Chapter 4

The role of self-serving Cognitive Distortions in Reactive and Proactive Aggression


In review
Abstract

Aggression is often divided into reactive and proactive aggression. Reactive aggression is thought to be typically related to Blaming Others and Assuming the Worst, while proactive aggression relates to Self-Centeredness and Minimising/Mislabelling. The current study investigates whether reactive and proactive aggression are differentially related to cognitive distortions and if changes in these cognitions relate to changes in aggression. Adolescents enrolled in an evidence-based intervention to reduce aggression were included (n=151, 59.5% boys, mean age 15.05, SD 1.28). Self-report questionnaires measured cognitive distortions (How I Think questionnaire) and aggression (Reactive Proactive aggression Questionnaire) pre- and post-intervention. Due to attrition and anomalous responses the post-intervention sample involved 80 adolescents. As such, dropout analysis was included. Correlation and linear regression analysis investigated the relation between cognitive distortions and aggression. Firstly, Blaming Others was related to reactive aggression pre-intervention, while all cognitive distortions were related to proactive aggression pre- and post-intervention. Study dropouts showed similar aggression but more cognitive distortions pre-intervention. Secondly, changes in reactive aggression were uniquely predicted by Blaming Others, while changes in proactive aggression were predicted by changes in cognitive distortions overall. Current results and implications are discussed and may give indications for more tailored treatment regarding reactive and proactive aggression.

Keywords. Reactive aggression, Proactive aggression, Cognitive distortions, Intervention, Behavioural changes
Antisocial behaviour, including aggression, is one of the most common reasons children and adolescents are referred to mental health services (Armburster, Sukhodolsky, & Michalsen, 2004; Rutter et al., 2011; Rutter, Giller, & Hagell, 1998). Aggression is a very heterogeneous concept for which various distinctions have been proposed (Anderson & Huesmann, 2003). A common approach is to subdivide aggression based on function or motive; defensive aggression is labelled as reactive aggression, whereas instrumental or offensive aggression is labelled as proactive aggression (Vitiello & Stoff, 1997). According to this approach, reactive aggression emerges from the (subjective) experience that a given situation is hostile. As such, this form of aggression is thought of as a reaction to an aversive event or anticipated threat as part of a defence mechanism, and involves arousal in the form of anger. In contrast, proactive aggression is driven by the anticipation of some form of gain and is offensive or premeditated in nature (Merk, de Castro, Koops, & Matthys, 2005). Literature has shown that despite high correlations of reactive and proactive aggression scales, these subtypes of aggression have specific correlates such as peer status, biological measures and social information processing (Kempes, Matthys, de Vries, & van Engeland, 2005).

The Social Information Processing (SIP) model (Crick & Dodge, 1994) assumes that aggression originates from problems in social information processing. In this regard, the division of reactive and proactive aggression seems particularly promising regarding the assumed underlying functions in which reactive aggression involves hostile attributions and is frustration based, while proactive stems from positive outcome learning (Merk et al., 2005). The SIP model assumes that in a social situation, behaviour is achieved by six sequential steps, i.e., (1) encoding of external and internal cues, (2) interpretation of cues, including attributions, (3) goal clarification or selection, (4) response generation, and (5) response decision, including response evaluation, outcome expectancies, self-efficacy, response selection and the last step involving (6) behavioural enactment (Crick & Dodge, 1994). Within the SIP model reactive aggression is thought to relate uniquely to difficulties in encoding and interpreting cues, whilst proactive aggression is thought to specifically relate to positive expectancies of aggression and personal gain (Crick & Dodge, 1994, 1996). Hostile attribution bias or style (HAS) is the tendency to attribute hostile intent to others and as such involves encoding and interpreting cues (i.e., step 1 and 2). Reactive aggression has been linked to HAS in adults (Lobbestael, Cima,
& Arntz, 2013) and young children (de Castro, Merk, Koops, Veerman, & Bosch, 2005). Proactive aggression has been shown to relate uniquely to biased response evaluation (i.e., step 5) in young children (de Castro et al., 2005) and detained girls (Marsee & Frick, 2007). This supports the idea of a distinction in SIP regarding reactive and proactive aggression. More recently it has been shown that self-efficacy for competency and positive evaluation (i.e., step 5) were related to reactive aggression in severely antisocial adolescents, and proactive aggression was related to overlooking consequences (i.e., step 5) (Oostermeijer, Nieuwenhuijzen, van de Ven, Popma, & Jansen, 2016). This suggests that both reactive and proactive aggression might both involve (distinct) problems in response decision.

