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Development and Validation of the Social Information Processing Application: A Web-Based Measure of Social Information Processing Patterns in Elementary School-Age Boys

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Abstract

The purpose of this study was to evaluate the psychometric properties of an audio computer-assisted self-interviewing Web-based software application called the Social Information Processing Application (SIP-AP) that was designed to assess social information processing skills in boys in 3rd through 5th grades. This study included a racially and ethnically diverse sample of 244 boys ages 8 through 12 ($M = 9.4$) from public elementary schools in 3 states. The SIP-AP includes 8 videotaped vignettes, filmed from the first-person perspective, that depict common misunderstandings among boys. Each vignette shows a negative outcome for the victim and ambiguous intent on the part of the perpetrator. Boys responded to 16 Web-based questions representing the 5 social information processing mechanisms, after viewing each vignette. Parents and teachers completed measures assessing boys' antisocial behavior. Confirmatory factor analyses revealed that a model positing the original 5 cognitive mechanisms fit the data well when the items representing prosocial cognitions were included on their own factor, creating a 6th factor. The internal consistencies for each of the 16 individual cognitions as well as for the 6 cognitive mechanism scales were excellent. Boys with elevated scores on 5 of the 6 cognitive mechanisms exhibited more antisocial behavior than boys whose scores were not elevated. These findings highlight the need for further research on the measurement of prosocial cognitions or cognitive strengths in boys in addition to assessing cognitive deficits. Findings suggest that the SIP-AP is a reliable and valid tool for use in future research of social information processing skills in boys.

Keywords

social information processing; antisocial behavior; aggression; Web-based assessment; social cognitive deficits

Social information processing (SIP) patterns in youth refer to a series of cognitive mechanisms associated with making decisions about interpersonal behavior. A conceptual framework was proposed within the developmental literature that provides a coherent structure and flow to understanding the processes associated with social decision making

(Crick & Dodge, 1994) that has had a tremendous impact on research across a wide range of fields in psychology. For example, the SIP theory has stimulated efforts to examine the etiology and growing complexity of social cognitive patterns across development (Fontaine, Yang, Dodge, Bates, & Pettit, 2008). In addition, this model has provided a rich foundation for research in the field of developmental psychopathology, such that biases or extremes in SIP responses have been found among aggressive and delinquent youths (Dodge, Coie, & Lynam, 2006). From a prevention science perspective, the SIP model has been translated into strategies for teaching social cognitive skills and reorienting cognitive biases to contribute to the prevention of aggressive, delinquent, and substance abusing behaviors (e.g., Fast Track, Conduct Problems Prevention Research Group, 1992; Metropolitan Area Child Study Intervention, Eron et al., 2002; Making Choices, Fraser, Nash, Galinsky, & Darwin, 2000; Second Step, Grossman et al., 1997). Similarly, school-based social emotional learning programs aimed at teaching social skills and enhancing academic functioning have also successfully utilized the SIP model as a conceptual foundation for their curriculum objectives (Durlak, Weissberg, Dymnicki, Taylor, & Schellinger, 2011). Finally, in the clinical child and psychiatric literatures, cognitive-behavioral intervention programs for aggressive and delinquent youths have been successfully developed and evaluated in randomized controlled trials to treat SIP cognitive deficits to reduce antisocial behavior (e.g., Coping Power, Lochman & Wells, 2002a, 2002b, 2004, 2005). Despite this well-developed body of research on SIP, there remains a need for a psychometrically strong measure of the cognitive mechanisms composing the SIP model that can be used for a wide range of purposes, and this forms the main goal of the current study.

The SIP Model and Aggression

The reformulated SIP model includes five cognitive mechanisms: (a) encoding of internal and external cues, (b) interpretation of these cues, (c) goal selection, (d) access to or construction of possible responses, and (e) response decision (Crick & Dodge, 1994). Each of the five SIP mechanisms has been related to aggressive behavior in correlation studies. In fact, SIP mechanisms are incrementally predictive of aggressive behavior over time (Dodge & Price, 1994), and longitudinal studies have reported that patterns of deviant SIP processing may be causally related to aggressive responding across development (Zelli, Dodge, Lochman, Laird, & Conduct Problems Prevention Research Group, 1999). In addition, Guerra and Slaby (1990) reported that changes in social cognitive mediators, including SIP skills, after exposure to a cognitive mediation training program, were associated with reductions in aggressive behavior. Similarly, Lochman and Wells (2002a) reported that changes in several SIP cognitions partially mediated the impact of a social cognitive intervention program on school behavior problems, delinquency, and substance use. Aggressive behavior is stable during childhood and adolescence and is more stable over time than many other behaviors (Lochman, Whidby, & Fitzgerald, 2000). Aggression also places preschoolage and elementary school-age children at risk for delinquency and criminality (e.g., Loeber & Farrington, 2000; Piquero & Chung, 2001) and substance abuse (e.g., Fite, Colder, Lochman, & Wells, 2007; White, Brick, & Hansell, 1993) in adolescence and adulthood. Therefore, understanding the relationship between each SIP mechanism and children's aggressive and delinquent behaviors and accurately assessing children's social cognitive competence in the processing of social information is important.

