



Verbal, physical and relational aggression: individual differences in emotion and cognitive regulation strategies

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Abstract

Cognitive and emotion regulation strategies play an influential role in the display of aggression, however much of this research has failed to identify specific regulation strategies related to aggression. The study's objective was to assess how emotional processes and the habitual use of maladaptive cognitive emotion regulation strategies are associated with trait aggression. Participants ($N=306$; $Mage=33.79$; $SD=13.29$), completed a self-report survey battery assessing four subtypes of trait aggression (physical, verbal and romantic relational and peer-directed relational), emotion (anger, hostility) and maladaptive cognitive emotion regulation strategies (blaming others, blaming self, ruminating, catastrophizing). Results indicated that anger and hostility (the emotion based variables) had greater influence on all subtypes of trait aggression (physical, verbal, and relational aggression), compared to cognitive emotion regulation strategies which had less of an influence. Blaming others had a positive association with physical and peer directed relational aggression. Low levels of rumination were associated with physical aggression, while low levels of self-blame were associated with peer directed relational aggression. Findings suggest that maladaptive cognitive emotion regulation strategies have differential impact on different forms of aggressive behavior.

Keywords Physical aggression · Verbal aggression · Romantic relational aggression · Peer directed relational aggression · Anger · Emotion regulation

Introduction

Aggression is a substantial social and public-health concern in societies around the world. In its most extreme form, aggression is manifested as violent behaviours. Therefore, it is imperative to understand the variables that are strongly associated with aggression to inform targeted interventions aimed at managing aggressive tendencies acknowledging that different mechanisms and pathways of association may be found depending on the type of aggressive behaviour displayed (e.g., physical, verbal, relational). Physical or overt aggression is understood as behavioural altercations intentionally directed to physically harm another (e.g., hitting)

(Kaye & Erdley, 2011), verbal aggression is understood to consist of spoken or written communications intentionally directed to harm another person (Infante & Wigley, 1986), while relational aggression is understood to include intentional actions directed towards influencing a person's relationships with others and undermining their social status (Crick et al., 2007). These behaviours can be employed in reaction to real or perceived threats, or proactively (Miller & Lynam, 2006; Poulin & Boivin, 2000).

Theoretical models of aggressive behaviours vary with respect to how much emphasis they place on person-level versus contextual-level factors, but there is consensus that the interactions between a developing person's more biologically-based attributes and their contexts (e.g., family, neighborhood, community) jointly influence their propensity to engage in aggressive behaviours, which over time, can form consistent patterns of aggressive behaviour owing to local and more distal reinforcement contingencies (Anderson & Bushman, 2002; Bettencourt et al., 2006; Dodge & Pettit, 2003). On the person-level, interactions among emotional and cognitive systems contribute to people's ability

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to regulate their internal emotional states in response to social stimuli, and to consequently influence their behaviours. According to the initial Social Information Processing (SIP) model, social cues are interpreted through a number of steps that can affect how an individual interprets and reacts (Crick & Dodge, 1994). These steps include: (1) encoding cues, (2) interpreting these cues, (3) goal clarification, (4) generating response alternatives, (5) evaluating response alternatives and selecting the optimal response and, lastly (6) enacting the optimal response (Crick & Dodge, 1994). While the original model (Crick & Dodge, 1994) focuses on the cognitive processes, the revised model (Lerner & Arsenio, 2000) incorporated emotion and emotion regulation processes that argue that an individual's emotionality and their cognitive biases affect how the individual interprets and reacts to social stimuli. Therefore, it is important to understand both the cognitive as well as the emotion regulation processes underlying different aggressive behaviors.

Appropriately utilizing emotion regulation techniques in the face of emotionally arousing events has clear benefits in reducing propensity for aggressive behaviour (Eftekhari et al., 2009; Robertson et al., 2012). Emotion regulation is defined as attempts to 'maintain, inhibit and enhance emotional experience and expression' (Robertson et al., 2012). Emotion regulation constitutes a set of processes that modulate emotions in accordance with personal goals and occurs either as a precedent, antecedent or consequence to the generation of an emotional response (Gross, 2014). For example, the ability to deploy regulatory strategies to manage negative emotions during stressful events, can help to control risk for engaging in antisocial and maladaptive behaviour (Cicchetti et al., 1995). To date, much of the research has explored emotion regulation as a general concept. The construct of emotional self-regulation is quite broad and encapsulates interactions among cognitive, physiological (i.e., emotional), and behavioural processes (Garnefski et al., 2002b; Gross, 2014). It would be important to identify which maladaptive emotion regulation strategies relate to different forms of aggression.