Social information processing is influenced by mental structures in the ‘database’ which stores memories and past experiences (Crick & Dodge, 1994). This database includes mental structures and schemata’s, which are thought to influence the sequential steps in the SIP model. In this regard social cognitions, specifically ‘self-serving’ cognitive distortions are thought to contribute to harmful acts against others, and are linked to aggression and delinquency (Barriga, Hawkins, & Camelia, 2008; Barriga, Landau, Stinson, Liau, & Gibbs, 2000). Four categories of self-serving cognitive distortions have been identified (Barriga & Gibbs, 1996; Gibbs, Gibbs, Barriga, & Potter, 2001) which are considered interrelated constructs¹. These categories are Self-Centered (SC), Blaming Others (BO) Minimising/Mislabelling (MM), and Assuming the Worst (AW). Self-Centeredness involves according status to one’s own views, expectations, needs, rights, immediate feelings, and desires to such a degree that the legitimate views of others (or even one’s own long-term best interests) are rarely considered or are disregarded altogether (i.e., egocentric bias). This fits well with a pursuit of personal gain, specifically thought to play a role in proactive aggression. Furthermore, as mentioned earlier, proactive aggression has been linked to biased response evaluation and fewer relationship endorsing goals (Crick & Dodge, 1996). In this regard, Minimising/Mislabelling (MM) involves depicting antisocial behaviour as causing no real harm or as being acceptable or even admirable, or referring to others with a belittling or dehumanising label. These cognitive cognitions may play a role in the biased response evaluation observed in proactive aggression. Reactive aggression however, has been characterised by defence and perceived threat (Merk et al.,
2005), which fits well with the cognitive distortion Blaming Others (BO). This cognitive bias typically involves misattributing blame to outside sources, especially another person, group, or momentary aberration (one was drunk, high, in a bad mood, etc.), or misattributing blame for one’s victimization or other misfortune to innocent people. Furthermore, Assuming the Worst (AW) is gratuitously attributing hostile intentions to others, considering a worst-case scenario for a social situation as if it were inevitable, or assuming that improvement is impossible in one’s own or another’s behaviour. This cognition directly relates to HAS which has been implicated in reactive aggression and possibly fosters to the use of aggression as a defence mechanism. Koolen, Poorthuis, and van Aken (2012) showed that cognitive distortions regarding blaming others were related to reactive aggression, while self-centeredness was related to proactive aggression. Note that both findings involved overt (confrontational) behaviour. Further research regarding cognitive distortions and reactive versus proactive aggression could provide more insight regarding the distinct social cognitions. However, to our knowledge no other studies have directly investigated cognitive distortions with regards to reactive and proactive aggression. It may be important to consider gender, since gender differences have been shown in correlates of reactive and proactive aggression (Connor, Steingard, Anderson, & Melloni, 2003). Previous literature has shown no differences between males and females regarding cognitive distortions and antisocial behaviours, although it was shown that females tended to have fewer cognitive distortions (Barriga, Morrison, Liau, & Gibbs, 2001).

