Chapter 3

Social Information Processing Problems related to Reactive and Proactive Aggression of Adolescents in Residential Treatment

S. Oostermeijer — M. Nieuwenhuijzen — P.M. van de Ven — A. Popma — L.M.C. Jansen

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Abstract

Adolescents in residential treatment predominantly show externalising problems. To provide more tailored treatments, gaining knowledge on underlying processes is important. Aggression is often subdivided in defensive/reactive and instrumental/proactive aggression. The Social Information Processing (SIP) model assumes reactive aggression involves early SIP, whereas proactive aggression involves late SIP. This study investigated SIP steps in relation to reactive and proactive aggression of adolescents in residential treatment. In total 81 adolescents were included in the main analyses. A Social Information Processing task using video-vignettes measured sequential SIP steps. Both zero-order and partial correlations with reactive and proactive aggression were investigated. Early SIP related to both subtypes of aggression, recognising problems was negatively related to proactive aggression. The late SIP steps generating antisocial goals and responses were related to both aggression subtypes. Feeling competent and positive evaluation related to reactive aggression, while overseeing consequences related to proactive aggression. Partial correlations were non-significant. Post-hoc analysis for males and females separately showed differences in relationships between aggression measures and SIP. The current study indicates that both subtypes of aggression are related to early and late SIP steps. However, discrepancies are present which could potentially provide specific targets for treatment.

Keywords. Reactive, Proactive, Aggression, Rule breaking, Social Information Processing
Antisocial behaviours in adolescents have a major impact on society and brings considerable costs (Scott, Knapp, Henderson, & Maughan, 2001; Cohen & Piquero, 2009). Adolescents showing severe antisocial behaviours may end up in the juvenile justice system, although such an imposed intervention does not always lead to reduction of problematic behaviours; many show recidivism after two years (Wartna, Kalidien, Tollenaar, & Essers, 2006; Wartna, 2012). Since 2008, a new compulsory residential treatment programme was implemented in the Netherlands, specifically aimed at adolescents with severe problem behaviours. Research has shown that adolescents in this residential treatment programme predominantly showed externalising problem behaviours (98%) (Van Dam, Nijhof, Scholte, & Veerman, 2010). Evaluation of treatment progress of adolescents in the residential programme has shown significant decreases in externalising problem behaviours as reported by adolescents and parents. However, group care worker ratings showed a worsening of externalising behaviours during admittance (Nijhof, Veerman, Engels, & Scholte, 2011). As such, rigorous interventions specifically aimed to reduce severe externalising behaviours (and recidivism) in adolescents do not necessarily have the desired effect. This could be due to the generic nature of these interventions, which are possibly not sufficiently tailored to differences within externalising behaviours of the adolescents. In order to provide more tailored interventions, it is important to gain more knowledge on the underlying processes of different types of externalising behaviours. It has been suggested that the origin of aggressive and rule-breaking behaviours lies within one or more problems in social information processing (Crick & Dodge, 1994). As such, the current study will investigate different types of aggression and the underlying social information processing problems in a group of adolescents with severe externalising behavioural problems in a residential treatment programme.

**The Social Information Processing model**

The Social Information Processing (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;
Problems in each one of these steps may lead to problematic behavioural responses, e.g., aggression. Ultimately, researching the underling SIP problems of aggression may inform more tailored treatment for aggressive youth. The first two SIP steps (encoding and interpretation of cues) are thought to guide interpretation and understanding of the current social situation. It has been shown that aggressive children are less likely to use relevant social cues compared to non-aggressive children (Dodge & Tomlin, 1987). Hostile attribution bias or style (HAS) is the tendency to attribute hostile intent to others, which involves encoding and interpretation. A meta-analysis has confirmed that HAS is linked to aggression in several populations and across different ages (Orobio de Castro, Veerman, Koops, Bosch, & Monshouwer, 2002). Furthermore, research supports the hypothesis that hostile attribution contributes to aggressive behaviour over time, predicting future aggressive behaviour (Dodge, 2006). As such, the early steps of social information processing involving encoding and interpretation seem to play a significant role in aggressive behaviour through hostile attribution biases. The role of late steps in social information processing in aggressive behaviour has not been researched as extensively. The steps of (3) goal clarification or selection, (4) response generation have received little or no attention. It has been shown that pre-adolescent aggressive boys generate more aggressive responses and evaluate aggressive responses less negatively (Orobio de Castro, Merk, Koops, Veerman, & Bosch, 2005). Response decision (5) has been shown to have a mediating role in the relation between hostile attribution and antisocial behaviour, especially in adolescents with well-developed cognitive processing capacities (Fontaine, 2010; Fontaine et al., 2010). It has been shown that youth who have problems in both early and late SIP steps, show higher externalising problems then youth characterised by either early or late SIP problems (Lansford et al., 2006). The present study focuses on both early and late SIP steps, and investigates social information processing problems and its relation with different types of aggression.
Reactive and proactive aggression