Individual differences in emotional and cognitive processes and aggression

Considering emotional drivers, anger is the most common determinant of aggression and is experienced when an individual becomes aroused due to physiological activation (Reyna et al., 2011; Wilkowski & Robinson, 2010). Anger which typically occurs when someone is provoked, threatened or when their goals are blocked, seems to fuel aggressive behavior (Beames et al., 2019; Dewi & Kyranides, 2022). Individuals that score high on experiencing and expressing anger are also more likely to hold hostile

cognitions, and to engage in physically or verbally aggressive behavior (Anestis et al., 2009; Kyranides et al., 2023). While anger has been found to have positive associations across different types of aggression (Chen et al., 2012; Wyckoff, 2016), the majority of previous research has focused on physical aggression, with less focus on indirect forms of aggression.

Hostility, a related but distinct concept, which refers to thoughts and feelings of injustice, has been found to be associated with aggression (Reyna et al., 2011). Thoughts that perpetuate and magnify anger have been found to mediate the association between anger and increased propensity for proactive and reactive forms of relational aggression, highlighting the interplay among cognitive and emotional regulatory factors (Kokkinos et al., 2021; Kyranides et al., 2017). Anger and hostility have been found to contribute independently and positively to physical and verbal aggression with a stronger relationship with physical as opposed to verbal (Rubio-Garay et al., 2016). Furthermore, more recently anger and hostility and have been found to be positively associated with more frequent reports of intimate partner aggression (Massa et al., 2019). One of the aims of the current study was to examine how anger and hostility relate with different forms of aggression including relational aggression.

Cognitive emotion regulation strategies (CERS) refer to how individuals consciously register and attend to emotionally-arousing information (Thompson, 1991, 1994). Garnefski and Kraaij (2007) developed a theoretically-based instrument documenting different maladaptive cognitive emotion regulation strategies commonly used, including self-blame, other-blame, rumination and catastrophizing. Self and Other blame are cognitive processes during which the individual attributes the occurrence of negative events or outcomes to oneself or others, respectively. The direction of blame often has implications on the individuals' emotions and behaviors during and following stressful events (Balzarotti et al., 2016). Rumination is defined as excessive, repetitive thinking of negative feelings and events that happened in the past and anger rumination refers to the specific tendency to focus and dwell on angry moods and frustrating experiences (Sukhodolsky et al., 2001). Catastrophizing involves irrational thoughts about the present and future whereby the person overestimates disastrous consequences (Chan et al., 2015). Garnefski and colleagues (2004) suggest there is a stronger relation between cognitive emotion regulation and internalising rather than externalising problems. Therefore, much of the focus within the realm of cognitive emotion regulation has been on internalising problems (Aldao et al., 2010; Chan et al., 2015; Garnefski & Kraaij, 2007), with less focus on cognitive emotion regulation and externalising problems.

Hence, this study examined how individual differences in the habitual use of maladaptive cognitive emotion regulation strategies informs our understanding of individual differences in aggressive behaviour. For example, findings suggest that poor emotion regulation is positively associated with reactive relational aggression (Colton et al., 2023; Dane & Marini, 2014; Kokkinos et al., 2019; Moroń & Biolik-Moroń, 2021) and proactive relational aggression (see Kokkinos et al., 2019). A strong evidence base also suggests that less ruminated anger, and more self-control are associated with stronger self-regulatory competencies and less aggression (Denson et al., 2012). On the other hand, greater levels of anger-related rumination are known to increase the occurrence of relational aggression (Kokkinos et al., 2021), physical and verbal aggression (Anestis et al., 2009). Impairments in adaptive self-reflection have also been linked to aggressive behavior (Nolen-Hoeksema et al., 2008). With regard to other maladaptive cognitive strategies, catastrophizing and blaming others were positively correlated with aggression (Casini et al., 2022). Self-blame as a cognitive emotion regulation strategy produced mixed results with some studies showing no association with aggression (Casini et al., 2022) while others found an association to competitive anger and aggressive behavior in athletes (Behjame et al., 2021) with most studies looking at aggression in general and not specifically looking at the different forms of aggression.

The current study

To unpack the contributions of cognitive-emotional regulatory processes towards propensity for different types of aggression we conducted a cross-sectional survey study with adult community-living participants using validated measures of aggression and regulatory processes. More specifically this study aims to examine how emotion-based processes and different maladaptive cognitive emotions regulation strategies relate to physical, verbal and relational aggression (assessed separately in the context of peer and intimate relationships). Additional insight into the cognitive-emotional might provide key innovations in designing prevention and intervention strategies for reducing different forms of aggressions. In keeping with prior literature we hypothesised that (1) anger and hostility, which are emotion based, will have a stronger relationship with all the different forms of aggression under study (physical, verbal, relational), (2) greater use of maladaptive cognitive emotion regulation strategies will correlate with higher levels of the different trait aggression (physical, verbal, relational).

