthood trauma, current symptoms of PTSD, and depression. No gender difference were observed for anxiety. More AST females than males met cut-off criteria for adulthood trauma, with no other gender differences observed (see Supplementary Table S3 for details).

TABLE 3 Self-report questionnaire means, standard deviations and confidence intervals of the Control Older Adult (COA) and Autism Spectrum Traits (AST) groups

		Control older Adults (n = 9179)	AS traits Group (n = 251)	Group difference	Effect size (d)	Odds ratio
Childhood trauma *(max = 20)*	*Mean (SD) [95% CI]*	1.64 (2.28) [1.59–1.69]	4.68 (3.80) [4.22–5.16]	$F(19,428) = 415.98$, $p < 0.001$***	1.30 [1.17–1.43]	-
Adult trauma *(max = 20)*	*Mean (SD) [95% CI]*	2.01 (2.46) [1.96–2.06]	4.29 (3.56) [3.86–4.74]	$F(19,428) = 205.04$, $p < 0.001$***	0.91 [0.79–1.04]	-
Post-traumatic stress *(max = 20)*	*Mean (SD) [95% CI]*	1.12 (1.97) [1.09–1.17]	4.34 (4.01) [3.84–4.84]	$F(19,428) = 598.83$, $p < 0.001$***	1.56 [1.43–1.69]	-
Depression *(max = 27)*	*Mean (SD) [95% CI]*	2.25 (2.82) [2.19–2.31]	6.31 (5.11) [5.67–6.94]	$F(19,425) = 475.95$, $p < 0.001$***	1.39 [1.26–1.52]	-
Anxiety *(max = 21)*	*Mean (SD) [95% CI]*	1.28 (2.32) [1.24–1.33]	4.33 (4.57) [3.75–4.91]	$F(19,426) = 384.51$, $p < 0.001$***	1.25 [1.13–1.38]	-
Childhood trauma *(past cut off ≥8)*	Frequency (%)	397 (4.3%)	49 (19.5%)	$\chi^2 = 125.20$, $p < 0.001$***	0.92 [0.74–1.11]	5.36 [3.86–7.45]
Adult trauma *(past cut off ≥8)*	Frequency (%)	505 (5.5%)	46 (18.3%)	$\chi^2 = 73.03$, $p < 0.001$***	0.74 [0.56–0.93]	3.85 [2.76–5.37]
Post-traumatic stress *(past cut off ≥10)*	Frequency (%)	88 (1.0%)	26 (10.4%)	$\chi^2 = 180.73$, $p < 0.001$***	1.37 [1.11–1.62]	11.94 [7.56–18.86]
Depression *(past cut off ≥10)*	Frequency (%)	265 (2.9%)	58 (23.1%)	$\chi^2 = 301.83$, $p < 0.001$***	1.27 [1.10–1.45]	10.10 [7.35–13.89]
Anxiety *(past cut off ≥10)*	Frequency (%)	128 (1.4%)	31 (12.4%)	$\chi^2 = 176.80$, $p < 0.001$***	1.26 [1.04–1.49]	9.96 [6.58–15.01]

Note: Childhood Trauma measured using CTS-5; Adulthood Trauma measured using ATS-5; Post-Traumatic Stress measured using PCL-CSF; Depression measured using PHQ-9; Anxiety measured using GAD-7. *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$.

3.8 | Association of severe trauma with psychiatric difficulties

Using the 95th percentile cut-offs described above, participants were categorised into childhood and adulthood "High Trauma" or "Low Trauma" groups.

For childhood trauma, a 2 × 2 analysis of variance revealed main effects of Trait (COA vs. AST) and Trauma (Low vs. High Childhood Trauma) on current PTSD symptom score. A significant interaction of medium effect was observed, with the effect of Trauma on PTSD symptom scores being significantly stronger in the AST than COA group.

Current depression might lead to more negative trauma reports and elevated PTSD scores; A similar pattern of main effects of Trait and Trauma, and interactions (with small effect), was observed for symptoms of depression and anxiety. However, the interaction between Trait and Trauma remained significant when controlling for current depression ($F(39,426) = 81.36$, $p < 0.001$) and anxiety ($F(39,425) = 84.62$, $p < 0.001$), as well as age ($F(39,428) = 94.78$, $p < 0.001$) and adulthood trauma ($F(39,429) = 105.55$, $p < 0.001$) (see Table 4).