Aggressive behaviour can be divided into subtypes based on motive or function. In this respect, defensive aggression is labelled as reactive aggression, whereas an instrumental or offensive act is labelled as proactive aggression (Vitiello & Stoff, 1997). According to this division, reactive aggression emerges from the (subjective) experience that a given situation is hostile, and is a reaction to an aversive event or anticipated threat as part of a defence mechanism. Proactive aggression however, is driven by the anticipation of reward and is offensive or premeditated in nature (Merk, Orobio de Castro, Koops, & Matthys, 2005). These subtypes of aggression are thought to theoretically differ in function and underlying mechanisms, in which reactive aggression involves hostile attributions and is frustrations based, while proactive stems from positive outcome learning (Merk et al., 2005). Indeed, within the SIP model it is assumed that reactive and proactive aggression involve different social information processing problems (Crick & Dodge, 1994). Reactive aggression is thought to involve particularly difficulties in encoding and interpreting cues (hostile attribution), while proactive aggression is thought to involve positive expectancies of aggression and personal gain (late SIP steps). It has been shown that reactive aggressive children showed hostile attribution more frequently, while proactive aggressive children evaluated aggressive acts more positively, and were less likely to have relationship-endorsing goals (Crick & Dodge, 1996).

To our knowledge there is little to no research on social information processing problems of adolescents in the compulsory treatment programme, even though they typically show severe externalising behaviours (Van Dam et al, 2010). Recently, Van Rest et al (2014) evaluated a newly developed SIP instrument measuring each sequential SIP step, in a sample with both adolescents in the juvenile justice system and adolescents in the compulsory treatment programme. Results showed that several SIP steps were correlated with self-reported general aggression and rule breaking behaviour, with no differences between IQ groups (mild to borderline versus average IQ). Correlations were found for both aggression and rule-breaking behaviour with hostile intent attribution. In addition, the aggression subscale was correlated with SIP scores for feeling competent and overseeing consequences of antisocial behaviour, and rule breaking behaviours was correlated with positive evaluation and the selection of antisocial responses. However, no distinction between
reactive and proactive aggression or early versus late SIP steps was researched. Furthermore, differences in males versus females have been shown in relation to aggression and its correlates (e.g., Berkout, Young, & Gross, 2011). As such, different social information processing problems for males versus females might relate to their aggression problems.

As such, the aim of the present study was to investigate problems in the sequential steps of social information processing in relation to reactive and proactive aggression of adolescents in a residential treatment programme. First, to replicate earlier findings, the relationship between social information processing and general aggression and rule breaking behaviour was investigated. It was hypothesised that similar correlation would be found (Van Rest et al., 2014). Furthermore, we investigated whether social information processing problems reflected in SIP step scores were related to reactive and proactive aggression respectively. It was hypothesised that reactive aggression is related to early SIP steps (i.e., encoding of external and internal cues, and interpretation of cues). Whereas proactive aggression, is hypothesised to relate to late SIP steps (i.e., goal clarification, response generation, and response decision). In addition, post-hoc analyses will investigate the relationship between aggression measures and SIP separately for males and females.

**Methods**

*Social Information Processing task*

The different steps of social information processing were measured with the Social Information Processing task, especially developed and validated for adolescents in residential facilities and in addition suitable for borderline intellectual functioning (Van Rest et al., 2014). The SIP task was developed in cooperation with adolescents with low IQ (between 55-85) in order to adjust language and social situations to their language and cognitive abilities. The interview consisted of six different video vignettes in which a social problem situation is displayed involving peers, showing one of the adolescents being underprivileged. Before each video vignette, the participants were asked to identify themselves with the underprivileged peer. After each video vignette,
each participant was asked to answer 24 structured questions involving the
different SIP steps. The whole interview took approximately 45 minutes, and
was performed and scored by a trained student who followed a detailed protocol
concerning potential difficulties with the SIP task, for example when the
assistant believed participants did not understand the items. A second trained
student scored each interview, and if consensus could not be reached a trained
researcher made the final decision of the assigned scores.