Method

Procedure

The study was approved by the University of Edinburgh Ethics Committee. Participants were recruited online via a shared link on various social media platforms (e.g., Facebook, Instagram, WhatsApp, Email) and offline (e.g., poster posted on campus and other university buildings). The survey was self-administered via a secure online platform.

Participants

A total of 308 participants took part in the study. Of these participants, 2 were excluded due to not providing a sufficient number of responses. The final analytic sample consisted of 306 participants of which 39.2% were male ($n=120$), 60.5% were female ($n=185$); one participant (0.3%) did not provide their sex. The average age of participants was 33.79 years ($SD=13.29$), with ages ranging from 19 to 81 years old ($Mode=27$; $Kurtosis=0.22$, $SE=0.28$; $Skewness=1.13$; $SE=0.14$). The majority of the sample 56.5% were between the ages of 19–29, 16% were between the ages 30–39, 9.5% were between the ages 40–49, 12.1% between the ages of 50–59, 4.9% between the ages of 60–69, 1% between the ages of 70–81. The majority of the sample reported having an undergraduate ($n=131$, 42.8%), or postgraduate master's degree ($n=127$, 41.5%). A smaller percentage 6.9% ($n=21$) reported obtaining a diploma, 5.9% ($n=18$) a high school degree, 1% ($n=3$) reported not obtaining a high school degree, while 0.7% ($n=2$) reported having a PhD as their highest qualification and 1.3% ($n=4$) did not provide any response to this question. Regarding employment status, most participants reported working full time ($n=129$; 42.2%), part time ($n=33$, 10.8%) or being self-employed ($n=28$; 9.2%). A smaller percentage reported being unemployed ($n=37$; 12.1%), unemployed but looking for work ($n=24$; 7.8%), were retired ($n=12$; 3.9%) or classified their employment status as other ($n=43$; 14.1%). Approximately half of the sample reported being single at the time the study was conducted ($n=123$; 40.2%), separated ($n=2$; 0.7%), divorced ($n=5$; 1.6%), or widowed ($n=1$; 0.3%) while the other half, reported being in a relationship ($n=58$; 19%), being engaged ($n=2$; 0.7%) or married ($n=115$; 37.6%).

Measures

Buss Perry Aggression Questionnaire (BPAQ); (Buss & Perry, 1992). The BPAQ is a 29-item self-report questionnaire that assesses levels of trait overt aggression. Items were presented in the form of a Likert scale, ranging from 1

(*extremely uncharacteristic of me*) to 5 (*extremely characteristic of me*). The scale consists of four subscales – physical aggression (9 items; $\alpha = 0.77$; e.g. “If I have to resort to violence to protect my rights, I will”), verbal aggression (5 items; $\alpha = 0.73$, “I often find myself disagreeing with people”), hostility (8 items; $\alpha = 0.82$; “I wonder why sometimes I feel so bitter about things”) and anger (7 items; $\alpha = 0.77$; “I have trouble controlling my temper”). Cronbach’s alpha of the BPAQ subscales in the present study reflected acceptable internal consistencies similar in range to those previously reported, $0.72 < \alpha < 0.85$ (Burton et al., 2007; Buss & Perry, 1992).

Self-Report of Aggression and Social Behavior measure (SRASBM; Morales & Crick, 1998). The SRASBM is a 56-item self-report questionnaire that assesses aggression and social behavior. The scale includes subscales that specifically assess relational aggression and these subscales have been used independently in prior work (Linder et al., 2002; Murray-Close et al., 2010). Similarly, we only used the items corresponding to romantic relational aggression, (5 items, $\alpha = 0.70$; e.g., “I have threatened to break up with my romantic partner in order to get him/her to do what I wanted”) and peer directed relational aggression (10 items, $\alpha = 0.88$; e.g., “When I am not invited to do something with a group of people, I will exclude those people from future activities”). Utilizing a 7-point Likert-scale (1 = *not at all true* to 7 = *very true*), participants self-assess each item. Participants who were not in a relationship were instructed to think about their prior intimate relationships. Of the 306 participants, 2.6% ($n = 8$ participants) did not have any current or prior intimate relationship and so they did not complete the romantic relational aggression items and 1.6% of the sample ($n = 5$ participants) did not fill in the peer directed relational aggression items. Higher scores on these subscales indicates greater likelihood to engage in relational aggression toward their romantic partner/peers respectively. Prior studies using the SRASBM have provided evidence of reliability and validity of the relational aggression subscales (Murray-Close et al., 2010; Ostrov & Houston, 2008).