In terms of the specific relationships between individual SIP mechanisms and antisocial behavior, the encoding of social cues is considered the cognitive mechanism that initiates the processing of social information, and aggressive youths have been found to have fewer encoding competencies than nonaggressive children (Dodge, Pettit, Bates, & Valente, 1995; Dodge & Tomlin, 1987). This means that aggressive children do not pick up on relevant social cues as accurately or as completely as nonaggressive children. Notably, prosocial

children report being less sure of their appraisals of the intent of others, particularly in ambiguous situations involving a peer provocation, suggesting that they are more cognizant of the need for additional information than aggressive or less prosocial children (Fitzgerald & Asher, 1995). This awareness of ambiguity in the social world and the need to gather more information may be a fundamental teachable skill in the encoding phase of SIP.

The second mechanism of the SIP model is the interpretation of cues, which involves making sense of the cues from a given situation, and all subsequent stages of the SIP model are thought to be influenced by how the cues are interpreted. Aggressive children and adolescents have been found to experience deficits in their interpretation of encoded cues (Dodge, Murphy, & Buchsbaum, 1984), which often leads to a hostile attributional bias (Crozier et al., 2008; Slaby & Guerra, 1988; Steinberg & Dodge, 1983). Children with a hostile attributional bias ascribe hostile intent to their peers' actions in response to a perceived provocation, often leading to a retaliatory aggressive response. In fact, de Castro, Veerman, Koops, Bosch, and Monshouwer (2002) completed a meta-analysis and concluded that hostile attributional biases consistently predict aggressive behavior. One manifestation of hostile intent is when children expect to be rejected by others, and when children have this expectation, they tend to behave in more aggressive and hostile ways (Downey, Lebolt, Rincón, & Freitas, 1998). Hostile intent also can be operationalized as the victim interpreting the perpetrator's intent as being disrespectful (Cohen, Hsueh, Zhou, Hancock, & Floyd, 2006; Stewart, Schreck, & Simons, 2006). Finally, emotional reactions to the situation influence how children interpret situational cues (Lemerise & Arsenio, 2000). Research has shown that when aggressive children are exposed to emotionally arousing situations, they are more likely to make hostile attributions and are subsequently more likely to prefer instrumental goals over relational goals than their more socially competent peers (de Castro, Slot, Bosch, Koops, & Veerman, 2003; Dodge & Somberg, 1987; Lemerise, Fredstrom, Kelley, Bowersox, & Waford, 2006).

Goals are arousal states that push individuals toward achieving desired outcomes and constitute the third mechanism in the SIP model. There is a body of evidence supporting the relation between goals and social adjustment (see Crick & Dodge, 1994, for a review). Deficits in the clarification of goals or the ways in which youths set goals in social situations have been found in reports by aggressive youths. For example, prosocial goals, such as getting along with others, predict positive social adjustment, whereas goals that do not benefit social relationships are associated with social maladjustment, including aggression and peer rejection (Crick & Dodge, 1996; Nelson & Crick, 1999). Aggressive children often endorse goals that involve revenge, dominance, and self-interest (Erdley & Asher, 1996; Rabiner & Gordon, 1992). When making social decisions involving peers, individuals may have multiple goals that need to be integrated and coordinated (Dodge, Asher, & Parkhurst, 1989). Goals guide and are associated with strategy decisions about how to solve social problems. For example, aggressive children also tend to rate the social goal of dominance as most important, and these ratings are associated with less friendly strategy generation (Lemerise et al., 2006).

