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SOCIAL INFORMATION PROCESSING, EXPERIENCES OF AGGRESSION IN SOCIAL CONTEXTS, AND AGGRESSIVE BEHAVIOR IN ADOLESCENTS

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This study examines social information processing and experiences of aggression in social contexts as predictors of different forms of aggressive behavior. A sample of 102 boys (aggressive, average, competent, and victimized students) was investigated with a prospective design in Grade 7/8 and again in Grade 9/10. Results show an aggressive-impulsive response repertoire strongly predicted self-reported and teacher-reported physical aggression, verbal aggression, violent offenses, general aggression, and other forms of delinquency. Positive evaluations of aggressive responses showed a weaker effect, and attributions of hostility and aggressive/egocentric goal setting had no impact. Perceived aggression in the family, in the peer group, in media consumption, and (less consistently) at school predicted verbal aggression as well as physical aggression and violent offenses. Multivariate analyses revealed both mediating and independent effects of social information processing and experiences of aggression in social contexts. Results are discussed from methodological and theoretical perspectives.

Keywords: social information processing; aggression; juvenile delinquency; social learning

When confronted with their aggressive behavior, violent offenders frequently express deviant interpretations of the relevant social interaction. This is not only because of post hoc rationalizations but also an indicator of social information processing (SIP) in the offense situation. Many studies based on various theoretical models demonstrate that SIP is an important construct in the explanation of human aggression and social adjustment (e.g., Akhtar & Bradley, 1991; Coie & Dodge, 1998; Crick & Dodge, 1994; Gifford-Smith & Rabiner, 2004; Huesmann, 1997). Although the respective research focuses on the social behavior of children, modes of SIP also have been of interest for research and practice on aggression in adolescents and adults. There are various reasons for this. First, SIP is relevant for theoretical integration because cognitive mechanisms mediate among the influences of social contexts, biological dispositions, personality traits, and situational factors (e.g., Dodge, 2000; Lösel & Bender, 2003). Second, characteristics of SIP can be useful as a dynamic predictor in risk assessment, for example, in the fields of violent and sexual offending (e.g., Boer, Hart, Kropp, & Webster, 1997; Hanson & Harris, 2000). Third, treatment evaluations suggest that interventions with a focus on thinking patterns and self-regulation

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are relatively successful in offender rehabilitation (e.g., Lösel, 1995; McGuire, 2002). Finally, programs that address social cognitions and skills seem to be relatively promising in individual-centered approaches to prevention (e.g., Lösel & Beelmann, 2003, 2005).

Although there is not yet one common theory of SIP in aggressive individuals, Crick and Dodge (1994) have convincingly integrated various constructs from studies on child and adolescent aggression. According to their model, individuals in social situations (a) perceive and encode the situational and social cues, (b) form a mental representation and interpretation of the situation, (c) select a goal or desired outcome for the interaction, (d) recall or construct possible reactions to the situation, (e) evaluate these reactions and finally, (f) initiate what they expect to be an adequate action. The model suggests that some individuals develop specific characteristics of SIP that enhance their risk of aggressive behavior. These processes are inferred from contents of the memory store, acquired rules, social schemata, and social knowledge.

Studies show that when aggressive youngsters encode situational cues, they focus more on aggression-relevant stimuli (Gouze, 1987), they remember more aggression-relevant details of a situation (e.g., Dodge & Frame, 1982), and they overperceive aggression in their partners (e.g., Lochman & Dodge, 1998).

When interpreting the cues, aggressive children are less able to recognize the specific intentions and motivations of others (e.g., Dodge, Price, Bachorowski, & Newman, 1990), and they exhibit a tendency to attribute hostile intentions to others (e.g., Coie, Dodge, Terry, & Wright, 1991; Zelli, Dodge, Lochman, Laird, & Conduct Problems Prevention Research Group, 1999).

In the third phase, more egocentric and antisocial goals have been found in aggressive youngsters. They try more frequently to maximize their own utility even when this injures others, or they are more interested in dominating the interaction rather than maintaining a relationship (e.g., Boldizar, Perry, & Perry, 1989; Coie et al., 1999; Lochman, Wayland, & White, 1993).

In the phase of response access or construction, aggressive children generate more aggressive and hostile alternatives (Bliesener & Lösel, 2001; Rubin, Bream, & Rose-Krasnor, 1991; Zelli et al., 1999). This does not seem to be because of a generally smaller number of stored response schemata (Asarnow & Callan, 1985). However, their repertoire of reactions lacks variety and is dominated by aggressive, impulsive, and sometimes fanciful reactions.

In the phase of response evaluation and decision, antisocial individuals have a more short-term estimation of consequences (Gottfredson & Hirschi, 1990; Lösel, 1975). They also seem to expect more self-efficacy and relatively positive consequences of aggressive behavior (e.g., Garber, Quiggle, Panak, & Dodge, 1991; Perry, Perry, & Rasmussen, 1986; Zelli et al., 1999). These evaluations may be derived from enduring beliefs learned in the family and in peer groups (e.g., Coie & Dodge, 1998).