Cognitive Emotion Regulation Questionnaire (CERQ; Garnefski et al., 2002a). The CERQ measures cognitive strategies individuals adopt to manage their emotions, in response to emotionally-arousing life events. It consists of 36 questions with nine distinct subscales referring to the different types of emotion regulation strategies commonly used. Only the maladaptive strategies were used as the focus of the study was to examine the relationship of these maladaptive cognitive emotion regulation strategies with different forms of aggression (physical, verbal and relational). These maladaptive strategies were: self-blame ($\alpha = 0.79$; e.g., “I feel that I am the one to blame”), blaming others ($\alpha = 0.78$; e.g., “I feel that others are responsible for what has

happened”), rumination ($\alpha = 0.79$; e.g., “I am preoccupied with what I think and feel about what I have experienced”) and catastrophizing ($\alpha = 0.82$; e.g., “I keep thinking about how terrible it is what I have experienced”). Each subscale contains four question items which are ranked on a 5-point Likert scale from 1 (*almost never*) to 5 (*almost always*). In the present study the CERQ subscales used showed good internal reliability $0.79 < \alpha < 0.82$, in line with prior studies (e.g., Garnefski et al., 2002b).

Statistical analysis

To examine if cognitive emotion regulation strategies contribute to aggression, four multiple hierarchical linear regression analyses were conducted with physical aggression, verbal aggression, romantic relational aggression, and peer directed relational aggression as dependent variables. To assess how well use of cognitive strategies are predictive of aggression levels, while controlling for the possible effect of age and sex, demographic variables were entered at step 1, relationship status was entered in step 2, trait-level anger and hostility were entered in step 3, and the four maladaptive cognitive strategies (self-blame, blaming others, ruminating, catastrophizing) were entered at step 4. To ensure regression models were comparable across the four dependent variables, the same independent variables were input into each model. The rationale behind such a hierarchy of input is based on theory (Berkowitz, 2012) and existing research findings (Martin & Dahlen, 2005; Rey & Extremera, 2012) which have identified emotion more strongly associated to different traits of aggression as compared with maladaptive cognitive emotion regulation strategies.

Results

Descriptive statistics for the main study variables including the different forms of aggression assessed (physical, verbal and romantic relational and peer directed relational aggression), anger, hostility and the maladaptive cognitive emotion regulation strategies are presented in Table 1. Independent sample t-tests were run to compare participants who reported being in an intimate romantic relationship, to participants who reported being single when the study was conducted. Participants who reported being in a romantic relationship reported lower levels of physical and verbal aggression, compared to participants who were single. Interestingly, participants who were single reported higher levels of anger and hostility, and reported experiencing higher levels of rumination and blamed themselves more, compared to individuals who were in a relationship. As there were significant differences in some of the forms of

Table 1 Means, standard deviations (SD), for the study variables presented separately for participants who were in an intimate relationship and participants that were not (single, separated, divorced)

Variable	Total sample (N=306)	In a relation- ship (n=175)	Not in a relation- ship (n=131)	Cohen's	
	Mean (SD)	Mean (SD)	Mean (SD)	t	d
Physical Aggression	18.65 (6.34)	17.79 (5.85)	19.82 (6.80)	2.80*	0.32
Verbal Aggression	13.75 (3.99)	13.08 (3.85)	14.63 (4.02)	3.42**	0.40
Romantic Relational Aggression	11.07 (5.08)	10.63 (4.96)	11.73 (5.21)	1.85	0.22
Peer Directed Relational Aggression	17.16 (8.35)	16.49 (8.25)	18.12 (8.58)	1.67	0.20
Anger	16.43 (5.29)	15.75 (5.10)	17.34 (5.43)	2.62*	0.30
Hostility	20.33 (6.38)	19.10 (6.04)	21.97 (6.48)	3.98**	0.46
Self-Blame	11.15 (3.47)	10.52 (3.39)	11.99 (3.41)	3.76**	0.43
Blaming-Others	8.58 (2.86)	8.59 (2.84)	8.56 (2.89)	0.10	0.01
Ruminating	12.55 (3.69)	11.99 (3.90)	13.29 (3.26)	3.08*	0.36
Catastrophizing	8.72 (3.69)	8.50 (3.44)	9.01 (4.00)	1.21	0.14

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

aggression under study, relationship status was included in regression analyses.

Findings from the correlation analysis show significant positive correlations among the different forms of aggression (physical, verbal, romantic relational and peer-directed relational), with anger and hostility (Table 2). There were also positive correlations observed among the different forms of aggression and all the maladaptive cognitive emotion regulation strategies with the exception of self-blame, which was not associated with peer-directed relational

aggression. Age was negatively correlated with all the different forms of aggression except peer-directed relational aggression. Age was negatively correlated with hostility but not anger, and was also negatively correlated with all the maladaptive regulation strategies, except blaming others.