Once children have observed and interpreted cues and formulated a goal for a given situation, they must generate and select a behavioral response. The deficits identified within the response access mechanism among aggressive youths include fewer competent responses, generation of more aggressive responses, and inflexibility in accessing novel, nonaggressive responses (Dodge, 1993; Ladd & Oden, 1979; Renshaw & Asher, 1983). Most important, aggressive children's response decisions are more aggressive and less prosocial than the responses of their nonaggressive peers across a broad range of social contexts (Crick & Dodge, 1994; Erdley & Asher, 1996; Fontaine, Yang, Dodge, Pettit, & Bates, 2009).

Once responses are generated, they are evaluated across many dimensions, including their moral acceptability, ease of execution, anticipation of desirable and undesirable outcomes, and values associated with behavioral choices (Fontaine & Dodge, 2006). Not only are aggressive children more likely to select aggressive responses to ambiguous provocation scenarios, they are also more likely to rate aggressive solutions to peer conflicts more favorably, report more confidence in enacting an aggressive response, and report more difficulty inhibiting their aggression than nonaggressive children (Perry, Perry, & Rasmussen, 1986). Aggressive children also perceive fewer negative consequences (Guerra & Slaby, 1989; Slaby & Guerra, 1988) and ascribe more positive outcomes (Crick & Ladd, 1993; Dodge et al., 1995) to behaving aggressively than do nonaggressive children. When compared with their less aggressive peers, aggressive children also report attaching more value or importance to certain rewards from aggression, such as gaining control over the victim, and attaching less importance to the negative outcomes of aggression, such as causing suffering in the victim or being rejected by their peer group (Boldizar, Perry, & Perry, 1989).

Taken together, this literature suggests that aggressive youths exhibit skills deficits in each of the social cognitive mechanisms outlined within the reformulated SIP model; however, patterns of biases or deficits vary widely across individuals. The majority of aggressive children exhibit deficits or biases in at least one social cognitive mechanism, which, in turn, has been found to be associated with maladaptive social behavior (Dodge, Pettit, McClaskey, & Brown, 1986; Weiss, Dodge, Bates, & Pettit, 1992). In fact, in a recent longitudinal study across childhood and adolescence, youths with pervasive SIP skills deficits in both the early (i.e., encoding or making hostile attributions) and the later SIP mechanisms had more externalizing problems than did youths demonstrating deficits in only one set of SIP skills (Lansford et al., 2006). Because patterns of SIP deficits vary across individuals and because these patterns are differentially associated with concurrent and subsequent outcomes, an assessment instrument that comprehensively assesses both early and later SIP mechanisms is needed.

Recent promising findings from two studies that included confirmatory factor analyses suggest that the SIP mechanisms are distinct from one another and that the measured factor structure confirms the theoretical SIP model (Dodge, Laird, Lochman, Zelli, & Conduct Problems Prevention Research Group, 2002; Hughes, Meehan, & Cavell, 2004). Both studies assessed four cognitive mechanisms, namely, intent attributions, goal orientation, response generation, and response evaluation; however, typically, only one indicator was assessed to represent each mechanism within each vignette, which limits the utility and comprehensiveness of these measures. For example, the complex mechanism of response evaluation, which is composed of multiple cognitive indicators, was assessed in both studies by only one indicator, namely, positive outcome expectancies for aggressive solutions to interpersonal problems. Several other factors limit the utility of these assessments. In both studies, SIP skills were assessed through interviewer-based questionnaires that require extensive interviewer training for administration and reliable coding as well as time-consuming hand scoring. In the case of the study by Dodge et al. (2002), three distinct questionnaires were administered to assess SIP skills; however, this is not an efficient method when conducting large-scale research projects or for applied purposes. In addition, in both studies, social goals were operationalized in terms of the relative importance or value of a particular outcome rather than the desire to achieve an outcome. The Social Information Processing Application (SIP-AP) addresses each of these limitations in terms of assessing multiple mechanisms, using multiple cognitive indicators for four out of the five cognitive mechanisms, being designed for self-administration and automated scoring, and assessing social goals in terms of wanting to achieve an outcome, which more directly assesses desire or motivation rather than the value of a social outcome. Thus, another purpose of the present

study was to conduct a confirmatory factor analysis of responses to a single, comprehensive, self-administered measure that was designed to assess the five SIP cognitive mechanisms.

