BRIEF REPORT

Cognitive distortions mediate relationships between early maladaptive schemas and aggression in women and men

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Abstract

Difficult childhood experiences can lead to the development of early maladaptive schemas (EMS) that cause emotional and behavioral problems later in life. The present study examined the role of cognitive distortions in mediating relationships between EMS and aggression in adults as a function of sex. Participants were 59 women (M_{age} = 34.7 years, standard deviation [SD] = 8.0) and 86 men (M_{age} = 39.3 years, SD = 13.2) who completed the Young Schema Questionnaire—Short Form-V3, the How I Think Questionnaire of cognitive distortions, and the Buss–Warren Aggression Questionnaire. Multiple mediation analysis identified EMS domain *impaired limits* to be uniquely and directly related to aggression, and the domain *impaired autonomy* to be indirectly related via a range of cognitive distortions. Multigroup analyses revealed no sex differences in these relationships, and analysis of covariance with age as a covariate revealed no sex differences in levels of EMS, cognitive distortion, or aggression. The results suggest that impaired limits and impaired autonomy are EMS domains of relevance to aggression regardless of sex. Furthermore, in the case of impaired autonomy, self-serving, proaggression cognitive distortions appear to be involved. Interventions for aggression may thus benefit by focusing on clients with entitlement/grandiosity traits indicative of impaired limits, and vulnerability/dependence traits indicative of impaired autonomy, and in the latter case consider addressing the self-serving cognitions that enable the expression of aggression in these clients.

KEYWORDS
aggression, cognitive distortions, early maladaptive schemas, sex differences

1 | INTRODUCTION

1.1 | Aggression and sex differences

Aggressive behaviors are behaviors intended to cause or threaten harm (Malti & Rubin, 2018). These behaviors can be "direct," such as physical or verbal acts targeting a person or relational acts that target their social status or access to social resources. They can also be "indirect" and involve efforts by the aggressor to conceal their intentions and/or identity (Dewi & Kyranides, 2021). Aggression can be proactive and opportunistic, reactive in response to frustration or actual or perceived threats, or entirely unprovoked (Merk et al., 2005).

Aggression can impact the intended target, their family, witnesses/bystanders, and/or society in the form of emotional harm, mental illness, and fiscal expenditure in health and correctional services (Richard et al., 2022).

Although men are more likely to perpetrate physical and verbal acts of aggression and perceive hostile intent in others (Cunha et al., 2022; Fahlgren et al., 2022), sex differences are less obvious in terms of relational and indirect aggression. Indeed, some studies actually find higher rates of these forms of aggression in women (Archer, 2004). Social role theory explains these sex differences in terms of sex roles that emphasize physical competition and social dominance in relation to men, and agreeableness, social compliance, and nonphysical methods of competition in relation to women (Wood & Eagly, 2012). Evolutionary theories posit that these sex differences stem from evolutionary pressures on men to compete for reproductive partners (Nivette et al., 2019). Both perspectives have in common the idea that the sexes do not necessarily differ in terms of their tendency to aggress, only that social and biological factors conspire to create a bias toward overt/physical forms of aggression in men and covert forms of aggression in women (Thomson et al., 2019).

1.2 | Early maladaptive schemas (EMS)

Those who perpetrate aggression are more likely to exhibit pervasive impairments in psychological and intrapersonal functioning, particularly in relation to emotional regulation in social situations (Lavoie & Harwood, 2022). Where there is evidence that these impairments are stable over time, have an early origin, and/or can be traced back to difficult life circumstances in childhood, they are taken to be indicative of maladaptive social cognitions. Social cognitions often implicated in aggression include biases or deficiencies in relation to the processing of social situations (e.g., a tendency to interpret challenging social situations as antagonistic), and proaggressive attitudes, beliefs, and emotional responses to social situations (e.g., a tendency to experience anger in response to frustration) (Buss & Perry, 1992; Dunne et al., 2018; Sleep et al., 2021). An influential explanation of aggression on the basis of social-cognitive development is EMS theory.

EMS are conceptualized as pervasive, stable, and persistent systems of belief and expectation (Beck, 1967) that arise in childhood in response to abuse, neglect, or family violence (Shainheit & Wright, 2012). Young and colleagues identify five EMS domains. The *disconnection/rejection* domain describes a sense of distrust, emotional detachment, sense of abandonment, social isolation, and difficulties forming relationships (Shorey et al., 2015). The *impaired limits* domain describes a sense of entitlement, diminished self-control, sense of superiority, and difficulty respecting the rights of others (Chodkiewicz et al., 2022). The *impaired autonomy* domain describes vulnerability, sense of personal failure, excessive dependence on others, and poor social functioning (Bruysters & Pilkington, 2022). The *over-vigilance/inhibition* domain describes excessive need for the approval of others, subjugation of one's own needs and emotions, punitiveness, and tendency toward emotional inhibition, negativity, and pessimism (Young et al., 2003). The *other-directedness* domain describes the desire to meet the needs of others to gain their approval and support (Young et al., 2003).

Sex differences are evident in relation to EMS (Ostrov & Godleski, 2010), consistent with the idea that gender schemas influence EMS. Indeed, of the five EMS domains, four appear to be relevant to aggression, with evidence of sex differences also apparent in these relationships (Janovsky et al., 2020). The disconnection/rejection domain features in women and men who perpetrate aggressive acts, particularly in the form of relational and indirect aggression by women and physical intimate partner violence by men (e.g., Fernández-González et al., 2022; Pilkington et al., 2021). The impaired limits domain is associated with verbal and physical aggression, particularly in men who are in relationships with women (Shorey et al., 2017). The impaired autonomy domain is associated with both perpetration and victimization, particularly in women (Kachadourian et al., 2013; Pilkington et al., 2021). The over-vigilance/inhibition domain is associated with both physical and verbal aggression in both women and men seeking treatment for substance abuse (Shorey et al., 2015). The exception is the other-directedness domain which, given its focus on gaining the approval of others, is unsurprisingly unrelated to aggression in women or men (Shorey et al., 2015). However, note that this body of research is limited to subpopulations of adults such as incarcerated violent offenders or those seeking treatment for substance abuse (e.g., Shorey et al., 2012, 2015). Note also that many of these studies typically report significant but small effect sizes (Shorey et al., 2012) or nonsignificant effects (Janson et al., 2019) in relation to sex differences.