Modelling overt aggression

Physical aggression. Age and sex explained 2.5% of the variance in physical aggression levels $F(2, 303) = 3.83, p = .023$. Relationship status entered in step 2 contributed an additional 1.1% to the variance of physical aggression but was not statistically significant, $F \text{ Change}(1, 300) = 3.39, p = .063$. However, the addition of anger and hostility which were added in step 3 to the model contributed to 38.4% of explained variance to the existing model $F \text{ Change}(2, 298) = 98.76, p < .001$. The addition of the maladaptive regulation strategies contributed to 2.1% of explained variance to the existing model $F \text{ Change}(4, 294) = 2.73, p = .029$. In the final model, anger ($\beta = 0.56, p < .001$), blaming others ($\beta = 0.14, p = .016$), age ($\beta = -0.11, p < .032$) and rumination ($\beta = -0.13, p = .037$), were significant predictors for physical aggression (see Table 3). The total variance explained was $R^2 = 0.44; F(9, 294) = 25.78, p < .001$.

Verbal aggression. Age and sex explained a variance of 2.3% of verbal aggression $F(2, 303) = 3.47, p = .032$ (see Table 3). Relationship status contributed an additional 2.6% to the variance of verbal aggression, $F \text{ Change}(1, 300) = 8.35, p = .004$. The entry of anger and hostility resulted in an increase of 39.5%, $F \text{ Change}(2, 298) = 105.92, p < .001$. The addition of the maladaptive strategies, however, contributed only 0.6% of explained variance to the overall model and was not significant $F \text{ Change}(4, 294) = 0.82, p = .52$. In the final model, anger ($\beta = 0.48, p < .001$), hostility ($\beta = 0.23, p < .001$), and biological sex (men more likely) were significant predictors for verbal aggression. The total variance explained was $R^2 = 0.45; F(9, 294) = 26.76, p < .001$.

Table 2 Correlations for Study Variables

	1	2	3	4	5	6	7	8	9	10
1. Physical Aggression	-									
2. Verbal Aggression	0.46**	-								
3. Romantic Relational Aggression	0.35**	0.27**	-							
4. Peer Directed Relational Aggression	0.40**	0.28**	0.69**	-						
5. Age	-0.17*	-0.11*	-0.17*	-0.11	-					
6. Anger	0.64**	0.62**	0.41**	0.38**	-0.10	-				
7. Hostility	0.48**	0.55**	0.42**	0.42**	-0.29**	0.64**	-			
8. Self-Blame	0.18*	0.17*	0.16*	0.10	-0.35**	0.20**	0.39**	-		
9. Blaming-Others	0.30**	0.19**	0.25**	0.33**	-0.09	0.28**	0.39**	0.33**	-	
10. Ruminating	0.14*	0.22**	0.23**	0.23**	-0.41**	0.21**	0.40**	0.66**	0.39**	-
11. Catastrophizing	0.30**	0.28**	0.30**	0.30**	-0.17*	0.33**	0.47**	0.46**	0.63**	0.44**

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

Table 3 Hierarchical regression analysis for variables predicting physical and verbal aggression

	Physical Aggression ($N=306$)				Verbal Aggression ($N=306$)			
	M1 (β)	M2 (β)	M3 (β)	M4 (β)	M1 (β)	M2 (β)	M3 (β)	M4 (β)
Age	-0.16*	-0.12	-0.08	-0.11*	-0.13*	-0.06	0.01	0.02
Sex ^a	-0.03	-0.03	-0.07	-0.06	-0.10	-0.10	-0.13**	-0.13**
Relationship Status ^b		-0.11	-0.03	-0.04		-0.17*	-0.08	-0.08
Anger			0.58**	0.56**			0.48**	0.48**
Hostility			0.08	0.06			0.22**	0.23**
Self-Blame				0.02				-0.08
Blaming-Others				0.14*				-0.07
Ruminating				-0.13*				0.08
Catastrophizing				0.02				0.03
ΔR^2	0.03*	0.01	0.38**	0.02*	0.02*	0.03*	0.40**	0.01

Note. ^a Sex: 1 = Male, 2 = Female; ^b Relationship status coded: 1 = Single, 2 = In a relationship. * $p < .05$, ** $p < .001$.