Issues Associated With Measurement of SIP Skills

Comparability across measures used in the many research studies that have examined children's SIP skills is difficult. First, researchers typically create a customized or modified SIP measure to address their specific research questions. Second, the number of scenarios used to assess SIP skills ranges widely from less than five (e.g., Pettit, Dodge, & Brown, 1988, used four) to more than five (e.g., Dodge et al., 2002, used eight; Lansford et al., 2006, used 24). Third, the perspective of the victim or respondent in hypothetical scenarios ranges from the first person (Hughes et al., 2004) to the third person (Garner & Lemerise, 2007; Goldstein, Tisak, Persson, & Boxer, 2006; Lansford et al., 2006; Rah & Parke, 2008). Fourth, the presentation of stories ranges from being read to or by children (Hughes et al., 2004; Pettit, Dodge, & Brown, 1988) to including a complementary visual depiction of the story through line drawings (Cole & Tamang, 1998; Denham, Bouril, & Belouad, 1994; Youngstrom et al., 2000), illustrated cartoons (Lansford et al., 2006; Monks, Smith, & Swettenham, 2005), or puppets (Eisenberg et al., 1994).

Interview or paper-and-pencil measures of SIP skills typically present vignettes followed by a series of questions designed to assess one or more of the five SIP mechanisms. SIP questions have been presented in a variety of formats, including open-ended questions (requiring highly trained interviewers, individual administration, time-consuming transcription services, and coding by trained, reliable research staff) and paper-and-pencil questionnaires of multiple choice or rating scale items. Although some stages of the SIP model, such as encoding and response generation, do not easily lend themselves to a closed-ended questionnaire format, the remainder of the stages have successfully utilized this type of questionnaire format (e.g., Crick & Dodge, 1996; Lochman, Wayland, & White, 1993; Shahinfar, Kupersmidt, & Matza, 2001). The measure described in this article included only rating scale responses, which are readily amenable to computer administration and psychometric analyses.

Notably, some researchers have developed and successfully used videotaped vignettes to provide stimuli with a closer approximation to actual social interactions (Dodge et al., 1984, 1986; Dodge & Price, 1994; Irvin & Walker, 1994). The presentation of standardized videotaped stimuli embedded as rich media in a Web-based assessment application was expected to be the most reliable and valid method for assessing SIP skills because this method is designed to reduce traditional sources of measurement error. For example, the use of a first-person perspective was expected to reduce the likelihood that responses would be prejudiced by a respondent's receptive verbal ability and to increase the likelihood of evoking a response mimicking a child's in vivo social experience (e.g., Dodge & Price, 1994; Lemerise et al., 2006; Pettit, Dodge, & Brown, 1988). Thus, the SIP-AP was designed to include videotaped vignettes of same-age peers filmed from the first-person perspective.

The SIP-AP was delivered in a Web-based format with audio computer-assisted self-interviewing (audio-CASI) methodology. This method was chosen for several reasons. First, Web-based technology is ideal for standardization and portability of administration, reducing measurement error due to variability in interviewer characteristics and delivery. Second, audio files are embedded in the program. Thus, children can listen to the directions, questions, and response options by wearing headphones; therefore, literacy skills are not a barrier to reliable responding. Third, with the use of audio-CASI, children respond directly to questions on the computer; thus, measurement error introduced through data entry is eliminated. Fourth, youths are more likely to report aggressive, substance abusing, and other

risky health behaviors when they are asked questions through the computer rather than in a paper-and-pencil questionnaire, which may reduce socially desirable responding (Turner et al., 1998). Thus, computer administration provides multiple advantages over traditional administration methods.

Most measures of children's SIP skills include scenarios that represent a variety of different types of social situations that children commonly experience (e.g., Cole & Tamang, 1998; Denham et al., 1994). In fact, Dodge, McClaskey, and Feldman (1985) created a taxonomy of situations identified by teachers and clinicians as likely to cause relationship difficulties in children. These situations have high face validity with teachers and have demonstrated clinical utility in independent studies, including temporal stability, concurrent validity, and relations with overlapping constructs (Dodge et al., 1985; Nangle, Ellis, & Hansen, 1994). Problematic SIP was most evident in response to provocation by a peer (e.g., tease, hit, insult) and in adaptation to peer group norms (e.g., group entry). These studies suggest that assessments of children's social responses to a variety of social problem situations are needed to obtain a stable appraisal of children's SIP skills deficits.