Promising treatments for antisocial behaviours involve cognitive-behavioural interventions (Lipsey, Landenberger, & Wilson, 2007). It has been shown that cognitive-behavioural interventions have a medium effect size on reducing aggression in adolescents, however treatment predictors involved seem unclear (Smeets et al., 2015). Typically these interventions aim to produce changes in cognition, feelings and behaviour (Kendall, 2011), targeting cognitive (antisocial) biases, beliefs, attributions and schemata's to change problem behaviour. Such social-cognitive structures influence and mediate the decision-making process, connecting external situations to the outcome of social or antisocial behaviour (Huesmann, 1998) However, it remains unclear whether changes in distinct social cognitions are associated with behavioural changes in reactive and proactive aggression. In order to give indications for more tailored
treatment or to provide specific treatment targets for reactive versus proactive aggression longitudinal research is needed.

As such, the current study addresses the following issues; 1) are reactive and proactive aggression differentially related to the different types of self-serving cognitive distortions, 2) are changes in these cognitions related to behavioural changes regarding reactive and proactive aggression after treatment. It is hypothesised that reactive aggression is typically related to Blaming Others and Assuming the Worst, while proactive aggression is typically related Self-Centeredness and Minimising/Mislabelling. Furthermore it is expected that this is similar with regards to behavioural changes in reactive and proactive aggression.

Methods

Participants
Adolescents from a special school in Rotterdam for children with disruptive behavioural problems (n=125) and from a residential facility for treatment of severe behavioural problems in Amsterdam (n=46) were included in the current study (see Figure 1). These participants displayed varying levels of aggression and were all enrolled in an evidence-based intervention aimed to reduce their aggression problems. Both studies were approved by the local Dutch ethical committee, CMO Arnhem/Nijmegen (registration number 2010/073, ABR number: NL 33231.091.10) and VUMC Amsterdam (registration number 2002/178, ABR number NL28476.029.09).

Participants were asked to fill in self-report questionnaires on aggression and self-serving cognitive distortions pre- and post-intervention. The How I Think (HIT) questionnaire used in the current study provides an Anomalous Responding (AR) score, which indicates whether responses are reliable. As such, participants with an AR score above 5.00 were excluded from the analysis (Nas, Brugman, & Koops, 2008) to ensure reliable responses. In total a group of 151 participants (59.5% boys, 28.05% western) with a mean age of 15.05 (SD 1.28), and a mean IQ of 81.70 (SD 15.58) was included in the pre-intervention correlation analysis. Data was checked for outliers (2 SD from the
mean), which resulted in exclusion of one participant for analyses with difference scores (outlier for HIT total and 3 HIT subscales). Due to study drop outs (n=53) and anomalous responses post-intervention (n=16), a group of 80 participants (61.30% boys, 22.08% western) had both pre- and post-intervention scores, with a mean age of 14.75 (SD 1.15), and a mean IQ of 80.17 (SD 15.60) was included in the pre-intervention correlation analysis.

**Figure 1**
Flow diagram of the study sample.

Note. CBT= cognitive behavioural therapy, HIT= the How I Think questionnaire, AR= anomalous responding, T1= pre-intervention, T2= post-intervention.
Measures

Reactive and proactive aggression

The Reactive and Proactive Questionnaire (RPQ) was used to measure reactive and proactive aggression (Raine et al., 2006) which has been validated in a Dutch sample (Cima, Raine, Meesters, & Popma, 2013). The RPQ is a self-report questionnaire consisting of 23 items, with a three-point Likert scale consisting of ‘never’ (0), ‘sometimes’ (1) or ‘often’ (2). As such, a total RPQ aggression score can be calculated, as well as a reactive aggression score (12 items) and a proactive aggression score (11 items). The RPQ has shown good internal reliability for total aggression and the two subscales, all exceeding Cronbach’s Alphas of 0.83 and item-total correlations ranging from .41 to .60 (Raine et al., 2006).

Cognitive distortions

Self-serving cognitive distortions were assessed with the Dutch translation of the How I Think Questionnaire (HIT; Nas et al., 2008). The questionnaire consists of 54 items, which are answered on a five-point scale from ‘I strongly disagree’ (0) to ‘I strongly agree’ (5). A few items are included acting as positive fillers and persuade the participant to use the full range of the answering scale. Test-retest reliability of the HIT has been reported as high, together with the internal reliability with Cronbach’s Alpha’s ranging between .78 and .90 for the four subscales (Barriga & Gibbs, 1996). This has also been shown in a Dutch validation study with Cronbach Alpha’s of the four types of cognitive distortions and the anomalous response ranging from .66 to .92 (Nas et al., 2008).