1.3 | Cognitive mediators of EMS in the context of aggression

It is not immediately obvious how EMS are maintained into adulthood and contribute to transgressive acts in the face of one's emotional, social, and moral development. One suggestion is that EMS survive as deeply entrenched patterns or "modes" of cognition, inner experience, and behavior (Young et al., 2003), akin to pathological personality traits (M. Keulen-de Vos et al., 2017). Correlational evidence supports this idea, with overlap evident between other-directedness and dependent personality disorder, over-vigilance and obsessive–compulsive personality disorder, and between disconnection/rejection and both borderline and avoidant personality disorders (Kunst et al., 2020).

Schema modes thought to be relevant to pathological personality in adults include: *Angry child* modes, characterized by vulnerability, anxiety, shame, frustration, anger, and a tendency toward impulsivity; *avoidant coping* modes, including the "angry protector" variant of this mode, where displays of anger are used to defend oneself from others; and *over-compensatory* modes in which threat and intimidation, including verbal and physical aggression, are used to coerce and

manipulate others (Young et al., 2003). There is evidence of the operation of several of these schema modes in descriptions of forensic patients' crimes support this idea, especially *angry child* modes in relation to disinhibited forms of aggression (M. Keulen-de Vos et al., 2014; M. E. Keulen-de Vos et al., 2016). According to schema therapy, the activation of these models produces negative emotions and triggers problematic coping responses, including acting on the schema (as if the schema were literally true), acting in the manner contradictory to the schema (overcompensating), and/or avoiding situations that reactivate the schema (M. Keulen-de Vos et al., 2017).

A related suggestion, one that is relevant to domain-specific problematic behaviors (such as aggression) is that EMS domains encourage the development of "scripts" for responding aggressively to situations (Dunne et al., 2018; Tremblay & Dozois, 2009), along with inaccurate and self-serving cognitive distortions of belief, attribution, expectation, and reasoning (e.g., Berkowitz, 1993), that impede one's ability to properly evaluate the appropriateness and consequences of one's aggressive behaviors (Young et al., 2003). The distortions inherent in EMS and the coping responses associated with them, are thought to shape the expression, likelihood, and frequency of problematic and transgressive behaviors, such as aggression, into adulthood (Espelage et al., 2018). They are also thought to maintain aggressive behaviors into adulthood by protecting one's self-esteem and reducing blame and guilt in response to one's moral transgressions (Barriga et al., 2008).

Cognitive distortions of relevance to aggression include "primary" or self-centered distortions that facilitate the pursuit of personal gain through acts of proactive aggression. This includes the belief that aggression is a valid or acceptable means to an end (Shorey et al., 2015), along with minimizing/mislabelling beliefs that promote a disregard for the welfare of others (Oostermeijer et al., 2017). This can take the form of reduced empathy toward others and moral disengagement from the consequences of one's actions (D'Urso et al., 2019). Other cognitions can be described as "secondary" distortions that are typically associated with reactive forms of aggression (Crick & Dodge, 1994). This includes blaming others for one's transgressions, engaging in hostile misinterpretations of the actions and motives of others, assuming the worst of others, and so forth. (Gini & Pozzoli, 2013).

Evidence in support of this idea comes from research showing that self-serving, proaggression cognitions are associated with a history of aggressive behavior and also predict future aggression, particularly in men (Barriga et al., 2001; Chereji et al., 2012; Smeijers et al., 2018). Cognitive distortions relevant to aggression in intimate relationships include misogynistic attitudes and the belief that it is acceptable to use violence to resolve interpersonal conflict (Guerrero-Molina et al., 2023; Hermann et al., 2018). These distortions are associated with perpetration of intimate partner abuse by men (and also by some women; Henning et al., 2005), sexual offending by incarcerated men (Cooke, 2021; D'Urso et al., 2019), and male-on-male sexual assault (Cunningham, 2023). However, it is worth noting that not all research supports this link

between cognitive distortions and aggression (Dadgardoust et al., 2022).

1.4 | The present study

Although there is evidence that EMS can increase perpetration of aggression, questions remain as to how these EMS influence aggression and how these influences persist into adulthood despite the person's moral development. A promising idea to emerge is that EMS persist because they lead to the development of self-serving proaggression cognitions that alter perceptions and emotional reactions to social situations, disinhibit transgressive behaviors in response to these situations, and/or encourage moral disengagement from the consequences of these transgressions.

However, most research in the area has focussed on children and adolescents. Where relevant research on adults has been conducted, it has typically focussed on forensic populations, and on men at the exclusion of women. Where women have been included, the focus has tended to be on forms of aggression that are nonphysical and more covert, such as relational aggression in the context of emotional manipulation (Grieve & Panebianco, 2013) and workplace bullying (Jang & Lee, 2022), as well as in relation to victimization rather than perpetration risk (Heim et al., 2018).

Furthermore, it is currently unknown whether cognitive distortions are broadly relevant to aggression or whether they are limited to certain EMS domains and particular types of aggressive behavior. This is partly due to the limited research that exists on cognitive distortions in relation to EMS, and also due to previous research typically focussing on particular domains of EMS and particular types of cognition and forms of aggression. We argue that this issue is important to clarify not only for theory development but also methodologically because of the high degree of overlap—bordering on multicollinearity—observed between types of EMS domain (Young & Brown, 2005) and types of aggression (Buss & Warren, 2000). We suggest that a possible way forward is to examine relationships between EMS, proaggression cognitive distortions, and aggressive behaviors comprehensively and simultaneously such that any unique links between them can be properly resolved.