In the sixth phase, individuals initiate the reaction that seems to be most appropriate and in line with their goals. Accordingly, studies suggest that aggressive children exhibit fewer social skills for engaging in nonaggressive interactions (e.g., Dodge, Pettit, McClaskey, & Brown, 1986; Gottman, Gonso, & Rasmussen, 1975).

Models of SIP assume that individuals go through these phases more or less automatically and with little if any reflection. Although the processes may depend partially on dispositions of neuropsychological functioning and temperament (e.g., Moffitt, 1993; Newman, 1998), the content of SIP is attributed mainly to learning in social contexts (e.g., Bandura, 1973). For example, experiences of aggression, conflict, abuse, and inappropriate

parenting in the family seem to have a basic influence (e.g., Dodge, Pettit, Bates, & Valente, 1995; Patterson, Reid, & Dishion, 1992). Aggression-prone schemata and beliefs may also be learned via media consumption, at school, and particularly in peer groups. The respective cognitions influence interactions in peer groups, and the resulting behavior is again evaluated and reinforced cyclically by them (Crick & Dodge, 1994). Eventual changes in SIP may be because of new social experiences, differentiations of cognitive schemata, and acquired social skills during development.

Although there is growing empirical evidence for such concepts of SIP in aggressive individuals, various issues need to be addressed in more detail (e.g., Dodge & Schwartz, 1997; Lösel & Bliesener, 1999a; Tremblay, 2000). For example, the assumed social origins of aggression-prone SIP have been investigated far less than the relation of SIP to aggressive behavior. Many studies are restricted to specific phases of SIP and do not address larger parts of the whole sequence. Features of SIP seem not to be equally important in different forms of antisocial behavior and age groups. Finally, results may depend on the respective operationalizations and on methodological monism.

The present study addresses some of the above issues in a prospective-longitudinal design with adolescents. In particular, the following questions are asked: (a) Are the characteristics of SIP related to experiences of aggression in social contexts (EASC) such as the family, school, peer group, and mass media consumption? (b) Is there a differential impact of SIP on various forms of aggression or delinquency? (c) How far do variables of SIP have a mediating or an independent function in predicting and explaining aggression?

METHOD

PARTICIPANTS

The study addresses a sample of 102 male adolescents. Participants were selected for a longitudinal and more detailed analysis from a representative sample of 1,163 students attending schools at Nuremberg and Erlangen, Germany. At the time of the first investigation (Time 1), the boys were in Grades 7 or 8 (mean age = 14.0 years, standard deviation = .89). The second investigation (Time 2) took place in Grades 9 or 10 (approximately 20 months later).

MATERIALS

Social Information Processing [SIP]

At Time 1, the boys answered questions on three written scenarios developed in various pretests to measure several phases of the above-mentioned model of SIP. The scenarios represented conflicts that can trigger more or less aggression-prone cognitive schemata, as in the following example: You are standing together with other students in the schoolyard. Suddenly, Carl comes up to you, a boy you always had problems with. He pushes you and shouts, "You are going to get it today!"

For each scenario, the adolescents were asked the following questions: (a) "Why does the other boy behave like that?" (interpretation of the situation), (b) "What do you want to achieve in this situation?" (clarification of goals), (c) "How would you react? What else could you have done?" (response access or construction), and (d) "What would happen then?" (response evaluation).

The adolescents' answers were categorized according to various characteristics. The following are core indicators of information processing in the four phases of a to d: (a) Answers attributing the other boys' behavior to hostile motives against oneself or as a result of being generally aggressive or unfriendly were coded as attribution of hostility; (b) Answers indicating the intention to hurt or punish the other boy and insisting on one's own advantage were categorized as aggressive-egocentric goal setting; (c) Answers including aggressive and unconsidered reactions such as physical attacks, insults, threats, extortion, or pigheadedness were coded as aggressive-impulsive response access; and (d) The category of response evaluation was used to classify those answers showing that aggressive-impulsive responses are seen as positive and successful ways of attaining one's own goals.

Three raters were trained intensively in coding the material. They were "blind" to the characteristics of the boys. For a selection of 30 protocols from the larger sample, mean interrater reliability varied between 75.0% and 89.1% across categories. The respective results for categorized data were 67.1% to 83.6%. This indicates that our categories were sufficiently reliable for further data analyses.

Experiences in Social Context

At Time 1, the boys reported on the aggression and conflict they experienced in various social contexts.

Family. The degree of aggression and conflict that the youngsters experienced in their family was operationalized through two measures. First, a 4-item scale on cohesion ($\alpha = .64$) from the *Familiendiagnostisches Testsystem* (Schneewind, Beckmann, & Hecht-Jackl, 1985) was applied. This is a German adaptation of the climate scales from Moos (1974). Second, aggressive parenting was assessed with three items (e.g., "Sometimes we get punished with a hiding," $\alpha = .63$) from the *Problemfragebogen für Jugendliche* (Süllwold & Berg, 1967). The cohesion scale was inverted, and both scores were z transformed and summed to form an index of the experienced aggression and conflict in the family.

School. The degree of aggression and conflict the boys experienced in their school class were also measured with two indicators: (a) The climate in the class was operationalized with an 8-item conflict scale ($\alpha = .73$) constructed to match the family climate scale (see Lösel & Bliesener, 2003); (b) The perceived frequency of aggression and violence on the school level was measured with a 6-point rating scale (ranging from *never* to *very often*). Both scores were z transformed and integrated to form a sum index.