Aggression replacement training

All adolescents included were initially enrolled in an aggression replacement training; a cognitive behavioural intervention aimed at reducing aggressive and delinquent behaviours through improving social skills, training anger management and boosting moral reasoning simultaneously (Goldstein, Glick, & Gibbs, 1998). The intervention entailed 30 sessions, with three hourly sessions per week. Research has shown positive results for aggressive and delinquent
populations (Goldstein, Glick, Carthan, & Blancero, 1994; Gundersen & Svartdal, 2006; Hatcher et al., 2008). It should be noted this intervention is evidence-based and assessing treatment integrity or treatment effect was not the aim of the current study. Rather, the behavioural change elicited was studied in relation to self-serving cognitive distortions.

Statistical analyses

Cronbach’s Alpha’s for both the HIT and RPQ questionnaire subscales were calculated to check reliability of the self-report questionnaires in the current study. Firstly, it was investigated whether reactive and proactive aggression differentially related to the different types of self-serving cognitive distortions. To examine whether Reactive (RA) and Proactive Aggression (PA) showed unique correlations with the HIT subscales, Spearman’s rank-order correlations were calculated (due to non-parametric data of the proactive aggression scale post-intervention) together with partial correlation to correct for shared variance.

To address our second aim, firstly the assumption that the current cognitive behavioural intervention elicited change in both cognitive distortions and aggression was checked by investigating whether the RPQ and HIT scales differed at pre- (T1) and post-intervention (T2) with paired samples t-tests. For proactive aggression a Wilcoxon Signed Rank for non-parametric data was performed. Furthermore, dropout in this study was high. To investigate how this might have influenced results, a dropout analysis was performed. Dropouts (participants without post-intervention data) were compared with participants with complete data on pre-intervention HIT and RPQ scores. Finally, it was investigated whether changes in these cognitions could predict behavioural changes regarding reactive and proactive aggression. It was investigated whether difference-scores of the HIT subscales could predict difference-scores of the RPQ subscales. Linear regression analyses with difference-scores of the RPQ and HIT subscales (T2-T1) were performed. Difference-scores for the HIT and RPQ subscales were considered reliable variables for analysis with pre- and post-intervention scores being sufficiently correlated (Pearson’s $r > .50$, with an exception of HIT SC with $r = .498$). Multi-collinearity statistics were investigated
to assess whether intercorrelation between the subscales could cause potential biases in the regression models. Post-hoc analyses were performed to assess and correct for gender, which was added to the linear regression analysis as a covariate.

Results

The Cronbach’s Alpha’s for the HIT subscales pre- and post-intervention ranged from .764 (BO) to .836 (AW) for pre-intervention and from .785 (SC) to .813 (AW) post-intervention. For the RPQ subscales Cronbach’s Alpha’s varied between .874 (RA) and .883 (PA) pre-intervention and .870 (RA) and .880 (PA) post-intervention. Spearman’s rank-order correlations were calculated as well as partial correlations. Significant correlations between both reactive and proactive aggression at T1 and T2, and self-serving cognitions on all four HIT subscales were found (ranging from \( r = .304 - .598, p < .001 \)). Partial correlation results for reactive aggression (correcting for proactive aggression) showed a significant correlation with the HIT subscale Blaming Others \( (r = .201, p < .05) \) at T1 and no significant correlations for T2. Proactive aggression (when correcting for reactive aggression) showed significant correlations for both T1 and T2 with all HIT subscales \( (ranging \ from \ r = .282 - .462, p < .05) \).