In summary, the SIP-AP was developed to address limitations in currently available assessment tools by creating a standard set of videotaped stimuli filmed from the first-person perspective and embedded in a Web-based application with Likert response scales. The SIP-AP measure was designed to be engaging, easy to administer, and easy to score for use in a wide range of settings, including basic and applied research projects. SIP skills representing all cognitive mechanisms were assessed across a range of victimization situations, including relational aggression in a group entry situation and peer provocation. The main goal of this article is to describe the development and psychometric properties of the new SIP-AP measure, including its internal consistency, factorial validity, and criterion validity.

Method

Participants

This study included a racially and ethnically diverse sample (23% Black/African American, 32% Hispanic, 39% White/Caucasian, 6% other) of 244 boys ages 8 through 12 ($M = 9.40$) in Grades 3, 4, and 5 from public elementary schools in five school districts from three states across the United States (California, Ohio, and North Carolina). One parent (13% fathers, 87% mothers; age: $M = 36$, range = 25–68 years) and a current teacher (13% male, 87% female) of each participating boy also completed measures of boys' behavioral functioning. Parents reported on their highest level of education. Almost half the parents reported being high school graduates and completing some college (46%); however, reports ranged from a low of elementary school education (13%) to a high of graduate or professional school (6%). Parent-reported annual family income suggested a wide range of family income in the sample, with a low of less than \$15,000 per year (24%) and a high of greater than \$90,000 per year (9%). Boys were recruited by their third-, fourth-, or fifth-grade teacher, who had agreed to participate in the current study. Consent forms were sent home to parents, who were asked to sign and return them regardless of whether they gave consent. The consenting families were then contacted to schedule appointments.

Procedure

The boys whose parents gave permission for them to participate in the study were scheduled for individual appointments, which were conducted after school. At the beginning of the session, child assent was obtained. Trained research assistants checked to be sure that the boys had experience in the use of a computer and initiated the SIP-AP program. Boys were told that they would watch several short videos and be asked questions about them. Each

boy viewed a standard protocol of eight vignettes on a laptop, followed by a set of questions designed to assess each of the five SIP mechanisms. Headphones were provided to ensure that boys could hear the narrations and questions. In addition, boys were randomly assigned to one of three groups to respond to a set of four vignettes selected from a library of 12 videotaped vignettes. The four supplemental vignettes were administered in addition to the core eight vignettes to provide possible options in case vignettes needed to be substituted into the core assessment protocol for the final instrument. These additional vignettes were followed by a reduced set of SIP questions that assessed only the cue interpretation and goal components of the SIP model. In summary, boys completed several basic demographic and background questions, eight core vignettes followed by SIP questions, four additional vignettes followed by a briefer set of SIP questions, and several other questionnaires not relevant to the present study.

Parents provided permission for their child's teacher to participate in the study as well as informed consent for their own participation in the study. Parents chose to complete the paper- and-pencil questionnaires while their sons completed the Web-based assessment or at home. Teachers of each participating boy completed questionnaires at their convenience and returned them by mail.

Measures

Demographic information—Parents of participating children completed a brief parent demographic questionnaire consisting of 11 items, which included the parent's race, age, gender, education, and income.

SIP-AP

Description of measure development: Several methods were used to create an attractive, user-friendly, developmentally and culturally appropriate, reliable, and valid assessment tool. Four racially homogeneous focus groups were conducted with 22 (9 White, 13 Black) boys, ages 8 through 11, of which 9% were in the clinical range for externalizing behavior on the Behavior Assessment System for Children (BASC; Reynolds & Kamphaus, 2004). Three of the four groups focused on generating scenarios regarding times when boys got angry or got into fights as the result of a misunderstanding with peers. Existing SIP measures were reviewed and summarized. Scripts were developed on the basis of the story lines and language suggested by the boys who participated in the focus groups. Each vignette included a fictitious child (the target child) who was provoked during a social situation by a second child (the perceived perpetrator), although the intent of the perpetrator was ambiguous. The fourth focus group reviewed the scripts to ensure that the scenarios and language were realistic and clear. The investigators worked with an experienced media production company to audition and hire professional child and adult actors; record voice actors; direct, film, and edit the scenarios; and produce the digitized video recordings that were integrated into the Web-based SIP-AP assessment.

Description of SIP-AP measure: The SIP-AP is a computerized, Web-based, audio-CASI, standardized measure designed to assess boys' SIP cognitions.¹ The measure includes eight videotaped vignettes that depict everyday social situations with peers that were filmed from the perspective of the viewer, who was the victim of a provocation or group entry failure. In each vignette, the outcome for the viewer was negative, but the intent of the perpetrator was ambiguous. Each vignette involved at least one other peer, including a male perpetrator.