Peer group. Experiences of aggression and conflict in the peer group were assessed with four items on quarrels and fights with other cliques (see Lösel & Bliesener, 2003). The items were combined to form a sum index.

Media Consumption. The consumption of movies and videos with violent content was assessed with a questionnaire on media use adapted from Spanhel (1990). For the purpose of the present study, the amount and intensity of violent media consumption was operationalized with a 5-point index.

Aggressive Behavior

At Time 1 and Time 2, aggressive and delinquent behavior was assessed with the following methods.

Physical aggression (self-report). The degree of physical aggression against other students was measured with a subscale of the German adaptation of the Bullying/Victim Questionnaire from Olweus (1989; Lösel, Averbek, & Bliesener, 1997). This scale contains 24 items on beating, kicking, and threatening other students ($\alpha = .95$).

Verbal aggression (self-report). Verbal and relational forms of aggression were assessed with the second scale of the German version of the Bullying/Victim Questionnaire (Lösel et al., 1997). It contains 14 items on teasing, denigrating, segregation from social contacts, and so forth ($\alpha = .91$).

Delinquency (self-report). Delinquency beyond interpersonal aggression and the school context was assessed with the Delinquency Scale from Lösel (1975). Three subscales differentiate between forms of delinquency: Seven items mention violent offenses (e.g., robbery, assault, weapon use; $\alpha = .74$), 12 items refer to property offenses (e.g., shoplifting, car theft, fraud; $\alpha = .78$), and 5 items apply to status offenses (e.g., truancy, alcohol and substance abuse, unauthorized staying out overnight; $\alpha = .70$).

Various teacher reports on aggressive behavior were used to avoid relying on only one data source and to complement the self-reports. At Time 1, teachers ranked all students in their class on general aggressiveness on a 7-point rating scale with a forced distribution. At Time 2, more differentiated measures were used.

Physical aggression (teacher report). Physical aggression was measured through teacher reports on the frequency of hitting and kicking and weapon use in the respective students. The eight items were drawn from the Bullying/Victim Questionnaire self-report ($\alpha = .90$).

Verbal aggression (teacher report). Similar to the Bullying/Victim Questionnaire, reports on the frequency of teasing and social segregation were used to operationalize verbal aggression from the teacher's perspective (four items, $\alpha = .88$).

General aggressiveness (teacher report). Broader forms of aggression (e.g., property damage, aggression toward nonpeers, cruelty to animals) were assessed with the aggression scale ($\alpha = .92$) from a German version of the Teacher-Report Form of the Child Behavior Checklist (Achenbach, 1991).

PROCEDURE

Because groups such as victims and offenders are highly relevant in developmental studies on antisocial behavior (Bergman & Magnusson, 1997; Moffitt, 1993) but normally have only a low representation in general samples, a screening was applied to oversample these groups. At Time 1, boys were selected according to their scores on self-reports and teacher reports of problem behavior and social competence so that the present sample contained four approximately equal-sized groups of highly aggressive, frequently victimized, socially

competent, or average students (Lösel & Bliesener, 2003). None of the predictors in the present study was included in the screening process.

Assessments at Time 1 were carried out as part of a written survey in the classroom; assessments at Time 2 were part of an intensive examination in the laboratory in groups of three boys. Teachers' reports at Time 2 were obtained by a postal survey. Parents, teachers, and adolescents were asked for informed consent at both times.

RESULTS

RELATIONS WITHIN THE THREE DOMAINS

SIP. All correlations between the four measures of SIP were positive and, thus, took the expected direction. They varied between $r = .01$ (n.s.) and $r = .36$ ($p < .01$; mean $r = .24$, $p < .05$). Four out of six coefficients were significant: Attribution of hostile intentions to others correlated at $r = .32$ with aggressive-egocentric goal setting ($p < .001$). Such goals related to an aggressive-impulsive response repertoire ($r = .27$, $p < .01$) and positive evaluations of aggressive-impulsive reactions ($r = .20$, $p < .05$). These last two variables correlated at $r = .36$ with each other ($p < .001$). These overall small to medium relations suggested that there was not one homogeneous dimension of SIP. A factor analysis indicated two dimensions: The first factor explained 41% of the variance and was characterized by high loadings for an aggressive-impulsive response repertoire (.84) and positive evaluations of these reactions (.77). The second factor (27% of variance) had high loadings for hostility attribution (.88) and aggressive-egocentric goal setting (.72). For reasons of theoretical clarity, the various phases of SIP were separated in the further analyses.

Experiences in social contexts. All correlations between the four measures of perceived aggression and conflict in the youngsters' social contexts were positive. Most coefficients were small (mean $r = .23$, $p < .05$) and only half of them attained statistical significance: Perceived aggression and conflict in the family correlated at $r = .24$ with the experience of aggression and conflict at school ($p < .05$) and $r = .42$ with aggressive activities in the peer group ($p < .001$). The latter related significantly to the consumption of violence in the media ($r = .23$, $p < .05$). In spite of the small to moderate bivariate coefficients, one common factor could be derived from a factor analysis. This explained 44% of the variance and had the following loadings: Experienced aggression and conflict in the family, .76; at school, .55; in peer groups, .75; and in the media, .54. Because the various variables showed rather different communalities (from 29% to 58%) and were not equally proximal to the problem behavior, a content-oriented analysis was preferred to the use of a common factor score.