Means and standard deviations of the main variables of this study are shown in Table 1 for adolescents pre-intervention ‘T1 pre-intervention’ and for the adolescents who completed the intervention ‘T2 post-intervention’. Paired samples t-tests showed that Reactive Aggression (RA) and all the HIT scales significantly differed pre- and post-intervention. A Wilcoxon Signed Rank for non-parametric data showed the proactive aggression scales also significantly differed pre- and post-intervention \( (Z = -4.125, p < .000) \).
Table 1
Paired sample t-tests of main study variables pre- and post-intervention.

<table>
<thead>
<tr>
<th></th>
<th>T1 pre-intervention</th>
<th>T2 post-intervention</th>
<th>df</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIT total</td>
<td>2.83 (0.90)</td>
<td>2.49 (0.47)</td>
<td>80</td>
<td>3.20*</td>
</tr>
<tr>
<td>HIT SC</td>
<td>2.68 (1.05)</td>
<td>2.36 (0.84)</td>
<td>80</td>
<td>2.15*</td>
</tr>
<tr>
<td>HIT BO</td>
<td>2.78 (0.96)</td>
<td>2.43 (0.81)</td>
<td>79</td>
<td>3.18*</td>
</tr>
<tr>
<td>HIT MM</td>
<td>2.80 (1.01)</td>
<td>2.44 (0.88)</td>
<td>80</td>
<td>2.93*</td>
</tr>
<tr>
<td>HIT AW</td>
<td>2.99 (0.96)</td>
<td>2.70 (0.84)</td>
<td>80</td>
<td>2.74*</td>
</tr>
<tr>
<td>RPQ total</td>
<td>18.66 (8.91)</td>
<td>13.13 (7.63)</td>
<td>79</td>
<td>6.01**</td>
</tr>
<tr>
<td>RPQ RA</td>
<td>12.76 (4.72)</td>
<td>9.37 (4.66)</td>
<td>77</td>
<td>5.87**</td>
</tr>
<tr>
<td>RPQ PA</td>
<td>5.98 (4.88)</td>
<td>3.58 (3.75)</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Note. SC= self-centeredness, BO= blaming others, MM= minimising /mislabelling, AW= assuming the worst. RA= reactive aggression, PA= proactive aggression. T1=pre-intervention, T2= post-intervention, ** p<.01, * p<.05. For PA the Wilcoxon Signed Rank Test indicated Z=-4.125, p<.000.

Results from the dropout analyses revealed that dropouts within the current study significantly differed on pre-intervention measures from participants with completed data on the HIT scales (see Table 2). For the RPQ aggression scales no significant differences on either RPQ total, RA or PA scales were found.
Table 2
Drop out analysis, with paired t-tests of the main study variables at T1.

<table>
<thead>
<tr>
<th></th>
<th>Completed</th>
<th>Drop outs</th>
<th>df</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIT total</td>
<td>2.69 (0.87)</td>
<td>3.05 (0.89)</td>
<td>148</td>
<td>2.36*</td>
</tr>
<tr>
<td>HIT SC</td>
<td>2.52 (0.99)</td>
<td>2.93 (1.07)</td>
<td>148</td>
<td>2.34*</td>
</tr>
<tr>
<td>HIT BO</td>
<td>2.66 (0.97)</td>
<td>2.95 (0.89)</td>
<td>147</td>
<td>1.77</td>
</tr>
<tr>
<td>HIT MM</td>
<td>2.66 (0.97)</td>
<td>3.03 (1.05)</td>
<td>148</td>
<td>2.17*</td>
</tr>
<tr>
<td>HIT AW</td>
<td>2.85 (0.94)</td>
<td>3.21 (0.96)</td>
<td>148</td>
<td>2.24*</td>
</tr>
<tr>
<td>RPQ total</td>
<td>17.64 (8.40)</td>
<td>20.34 (9.63)</td>
<td>148</td>
<td>1.79</td>
</tr>
<tr>
<td>RPQ RA</td>
<td>12.30 (4.36)</td>
<td>13.53 (5.30)</td>
<td>81.6</td>
<td>1.39</td>
</tr>
<tr>
<td>RPQ PA</td>
<td>5.33 (4.76)</td>
<td>6.90 (5.00)</td>
<td>145</td>
<td>1.86</td>
</tr>
</tbody>
</table>

Note. SC= self-centeredness, BO= blaming others, MM= minimising /mislabelling, AW= assuming the worst. RA= reactive aggression, PA= proactive aggression. * p<.05.