The following SIP scores resulted from the structured interview.
**Encoding** was assessed with the question ‘What happened in this video
vignette?’ followed by a second question ‘What else can you tell me?’ Each video
vignette involved ten relevant cues, for which the participant earned a point, this
led to one variable of mean score encoding for all six video vignettes (score 0-10).
Secondly, it was assessed whether the main problem in the situation was
recognised, **problem recognition**, with the question ‘In the video vignette a
problem is displayed, can you shortly tell me what it is?’ If the problem was fully
recognised, the answer was coded with a 2, if partly recognised a 1, and a 0 when
the problem was not or wrongly recognised. A total mean score was calculated
over all six video vignettes, ranging from 0 to 2. All participants were then given
equal information by the interviewer, stating the correct problem before
proceeding with the interview. Then, **interpretation** was measured by asking
whether the participant thought the action was on purpose, and if they thought it
was mean. Participants answered on a five-point Likert scale, ranging from 1
(totally disagree) to 5 (totally agree). The interpretations ‘on purpose’ and ‘being
mean’ were used, calculating mean scores across the six video vignettes.

**Antisocial responses** were measured by asking the participant ‘If you were this
boy/girl, what would you do?’ and if the response was not clear this would be
followed by the question ‘What does it look like when you show this response?’.
These answers were scored as prosocial/assertive, passive/submissive or an
antisocial/aggressive response. A total antisocial response score was calculated
by counting the antisocial/aggressive responses over the six video vignettes,
ranging from 0 to 6. After the question ‘what would you do’, the goals were
explored by the questions ‘why would you do this?’ **Antisocial goals** were
calculated taking the mean score for the answers ‘show them who’s boss’ and
‘take revenge’. Continuing the interview, three reactions displayed situations
involving a prosocial/assertive, passive/submissive and an antisocial/aggressive
reaction. After each of these reactions, response evaluation was assessed with the
question “Would it be easy for you to react like this?’, ‘Would this have a good outcome for you?’ and ‘Is it proper to react like this?’ Again, participants answered on a 5 point Likert scale, and mean self efficacy for competency and overlooking consequences, as well as a mean positive evaluation was calculated for the antisocial/aggressive reactions across the six video vignettes, ranging from 1 to 5. Finally, the last question assessed what the participant considered the best option (prosocial/assertive, passive/submissive and antisocial/aggressive). A total score was calculated by counting the antisocial/aggressive responses over the six video vignettes, to calculate the mean antisocial response selection, ranging from 0 to 6.

Youth Self Report

The Youth Self Report (YSR version 2001) is a self-report questionnaire assessing behavioural problems in adolescents (Achenbach, 1991; Verhulst, van der Ende, & Koot, 1997; Achenbach et al., 2008). Each item is answered with a Likert scale consisting of ‘not true (1)’, ‘sometimes/ somewhat true (2)’, or ‘often/ totally true (3)’. In this study the subscales ‘Rule breaking behaviour’ and ‘Aggression’ were used for analyses. A score between 65 – 69 falls in the subclinical range, and above 69 indicates clinical relevant problems. For the subscale ‘Rule breaking behaviour’ twelve participants missed 1 or 2 items, and for the subscale ‘Aggression’ fifteen participants missed 1 or 2 items. These missing values were handled with Expectation Maximalization (EM) in order to be able to calculate the subscales for these participants.

Reactive and Proactive Questionnaire

The Reactive and Proactive Questionnaire (RPQ) was used to measure reactive and proactive aggression (Raine et al., 2006) and was recently validated in a Dutch population (Cima, Raine, Meesters, & Popma, 2013). The questionnaire consists of 23 items and is a self-report measurement. Items are answered on a Likert scale consisting of ‘never (0)’, sometimes (1) or ‘often’ (2). A total aggression score was calculated, as well as a reactive aggression score (RA; 12 items) as a proactive score (PA; 11 items). This questionnaire has shown good internal reliability for all scales, all exceeding Cronbach’s Alphas of 0.83 and item-total correlations ranging from 0.41 to 0.60 (Raine et al., 2006). For the
RPQ scores clinical cut off scores are not directly available. However, Smeets et al. (2014, submitted) identified the following cut off scores for the RPQ: reactive aggression =10.13, proactive aggression =4.85, based on a Dutch juvenile sample.

**Participants**

Consent to participate was obtained from all participants and parents involved, and the study was approved by the local ethical committee VU medical centre Amsterdam. Participants were recruited from a compulsory residential treatment facility in Amsterdam, the Netherlands. In total, 112 adolescents participated between 12 and 20 years old ($M=15.79$, $SD=1.26$). Their average IQ was 85.05 ($SD=14.90$, range: 55-126, n=73), 50 % was male, and 38.4 % was of western origin. The current sample partly overlaps (n=47) with the earlier study of Van Rest et al. (2014). Exclusion of participants with a DSM-IV diagnosis in the autism spectrum (n=6) and due to missing questionnaires (n=25), a total of 81 adolescents could be included in the main analyses involving reactive and proactive aggression.