Aggression/delinquency. All measures of aggressive and delinquent behavior correlated significantly with each other (mean $r = .51$, $p < .001$). Coefficients varied between $r = .83$ (self-reported physical aggression vs. violent offending; $p < .001$) and $r = .31$ (self-reported status offenses vs. teacher-reported physical aggression; $p < .01$). The average correlation between self-reports was $r = .63$ ($p < .001$) and between teacher reports was $r = .66$ ($p < .001$). As to be expected, there was less common variance between the two sources of information

TABLE 1: Bivariate and Multiple Correlations Between Social Information Processing (Time 1) and Aggression/Delinquency (Time 2)

Measure at Time 2	Measure at Time 1				Multiple Correlation
	Attribution of Hostile Intentions	Aggressive-Egocentric Goal Setting	Aggressive-Impulsive Response Repertoire ^a	Positive Evaluation of Aggressive-Impulsive Responses	
Physical aggression (SR)	-.10	-.01	.44***	.09	.47***
Verbal aggression (SR)	.00	.15	.57***	.09	.58***
Violent offenses (SR)	-.09	.02	.48***	.09	.50***
Physical aggression (TR)	-.06	.10	.51***	.22*	.52***
Verbal aggression (TR)	-.00	.03	.47***	.15	.48***
General aggressiveness (TR)	.02	-.02	.42***	.07	.45***
Property offenses (SR)	-.01	.05	.47***	.03	.50***
Status offenses (SR)	-.04	.06	.46***	.21*	.47***

Note. SR = self-report; TR = teacher report.

a. Beta coefficients (not shown), $p < .001$.

* $p < .05$. *** $p < .001$.

(mean $r = .39$, $p < .001$). However, a principal components analysis revealed a strong general factor of aggression and delinquency (57% of variance). The factor loadings of the various measures ranged between .78 (self-reported physical aggression; $p < .001$) and .66 (teacher-reported physical aggression; $p < .001$). Although these results had made it possible to address antisocial behavior as a broad construct, a more specific approach in line with the research questions mentioned above was preferred.

RELATIONS BETWEEN THE THREE DOMAINS

Information processing predicts aggression. Table 1 reports the bivariate and multiple correlations between the measures of SIP at Time 1 and the problem behavior at Time 2.

The overall prediction of aggression/delinquency by measures of SIP was highly significant. All multiple correlations were in a similar range and explained between 20% and 34% of variance. There were no clear differences between the various forms of aggressive behavior and nonaggressive modes of delinquency. However, the overall strong relationship to antisocial behavior could not be generalized across the various phases of SIP. Boys who recalled mainly aggressive-impulsive response schemata consistently exhibited high scores on all measures of aggression and delinquency. These correlations were even similar for self-reports of aggression (mean $r = .50$, $p < .001$) and teacher reports (mean $r = .47$, $p < .001$). A positive evaluation of aggressive-impulsive reactions was related significantly to

TABLE 2: Bivariate and Multiple Correlations Between Experiences of Aggression in Social Contexts (Time 1) and Aggression/Delinquency (Time 2)

Measure at Time 2	Measure at Time 1				Multiple Correlation
	Family	School	Peer Group	Media Consumption	
Physical aggression (SR)	.37***	.16	.57*** ^c	.41*** ^a	.65***
Verbal aggression (SR)	.24*	.13	.34*** ^a	.30*** ^a	.42***
Violent offenses (SR)	.37***	.18	.55*** ^c	.45*** ^b	.66***
Physical aggression (TR)	.14	.21*	.40*** ^c	.12*	.44***
Verbal aggression (TR)	.30**	.20*	.40*** ^b	.25*	.47***
General aggressiveness (TR)	.29**	.14	.35*** ^a	.19	.41***
Property offenses (SR)	.25*	.15	.38*** ^b	.52*** ^c	.60***
Status offenses (SR)	.15	.14	.43*** ^b	.44*** ^c	.56***

Note. SR = self-report; TR = teacher report.

a. Beta coefficients (not shown), $p < .05$.

b. Beta coefficients (not shown), $p < .01$.

c. Beta coefficients (not shown), $p < .001$.

* $p < .05$. ** $p < .01$. *** $p < .001$.

at least some forms of problem behavior (teacher-rated physical aggression and self-reported status offenses).

Social experiences predict aggression. Table 2 reports relations between the four indicators of EASC and the measures of problem behavior.

All bivariate correlations with aggression/delinquency took the expected direction. Most were statistically significant, and half of them had at least a medium size. Aggression within the activities of one's peer group showed the strongest relations to the various forms of problem behavior (mean $r = .43$, $p < .001$); violence consumption in the media ranked second (mean $r = .34$, $p < .001$); perceived aggression and conflict in the family, third (mean $r = .26$, $p < .01$); and the school context, fourth (mean $r = .13$, n.s.). The higher average correlations in the first two areas of experience were plausible insofar as both were confounded more with antisocial behavior. EASC seemed to be particularly relevant for more serious forms of aggression such as physical aggression and violent offending. However, this tendency emerged only for the self-report measures.