For adulthood trauma, main effects of Trait (COA vs. AST) and Trauma (Low vs. High Adulthood Trauma) group were observed on PTSD symptom score. A significant interaction with small effect was observed, with the effect of Trauma on PTSD symptoms scores being significantly stronger in the AST than COA group. This interaction remained significant when controlling for current depression ($F(39,426) = 35.44$, $p < 0.001$), anxiety ($F(39,425) = 45.32$, $p < 0.001$), age ($F(39,428) = 34.67$, $p < 0.001$), or childhood trauma ($F(39,429) = 34.24$, $p < 0.001$). A similar pattern of main effects was also observed for symptoms of depression and anxiety. A significant interaction with small effect was found for depression, but not for anxiety. See Table 5.

3.9 | Associations between trauma and PTSD symptoms

For the AST group, significant moderate positive associations were found between PTSD symptoms and childhood trauma ($r = 0.42$, $p < 0.001$), and PTSD symptoms and adulthood trauma ($r = 0.27$, $p < 0.001$), with the former significantly stronger than the latter association ($z = 1.85$, $p < 0.001$).

For the COA group, significant small positive associations were found between PTSD symptoms and childhood trauma ($r = 0.15$, $p < 0.001$), and PTSD symptoms and adulthood trauma ($r = 0.21$, $p < 0.001$), with the latter being significantly stronger than the former association ($z = -4.28$, $p < 0.001$).

Comparing groups, the strength of the PTSD symptoms and childhood trauma association was significantly stronger in AST than

TABLE 4 Current self-report mental health symptoms by childhood traumatic experience level in the Control Older Adult (COA) and Autism Spectrum Traits (AST) groups

	Control older adults		AS traits group		Group difference					
	Low child trauma (n = 8781)	High child trauma (n = 397)	Low child trauma (n = 202)	High child trauma (n = 49)	As traits main effect	Effect size (d)	Trauma type main effect	Effect size (d)	Interaction	η²p
Post-traumatic stress (max = 20)	1.11 (1.91) [1.06–1.15]	1.54 (2.85) [1.26–1.82]	3.61 (3.41) [3.14–4.01]	7.32 (4.83) [5.94–8.71]	$F_{(19,426)}$ = 591.98, p < 0.001***	1.55 [1.42–1.68]	$F_{(19,426)}$ = 148.57, p < 0.001***	0.59 [0.49–0.69]	$F_{(19,429)}$ = 92.46, p < 0.001***	0.010
Depression (max = 27)	2.21 (2.74) [2.15–2.26]	3.19 (4.13) [2.78–3.60]	5.80 (4.88) [5.12–6.48]	8.38 (5.51) [6.80–9.97]	$F_{(19,426)}$ = 328.82, p < 0.001***	1.16 [1.03–1.28]	$F_{(19,426)}$ = 53.46, p < 0.001***	0.35 [0.25–0.44]	$F_{(19,429)}$ = 10.88, p < 0.001***	0.001
Anxiety (max = 21)	1.26 (2.30) [1.12–1.30]	1.76 (3.04) [1.46–2.06]	3.99 (4.25) [3.39–4.58]	5.73 (5.78) [4.07–7.39]	$F_{(19,426)}$ = 272.38, p < 0.001***	1.05 [0.92–1.18]	$F_{(19,426)}$ = 30.75, p < 0.001***	0.27 [0.17–0.36]	$F_{(19,429)}$ = 9.33, p = 0.002**	0.001

Note: Mean (S.D.), [95% CI]. Childhood Trauma cut-offs created using CTS-5; Post-traumatic Stress measured using PCL-C5F; Depression measured using PHQ-9; Anxiety measured using GAD-7. *p < 0.05, **p < 0.01, ***p < 0.001.