Table 4 Hierarchical regression analysis for variables predicting romantic relational aggression and peer directed relational aggression

	Romantic Relational Aggression ($N=298$)				Peer Directed Relational Aggression ($N=301$)			
	M1 (β)	M2 (β)	M3 (β)	M4 (β)	M1 (β)	M2 (β)	M3 (β)	M4 (β)
Age	-0.17**	-0.15*	-0.08	-0.07	-0.13*	-0.10	-0.02	-0.02
Sex ^a	0.00	0.00	-0.01	0.00	-0.12*	-0.12*	-0.13*	-0.12*
Relationship Status ^b		-0.06	-0.01	-0.02		-0.08	-0.02	-0.06
Anger			0.25**	0.24**			0.22**	0.20*
Hostility			0.23**	0.18*			0.26**	0.20*
Self-Blame				-0.08				-0.18*
Blaming-Others				0.01				0.15*
Ruminating				0.08				0.14
Catastrophizing				0.13				0.06
ΔR^2	0.03*	0.00	0.18**	0.02	0.03*	0.01	0.18**	0.05**

Note. ^a Sex: 1 = Male, 2 = Female; ^b Relationship status coded: 1 = Single, 2 = In a relationship. * $p < .05$, ** $p < .001$.

Modelling relational aggression

Romantic Relational Aggression. Demographic variables had contributed significantly to the outcome variable, explaining 2.9% of the total variance, $F(2, 292) = 4.46$, $p = .012$ (Table 4). The addition of relationship status contributed a minimal 0.3% of the variance, which was not significant F Change (1, 289) = 0.91, $p = .34$. The addition of anger and hostility to the model contributed to 17.9% of explained variance F Change (2, 287) = 32.52, $p < .001$. Finally, the maladaptive strategies contributed a minimal 1.8%, which was not significant F Change (4, 283) = 1.68, $p = .15$. In the final model, anger ($\beta = 0.24$, $p < .001$) and hostility ($\beta = 0.18$, $p = .018$) presented as significant predictors for romantic relational aggression. The total variance explained was $R^2 = 0.23$; $F(9, 283) = 9.39$, $p < .001$.

Peer-Directed Relational Aggression. Age and sex entered in step 1 explained 2.6% of the variance in levels of peer directed relational aggression, $F(2, 295) = 3.85$, $p = .022$ (Table 4). Adding relationship status increase the variance only by 0.5% F Change (1, 292) = 1.50, $p = .22$. The addition of anger and hostility in step 3 explained a further 17.8% of variance peer-directed relational aggression, $F(2,$

290) = 32.57, $p < .001$. Finally, the maladaptive strategies contributed an additional 4.9%, F Change (4, 286) = 4.69, $p = .001$. In the final model, sex (men more likely), anger ($\beta = 0.20$, $p = .003$), hostility ($\beta = 0.20$, $p = .006$), blaming others ($\beta = 0.15$, $p = .025$) and self-blame ($\beta = -0.18$, $p = .009$) presented as significant predictors for peer-directed relational aggression. The total variance explained was $R^2 = 0.26$; $F(9, 286) = 11.00$, $p < .001$.

Discussion

This study investigated how maladaptive cognitive-emotion regulation processes were uniquely associated with different forms of aggression including physical, verbal, romantic relational aggression and peer directed relational aggression. The aim was to examine whether different forms of aggression were associated with overlapping or distinct impairments in emotion regulation. In relation to emotional processes, anger and hostility explained the largest variance in the models and were positively associated with each of the different forms of aggression, with the exception of hostility not reaching significance for physical aggression.

In relation to the maladaptive cognitive emotion regulation strategies, these had a smaller influence on the different forms of aggression compared to the emotional processes. More specifically, blaming others for negative events was positively associated with physical aggression and peer-directed relational aggression (Bao et al., 2016), while self-blame was negatively associated only with peer-directed relational aggression. Finally, higher levels of rumination were negatively associated with physical aggression.

The current findings suggest that anger and hostility are key negative emotional processes associated with various forms of aggression. The results replicate previous research indicating that greater levels of anger and hostility characterize difficulties in emotion regulation that underpin various aggressive behavior (Chen et al., 2012; Colton et al., 2023; Dewi & Kyranides, 2022; Morón & Biolik-Morón, 2021). However, the current results add to the literature by demonstrating significant associations between anger/hostility and aggression after controlling for each other's influence. This suggests that anger and hostility each have an independent influence on various forms of aggression and that each should be considered individually in understanding the emotion regulation processes that contribute to aggression (Rubio-Garay et al., 2016). An exception was that hostility was not associated with physical aggression. However, we posit that the optimal interpretation for this finding is in terms of the relatively greater explanatory contribution of anger compared to hostility in explaining differences in overt aggression. A preponderance with difficulties in regulating anger appears to underpin overt aggression.