Table 1 shows the means, standard deviations and range of the YSR (T-scores), as well as the RPQ total and subscales scores. Results showed that for the YSR scales, means fell in the nonclinical range (clinical $>69$ and subclinical $65 - 69$), indicating no severe aggression or rule breaking behaviour reported by adolescents, although the range shows there are adolescents in the sample scoring in the clinical range. For the RPQ scores such clinical cut offs are not currently available.
Table 1
Mean, S.D.’s and range of the YSR (T-scores) and RPQ subscale scores.

<table>
<thead>
<tr>
<th></th>
<th>n</th>
<th>Mean</th>
<th>S.D.</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>YSR aggression</td>
<td>91</td>
<td>56.85</td>
<td>8.01</td>
<td>50 - 82</td>
</tr>
<tr>
<td>YSR rule breaking</td>
<td>91</td>
<td>62.87</td>
<td>7.58</td>
<td>50 - 85</td>
</tr>
<tr>
<td>RPQ RA</td>
<td>81</td>
<td>11.75</td>
<td>5.32</td>
<td>1 – 22</td>
</tr>
<tr>
<td>RPQ PA</td>
<td>81</td>
<td>5.07</td>
<td>5.19</td>
<td>0 - 21</td>
</tr>
</tbody>
</table>

Note. YSR= Youth Self Report; RPQ= Reactive Proactive Questionnaire; RA= reactive aggression, PA= Proactive Aggression.

Statistical analyses

Firstly, to investigate the sample on general aggression and rule breaking behaviour and replicate earlier findings (Van Rest et al., 2014), Pearson’s correlations were calculated for SIP scores and the YSR aggression and rule breaking scales. Secondly, to investigate the relations between SIP on the one hand and reactive aggression and proactive aggression on the other, Spearmann’s correlations were calculated because of skewness of scores on the proactive aggression scale and comparisons of correlations between each pair of scales. Partial correlations between SIP scores and proactive aggression were calculated to investigate which SIP scores are associated with proactive aggression (respectively reactive) when controlling for reactive aggression (respectively proactive). The partial correlations provide a measure of association between the SIP scores and aggression scale when variance explained by the other aggression scale is filtered out from the two variables. It has been argued that even though the partialling of variables from one another can be a powerful technique, there can be difficulty in knowing what remains of the original construct (Lynam, Hoyle, & Newman, 2006). Therefore, both zero-order and partial correlation were reported for the reactive and proactive aggression scales. Finally, due to the wide range of IQ scores within the current sample, post-hoc analyses were included, controlling for IQ scores (available for 53 participants).
Results

Firstly, results showed that general aggression on the YSR aggression subscale, and YSR rule breaking were positively related to antisocial goals, and antisocial responses. In addition, rule breaking behaviour was positively related to overseeing consequences of antisocial responses (see Table 2). Secondly, the subdivision of reactive and proactive aggression resulted in additional correlations with several compared to general aggression and rule breaking (see Table 2). The early SIP step attribution ‘being mean’ was related to reactive and proactive aggression, and recognising problems was negatively related to proactive aggression. The late SIP steps generating antisocial goals and responses were related to both reactive and proactive subscales. Feeling competent and positive evaluation of antisocial responses were related to reactive aggression, while overseeing consequences of antisocial was related to proactive aggression. Further exploring the relations with reactive and proactive aggression with partial correlations, showed that only generating antisocial goals remained significant for reactive aggression.
Table 2
Correlations and partial correlations between SIP scores, YSR and RPQ scales.