TABLE 5 Current self-report mental health symptoms by adult traumatic experience type in the AST and COA groups

	Control older adults		AS traits group		Group difference					
	Low adult trauma (n = 8673)	High adult trauma (n = 505)	Low adult trauma (n = 205)	High adult trauma (n = 46)	As traits main effect	Effect size (d)	Trauma type main effect	Effect size (d)	Interaction	η²p
Post-traumatic stress (max = 20)	1.10 (1.91) [1.06–1.14]	1.59 (2.74) [1.36–1.83]	3.87 (3.77) [3.35–4.39]	6.39 (4.41) [5.07–7.70]	$F_{(19,426)}$ = 478.95, p < 0.001***	1.40 [1.27–1.53]	$F_{(19,426)}$ = 75.62, p < 0.001***	0.37 [0.29–0.46]	$F_{(19,429)}$ = 33.98, p < 0.001***	0.004
Depression (max = 27)	2.19 (2.73) [2.13–2.24]	3.29 (3.96) [2.94–3.64]	6.01 (4.81) [5.35–6.68]	7.58 (6.14) [5.76–9.41]	$F_{(19,426)}$ = 274.24, p < 0.001***	1.05 [0.93–1.18]	$F_{(19,426)}$ = 29.66, p < 0.001***	0.23 [0.15–0.32]	$F_{(19,429)}$ = 29.66, p < 0.001***	0.001
Anxiety (max = 21)	1.24 (2.27) [1.19–1.29]	1.94 (3.22) [1.66–2.22]	4.23 (4.6) [3.60–4.86]	4.76 (4.63) [3.33–6.18]	$F_{(19,426)}$ = 199.73, p < 0.001***	0.90 [0.78–1.03]	$F_{(19,426)}$ = 8.91, p = 0.003**	0.13 [0.04–0.21]	$F_{(19,429)}$ = 0.18, p = 0.675	<0.001

Note: Mean (S.D.), [95% CI]. Adult Trauma cut-offs created using ATS-5; Post-traumatic Stress measured using PCL-C5F; Depression measured using PHQ-9; Anxiety measured using GAD-7. *p < 0.05, **p < 0.01, ***p < 0.001.

COA ($z = 4.52$, $p < 0.001$), while the associations between PTSD symptoms and adulthood trauma were not found to differ by Trait ($z = 0.94$, $p = 0.340$).

3.10 | Post-hoc analyses of the intermediate (INT) group

The pattern of results showed that the INT group fell between the other two groups, generally scoring significantly worse than the COA group and significantly better (e.g., less trauma, lower PTSD symptoms) than the AST group. See Supplementary Materials for full breakdown of INT, COA and AST comparisons.

4 | DISCUSSION

This study documents for the first time the prevalence of self-reported childhood and adulthood traumatic experiences and current PTSD symptoms for older adults with high autistic traits. In keeping with the younger adult autism literature,[10–15] those with high socio-communicative autistic traits reported significantly higher rates of trauma during childhood and adulthood, and more symptoms of current PTSD, depression and anxiety, compared to those with low autistic traits. Furthermore, individuals with high autistic traits who had experienced severe trauma in childhood reported high and probable clinical levels of current PTSD symptoms, according to a self-report questionnaire that maps well onto DSM diagnostic criteria.[35] The significant interaction of trauma group by autism trait group (which survived correction for depression and anxiety) and association between trauma and PTSD symptoms suggest that exposure to severe trauma is even more damaging for those with high autistic traits, in terms of the association with PTSD and depression symptoms. These results suggest that older adults with high autistic traits may be susceptible to experiencing PTSD symptoms due to high rates of trauma across their lifespan, but in keeping with the typical ageing literature,[7,28,30,31] trauma in childhood may infer a particular vulnerability for PTSD symptoms latter in life for those with elevated autistic traits.

High rates of many types of trauma were observed in our older adult sample, consistent with the previous literature exploring the occurrence of childhood and adulthood traumatic experiences in autistic and high autistic trait populations.[10–13,15,17] Those with high autistic traits reported elevated rates of emotional and physical abuse or neglect, as well as sexual abuse, when compared to the comparison sample; almost 30% of the AST group, compared to less than 8% of the COA, reported severe trauma in childhood/adulthood. These higher rates represented a three-to-eightfold increased incidence of trauma during childhood, and a three-to-fivefold increased incidence of trauma during adulthood. Notably, emotional traumas were also reported at particularly high rates in the AST group compared to COA, including an eight-fold increase in emotional neglect and seven-fold increase in emotional abuse.