There is also evidence of sex differences in aggression, particularly in relation to the type of aggression if not the frequency or intensity of aggression. However, sex differences in terms of EMS and cognition distortions are less well understood with most research in the area focussing on male perpetrators of proactive/overt forms of aggression. To the extent that women and men appear to exhibit aggression differently (Cunha et al., 2022) and respond differently to EMS domains (Ostrov & Godleski, 2010), we suggest that more research is needed into sex differences in relation to links between EMS and aggression.

Therefore, the present study was conducted with the principal aim of elucidating relationships between EMS domains, cognitive distortions, and types of aggression in a community sample of adults. A multiple mediation approach was employed in which cognitive distortions were modeled in parallel as potential mediators, and each

of the three sets of variables— EMS domain, cognition distortion, aggression type—intra-correlated to control for the high degree of conceptual and measurement overlap within each set (Figure 1 depicts the final version of the model used). The secondary aim of the study was to examine sex differences in these relationships. The approach adopted was to first confirm measurement invariance within the three variable sets, followed by the use of multigroup comparisons of the multiple mediation model to examine sex differences in relationships between the sets. The following hypotheses were tested:

H1: On the basis of previous research into relationships between EMS domains and aggression in adults, it was hypothesized that the disconnection/rejection, impaired limits, impaired autonomy, and over-vigilance/inhibition EMS domains will be uniquely and positively associated with aggression.

H2: In support of the idea that self-serving, proaggression cognitions account for the influence of EMS in adulthood, it was hypothesized that paths from EMS domain to aggression (identified in H1) will be positively mediated by cognitive distortions.

H3a: Because some research suggests that the relevance of EMS to aggression is different for women, it was hypothesized that sex differences will be observed in relation to EMS domains, with disconnection/rejection and impaired limits most relevant for men, impaired autonomy most relevant for women, and over-vigilance/inhibition equally relevant to both sexes.

H3b: Given previous research showing that women and men express aggression differently, it was hypothesized that sex differences will

be observed in relation to modes of aggression, with physical and verbal aggression as well as perceptions of hostile intent more relevant to men, and indirect aggression more relevant to women.

Due to ongoing questions about the factor structure of each of the measures in nonforensic samples such as ours (e.g., Cunha et al., 2022), hypothesis tests were preceded by psychometric evaluations of each measure.

2 | METHOD

2.1 | Participants and procedures

The project received prior ethics approval from the Human Research Ethics Committee of our institution, and the research team complied with APA ethical standards in the treatment of participants. Participants were 59 women (M_{age} = 34.7 years, standard deviation [SD] = 8.0) and 86 men (M_{age} = 39.3 years, SD = 13.2) recruited via Amazon MTurk™. Power analysis estimated the resultant sample of 145 to be adequate against the minimum sample size required to detect a significant effect at $p < .05$ (assuming an anticipated effect size of 0.15 and power level of 0.80), either with 5 YSQ predictors (N_{min} = 91) or 5 YSQ plus 4 HIT-Q predictors (N_{min} = 113). Most participants were employed full- or part-time (97%) and resided primarily in the United States (80%) or India (17%). They completed the following measures online via SurveyMonkey™, in the order in which they are described, and their responses are summarized in Table 1.
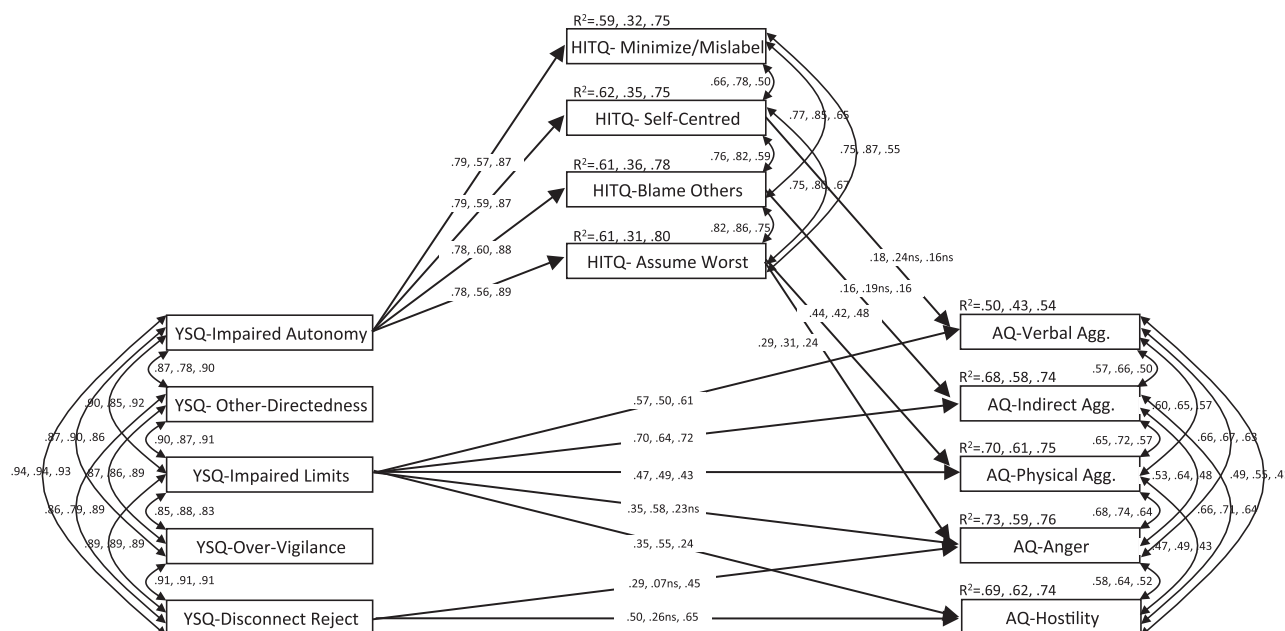

FIGURE 1 Path model used to conduct multiple mediation and multigroup path analyses reported in Table 2. Coefficients are presented in triads, with the leftmost value obtained on the entire sample, as shown in model 4, Table 2, and the others obtained using the same model but with sex included as a free parameter (middle values = female; rightmost values = male) as shown in model 4a, Table 2. Note that the model has been optimized by the removal of nonsignificant paths when tested on the group data. All coefficients included in the figure are significant except where indicated by "ns."