All multiple correlations were highly significant, and some of them had large effect sizes. Between 17% and 44% of the variance in antisocial behavior could be explained by the four areas of EASC. The models for the more serious forms of self-reported aggression showed the strongest relationships. However, this was not the case for teacher-reported aggression; and property delinquency also revealed an R of .60, $F(4, 95) = 13.50$, $p < .001$. That the family variable was not an independent predictor in the multiple regressions was because of the higher bivariate correlations of the peer group variable and the substantial relation between both predictors.

Social experiences and information processing. Table 3 reports the correlations between the measures of EASC and SIP.

The strongest relation was found between aggressive peer group activities and an aggressive-impulsive response repertoire. Boys who were involved in groups that frequently

TABLE 3: Relationship Between Experiences of Aggression in Social Contexts and Social Information Processing (Bivariate and Multiple Correlations)

	<i>Attribution of Hostile Intentions</i>	<i>Aggressive- Egocentric Goal Setting</i>	<i>Aggressive- Impulsive Response Repertoire</i>	<i>Positive Evaluation of Aggressive- Impulsive Reaction</i>
Family	-.21 ^a	.07	.28 ^{**}	.04
School	-.03	.03	.25 [*]	.08
Peer group	-.07	.00	.42 ^{***a}	.23 [*]
Media consumption	-.06	-.02	.16	-.07
Multiple correlation	.23	.11	.47 ^{***}	.28

a. Beta coefficient (not shown), $p < .05$.

^{*} $p < .05$. ^{**} $p < .01$. ^{***} $p < .001$.

fought and quarreled with others produced more aggressive-impulsive responses in the conflict scenarios. They also evaluated aggressive behavior as being more successful. Further significant correlations referred to the experience of aggression and conflict in the family. As expected, boys from a problematic family background exhibited a more aggressive-impulsive response repertoire. In contrast, the small but significant correlation with the hostility attribution took a negative direction. Differential relations between both domains were also revealed by multiple regressions. Although approximately 22% of the variance in the response repertoire could be attributed to EASC, the other three coefficients remained non-significant.

To estimate the overall relationship between EASC and aggression-prone SIP, a canonical correlation between the measures of both domains was computed. This revealed one significant function and a canonical correlation of $r = .49$ (Wilks's Lambda = .70, $\chi^2 = 34.00$, $df = 16$, $p < .01$). Using the canonical coefficients for both sets of variables, individual scores for the degree of EASC and SIP, respectively, were derived. Both values correlated with the factor scores of the general factor of antisocial behavior mentioned above. The first-order relation between EASC and antisocial behavior was $r = .57$ ($p < .001$). When controlling for SIP, the partial correlation was $r = .40$ ($p < .001$). The respective correlations between SIP and antisocial behavior were $r = .59$ (first order) and $r = .45$ when controlling for EASC (both $p < .001$). These results suggested a mediating effect of SIP on the relation between EASC and antisocial behavior. However, although the canonical function optimized the relation between both predictor domains, it remained a significant independent effect after controlling for EASC. Similar relationships were found when SIP was controlled.

Hierarchical regressions. The previous analyses did not refer to differences in the proximity of predictors to aggressive behavior. However, theoretical reasons suggest a more or less plausible sequence of the various experiences in social contexts. According to the results just mentioned above, it must also be taken into account that SIP variables have not only a mediating but also an independent influence on aggression. Therefore, a hierarchical regression was computed with overall antisociality as a prototypical criterion and stepwise inclusion of the various predictors. The results are reported in Table 4.

TABLE 4: Hierarchical Regression With Experiences of Aggression in Social Contexts and Social Information Processing as Predictors of Antisocial Behavior

Predictor	R	R ²	R ² Change
Aggression in the family	.33**	.11	.11**
Aggression at school	.34**	.12	.01
Media violence consumption	.52***	.27	.15***
Aggressive peer groups	.65***	.42	.15***
Attribution of hostility	.65***	.42	.00
Aggressive-egocentric goal setting	.65***	.42	.00
Aggressive-impulsive response repertoire	.76***	.58	.16***
Positive evaluation of aggressive-impulsive responses	.76***	.58	.01

Note. Table reflects factor scores of all self-reported and teacher-reported measures of aggression/delinquency at Time 2.

** $p < .01$. *** $p < .001$.

Each of the four most robust predictors from the previous analyses contributed a highly significant amount of variance to the model. Although the indicators of EASC were more important than SIP, the aggressive-impulsive response repertoire remained a substantial and independent factor. The total amount of variance explained by all predictors ($R^2 = .58$) was impressive, particularly in view of the fact that the predictors were rather simple.

However, the impact of these factors should also be evaluated in relation to other constructs and variables. As a general rule, previous antisocial behavior often proved to be the best predictor of future aggression and delinquency (Farrington, 1998). Because some of the outcome measures were also assessed at Time 1, additional influences of the SIP and EASC variables can be evaluated. For this purpose, hierarchical regressions were computed that contained the respective score of problem behavior at Time 1 as first predictor and one of the five best predictors from Table 1 as the second (see Table 5).