Finally, linear regression models with difference scores for the HIT and RPQ scales were performed. It is has been debated when multi-collinearity might bias results, however VIF values around 2.5 and Tolerance values above .3 do not raise much concern (Menard, 1995). Inline with the hypothesis, the HIT subscale ‘Blaming Others’ showed a significant unique contribution as a positive predictor for Reactive Aggression (Table 3). However, the HIT subscale ‘Assuming the Worst’ did not predict Reactive Aggression. For Proactive Aggression the complete prediction model with all HIT subscales was significant, however none of the subscales showed a unique contribution (Table 3).
### Table 3

Estimates resulting from the prediction of difference scores for aggression by cognitive distortions.

<table>
<thead>
<tr>
<th>Dependent</th>
<th>Predictors</th>
<th>F</th>
<th>R²</th>
<th>B</th>
<th>SE</th>
<th>β</th>
<th>t</th>
<th>p</th>
<th>VIF</th>
<th>tol</th>
</tr>
</thead>
<tbody>
<tr>
<td>ΔRA</td>
<td></td>
<td>2.68*</td>
<td>.130</td>
<td>-.119</td>
<td>-.748</td>
<td>.457</td>
<td>2.085</td>
<td>.480</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ΔHIT SC</td>
<td></td>
<td>-.611</td>
<td>.817</td>
<td>-.242</td>
<td>-1.633</td>
<td>.107</td>
<td>1.126</td>
<td>.267</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ΔHIT BO*</td>
<td></td>
<td>1.585</td>
<td>.788</td>
<td>.288</td>
<td>2.011</td>
<td>.048</td>
<td>1.696</td>
<td>.590</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ΔHIT MM</td>
<td></td>
<td>-1.407</td>
<td>.861</td>
<td>-.242</td>
<td>-1.633</td>
<td>.107</td>
<td>1.816</td>
<td>.551</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ΔHIT AW</td>
<td></td>
<td>1.670</td>
<td>.951</td>
<td>.299</td>
<td>1.756</td>
<td>.083</td>
<td>2.399</td>
<td>.417</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ΔPA</td>
<td></td>
<td>3.38*</td>
<td>.156</td>
<td>.148</td>
<td>.940</td>
<td>.350</td>
<td>2.142</td>
<td>.467</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ΔHIT SC</td>
<td></td>
<td>.646</td>
<td>.688</td>
<td>.136</td>
<td>.908</td>
<td>.367</td>
<td>1.950</td>
<td>.513</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ΔHIT BO</td>
<td></td>
<td>.620</td>
<td>.684</td>
<td>.148</td>
<td>.940</td>
<td>.350</td>
<td>2.142</td>
<td>.467</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ΔHIT MM</td>
<td></td>
<td>-2.68</td>
<td>.714</td>
<td>-.056</td>
<td>-.375</td>
<td>.709</td>
<td>1.960</td>
<td>.510</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ΔHIT AW</td>
<td></td>
<td>1.004</td>
<td>.836</td>
<td>.208</td>
<td>1.202</td>
<td>.233</td>
<td>2.594</td>
<td>.385</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note.* SC= self-centeredness, BO= blaming others, MM= minimising/mislabelling, AW= assuming the worst. RA= reactive aggression, PA= proactive aggression. Δ indicates a difference score of post-intervention scores- pre-intervention scores, *p*<.05.