TABLE 1 Descriptives and Pearson bivariate correlations (results for $n = 59$ women in upper-right diagonal; results for $n = 86$ men in lower-left diagonal).

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	WOMEN M	SD	S/se	K/se	α
1	Age	–	0.04	0.00	0.01	-0.15	0.04	0.59**	0.63**	0.60**	0.59**	-0.11	-0.07	-0.02	0.17	0.01	34.7	8.0	–	–	–
2	YSQ-disconnect/reject	0.03	–	0.95**	0.91**	0.81**	0.92**	0.59**	0.60**	0.57**	0.56**	0.68**	0.59**	0.73**	0.75**	0.76**	3.87	0.87	-2.75	2.10	.95
3	YSQ-impaired autonomy	-0.04	0.88**	–	0.86**	0.81**	0.90**	0.66**	0.70**	0.71**	0.71**	0.63**	0.56**	0.69**	0.75**	0.72**	3.75	0.92	-2.30	1.01	.94
4	YSQ-impaired limits	-0.03	0.88**	0.89**	–	0.88**	0.90**	0.64**	0.65**	0.61**	0.62**	0.76**	0.69**	0.80**	0.74**	0.78**	3.91	0.82	-2.43	1.77	.86
5	YSQ-other-directedness	-0.02	0.87**	0.85**	0.88**	–	0.87**	0.59**	0.62**	0.58**	0.58**	0.70**	0.66**	0.75**	0.66**	0.71**	3.98	0.62	-0.07	-0.57	.84
6	YSQ-over-vigilance	0.05	0.89**	0.83**	0.82**	0.85**	–	0.59**	0.63**	0.60**	0.59**	0.66**	0.60**	0.72**	0.73**	0.72**	3.93	0.73	-1.87	1.68	.90
7	HIT-Q-self-centredness	-0.06	**0.84****	**0.87****	0.77**	0.77**	0.70**	–	0.88**	0.85**	0.87**	0.70**	0.58**	0.66**	0.48**	0.60**	4.19	0.85	-4.35	3.88	.86
8	HIT-Q-blaming others	-0.04	**0.86****	**0.88****	0.81**	0.82**	0.74**	0.93**	–	0.90**	0.91**	0.76**	0.65**	0.76**	0.53**	0.66**	4.19	0.95	-4.42	2.95	.93
9	HIT-Q-minimize/mislabel	0.03	0.85**	**0.87****	0.78**	0.78**	0.74**	0.92**	0.92**	–	0.91**	0.68**	0.56**	0.70**	0.46**	0.55**	4.19	0.87	-4.48	3.69	.89
10	HIT-Q-assume worst	-0.08	**0.86****	**0.89****	0.78**	0.78**	0.73**	0.92**	0.95**	0.90**	–	0.75**	0.62**	0.75**	0.54**	0.62**	4.11	0.98	-3.76	1.73	.93
11	AQ-physical aggression	-0.01	0.74**	**0.83****	0.76**	0.66**	0.68**	0.89**	0.85**	0.77**	0.85**	–	0.85**	0.92**	0.76**	0.89**	3.13	0.98	-1.96	-0.24	.93
12	AQ-verbal aggression	0.01	0.66**	0.74**	0.68**	0.56**	0.65**	0.73**	0.69**	0.70**	0.68**	0.85**	–	0.84**	0.73**	0.85**	3.18	0.80	-1.07	0.19	.80
13	AQ-anger	0.00	0.81**	**0.85****	**0.85****	0.70**	0.75**	0.86**	0.82**	0.80**	0.83**	0.91**	0.87**	–	0.85**	0.88**	3.17	0.90	-1.87	-0.12	.89
14	AQ-hostility	-0.12	0.77**	0.81**	0.75**	0.70**	0.72**	0.82**	**0.79****	**0.75****	**0.79****	0.82**	0.77**	0.85**	–	0.86**	3.3	0.82	-2.64	1.50	.89
15	AQ-indirect aggression	-0.06	0.71**	0.80**	0.77**	0.67**	0.67**	0.79**	0.79**	0.74**	0.76**	0.88**	0.82**	0.85**	0.84**	–	3.28	0.82	-2.20	1.06	.85
MEN	M	39.3	3.69	3.59	3.76	3.92	3.83	3.87	3.99	4.03	3.92	2.88	3.01	2.93	3.14	3.08					
	SD	13.2	0.98	1.07	0.91	0.83	0.83	1.13	1.02	1.03	1.11	1.01	0.88	0.95	0.85	0.91					
	S/se	–	-2.62	-2.00	-2.54	-1.11	-2.16	-2.05	-2.61	-2.91	-2.69	-1.21	-1.37	-1.41	-2.46	-2.10					
	K/se	–	0.16	-0.96	0.51	-1.36	0.60	-1.75	-1.11	-0.23	-0.75	-1.67	-0.31	-1.25	-0.19	-0.79					
	α	–	.96	.95	.87	.88	.91	.92	.92	.91	.95	.91	.79	.87	.88	.84					

Note: Coefficients in bold are significantly greater in men than women at $p < .01$.