¹Information about the computer requirements, cost, and customization options for the SIP-AP measure can be accessed at www.sealprograms.com/sipinfo or by emailing the first author or sealprograms@irtinc.us.

The vignettes depicted a variety of different contexts for victimization experiences including physical aggression, relational aggression, covert aggression, property destruction, and verbal aggression. There are two physical aggression vignettes that included tripping over a perpetrator's foot while walking to one's desk after sharpening a pencil and being bumped in the face by the perpetrator's book bag while leaving a classroom. There is one relational aggression vignette that depicted not being invited to a party after approaching a group of boys who were talking to one another about the party. There are three covert aggression vignettes, including losing a basketball game to a perpetrator who may have cheated by stepping over the free throw line, getting in trouble with the teacher after telling a boy not to cheat who appeared to be cheating, and having a handheld video game taken by an alleged perpetrator at school. The property destruction vignette depicts a ball crashing into a complicated marble track, breaking it apart. Finally, one verbal aggression vignette was administered that depicted the perpetrator commenting on the target child's new shoes; however, boys found this vignette confusing so the data from one of the supplemental videos depicting a physical aggression provocation were substituted for the verbal aggression vignette findings.² See the Appendix for a more detailed description of each of the vignettes used in the SIP-AP measure.

After viewing the video clips of the eight core ambiguous social situations, boys responded to a series of 16 questions about what they would do in each situation. Other questions were also included that were not relevant to the present study. The responses to each question were rated on 5-point Likert scales. Encoding deficits were appraised by one item following each vignette where boys were asked to report on whether they had enough information to draw conclusions regarding the intent of the perpetrator viewed in each of the videotaped vignettes: "Would you need more information to make a decision about why the boy (brief description of the provocation)?" Scores ranged from a low of 1 (*not needing more information*) to a high of 5 (*more information is definitely needed*).

We examined cue interpretation, using three items addressing the presence of a hostile attributional bias, namely, judgments of whether the perpetrator was being mean ("Do you think the boy intended to be mean?"), rejecting ("How disliked or rejected would you feel if this happened to you?"), or disrespectful ("How disrespected would you feel if this happened to you?") toward the respondent/victim. Scores ranged from a low of 1 (definitely not being mean, rejecting, or disrespectful) to a high of 5 (*definitely being mean, rejecting, or disrespectful*).

Children also rated their level of anger in response to each provocation vignette, because of the strong relationship between anger and hostile attributional biases ("How angry would you feel if this happened to you?"). Scores ranged from a low of 1 (*not at all angry*) to a high of 5 (*extremely angry*).

Goals were assessed with three items, including wanting revenge ("Would you want to get back at the boy or get the boy in trouble if this happened to you?"), dominance ("Would you

²Preliminary analyses suggested that one of the videotaped vignettes was problematic. This vignette attempted to depict an ambiguous provocation involving verbal aggression; however, many boys interpreted the comment as a compliment (rather than a criticism) in that several of the SIP items were correlated in an unexpected direction with aggression and conduct problems. Reliability analyses also revealed that by including the 16 items associated with this verbal aggression vignette into the internal consistency analyses, many of the individual cognition scales had low alphas, and when these items were removed, the alphas improved. Thus, it was determined that the verbal aggression vignette was misinterpreted, and the data from this vignette were not used in any of the analyses reported in this article. Instead, data from boys' responses to a physical aggression vignette were substituted and included in all of the analyses reported in this article. The physical aggression vignette depicted a scene of the victim being bumped by a peer while playing a game of freeze tag, and the three individual SIP items associated with this vignette were significantly correlated with aggression and conduct problems. Inclusion of data from this physical aggression vignette positively contributed to the internal consistency analyses for these three SIP cognition scales.

want to make sure that the boy knows that you are the boss and he can't push you around?"), and a prosocial outcome ("Would you want to get along with the boy?"). Scores ranged from a low of 1 (*no revenge, dominance, or prosocial goals*) to a high of 5 (definitely had revenge, dominance, or prosocial goals).