The more serious forms of self-reported aggression showed the highest stability over time. Overall, the stability coefficients were so large that only a few other variables remained as significant predictors. The consumption of violence in the media and an aggressive-impulsive response repertoire seemed to be particularly relevant for changes in the amount of variance explained. With respect to effect sizes, both predictors were more important for nonaggressive delinquency than for measures of aggression.

DISCUSSION

The results of this study support the model of SIP. SIP variables explain between 20% and 34% of the individual differences in aggression after 20 months. These are substantial effects, and a significant impact of SIP even remains when EASC are controlled. However, the relationships to aggressive behavior are mainly because of one phase of SIP, retrieving aggressive-impulsive response schemata from memory store. Positive evaluations of such reactions also have some significant but weaker effects. The finding that this SIP variable does not emerge as an independent predictor in the multiple regressions is plausible because it correlates substantially with the aggressive-impulsive response repertoire. In contrast to the theoretical model, however, attribution of hostile intentions and aggressive-egocentric goal setting do not correlate significantly with any measure of aggression/delinquency. This

TABLE 5: Stability Coefficients of Measures of Aggression/Delinquency and Significant Further Predictors in Hierarchical Regressions

<i>1st Predictor (T1) and Criterion (T2)</i>	<i>r₁₂</i>	<i>2nd Predictor</i>	<i>R</i>	<i>R² Change</i>
Physical aggression (SR)	.71***	Media violence consumption	.75***	.05**
Verbal aggression (SR)	.65***	Media violence consumption	.67***	.03*
General aggressiveness (TR)	.59***	Aggression in the family	.62***	.03*
		Aggressive peer group	.61***	.03*
Violent offenses (SR)	.76***	Aggressive-impulsive response repertoire	.78***	.02*
Property offenses (SR)	.55***	Media violence consumption	.67***	.12***
		Aggressive-impulsive response repertoire	.61***	.06**
Status offenses (SR)	.58***	Media violence consumption	.65***	.08***
		Aggressive-impulsive response repertoire	.66***	.10***

Note. T1 = Time 1; T2 = Time 2; SR = self-report, TR = teacher report.

* $p < .05$. ** $p < .01$. *** $p < .001$.

is unexpected insofar as the specific composition of the sample should lead to relatively high effect sizes. These are indeed found when we look at the overall explanation of the variance in antisocial behavior that comes close to 60%.

The differential relationships between measures of SIP and aggression are reflected within the set of SIP variables. Here, correlations are only small to moderate, and factor analysis suggests two relatively independent dimensions. One refers primarily to the cognition of the situation (hostile attributions and goal setting); the other is related more to the behavioral schemata in the memory store (response repertoire and evaluation). Therefore, a boy who shows aggression-prone modes of SIP in one phase may not automatically exhibit a similar tendency in the next phase. Perhaps social cognitions are not as homogeneous as the SIP constructs suggest. For example, Zelli et al. (1999) found that aggression-prone beliefs and respective modes of SIP are relatively distinct. However, the latter have a mediating influence on aggressive behavior. More research on individually consistent sequences or patterns of SIP across the whole process is needed.

The finding that some phases of SIP (attribution of hostile intentions and setting of aggressive-egocentric goals) do not relate to aggression may be partially because of methodological problems. The operationalization of SIP in the present study is based on the answers to conflict scenarios that are presented in a paper-and-pencil format. Videotaped scenarios or real social situations may well stimulate stronger aggression-prone reactions (e.g., Feldman & Dodge, 1987). In a previous study of SIP in experimental conflict situations, we found significant effects of not only an aggressive-impulsive response repertoire but also attributions of hostility, aggressive-egocentric goal setting, and positive evaluations of aggressive-impulsive responses (Lösel & Bliesener, 1999a). However, these findings were based on cross-sectional data only. The written scenarios and questions in the present study probably lead to more reflected answers that may contain effects of a positive self-presentation. This interpretation is in line with a study of Cates et al. (1996) in which high time pressure in social problem solving provoked a stronger hostility bias and more aggressive reactions. Because the present study addresses adolescents, processes of metacognition

and self-presentation are more relevant than in studies of children. Similar to the assessment of adults, one must expect that negative goals and attitudes will be reported less freely or embedded in rationalizations and neutralizations. The latter cognitive techniques are also issues of SIP and are related partially to the measures used in this study (Lösel & Bliesener, 2003).

Furthermore, it must be taken into account that our conflict scenarios are not totally ambiguous. In all three situations, the other boy acts in a more or less provocative or aggressive manner. As such, attribution of hostility in these cases cannot be seen as a bias that results from a distorted perception only. In contrast, it may indicate a realistic and competent view of the specific social situation. Such an interpretation is supported by various findings. First, in the present sample, the attribution of hostility correlates significantly with verbal intelligence ($r = .23, p < .05$), which is not the case for other SIP measures. Second, the correlations between attribution of hostility and aggressive behavior are not only non-significant but also negative. Third, the EASC variables also correlate negatively with the attribution of hostility and in the case of the family, even significantly. These reasons suggest that specific issues of SIP cannot be interpreted generally as being "unskillful" or "biased." This issue is also emphasized in controversies concerning the social understanding and behavior of school bullies (Crick & Dodge, 1999; Sutton, Smith, & Swettenham, 1999).