Abbreviations: AQ, Buss–Warren Aggression Questionnaire; HIT-Q, How I Think Questionnaire; K/se, kurtosis/standard error of kurtosis; M, mean; SD, standard deviation; S/se, skew/standard error of skew; YSQ-S3, Young's Schema Questionnaire—Short form-V3.

*$p < .05$; **$p < .01$.

2.2 | Measures

The *Young Schema Questionnaire—Short Form-V3* (YSQ-S3; Young & Brown, 2005). Participants used 6-point Likert-type scales ranging from 1 ("completely untrue of me") to 6 ("describes me perfectly") to indicate level of endorsement of 90 statements describing examples of five EMS domains (25 examples of Disconnection/Rejection, 20 examples of Impaired Autonomy/Performance, 10 examples of Impaired Limits, 15 examples of Other-Directedness, and 20 examples of Over-Vigilance/Inhibition). Responses were averaged, with higher scores indicating greater endorsement of each schema.

How I Think Questionnaire (HIT-Q; Barriga et al., 2001). Participants used 6-point Likert-type scales ranging from 1 ("totally disagree") to 6 ("totally agree") to indicate extent of agreement with 39 examples of four types of cognitive distortion (9 examples of Self-Centeredness, 10 examples of Blaming Others, 9 examples of Minimizing/Mislabelling, and 11 examples of Assuming the Worst). Responses were averaged, with higher scores indicating greater endorsement of each cognitive distortion.

Buss–Warren Aggression Questionnaire (AQ; Buss & Warren, 2000). Participants used 5-point Likert-type scales ranging from 1 ("not at all like me") to 5 ("completely like me") to respond to 34 examples of five types of aggression (8 examples of Physical aggression, 5 examples of Verbal aggression, 6 examples of Indirect aggression, 7 examples of Anger, and 8 examples of Hostility). Responses to items were averaged, with higher scores indicating higher levels of aggression.

3 | RESULTS

3.1 | Data screening, variable creation, and assumptions testing

SPSS™ v27 was used to screen cases for anomalous or rapid responding, as well as for evidence of bots in the form of repeatedly used IP addresses or failure to respond to three captcha items interspersed in the survey. Missing values in remaining cases were fewer than 1% of items and were distributed randomly across measures and cases. These were replaced by imputation using regression in AMOS™ v27 for the purposes of conducting model fits (see below). Note that AMOS™ conducts imputation on an initial model fit of the data using maximum likelihood estimation and then uses the resultant parameters to conduct linear regressions from which missing values can be predicted. This method has been shown to provide adequate model results up to missing value rates of 20% (Chen et al., 2012).

Confirmatory factor analyses (CFAs) conducted in AMOS™ confirmed adequate fit of the five-factor YSQ[i] and AQ models against the following fit criteria: $\chi^2(df)$ nonsignificant; $\chi^2/df < 5$; root mean square error of approximation (RMSEA) < 0.08; standardized root mean square residual (SRMR < 0.08), comparative fit index (CFI) > 0.90, and Tucker–Lewis Index (TLI > 0.90) (cf. Hu & Bentler, 1999) (see models 1 and 3, from Table 2). Loadings were

acceptable (all > 0.5 and significant at $p < .05$), as was internal consistency for factor items (all Cronbach's $\alpha > \sim.80$) (see Table 1). However, correlations between factors were high, with multicollinearity (>0.85) present in both measures (Table 1). These results thus provided qualified support for the computation of YSQ and AQ subscales for use in subsequent inferential analyses.

The HIT-Q measure demonstrated poorer fit to the data, necessitating the following additional steps: First, we identified and removed 13 cases that were multivariate outliers in relation to the HIT-Q items (defined as having a Mahalanobis distance of $p < .001$ on a $\chi^2(df =$ number of items per subscale) distribution). Three offending cases were in relation to HIT-Q-Self-Centredness; four were in relation to HIT-Q-Blaming Others; two were in relation to HIT-Q-Minimize/Mislabel: and four were in relation to HIT-Q-Assuming the Worst. Second, we added a correlated error between items 26 ("*People force you to lie when they ask too many questions*") and 46 ("*When I lose my temper, it's because people try to make me mad.*") of HIT-Q-Blaming Others on the basis of an elevated modification index coupled with evidence of conceptual overlap between these items (both involved rationalizing aggression by attributing the cause to pressure received from others). Third, we removed two cross-loaded items identified on the basis of elevated modification indices and conceptual overlap. This included item 28 of HIT-Q-Self-Centredness ("*You should get what you need, even if it means someone has to get hurt.*") and item 25 of HIT-Q Blaming Others ("*If someone got robbed, it's their fault for not having better security/ protection.*") which both loaded onto HIT-Q-Assuming the Worst. Resultant fit supported the use of this modified four-factor HIT-Q model as acceptable for use in subsequent analyses (see model 2 from Table 2).

Finally, univariate outliers in each measure's subscales (>±3.29 SD from the mean) were adjusted to the value equal to 3.29 SD (i.e., their rank position was retained) (Tabachnick & Fidell, 2007). No resultant subscales violated normality assumptions in relation to skew or kurtosis, and no cases were identified as multivariate outliers across subscales (Mahalanobis's distance $p < .001$).

Descriptives and bivariate correlations between subscales are summarized separately for women and men in Table 1. The table reveals both inter- and intrafactor correlations (with the exception of age).

3.2 | Relationships between EMS and aggression

Hypotheses were tested in AMOS™ using the multiple mediation model depicted in Figure 1. This model included correlations between subscales to reflect the presence of significant bivariate correlations and ensure that paths between measures would identify unique/ unshared associations. The final model, optimized by removal of nonsignificant paths, performed adequately in relation to most indices (see model 4, Table 2).