When correcting for gender in the model for RA the total model just escaped significance \((F(5, 71)=2.26, \ p=.057, \ R^2=.138, \ R^2_{adj}=2.077)\). When investigating the coefficients of the separate cognitive distortions, Blaming Others showed a trend for unique contribution \((β=.275, \ t(76)=1.91, \ p=.061)\) similar to the model without gender. When correcting for gender in the model for PA the total model remained significant \((F(5, 72)=2.67, \ p<.05, \ R^2=.156, \ R^2_{adj}=2.098)\). When investigating the coefficients of the separate cognitive distortions, none of the cognitive distortions showed unique contributions (including gender), similar to the model without gender.
Discussion

The current study firstly investigated whether reactive and proactive aggression were differentially related to different types of self-serving cognitive distortions. The following aims were investigated; 1) are reactive and proactive aggression differentially related to the different types of self-serving cognitive distortions, 2) are changes in these cognitions related to behavioural changes regarding reactive and proactive aggression. It was hypothesised that reactive aggression is typically related to Blaming Others and Assuming the Worst, while proactive aggression is typically related to Self-Centeredness and Minimising/Mislabelling. Furthermore it was expected that this would be similar with regard to behavioural changes in reactive and proactive aggression after intervention.

Firstly, correlation analysis indicated that both types of aggression are related to self-serving cognitions, with no particular distinction between the two types of aggression. To further investigate this, partial correlations were investigated. Partial correlations provided a measurement of association between the aggression scales and cognitive distortions in which variance explained by the other aggression scale was filtered out. These results indicated that reactive aggression pre-intervention was uniquely correlated with Blaming Others ($r=.20^*)$. Proactive aggression both pre- and post-intervention showed low to moderate correlations with all self-serving cognitive distortions. Taken together, results indicated that the cognitive distortion ‘Blaming Others’ might be a distinct correlate of reactive aggression while proactive aggression showed consistent correlations to all four cognitive distortions. The cognitive bias Blaming Others typically involves misattributing blame to outside sources and was indeed expected to specifically relate to reactive aggression. This is inline with reactive aggression being a defensive form of aggression (Merk et al., 2005). Although expected, ‘Assuming the Worst’ was not specifically related to reactive aggression. This is somewhat surprising, since this cognitive bias directly relates to HAS which has been linked to reactive aggression (de Castro et al., 2005; Lobbestael et al., 2013). Furthermore, proactive aggression was unexcitingly related to all forms of cognitive biases. Self-serving cognitive biases are thought to protect the self from blame and negative self-concept (Barriga et al., 2000). Since proactive aggression is premeditated in nature it maybe more strongly related to a wide variety of cognitive biases, as opposed to reactive aggression which is impulsive (Merk et al., 2005). Alternatively, current results could be
explained by means of severity of aggression, in which proactive aggression is indicative of more severe aggression and thus involves more cognitive distortions, as compared to reactive aggression. It has indeed been shown that the distinction between proactive and reactive aggression may mainly be driven by aggression severity (Smeets et al., 2016).

In order to investigate whether changes in cognitions distortions related to behavioural changes regarding reactive and proactive aggression, we first assessed whether reactive and proactive aggression and self-serving cognitions showed significant change pre- and post intervention. Results confirmed that both reactive and proactive aggression scores, as well as self-serving cognitive distortions, significantly decreased. We do not claim this effect can be solely attributed to the intervention. This study involved two intervention settings, no control condition was available, and ratings were not blinded. However, the aggression replacement training is an evidence-based intervention that has proven to be an effective treatment (Goldstein et al., 1994; Gundersen & Svartdal, 2006; Hatcher et al., 2008). It should be noted that assessing treatment-effect was not the aim of this study, rather these results confirmed that behavioural and cognitive change has occurred in the current study.

Furthermore, because attrition in the current study was high, a dropout analyses was performed to investigate whether dropouts within the current study differed from the final sample. There were no differences in aggression between the pre- and post-intervention group. This suggests that dropouts of the current study did not differ on reactive and proactive aggression from adolescents included in the final analyses. However, it should be noted that dropouts did differ with regards to cognitive distortions. The final study sample included in the current study may consist of adolescents experiencing fewer cognitive distortions compared to the general population of adolescent enrolled in an aggression intervention. As such, it should be kept in mind that final results regarding cognitive distortions and behavioural changes may not be fully representative of the general population of adolescent enrolled in aggression interventions. However, this finding could be interesting from a clinical perspective. More self-serving cognitions seems to be distinctive for treatment dropout, even though these adolescents do not show more reactive or proactive aggression pre-intervention. Possibly, experiencing more self-serving cognitive distortions fosters a tendency to drop out of cognitive behavioural treatments.
This could imply that cognitive behavioural therapy is particularly difficult for those with more severe cognitive distortions. They may need more intensive treatments and it could provide better treatment selection for antisocial adolescents.