Other reasons may explain why an aggressive response repertoire is a better predictor of aggression than situational interpretations: For example, high scores on aggression are particularly prevalent among the subgroup of bullies who tend toward proactive aggression (Lösel & Bliesener, 1999b). However, hostile attributions are more relevant for reactive aggression (e.g., Dodge & Coie, 1987; Schwartz et al., 1998). In contrast, proactive aggression relates more to positive goal expectancies for aggressive behavior (Crick & Dodge, 1996; Schwartz et al., 1998). The latter also shows the highest correlation to the aggressive-impulsive response repertoire in our study.

Because developmental criminology suggests the differentiation of various forms of aggressive and delinquent behavior (Loeber & Stouthamer-Loeber, 1998; Tremblay, 2000), a broad range of measures has been used. However, the relations to SIP are rather similar for physical aggression, verbal aggression, violent offenses, and general aggressiveness. There are even no clear differences to nonaggressive modes of delinquency such as property and status offenses. Teacher-reported aggression reveals similar effect sizes as self-report measures, which supports the validity of the current study. In any case, the predictive effects cannot be explained by response tendencies in self-reports. In a similar manner, the general factor of antisocial behavior cannot be attributed to the sampling procedure. In a representative sample of more than 1,100 students, such a factor was also observed (Lösel et al., 1997), and numerous other studies reveal a general syndrome of externalizing problem behavior (e.g., Elliott, Huizinga, & Menard, 1989; Jessor, Donovan, & Costa, 1992). The aggressive-impulsive response schemata seem to be a central SIP predictor of aggressiveness and an indicator of an antisocial-impulsive lifestyle. Thus, it is plausible that there are no substantial differences between the various measures of aggression and delinquency. To reveal more differential relationships to SIP, probably specific subgroups will have to be selected that show one type of problem behavior but not the other (e.g., Lösel & Bliesener, 1998). It would also be more adequate to analyze specific homogeneous developmental trajectories or to perform experimental interventions that address only specific components of

the hypothesized causal mechanisms (see Tremblay, 2000). However, such designs go beyond the frame of the present study.

In contrast to SIP, significant predictions of aggression on all measures of EASC are found in the present study (see Table 2). With the exception of the school context, there are also substantial effect sizes. These results are consistent with other longitudinal studies on risk factors for violent and other juvenile offending (e.g., Hawkins et al., 1998; Lipsey & Derzon, 1998). That effect sizes in the literature are often smaller ($r = .10$ to $.20$; Lösel, 2002) than in the current study can be explained by the composition of the sample and the short follow-up period. Both factors are also relevant for the relatively high stability coefficients of aggressive behavior (see Table 5) that are in accordance with meta-analyses in this field (Olweus, 1979; Zunkley, 1994). However, one should bear in mind that high stability coefficients imply consistency only in the rank order of individuals and not in the mode or intensity of the respective behavior (Farrington, 1990; Tremblay, 2000).

Of course, experiences of aggression in the various social contexts cannot be interpreted as strictly causal determinants of aggressive behavior. At least partially, aggression and conflict in the family may also be reactions to the boy's problem behavior (Pike, McGuire, Hetherington, Reiss, & Plomin, 1996; Plomin, 1994). Belonging to peer groups that engage in fights with others is a consequence of selective affiliation in line with an adolescent's own interests and lifestyle (Bender & Lösel, 1997; Thornberry, 1998). Moreover, such group experiences reinforce and model further antisocial behavior and may lead to a new quality of severity (Elliott et al., 1989; Thornberry, 1998). Similar circular processes can be assumed for the effects of violence consumption in the media (Huesmann, Moise, & Podolski, 1997); as part of their lifestyle, aggressive adolescents prefer such media contents and, thus, reinforce their tendencies to act aggressively. Although we must assume these and other bidirectional influences in the development of aggressive behavior, EASC still remain an important source for aggression-prone knowledge structures and beliefs. That the boys' experience of aggression and conflict at school shows only small correlations with aggression is consistent with research on bullying (e.g., Lösel & Bliesener, 1999b; Olweus, 1993). Active bullying does not seem to result primarily from school factors but depends on a variety of social and personality features that contribute to aggressiveness in other contexts as well. It is more the experience of victimization that is related to the educational climate at school (e.g., Lösel & Bliesener, 2003; Olweus, 1993).

According to the hypotheses on SIP, EASC correlate with aggression-prone modes of SIP. This is particularly the case for the aggressive-impulsive response repertoire. The strongest relations are found with aggression in the peer group. This is in accordance with the model of Crick and Dodge (1994). Here, the peer group plays a central role in the circular reinforcement of aggression-prone schemata and beliefs. However, we should bear in mind that our correlations are not high enough to assume a closed cycle of violence. This is also not proven for the family in other fields of research (e.g., Kaufman & Zigler, 1989). Taking into account the above-mentioned problems of the paper-and-pencil operationalization of SIP and the relatively simple measures of aggression in social contexts, the effect size of the canonical correlation between both domains appears adequate. The results of the hierarchical regression containing both domains are even more impressive with respect to effect size. Both analyses demonstrate substantial cumulative and independent effects of the two domains on antisocial behavior. Although a definite causal order in the various influences cannot be assumed, the following sequence seems to be relatively plausible

(Lösel & Bender, 2003): Intensive experiences of aggression and conflict in the family lead to aggression-prone modes of SIP. They also enhance the probability of contacts with aggressive peer groups and—as part of the lifestyle—media consumption of violence. These activities, in turn, shape and reinforce aggression-prone schemata of cognition and action planning. Naturally, such assumptions of recursive cycles are difficult to prove in empirical research. However, they seem to be more adequate than linear models of causality that also cannot be proven strictly in nonexperimental designs.