TABLE 2 Summary of model fit results.

Measurement models	Comparison	CMIN(df)	CMIN/df	RMSEA	SRMR	CFI	TLI	ΔCMIN	Δdf	sig
YSQ model										
(1) YSQ model All parameters unconstrained; both sexes included together	–	**217.35*(125)**	**1.74**	**0.075**	**0.026**	**0.97**	**0.96**	–	–	–
(1a) Baseline model All parameters unconstrained; groups tested simultaneously	–	480.24*(240)	1.92	0.084	0.031	0.92	0.91	–	–	–
(1b) Metric invariant model Model 1a with factor loadings constrained between sexes	Model 1a	498.49*(263)	1.90	0.083	0.034	0.92	0.91	18.25	23	p = .743 ns
(1c) Scalar invariant model Model 1b with intercepts constrained between sexes	Model 1b	524.46*(281)	1.87	0.082	0.035	0.92	0.91	25.97	18	p = .100 ns
HIT-Q model										
(2) HIT-Q model All parameters unconstrained; both sexes included together	–	**766.46(*488)**	**1.57**	**0.066**	**0.046**	**0.92**	**0.91**	–	–	–
(2a) Baseline model All parameters unconstrained; groups tested simultaneously	–	1714.75*(976)	1.76	0.076	0.057	0.81	0.80	–	–	–
(2b) Metric invariant model Model 2a with factor loadings constrained between sexes	Model 2a	1739.98*(1005)	1.73	0.075	0.060	0.81	0.80	25.23	29	p = .666 ns
(2c) Scalar invariant model Model 2b with intercepts constrained between sexes	Model 2b	1770.51*(1038)	1.71	0.074	0.064	0.81	0.80	30.53	33	p = .591 ns
AQ model										
(3) AQ model All parameters unconstrained; both sexes included together		**773.00*(485)**	**1.59**	**0.064**	**0.052**	**0.91**	**0.90**	–	–	–
(3a) Baseline model All parameters unconstrained; groups tested simultaneously		1635.67*(998)	1.64	0.067	0.071	0.82	0.81	–	–	–
(3b) Metric invariant model Model 3a with factor loadings constrained between sexes	Model 3a	1597.88*(970)	1.65	0.067	0.067	0.82	0.81	37.79	28	p = .102 ns
(3c) Scalar invariant model Model 3b with intercepts constrained between sexes	Model 3b	1638.80*(1003)	1.63	0.067	0.068	0.82	0.81	40.92	33	p = .162 ns
Path model (see Figure 1)										
(4) Path model Significant paths only; all parameters unconstrained; group data		**88.48*(50)**	**1.77**	**0.077**	**0.039**	**0.99**	**0.98**	–	–	–
(4a) Baseline model All parameters unconstrained; groups tested simultaneously		183.28*(100)	1.83	0.080	0.033	0.97	0.95	–	–	–

(Continues)

TABLE 2 (Continued)

Measurement models	Comparison	CMIN(df)	CMIN/df	RMSEA	SRMR	CFI	TLI	ΔCMIN	Δdf	sig
(4b) Metric invariant model Model 4a with factor loadings constrained between sexes	Model 4a	203.43*(115)	1.77	0.077	0.034	0.97	0.95	20.15	15	p = .166 ns
(4c) Scalar invariant model Model 4b with intercepts constrained between sexes	Model 4b	209.19*(124)	1.69	0.073	0.034	0.97	0.96	5.76	9	p = .764 ns

Note: Path model is depicted in Figure 1.

Abbreviations: AQ, Buss–Warren Aggression Questionnaire; CFI, comparative fit index; CMIN, likelihood ratio χ^2; HIT-Q, How I Think Questionnaire; RMSEA, root mean square error of approximation; SRMR, standardized root mean square residual; TLI, Tucker–Lewis Index; YSQ, The Young Schema Questionnaire—Short Form-V3.

*$p < .01$.

The hypothesis that EMS domains would be positively associated with aggression (H1) was partially supported with impaired limits directly associated with all AQ subscales and disconnection/rejection associated with anger and hostility (as explained in Section 3.3, these relationships appeared to be limited to men). Despite their large and statistically significant bivariate correlations with all AQ subscales (see Table 1), the mediation model showed that the other three EMS domains were not uniquely associated with any AQ subscales.

The hypothesis that cognitive distortions would positively mediate associations between EMS domains and aggression (H2) was also partially supported. Indirect effects tests conducted in AMOS™ using a bias-corrected bootstrap resampling method with 2000 samples (Shrout & Bolger, 2002), revealed the presence of significant indirect paths, but only from the impaired autonomy EMS domain. Specifically, the path from impaired autonomy to verbal aggression was mediated by distortions in the form of self-centeredness, $\beta = .14$, $p < .05$; the path to indirect aggression was mediated by distortions in the form of blaming others, $\beta = .13$, $p < .05$; and the path to anger and physical aggression were both mediated by assuming the worst, $\beta = .23$ and $.385$, $p < .001$, respectively.

3.3 | Sex differences in EMS domains and aggression

Measurement invariance tests on the YSQ, HIT-Q, and AQ measurement models were conducted to confirm metric invariance as a function of sex (to support the creation of subscale scores in the same manner for both sexes) followed by tests to confirm scalar invariance (to allow meaningful comparisons of subscale scores to be made between the sexes). These were carried out in AMOS™ using the approach recommended by Byrne (2010) and reporting conventions recommended by Putnick and Bornstein (2016). This involved creating baseline models of each measure fit on both sexes simultaneously with no equality constraints imposed. Metric invariance was then evaluated by constraining factor loadings between the groups, followed by scalar invariance evaluated by constraining factor intercepts. Difference-of-χ^2 tests were used to

determine if model fit deteriorated significantly at each step. The results, summarized in Table 2, show nonsignificant deterioration of model fits resulting from imposition of either type of constraint, thus supporting both metric and scalar invariance for the three measurement models. This allowed comparison of scores on the subscales, evaluation of sex differences in terms of the direction and magnitude of correlation coefficients, and comparison of path coefficients between the groups.