<table>
<thead>
<tr>
<th></th>
<th>YSR aggression</th>
<th>YSR rule breaking</th>
<th>RPQ RA</th>
<th>RPQ PA</th>
<th>RPQ RA partial</th>
<th>RPQ PA partial</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(n=91^+)</td>
<td>(n=91^+)</td>
<td>(n=81)</td>
<td>(n=81)</td>
<td>(df=77)</td>
<td>(df=77)</td>
</tr>
<tr>
<td>Encoding</td>
<td>-0.047</td>
<td>-0.108</td>
<td>-0.057</td>
<td>-0.083</td>
<td>0.024</td>
<td>-0.056</td>
</tr>
<tr>
<td>Problem recognition</td>
<td>0.067</td>
<td>0.038</td>
<td>-0.082</td>
<td>-0.227*</td>
<td>0.085</td>
<td>-0.152</td>
</tr>
<tr>
<td>Attribution on purpose</td>
<td>-0.077</td>
<td>0.032</td>
<td>0.105</td>
<td>0.077</td>
<td>0.107</td>
<td>-0.009</td>
</tr>
<tr>
<td>Attribution being mean</td>
<td>0.177</td>
<td>0.169</td>
<td>0.315*</td>
<td>0.234*</td>
<td>0.197</td>
<td>0.016</td>
</tr>
<tr>
<td>Antisocial goals</td>
<td>0.217*</td>
<td>0.255*</td>
<td>0.429**</td>
<td>0.409**</td>
<td>0.284*</td>
<td>0.146</td>
</tr>
<tr>
<td>Antisocial responses</td>
<td>0.246*</td>
<td>0.253*</td>
<td>0.332*</td>
<td>0.310*</td>
<td>0.171</td>
<td>0.111</td>
</tr>
<tr>
<td>Antisocial competency</td>
<td>0.127</td>
<td>0.158</td>
<td>0.261*</td>
<td>0.200</td>
<td>0.141</td>
<td>0.062</td>
</tr>
<tr>
<td>Antisocial consequences</td>
<td>0.078</td>
<td>0.286**</td>
<td>0.218</td>
<td>0.225*</td>
<td>0.084</td>
<td>0.072</td>
</tr>
<tr>
<td>Antisocial Positive evaluation</td>
<td>0.034</td>
<td>0.175</td>
<td>0.232*</td>
<td>0.126</td>
<td>0.196</td>
<td>-0.070</td>
</tr>
<tr>
<td>Antisocial Response selection</td>
<td>-0.049</td>
<td>0.198</td>
<td>0.104</td>
<td>0.180</td>
<td>-0.049</td>
<td>0.200</td>
</tr>
</tbody>
</table>

Note. YSR= Youth Self Report; RPQ= Reactive Proactive Questionnaire; RA= reactive aggression, PA= Proactive Aggression. \(^+\) = n-1. *indicates p<.05 and **indicates p<.001
Post-hoc analyses were performed to investigate correlations between SIP scores and the RPQ subscales, while controlling for IQ scores. Distributions of the RPQ subscales and SIP scores of the IQ subsample were equivalent to the entire sample. When controlling for IQ scores, reactive and proactive aggression subscales were significantly related to the SIP scores antisocial goals ($r_s = .401, p = .004$, $r_s = .346, p = .013$, df=49) and antisocial response selection ($r_s = .335, p = .016$, $r_s = .292, p = .038$, df=49).

Post-hoc analyses were performed to investigate correlations between SIP scores and the RPQ subscales for males ($n=37$) and females ($n=44$) separately. Results for males showed that general aggression on the YSR aggression subscale was not related to SIP scores. The YSR rule breaking was positively related to antisocial goals, antisocial responses and overseeing consequences of antisocial responses. In addition, rule breaking behaviour was positively related to attribution 'on purpose', attribution 'being mean' and feeling competent (see Table 3). The early SIP step attribution 'being mean' was related to reactive aggression, and recognising problems was negatively related to proactive aggression. The late SIP steps generating antisocial goals and responses were related to both reactive and proactive subscales. Further exploring the relations with reactive and proactive aggression with partial correlations showed that only generating antisocial goals remained significant for proactive aggression.

Results for females showed that general aggression on the YSR aggression subscale was positively related to the SIP scores antisocial goals, antisocial responses, and additionally feeling competent and overseeing consequences of antisocial responses. The YSR rule breaking subscale was positively related to overseeing consequences of antisocial responses (see Table 4). The early SIP steps were not related to reactive or proactive aggression. The late SIP steps generating antisocial goals were related to both reactive and proactive subscales. Antisocial responses were related to reactive aggression, while feeling competent and overseeing consequences of antisocial responses was related to proactive aggression. Further exploring the relations with reactive and proactive aggression with partial correlations, showed that generating antisocial goals, antisocial responses and positive evaluation of antisocial responses remained significant for reactive aggression.
### Table 3
Correlations and partial correlations between SIP scores, YSR and RPQ scales for males only.