Response access was assessed with four items, including aggression ("Would you push, hit, call names, or insult the boy or try to hurt him in some other way?"), dominance ("Would you threaten the boy, order him around, or let him know you are the boss in some other way?"), relational aggression ("Would you talk about the boy behind his back or try to get other kids to not play with him?"), and forgiveness ("If the boy apologized, would you forgive him for what he did to you?") responses. Scores ranged from a low of 1 (no endorsement of aggression, dominance, relational aggression, or forgiveness responses) to a high of 5 (the child definitely endorsed revenge, dominance, relational aggression, or forgiveness responses).

Finally, response evaluation was assessed with four items, including evaluating potential aggressive responses in terms of their moral acceptability ("How right or wrong would it be to get back at the boy?"), antisocial outcome expectancy ("If you get back at the boy, would things turn out to be good or bad for you?"), self-efficacy ("How easy or hard would it be for you to get back at the boy?"), and prosocial outcome value ("If you got back at the boy, how much would you care if he got hurt?") in terms of caring about victim suffering. Scores ranged from a low of 1 (*no endorsement*) to a high of 5 (*strong endorsement*) of the moral acceptability of aggression, positive outcome expectancies for aggression, self-efficacy for aggression, or concern for victim suffering. Thus, there were 16 cognition scores created that represented each of the 16 SIP items assessed in the measure. Each cognition scale score consisted of the average response for that item across seven or eight (for items asked after the freeze tag video) vignettes.

BASC parent and teacher rating scales (2nd ed.; Reynolds & Kamphaus, 2004)

—Parents and teachers rated the aggression (e.g., bullying, name calling, hitting, being cruel, seeking revenge on others) and conduct problem (e.g., cheating, having trouble with police, lying, stealing, drinking, using illegal drugs) behaviors of each boy on 4-point Likert scales (i.e., *never* to *almost always*). The questionnaire consisted of 138 items. Both parent and teacher versions of the BASC have been shown to be reliable and valid measures: internal consistency reliabilities of the composite scores all range from 0.84 to 0.94; the median value for test–retest reliability for the composites is 0.88; and the median value for interrater reliability across parent and teacher reports is 0.57 (Reynolds & Kamphaus, 2004). BASC *t* scores of 70 or greater on the Aggression and Conduct Problems scales indicate clinically significant scores. In the current sample, 12% of the participating boys ($n = 29$) were in the clinical range for aggression and 9% of boys ($n = 22$) were in the clinical range for conduct problems. Parent and teacher reports on the BASC Aggression and Conduct Problems subscales were averaged to create an Antisocial Behavior score, $\alpha = .79$.

Results

Three sets of analyses were conducted. The first set of analyses involved examining the psychometric properties of the 16 cognition scales that were administered for the seven core vignettes (some items were also included in the analyses for the eighth supplemental vignette), including descriptive statistics and internal consistencies to test if the individual indices were reliable and distinct. In addition, interscale correlations were conducted to begin to examine the interrelations among the individual cognition scales. The second set of analyses involved confirmatory factor analyses to evaluate the hypothesis that SIP mechanisms were distinct from one another. Sample size limitations prevented the

examination of the factor loadings of each individual item administered in the SIP-AP. Instead, the variables tested in the confirmatory factor analyses models were the 16 individual cognition scale scores (i.e., the mean of the individual cognition items) and these item means were analyzed in a *partial aggregation model* (Bagozzi & Edwards, 1998; Bagozzi & Heatherton, 1994). This type of model is preferable with smaller sample sizes, because it reduces the number of parameters that are estimated in a confirmatory factor analyses. Also, the creation of scale scores forms more reliable, composite indicators. Use of more reliable indicators reduces measurement error in the confirmatory factor analyses which is desirable in the creation of a robust tool. Finally, in the third set of analyses the validity of the SIP mechanisms were examined in two ways; first, using correlations with antisocial behavior and second, comparing boys with elevated hostile cognitions to the rest of the sample.

Descriptive Statistics and Internal Consistency of Item Scales

As can be seen in Table 1, the 16 SIP-AP cognition scales have acceptable reliability with a mean Cronbach's α of .88, ranging from a low of .69 for Hostile Attributions to a high of .94 for Self-Efficacy for Aggression. Also, there was some skew in the distribution of the raw scores; however, this skew is to be expected given that these scales are measuring relatively uncommon hostile social cognitions. All cognition scales, with the exception of Encoding Appraisals, Forgiveness Responses, and Prosocial Outcome Values, were positively skewed, with most of the scores on these scales grouped toward the lower end of the scale and a tail of responses trailing off toward the higher end of the scale, indicating that most boys responded in a more prosocial manner to these items. This pattern is consistent with the sampling of a normative, school-based population of boys from regular education classrooms.