Three sets of analysis of covariance by sex, with age included as a covariate, revealed no sex differences in the disconnection/rejection, impaired autonomy, impaired limits, other-directedness, and over-vigilance/inhibition YSQ subscales, $F(1,132) = 1.74$, 1.01, 1.05, 0.42, 0.34, $\eta^2_{partial} = 0.013$, 0.008, 0.008, 0.003, 0.003, $p > .05$ ns, the self-centeredness, blaming others, minimizing/mislabelling, and assuming the worst HIT-Q subscales, $F(1,132) = 1.78$, 2.33, 0.82, 0.88, 0.61, $\eta^2_{partial} = 0.018$, 0.006, 0.007, 0.005, $p > .05$ ns, or the physical, verbal, indirect, anger, and hostility AQ subscales, $F(1,132) = 1.62$, 0.66, 1.53, 1.13, 1.62, $\eta^2_{partial} = 0.012$, 0.005, 0.012, 0.009, 0.012, $p > .05$ ns, respectively.

Fisher's r-to-z transformations were then used to convert Pearson's r values in Table 1 into z scores for sex comparisons according to: $\Delta z/(\sqrt{(1/(N_{women} - 3)) + (1/(N_{men} - 3))}$, tested against a two-tailed p value of $.01$ or $z = 2.58$ (note that the use of a conservative p value was due to the inflation of familywise error associated with the large number of comparisons involved). We identify the significantly deviant correlation coefficients in bold in Table 1, and note that these deviant correlations were consistently in the form of stronger positive correlations between the HIT-Q subscales and two YSQ subscales (impaired autonomy and disconnection/rejection), and one AQ subscale (hostility), in men compared with women.

Finally, the path model depicted in Figure 1 (with the two sexes tested simultaneously and sex included as a free parameter) was examined for evidence of sex differences. Inspection of the resultant model indicated several sex differences in relation to their being significant direct paths from YSQ-Disconnection/Rejection to AQ-Anger and Hostility men but not women. However, multigroup analyses on the two groups did not support hypotheses that sex

differences would be observed in relation to EMS domains (H3a) and modes of aggression (H3b). Relative to the baseline version model (model 4a in Table 2), constraining regression weights (model 4b) resulted in no significant deterioration of model fit, $\Delta\chi^2(\Delta df) = 20.15(15)$, $p = .166$, and relative to this model, constraining squared multiple correlations (model 4c) resulted in no further deterioration of model fit, $\Delta\chi^2(\Delta df) = 5.76(9)$, $p = .764$. Furthermore, indirect paths retested separately for the two sexes revealed similar indirect effects for the two groups.

4 | DISCUSSION

The aims of the study were to explore relationships between EMS and aggressive behavior, evaluate the role of cognitive distortions as mediators of these relationships, and test for sex differences in these relationships.

4.1 | Impaired limits and impaired autonomy

The presence of high intrafactor correlations required the inclusion of covariance terms between EMS domains such that their unique associations with aggression could be quantified. Doing so revealed two EMS domains—impaired limits and impaired autonomy—with unique associations with aggression.

Impaired limits were found to be broadly associated with aggression, including overt physical and verbal aggression, the expression of anger, and indirect aggression. Interestingly, paths from impaired limits to aggression were exclusively direct, that is, unrelated to and unmediated by cognitive distortions. Perhaps the lack of insight and disregard for others' welfare characteristic of this EMS domain (Chodkiewicz et al., 2022) obviates the need for adults with impaired limits to use cognitive distortions to enable/justify aggression. Consider that the one component of aggression found to be unrelated to impaired limits—hostility—is a disposition characterized by feelings (bitterness, resentment, cynicism, paranoia, distrust of others, and jealousy; Buss & Warren, 2000; Chereji et al., 2012) rather than an overt behavior that might require social disinhibition.

Impaired autonomy was also associated—but only indirectly—with all subscales of aggression. The characteristics of this domain, including vulnerability, sense of personal failure, excessive dependence on others, and poor social functioning (Bruysters & Pilkington, 2022), are thought to encourage poor self-esteem, over-dependence on and enmeshment with others, and the use of aggression and other forms of manipulation to maintain continued dependence on others (Shorey et al., 2015). This EMS domain has been found to be associated with aggression toward intimate partners (Gay et al., 2013; Kachadourian et al., 2013), and in the present study was found to be directly associated with both indirect aggression and hostility.

4.2 | Cognitive distortions as mediators of impaired autonomy

Although previous research has confirmed that cognitive distortions are associated with aggression (see review by Gini & Pozzoli, 2013), our study went further in showing (i) that these distortions were limited to a single EMS domain, impaired autonomy (after controlling for overlap between EMS domains), and (ii) that specific distortions were linked to specific types of aggression (after controlling for overlap between types of aggression).

Distortions in the form of attributing hostile intent to others and/or assuming that confrontation is inevitable (assuming the worst), were associated both with anger and physical aggression. This was in keeping with the idea that cognitive distortions facilitate aggression by protecting the perpetrator from self-blame (Oostermeijer et al., 2017) Disregarding the impact of one's acts on others (self-centeredness), was relevant to verbal aggression, similar to previous findings of an association between self-centered impulsivity and hostility in forensic psychiatric patients (Edens & McDermott, 2010). Finally, a tendency to blame others for negative outcomes (blaming others), was relevant to indirect aggression, consistent with previous evidence that provocation to anger is mediated by hostile attributions of others, including the observation that this tendency is more pronounced in forensic populations (Zajenkowska et al., 2021).