Addressing our second aim, it was investigated whether changes in self-serving cognitions related to behavioural changes regarding reactive and proactive aggression. It was hypothesised that change in reactive aggression would be related to change in Blaming Others and Assuming the Worst, while changes in proactive aggression would be related to change in Self-Centeredness and Minimising/Mislabelling. The linear regression analysis with difference scores showed no significant unique contribution for any of the separate self-serving cognitions for changes in proactive aggression. Similar to the correlation analysis, this suggests that change in self-serving cognitive distortions overall relates to behavioural changes in proactive aggression. For reactive aggression changes in the cognitive distortion Blaming Others uniquely contributed to behavioural change. Similar to correlation analysis, this suggests that changes misattributing blame to others uniquely relate to change in reactive aggression. Notably, the cognitive distortions Assuming the Worst which were additionally hypothesised to be important for reactive aggression showed a trend towards significance \((p=.083)\). Our results indicated that correcting for gender did not influence the relationship between cognitive distortions and aggression. This is in line with earlier research which showed similar relations for males and females between social cognition and antisocial behaviours (Barriga et al., 2001). In sum, the current study indicated that the cognitive distortion Blame Others is particularly important in behavioural change involving reactive aggression, whereas proactive aggression seems to involve self-serving cognitive distortions overall. In regards to the SIP model, this may suggest that reactive aggression is less likely a behavioural outcome if the ‘database’ contains less mental structures involving misattributing blame to outside sources, while reducing proactive aggression as a likely outcome involves reducing cognitive biases overall. Since this database within the SIP model is thought to influence all sequential SIP steps reciprocally (Crick & Dodge, 1994), changes as such would have considerable on-going effects on future behavioural outcomes.

Limitations of this study should be mentioned. There was a rather high dropout rate of participants post-intervention \((n=53\), see figure 1). As dropout
analysis showed, participants without post-intervention data showed more self-servin
g cognitive distortions (with the exception of Blaming Others) compared
to participants with complete data. As such, it needs to be considered that
reported results could be biased; the current population might consist of
adolescents experiencing fewer cognitive distortions affecting the final results.
However, dropout analysis showed no differences in reactive and proactive
aggression between pre- and post-intervention group. This suggests that the
final sample does not differ on behavioural measures regarding aggression.
Possibly, underlying cognitive distortions are a measure of severity that can
serve as an indicator to estimate the risk for treatment drop out. Furthermore, it
has been suggested that sufficient IQ ($\geq 90$) is needed for valid results on the HIT
questionnaire (Nas et al., 2008). Unfortunately, our sample did not have a
sufficient range of IQ scores to distinguish normal and low IQ groups for such
comparisons. Despite these limitations, research towards reactive and proactive
aggression in problematic adolescents is beneficial and results showed self-
serving cognitive distortions could be an important treatment target for
behavioural change. To our knowledge the current study is the first in
investigating the relationship between changes in cognitive distortions and
behavioural changes of aggression. Treatment of reactive aggression may benefit
from focusing primarily on reducing cognitive distortions involving
misattributing blame to others, while proactive aggression benefits from
reducing self-serving cognitive distortions overall. Future research is needed to
assess whether it is beneficial to translate current results to more tailored
interventions for reactive and proactive aggression.

Footnote

¹The four self-serving cognitive distortions have been further divided into primary
(SC) and secondary distortions (BO, MM and AW), secondary cognitive distortions
are developed to support self-centeredness and prevent damage to the self.
References