<table>
<thead>
<tr>
<th></th>
<th>YSR aggression</th>
<th>YSR rule breaking</th>
<th>RPQ RA</th>
<th>RPQ PA</th>
<th>RPQ RA partial</th>
<th>RPQ PA partial</th>
</tr>
</thead>
<tbody>
<tr>
<td>Encoding *</td>
<td>0.097</td>
<td>0.003</td>
<td>-0.054</td>
<td>-0.184</td>
<td>0.150</td>
<td>-0.213</td>
</tr>
<tr>
<td>Problem recognition</td>
<td>-0.151</td>
<td>0.011</td>
<td>-0.205</td>
<td>-0.330*</td>
<td>0.029</td>
<td>-0.135</td>
</tr>
<tr>
<td>Attrib on purpose</td>
<td>0.058</td>
<td>0.361*</td>
<td>0.170</td>
<td>0.091</td>
<td>0.195</td>
<td>-0.047</td>
</tr>
<tr>
<td>Attrib being mean</td>
<td>0.200</td>
<td>0.366*</td>
<td>0.424*</td>
<td>0.260</td>
<td>0.314</td>
<td>-0.058</td>
</tr>
<tr>
<td>Antisocial goals</td>
<td>0.127</td>
<td>0.366*</td>
<td>0.360**</td>
<td>0.477**</td>
<td>0.089</td>
<td>0.225</td>
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<tr>
<td>Antisocial responses</td>
<td>0.079</td>
<td>0.351*</td>
<td>0.452*</td>
<td>0.593**</td>
<td>0.114</td>
<td>0.345*</td>
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<tr>
<td>Antisocial competency</td>
<td>0.059</td>
<td>0.396*</td>
<td>0.216</td>
<td>0.300</td>
<td>0.091</td>
<td>0.106</td>
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<tr>
<td>Antisocial consequences</td>
<td>-0.228</td>
<td>0.354*</td>
<td>0.101</td>
<td>0.169</td>
<td>0.088</td>
<td>0.021</td>
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<td>0.254</td>
<td>0.241</td>
<td>0.198</td>
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<tr>
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<td>-0.155</td>
<td>0.229</td>
<td>0.052</td>
<td>0.1211</td>
<td>-0.061</td>
<td>0.163</td>
</tr>
</tbody>
</table>

*Note.* YSR = Youth Self Report; RPQ = Reactive Proactive Questionnaire; RA = reactive aggression, PA = Proactive Aggression. * = n-1. *indicates p<.05 and **indicates p<.001.
Table 4
Correlations and partial correlations between SIP scores, YSR and RPQ scales for females only.

<table>
<thead>
<tr>
<th></th>
<th>YSR</th>
<th>YSR</th>
<th>RPQ RA</th>
<th>RPQ PA</th>
<th>RPQ RA partial</th>
<th>RPQ PA partial</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n=47⁺</td>
<td>n=47⁺</td>
<td>n=44</td>
<td>n=44</td>
<td>df=40</td>
<td>df=40</td>
</tr>
<tr>
<td>Encoding*</td>
<td>-0.139</td>
<td>-0.154</td>
<td>-0.049</td>
<td>0.015</td>
<td>-0.078</td>
<td>-0.060</td>
</tr>
<tr>
<td>Problem recognition</td>
<td>0.181</td>
<td>0.004</td>
<td>-0.025</td>
<td>-0.192</td>
<td>0.069</td>
<td>-0.125</td>
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<td>Attribution on purpose</td>
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<td>-0.049</td>
<td>0.145</td>
<td>0.060</td>
<td>0.104</td>
<td>-0.009</td>
</tr>
<tr>
<td>Attribution being mean</td>
<td>0.263</td>
<td>0.090</td>
<td>0.239</td>
<td>0.227</td>
<td>0.106</td>
<td>-0.030</td>
</tr>
<tr>
<td>Antisocial goals</td>
<td>0.334*</td>
<td>0.223</td>
<td>0.568**</td>
<td>0.381*</td>
<td>0.430*</td>
<td>0.066</td>
</tr>
<tr>
<td>Antisocial responses</td>
<td>0.475**</td>
<td>0.252</td>
<td>0.295</td>
<td>0.067</td>
<td>0.352*</td>
<td>-0.003</td>
</tr>
<tr>
<td>Antisocial competency</td>
<td>0.376*</td>
<td>0.172</td>
<td>0.375*</td>
<td>0.154</td>
<td>0.277</td>
<td>-0.200</td>
</tr>
<tr>
<td>Antisocial consequences</td>
<td>0.482**</td>
<td>0.335*</td>
<td>0.410**</td>
<td>0.292</td>
<td>0.274</td>
<td>-0.018</td>
</tr>
<tr>
<td>Antisocial Positive evaluation</td>
<td>0.178</td>
<td>0.092</td>
<td>0.282</td>
<td>0.028</td>
<td>0.345*</td>
<td>-0.225</td>
</tr>
<tr>
<td>Antisocial Response selection</td>
<td>0.012</td>
<td>0.218</td>
<td>0.234</td>
<td>0.191</td>
<td>-0.084</td>
<td>0.152</td>
</tr>
</tbody>
</table>

Note. YSR= Youth Self Report; RPQ= Reactive Proactive Questionnaire; RA= reactive aggression, PA= Proactive Aggression. * = n-1. *indicates $p<.05$ and **indicates $p<.001$. 