From this perspective, one should not overemphasize the strong reduction of predictive power when previous aggression is controlled (see Table 5). That earlier aggressive behavior accounts for most of the later variance does not make the variables of SIP and EASC unimportant. In contrast, we must assume a continuous influence that has already contributed to the behavioral differences at Time 1 and to their relative stability at Time 2 (e.g., Burks, Laird, Dodge, Pettit, & Bates, 1999). It is interesting that the largest amount of additional variance explanation is observed in property and status offenses. Perhaps this indicates developmental processes of less serious, adolescence-limited antisociality (Moffitt, 1993). In contrast, the more stable and serious forms of aggression may partially represent life course–persistent developments. Perhaps only boys with a more aggression-prone SIP and EASC are at risk to move from the less serious to the more serious trajectory. Further data waves will be necessary to test this hypothesis.

The partial correlations and the hierarchical regressions suggest both a mediating and an independent effect of SIP on aggressive behavior. With respect to effect size, it has to be remembered that the present study addresses perceived features of social contexts and not objective data. This promotes confounds with the variables of SIP and self-reported aggression. On the other hand, the measures of SIP are derived from only three hypothetical scenarios. As such, small independent effects should not be underestimated.

Effects of SIP that are independent from EASC contradict the assumption that these characteristics are only because of social learning processes. Although research on SIP is based on these theoretical explanations of aggression (e.g., Bandura, 1973), the origin and development of aggression-prone schemata and beliefs is not yet very clear (e.g., Dodge & Schwartz, 1997). In addition to family, peer group, and other socialization influences, biological factors and temperament must be taken into account (Frick, 1998; Tremblay, 2000). This leads once more to questions regarding the measurement of SIP.

Although video scenarios and related interviews are replicated methods for the investigation of children, there are more methodological problems in operationalizing the phases of SIP in adolescents and adults. Such problems are relevant for not only paper-and-pencil approaches but also analyses of concrete interactions (Lösel & Bliesener, 1999a). Because of the reactivity of these assessments, effects of faking, social desirability, and the like should be expected, particularly in forensic contexts. The assessment of enduring schemata and beliefs in a differentiated and reliable way probably calls for multiple methods and informants. As in the assessment of psychopathy (Hare, 1995), forensic applications of SIP constructs based on reports from the respective person on his or her own thinking processes must be validated critically against other data sources. We must also take into account that constructs such as “impulsivity” are rather complex and multidimensional (e.g., Beelmann, Bliesener, & Lösel, 2000; White et al., 1994). Related methodological problems are more fundamental: Models of SIP refer to mental processes that occur immediately before an aggressive behavior. Naturally, these processes cannot be registered in reality. One can interview individuals about

such processes only afterward, or one can use scenarios that may provoke "typical" thinking patterns in both prospective and retrospective studies. These data are then used to infer cognitive processes that may take place in real situations of offending. Similar to the question of criminal responsibility, these inferences on cognitive processes in the offense situation cannot really be proven but are based more on criteria of plausibility.

Although SIP models of aggressive behavior assume that the respective cognitive processes run more or less automatically, the assessment of SIP asks for conscious attributions, goals, evaluations, and so forth. However, the studies of Duncker (1935) already demonstrate that we can learn little about the nature of thinking processes from the reports of the thinking person alone. Neuropsychological research shows, for example, the appearance of electroencephalogram readiness potentials before individuals consciously represent action intentions (Libet, 1985). Drawing on these and other results, modern concepts of consciousness question whether we do what we want or in contrast, want what we do (Prinz, 1997). Research on somatic markers (Damasio, 1994) and response modulation (Newman, 1998) in highly aggressive or psychopathic persons reveals deficits in the supervisory attention system that perhaps can be attributed to dysfunctions in the prefrontal cortex (Raine, 1997; see also, Lösel, & Schmucker, 2004). Such subconscious, automatic processes may be one reason why even adequate rehabilitation programs for high-risk offenders show only rather moderate effects (Lösel, 2001).

If highly antisocial individuals are really lacking in biological or emotional markers that contribute to more reflective response decisions, we should expect them to exhibit difficulties in the SIP analysis of their attributions, intentions, and evaluations. However, similar to the method of free association, questions on response alternatives (without interpretations and evaluations) may provide the most realistic representation of what goes through their heads in aggression-prone situations. This could explain why the aggressive-impulsive response repertoire revealed the strongest SIP effects in the present study. Obviously, this hypothesis is rather speculative. Nonetheless, it seems worthwhile to relate SIP research on mental processes more strongly to biological mechanisms in aggressive behavior (e.g., Dodge & Schwartz, 1997).

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