That these cognitive distortions were not associated with impaired limits perhaps indicates that this EMS domain promotes aggression in a relatively straightforward manner. Impaired limits are thought to be relevant to proactive aggression by reducing self-control and elevating one's needs and perspectives above those of others (Askari, 2019; Dunne et al., 2018; Tremblay & Dozois, 2009). In terms of the schema modes proposed by Young et al. (2003), this EMS domain appears to be closely related to over-compensatory modes in which bullying, attack, manipulation, and over-control are used to subjugate others, and parent modes characterized by a punitive and demanding attitude to self and others (M. Keulen-de Vos et al., 2017). We suggest that the cognitions underpinning these schema modes represent the operation of simple self-interest.

We do not think that this is the case for impaired autonomy, which we found to be indirectly linked to aggression. This domain is inherently dependent on interpretation, requiring an analysis of potential threats, the motives of others, and one's precarity and dependence on others (Kachadourian et al., 2013). It is also most closely related to angry child schema modes characterized by unmet needs, a sense of vulnerability, and sensitivity to abandonment and humiliation (M. Keulen-de Vos et al., 2017). We suggest that such determinations are not only more cognitively taxing, they are also more susceptible to error and distortion. Indeed, previous research has shown the impaired autonomy domain to be associated with interpretive errors, particularly unwarranted sensitivity to perceived threats, fear of loss, and fear of victimization (Pilkington et al., 2021). We suggest that future research be conducted to explore this idea further.

4.3 | EMS domains that were not uniquely related to aggression

The use of a multiple mediation model with covariance terms between EMS subscales allowed us to identify three EMS domains that failed to be uniquely associated with aggression despite their bivariate correlations with aggression. The other-directedness domain has been shown to be associated with suppression of one's feelings/impulses along with maladaptive internalization, and it was not surprising that it was not uniquely associated with aggression perpetration (Shorey et al., 2015). Similarly, the over-vigilance/inhibition domain was also not uniquely associated. It may be that need for approval and subjugation of one's own needs characteristic of this EMS domain are more relevant to internalization issues and risk of victimization rather than perpetration (Pilkington et al., 2021).

4.4 | Limited evidence of sex differences

Tests for sex differences were motivated by evidence (albeit mixed) that women and men differ in their endorsement of EMS as well as their expression of aggression. However, sex differences were limited to the disconnection/rejection domain. Bivariate correlations between this domain and both physical aggression and anger were found to be significantly larger for men than women, and paths from this domain to anger and hostility were only found to be significant for men, not women. Although previous research has found disconnection/rejection to be relevant to aggression in both sexes (Fernández-González et al., 2022; Pilkington et al., 2021), this research has focussed on relational/indirect forms of aggression. Our results suggest that this EMS domain may be gendered but only in relation to expressions of aggression and anger (Askari, 2019).

Aside from these few correlations/paths involving disconnection/rejection, our results failed to reveal consistent and widespread sex differences. This argues against the idea that gender schema shape EMS domains and/or their expression (Ostrov & Godleski, 2010). Our result may be related to the possibility that sex differences in EMS tend to diminish with age (Janson et al., 2019; Shorey et al., 2012). Despite being conceptualized as stable psychological constructs (Pilkington et al., 2021), EMS may moderate over the course of one's lifespan in response to evolving moral reasoning (Young et al., 2003). Unfortunately, although longitudinal research exists on this issue, most studies have evaluated EMS stability over timespans of months rather than years (Calvete et al., 2015), and in the few longitudinal studies conducted over years, participants have typically been adults at baseline (Wang et al., 2010).

We also observed no consistent sex differences in levels of aggression-related cognition or behavior. There is a long-standing controversy about sex differences in aggression, one that is reviewed by (Langhinrichsen-Rohling, 2010). This evidence points to similarities in low to moderate levels of aggression as a function of sex, as well as similarities in the expression of aggression, but with the notable exception of "patriarchal terrorism" or "coercive control," that is, the use of violence to maintain control over one's partner, which is far more prevalent in men and greatly overrepresented in forensic populations (Johnson, 1995).

4.5 | Limitations and implications

In addition to being unable to infer causality due to our use of a cross-sectional research design and correlational analytic methods, our study was limited in its use of a small sample of low diversity. There was also evidence of questionable factor structure for the HIT-Q measure of cognitive distortions (several additional statistical steps were required to create a usable model). In terms of sex roles, a possibility that we did not examine in our study is that sex differences in the context of EMS are less to do with gender identity per se and more closely related to beliefs about and adherence to sex roles (e.g., Preston et al., 2018). Unfortunately, we did not measure gender role attitudes or adherence of our participants.

In conclusion, two EMS domains—impaired limits and impaired autonomy—were found to be uniquely associated with aggression in adults. Impaired limits were directly associated with all forms of aggression, whereas impaired autonomy was associated with aggression by way of a range of cognitive distortions. These results support the idea that EMS can lead to the development of self-serving, proaggression cognitions that predispose and maintain aggressive behaviors into adulthood. The therapeutic implications for cognitive interventions for aggression (e.g., Oostermeijer et al., 2017) is that such interventions may benefit by focusing on entitlement/grandiosity and vulnerability/dependence traits in their clients, and in the latter case also address self-serving cognitions that enable aggression.

CONFLICT OF INTEREST STATEMENT
The authors declare no conflicts of interest.

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

ETHICS STATEMENT
The project received prior ethics approval from the Human Research Ethics Committee of our institution, and the research team complied with APA ethical standards in the treatment of participants.

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ENDNOTE

[i] Recent psychometric work favors a four-factor model of the YSQ, at least for the long-form version of the measure (e.g., Yalcin et al. (2020). However, we retained the five-factor model for the purposes of comparability with previous published research which has almost exclusively assumed a five-factor structure.

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