Discussion

The aim of the current study was to investigate the relationship between sequential social information processing (SIP) problems and reactive and proactive aggression in adolescents with severe externalising behaviours in a compulsory residential treatment programme. First, to replicate earlier findings (Van Rest et al., 2014), the relationship between SIP and general aggression and rule breaking behaviour was investigated. Results showed that general aggression on the YSR aggression subscale, and YSR rule breaking were positively related to antisocial goals, and antisocial responses. In addition, rule breaking behaviour was positively related to overseeing consequences of antisocial responses. There were discrepancies in the correlations with SIP variables compared to the earlier study of Van Rest et al. (2014). They found similar correlations with generating antisocial responses and antisocial responses. However, correlations with regards to antisocial attribution, feeling competent about antisocial responses, positive evaluation and antisocial response selection were not replicated in the current sample. The current study found correlations with antisocial goals for both general aggression and rule breaking behaviour, and overseeing consequences related to rule breaking, as opposed to general aggression. Even though YSR aggression and rule breaking behavioural scores were similar in the current sample, in addition to age and gender, it seemed that in this study the adolescents had less SIP problems directly related to their externalising problem behaviours. This might be due to the fact that the current sample consists of adolescents in a compulsory residential treatment programme only, while Van Rest et al. (2014) also included adolescents from juvenile detentions centres. Future studies should consider separating results for adolescents in the compulsory residential treatment programme from adolescents in the juvenile justice system.

Secondly, it was investigated whether social information processing problems reflected in SIP step scores are related to reactive and proactive aggression respectively. Early SIP scores, involving encoding, problem recognition and hostile attribution, were expected to relate specifically to reactive aggression. The later SIP steps measured in the current study involved antisocial goals, antisocial responses, competency, overseeing consequences, positive evaluation and antisocial response selection. These SIP steps were expected to specifically relate to proactive aggression. Both hypotheses were not
confirmed, considering the zero-order correlations results showed that both reactive and proactive aggression correlate with early and late SIP steps. This could indicate that the relationship between reactive and proactive aggression within adolescents with severe externalising problems might be different then suggested by earlier research (Crick & Dodge, 1994; 1996). Further exploring the relationships with reactive and proactive aggression with partial correlations, showed that only the correlation between antisocial goals and reactive aggression remained significant. Although the RPQ scales possesses adequate reliability, due to the high correlation between the reactive and proactive subscales there can be considerable discrepancy between the original subscale and the partial correlations (Lynam, Hoyle, & Newman, 2006). This might explain why further exploring unique correlations between reactive and proactive aggression resulted in the loss of almost all relationships with SIP problems.

Interestingly, it is shown that the subdivision in reactive and proactive aggression results in more elaborate relationships with SIP problems, compared to general aggression and rule breaking behaviour. For example, both subscales were related to hostile intent attribution and in addition proactive aggression was related to worse problem recognition. The latter might be due to the fact that proactive adolescents often feel there is no problem present at all. Regarding the later SIP steps, both reactive and proactive subscales showed relationships with SIP but discrepancies between the subscales were found. For example, adolescents who more frequently reported it was easy for them to act antisocial (‘competency’), reported more reactive aggression. Reactive aggression is typically characterised as a reaction to frustration, involving loss of control and impulsivity (Merk et al., 2005), which could explain why antisocial adolescents report it is easy to act antisocial in retrospect, as a result of behavioural impulsivity.

Results showed males and females showed different correlations between SIP and the subtypes of aggression. SIP problems in males were particularly related to rule breaking behaviour and not general aggression. On the other hand females showed more correlates between (late) SIP and general aggression. This suggests that rule breaking and general aggression might have different underlying mechanism for males and females. Results for reactive and proactive aggression showed different correlates with SIP problems in males versus
females. Males showed similar SIP problems related to reactive and proactive aggression. Females’ late SIP problems related to reactive aggression, while proactive aggression showed minimal relationships with SIP problems. Overall, results indicated reactive and proactive aggression may have different underlying SIP problems in males versus females. This is an important addition to the literature, as previous SIP studies have not focused on gender differences.

The IQ scores in the current sample indicated a wide range of scores, leading to post-hoc analyses to investigate if controlling for IQ would lead to any major changes in the relationship between SIP scores, reactive and proactive aggression. Results showed that after controlling for IQ, reactive and proactive aggression were both significantly related to the SIP scores antisocial goals and antisocial responses. Other former correlations between social information processing scores and the aggression subscales did not sustain significance, however coefficients did not change substantially. This indicates that IQ might play some role in the relationship between SIP problems and aggression. However, conclusive results cannot be drawn from the current study.