A preponderance also exists in relation to individual biases to blame others for negative events in aggression. The current result is consistent with the large body of research showing that blaming others as a strategy ineffectively manages the persons emotions which results in aggressive behavior but also that aggressive adults are more prone to reporting self-serving cognitive distortions (i.e., hostile attribution bias to blame others) to justify their aggressive behaviour and neutralise guilt, at least when prompted during experimental tasks (see Tuente et al., 2019 for review). Our study adds to this literature by suggesting hostile attributional biases for negative events are specific subordinate characteristics of physical aggression and peer-directed relational aggression. We note that the current results are in contrast with some previous research which may be important in understanding the distinct mechanisms of cognitive emotion regulation related to aggression. For instance, greater self-blame was previously found to increase physical and verbal aggression among adolescents (Rey & Extremera, 2012). We suggest that self-blame, which is typically associated with internalizing symptoms and social withdrawal (Zimmer-Gembeck et al., 2016), may overlap

with difficulties in regulating aggression due to underdeveloped executive function during adolescence (Poon, 2018). The significance of self-blame may become more apparent for specific forms of aggression in adulthood. Additionally, we found that reduced rumination for events was associated with physical aggression suggesting that individuals who reflect less on their actions and past experiences, are more likely to engage in physical aggression (Rey & Extremera, 2012). However, this is inconsistent with research showing anger-related rumination increases aggression (e.g., Denson et al., 2012; Kokkinos et al., 2021). We note the current study measured rumination more broadly and may encompass rumination on sad feelings and personal reflection in addition to anger, and it is possible that only anger-specific rumination is uniquely related to increased aggression. Future work would need to use scales that include anger specific rumination items to clarify if these findings would apply to anger related rumination, more specifically. These findings emphasize the salience of identifying distinct cognitive emotion regulation mechanisms that underlie specific forms of aggression which may help explain previously mixed findings.

Theoretical implications of research findings

The current findings have important implications for understanding the phenomenological manifestation of aggression and the key difficulties in emotion regulation that underpin different forms of aggression. For instance, the results help clarify that different forms of aggression are putatively underpinned by common underlying impairments in the regulation of anger and hostility. Both these forms of negative emotional responding potentially characterize core dysfunctional affective components in trait aggression (Dewi & Kyranides, 2022; Reyna et al., 2011; Wilkowski & Robinson, 2010). However, impairments in cognitive emotion regulation that primarily consist of blaming others appears uniquely associated with physical aggression and peer-directed relational aggression. This reinforces proposals (e.g., Burt, 2012) that there is need to distinguish different forms of aggression and their subordinate characteristics (i.e., specific cognitive emotion regulation strategies). We propose that the pattern of shared affective and unique cognitive strategies of emotion regulation suggests the utility of a hierarchical typology to study underlying cognitive-emotional mechanisms of aggression. Affective components of anger and hostility may represent latent characteristics of aggression, while cognitive-attributional biases may represent subordinate characteristics of specific types of aggression.

These results serve to refine existing theories that emphasize hostile attributional biases and rumination as cognitive

mechanisms underlying aggression by explicating associations between certain types of hostile attribution biases, types of ruminative thought, and aggression subtypes. Social information processing theory of aggression, for instance, posits that poor regulation of aggression is associated with increased attention to hostile cues and attribution of hostile intentions (Crick & Dodge, 1994; Dodge, 2006; Matthys et al., 2012). The current results help refine our understanding of hostile attributional biases by suggesting different hostile attributional biases have different pathways of association with different forms of aggression. The current evidence suggests that one's tendency to blame others for negative events, may have specific associations with physical aggression and peer-directed relational aggression, while instrumental attributions for explaining other people's behaviours (i.e., hostile intent attributions) may relate to the relational aggression subtypes (Bailey & Ostrov, 2008; Bao et al., 2016) and verbal aggression (all forms of aggression under study except physical). This suggests that individuals who tend to blame others are less able and less willing to take responsibility for their actions and are more likely to engage in physical or peer directed relational aggressive behavior. Interestingly blaming others was not associated with verbal and romantic relational aggression and this might be because the distinction between the different forms of aggression was not made in previous studies which tend to use a more general assessment of aggression (e.g., Casini et al., 2022; Rey & Extremera, 2012). Furthermore, it might be the case that individuals who are relational and verbally aggressive are less likely to label, acknowledge their behaviors as a form of aggression. Equally, our results support the possibility that reduced self-reflective rumination for events may be linked to physical aggression, while anger-related rumination increases the occurrence of relational aggression (Kokkinos et al., 2021). This suggests further consideration should be given to understanding combinations of different forms of attributional biases, rumination, and aggression in order to more accurately model the distinct maladaptive cognitive-emotional mechanisms of aggression. It should also be noted that in the current study romantic relational aggression as oppose to the other forms of aggression (physical, verbal and peer directed relational aggression) was situation specific, as participants were asked to report relational aggression incidences in their current relationship or if they were not in a relationship to report based on the prior intimate relationships. In contrast physical, verbal and peer directed relational aggression were assessed more broadly and this might explain the different findings between romantic relational aggression and peer directed relational aggression. We also did not define what it means to be in a relationship to participants. Thus, it may be that participants used different definitions when answering the

items on the romantic relational aggression subscale and deciding who their most recent relationship partner was (as oppose to casually dating a person), and consequently how established their interactional patterns were.