These higher rates of emotional trauma were also found in adulthood, with the AST group reporting higher rates than the COA group for emotional neglect and emotional abuse. This finding may be of particular importance; in the general population, emotional neglect and abuse during childhood have been identified as key precursors to poor psychosocial development and subsequent psychiatric difficulties during adulthood, including an increased likelihood for PTSD, depression, and anxiety symptoms.[29] Importantly, recalled childhood abuse/neglect appear to be better predictors of latter poor mental health and wellbeing than contemporaneously recorded incidents.[39]

Elevated rates of current PTSD, depression, and anxiety symptoms were also reported by those with high versus low autistic traits (with very large Trait group effects). Individuals in the AST group demonstrated a twelve-fold increase in the likelihood of passing cut-offs for probable clinical PTSD symptoms, and a ten-fold increase in likelihood for probable clinical depression and anxiety symptoms, when compared to COA. Furthermore, the effect of childhood trauma was significantly stronger in AST compared to COA, with half the AST group (compared to 13% in COA) who had experienced trauma reporting near-clinical current symptoms of PTSD, as well as depression and anxiety. A similar pattern was found in those with high autistic traits and who had experienced severe trauma in adulthood, with higher reported symptoms of PTSD and depression (but not anxiety), and 35% passing probable clinical cut-off for PTSD (compared to 17% in COA). While those who experienced trauma at any age reported more psychiatric difficulties in older age, the strength of association between childhood trauma and PTSD symptoms was stronger than for adult trauma in those with elevated autistic traits, suggesting that trauma during childhood could be particularly damaging for those on the autism spectrum. However, it is important to note that this study is cross-sectional and cannot infer causation.

When contextualising the findings of this study, it is important to consider limitations, as well as strengths. A strength of PROTECT is its use of an online platform, allowing large scale recruitment from a wide geographical spread across the UK. However, use of self-report alone is a limitation, and collecting multiple informant measures will be important in future work. Retrospective reports of childhood trauma, in the general population, show only moderate agreement with prospective informant reports, but are independently predictive of psychopathology in young adulthood.[40] Older adults who engage in medical research are typically those who are physically and mentally able, which may lead to sampling biases, survival effects, and poor generalisability of findings.[41] Finally, the criteria used to identify the AST group was a short, bespoke (albeit validated) set of questions rather than a standardised measure and participants may have scored highly for reasons other than autism-related traits (hence we controlled for e.g., depression in our analyses). Whilst these factors may limit the overall generalisability of the findings, the results still provide important new information about self-reported experiences of trauma and psychiatric difficulties in relation to socio-communicative abilities in a large

population of older adults, and represent a first step towards greater understanding of ageing for those with persistent poor socio-communicative functioning.

In conclusion, our study exploring the experience of trauma and psychiatric difficulties of older adults suggests that those who self-report high autistic traits are at greater risk of experiencing trauma across the lifespan, as well as symptoms of PTSD, depression and anxiety in older age. Indeed, self-reported childhood or adulthood trauma appears to be even more damaging to those with high autistic traits than to the general population, in terms of PTSD and depression symptoms in older adulthood. As such, individuals with high autistic traits—and especially those who have experienced severe trauma—may benefit from intervention to mitigate this vulnerability. The findings of the current study highlight the need for adequate mental health support for those on the autism spectrum, including those with high traits who may not have a diagnosis, to ensure that they receive appropriate support to prevent psychiatric problems and resulting crises, such as suicide.

AUTHOR CONTRIBUTIONS

Authors Anne Corbett, Clive Ballard, Byron Creese, Dag Aarsland, Adam Hampshire conceived the PROTECT study and have overseen data collection. Gavin R. Stewart, Rebecca A. Charlton and Francesca Happé conceived the present study. Gavin R. Stewart conducted statistical analyses and wrote the manuscript under the supervision of Rebecca A. Charlton and Francesca Happé. Rebecca A. Charlton and Francesca Happé have verified the underlying data. All authors reviewed the final manuscript.

CONFLICT OF INTEREST

None.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

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