Limitations

The current study involved a sample from one treatment facility implementing the compulsory residential treatment programme in the Netherlands. When generalising results to adolescents within this treatment programme this limitation should be kept in mind. However, since research within this group is scarce, current results are considered a valuable addition to the recent literature and give new insights in the underlying mechanisms of aggressive behaviours within this group. All measurements in this study were self-report in which social desirability could have biased results. In addition, our study design was cross-sectional and did not allow the investigation of causal results, as such no conclusions could be drawn on causality of aggressive behaviour and social information processing problems.

In this paper we only explored univariate correlations using both zero-order and partial correlations between SIP problems and reactive and proactive aggression. More elaborate techniques, such as a stepwise linear regression, to identify a minimal subset of SIP steps that explained most variation in proactive
and reactive aggression scores while controlling for the scores on the other aggression scales were not deemed suitable for testing our hypothesis, due to the high correlation between some of the SIP variables (several correlations > .50) as well as correlations between the aggression subscales (correlation > .70). Selection and estimated regression coefficients would have been unreliable due to multicollinearity, interchangeability of variables in the model because of high correlation, unreliable highly correlated regression coefficients, and partialling out too much information when controlling for the other scores. Considering univariate partial correlations, this technique has the advantage of removing shared variance with in this case the ‘other’ aggression subscale. Many of the conclusions in the reactive and proactive literature are based primarily on the results of partial correlation analyses, and the discrepancy between the original scale and remaining variable after partialling should be considered (Lynam, Hoyle & Newman 2006). Indeed, the RPQ subscales investigated with partial correlations were highly correlated (in the current sample r.s=.731**) and results should be considered in light of this notion. Future research should consider other research instruments for reactive and proactive aggression that show low correlation between the two subtypes, i.e., the Instrument for Reactive and Proactive Aggression (IPRA; Polman, Orobio de Castro, Thomaes, & van Aken, 2008).

Participants in this study were asked to identify with an underprivileged person in the video vignettes of the SIP task. This instruction implies a cue condition. Proactive aggression is driven by the anticipation of reward and is offensive or premeditated in nature (Merk, Orobio de Castro, Koops, & Matthys, 2005). This type of aggression would not necessarily need a cue but may derive only from the desire to act aggressively. However, predominant proactive adolescents would still be expected to express more affinity with good outcome and positive consequences of antisocial responses (late SIP) in the displayed social situations of the SIP instrument. Furthermore, aggressive adolescents may have more affinity identifying with a superior or dominant person in social situation as apposed to the underprivileged individual. However, the SIP task in the current study does not offer this opportunity. Such an approach could offer different perspectives on the relationship between SIP and aggression.

Furthermore, it should be noted that for the post-hoc IQ analysis data was only available for a small part of the sample (n=53) and IQ scores were
based on dossier information. The role of IQ on the relationship between social information processing problems and aggression could not be researched properly. In an earlier study, Van Rest et al (2014) results indicated no significant role of IQ in the relationship between social information processing and aggression. However, current results indicate that adolescents within the compulsory treatment programme show a wide range of IQ scores. In addition, the post-hoc analysis indicates that IQ might play a role in the relationship between social information processing, reactive and proactive aggression. Further research is needed to fully explore the role of IQ within this relationship.

Implications

Current results indicate potential targets for differential treatment of reactive versus proactive aggressive adolescents. Aggression interventions in compulsory residential treatment programmes for adolescents often involve social skill training (e.g., aggression replacement training and EQUIP). Reactive aggressive adolescents might particularly benefit from treatment focused on diminishing hostile attribution biases, antisocial goals and responses, and diminishing positive evaluations for antisocial responses (i.e., regarded as proper). In contrast, proactive aggressive adolescents might particularly benefit from improving problem recognition in social situations, in addition to diminishing hostile attribution biases, antisocial goals, antisocial responses, and overseeing consequences for antisocial responses. Future research should focus on reactive and proactive aggression in youth with severe externalising behaviours (such as youth in compulsory residential treatment programmes), since relations between these subtypes of aggression and social information processing problems might not be as earlier research suggests. In addition, differences between males and females in aggression and underlying SIP problems should be investigated as this could imply different treatment approaches. Furthermore, research towards interventions and specific targets are needed, in order to investigate whether treatment targeting these specific SIP steps facilitates a reduction in reactive and proactive aggression in these adolescents.
References