Clinical implications

Knowledge of how specific forms of maladaptive cognitive-emotion regulation processes influence different forms of aggression allows for the design of personalised interventions that focus on correcting unique cognitive distortions in a bid to reduce one's aggressive behaviors. To that end, the emerging science of personalizing interventions represents a framework for translating the current findings into practice (Ng & Weisz, 2018). The framework combines assessments of clinically relevant individual characteristics with treatments tailored to target those characteristics to optimize gains in evidence-based treatment. In line with this, the current findings promote the need to perform a comprehensive assessment of aggression in relation to its different forms and the subordinate cognitive emotion regulation mechanisms. This may include the use of standardized measures of aggression subtypes and maladaptive cognitive emotion regulation strategies, such as the ones used for the current study, to accurately formulate the specific individual dysfunction in emotion regulation representing targets for treatment. Choice of evidence-based psychotherapeutic techniques would subsequently target these individual characteristics. The current evidence suggests that an evidence-based therapy for targeting and addressing emotions (Emotion Focused Therapy, EFT) and specific hostile attribution biases is cognitive behavioural therapy (CBT) would be appropriate. The strong influence of emotion, suggests that promoting awareness, acceptance, expression and regulation of emotions are important and key components of EFT (Beasley & Ager, 2019). Specific cognitive therapy techniques would teach clients methods of reattribution (Lee & DiGiuseppe, 2018). Based on the current results, reattribution of blame to situational factors rather than others would help attenuate physical aggression and peer-directed relational aggression.

Limitations and recommendations for future research

The following limitations of the current study require attention in future research. Firstly, the correlational nature of this study limits the extent of causal inferences that can be drawn as we are unable to interpret the direction of relationship. It is possible that trait aggression leads to use of maladaptive emotion regulation strategies, or that both constructs derive from the same underlying cognitive influences

(Robertson et al., 2014). Secondly, this study was conducted with a community sample of adults whose levels of aggression are unrepresentative of high-risk populations (Bácskai et al., 2011; Garofalo et al., 2018). Further research with high-risk population (e.g., forensic or clinical samples) is needed to ascertain the relationship between the use of maladaptive cognitive emotion regulation strategies and levels of trait aggression, in order to confer such findings with clinical significance. Thirdly, the current study used multiple regression modelling to investigate the unique associations between cognitive-emotion regulation processes and different forms of aggression. While this approach was appropriate for investigating specific associations between variables while controlling for other variables, it is limited in considering putative interrelationships between different types of aggression. Future research could use a person centered within-person cluster analysis to consider the different forms of aggression together. This includes expanding the analysis to study pathways of association between emotion regulation and functions of aggression (reactive vs. proactive) as well. Finally, future research can examine how these inter-relationships among strategies and aggression type may change (or stay the same) when studied in the context of specific relationships, all peer relationships, or all romantic relationships for example.

Conclusion

The key findings of this study highlight the phenomenological heterogeneity of aggression in adults, and allude to the need to understand the shared and unique dysfunctions in emotion regulation that underpin different forms of aggression. To that end, the current findings provide a preliminary map of emotional triggers and maladaptive cognitive-emotional regulation processes underlying different forms of aggression in adult populations. Both anger and hostility were uniquely positively associated with each of the different forms aggression, with anger having a greater influence in overt aggression compared to hostility. On the contrary, individual bias to blame others for negative events was specifically associated with physical aggression and peer-directed relational aggression. These findings have implications in understanding the typology of aggression as well as refining existing theories of aggression to include an explicit focus on modelling pathways of association between maladaptive cognitive-emotional regulation processes and different forms of aggression. We subsequently proposed a model of personalizing interventions whereby different forms of aggression and their subordinate characteristics of maladaptive emotion regulation are assessed and targeted in treatment. Techniques of reattribution to improve regulation

of emotions in specific forms of aggression are suggested as the most evidence-based approach. The potential clinical utility of this approach warrants further empirical investigation along with an understanding of the within-individual associations between cognitions, emotions, and specific forms of aggression.

Author contributions First author presented the idea and supervised the findings of this work. All authors contributed to the final manuscript.

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Data availability The dataset analyzed for the current study is available from the corresponding author on reasonable request.

Declarations

Conflicts of interest Authors have no conflicts of interest to disclose.

Ethical approval All procedures performed in the study involving human participants were in accordance with the ethical standards of the institutional and national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Consent to participate Informed consent was obtained from all individual participants included in the study.

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