Interscale Correlations

Table 2 provides the zero-order interscale correlations among the cognition scales and demonstrates that similar cognitions were significantly correlated with one another in the direction that would be expected. Interscale correlations ranged from a low of .02 to a high of .92 for the correlation between Overt Aggressive and Dominance Responses, with a mean interscale correlation of .31.

Encoding Appraisals were significantly, positively correlated with other early stage cognitions, including Hostile Attributions, Rejection Attributions, Disrespect Attributions, and Anger. The more the boys needed additional information, the more they believed the perpetrator was hostile, rejecting, and disrespectful and the angrier they reported feeling. Hostile Attributions were significantly positively correlated with most of the subsequent cognitive deficit scales. The Rejection and Disrespect Attributions scales, two other Cue Interpretation scales, were similarly significantly positively correlated with subsequent individual cognitive deficit scales. The Revenge, Dominance, and Prosocial Goals scales were all significantly correlated with the corresponding Behavioral Responses and Response Evaluation scales. The Prosocial Goals scale was positively correlated with the two other prosocial cognition scales, Forgiveness Responses and Prosocial Outcome Values, which were also positively correlated with one another. All three individual prosocial cognition scales were negatively correlated with most of the individual scales related to social cognitive deficits. The Overt Aggressive Responses scale was positively correlated with the Dominance and Relationally Aggressive Responses scales. Of the Response Evaluation cognition scales, Antisocial Moral Agency and Antisocial Outcome Expectancies for Aggression were positively correlated with one another. The more boys believed it was okay to get revenge, the more boys believed that there would be a positive outcome associated with being aggressive.

SIP-AP Factor Structure

The two previous studies that reported testing a confirmatory factor model of the SIP model included only antisocial cognitions and only a subset of the five SIP mechanisms. The current study examined antisocial cognitions for all five SIP mechanisms as well as prosocial cognitions thought to be associated with three of the five mechanisms. Prosocial cognitions included Prosocial Goals (wanting to get along with the perpetrator), Forgiveness Responses (forgiving the perpetrator if he apologized), and Prosocial Outcome Values (caring about the perpetrator if he got hurt). Given that this is the first study to include prosocial cognitions in a factor analysis of the full SIP model, we were unsure whether they would load negatively on their respective SIP mechanisms or whether they would load on a separate Prosocial Mechanisms factor. Therefore, we tested the fit of two models: the traditional five-factor model in which the prosocial cognitions loaded on the relevant SIP mechanism factors and a six-factor model in which the prosocial cognitions loaded on a separate SIP mechanism factor.

Analyses began with the estimation of a hypothesized five-factor model thought to reflect the five underlying dimensions of the SIP framework: Encoding Appraisal, Cue Interpretation, Goals, Response Access, and Response Evaluation. Each factor was composed of at least three of the individual cognition scale composites previously discussed, with the exception of the Encoding Appraisal factor, which was indicated by only a single individual cognition scale. This model and all subsequent models were estimated with maximum likelihood estimation in the AMOS 16 statistical program (Arbuckle, 2007). The chi-square test statistic and a sample of fit indices were used to evaluate the fit of the hypothesized model. The evaluation criteria for the fit statistics used in the current study were based on recommendations from a variety of sources (Browne & Cudeck, 1992; Hu & Bentler, 1998, 1999; Kline, 2005) and were as follows: Tucker–Lewis index (TLI) values greater than .90 indicate acceptable fit, comparative fit index (CFI) values greater than .95 indicate excellent fit, and root-mean-square error of approximation (RMSEA) values less than .08 indicate a reasonable fit. The hypothesized five-factor model did not fit the data well. The chi-square test was significant, $\chi^2(95) = 506.76, p < .001$, and the fit statistics indicated a poor fit to the data, TLI = .82, CFI = .86, RMSEA = .13 (Browne & Cudeck, 1992; Hu & Bentler, 1998, 1999; Kline, 2005). The hypothesized model did not accurately represent these data on the basis of fit statistic criteria discussed earlier.

Next, we estimated the hypothesized six-factor model that included the estimation of a new factor representing Prosocial Cognitions. On the basis of previous research and theory, it is reasonable to test whether the three individual cognitions loaded on one coherent Prosocial Cognitions factor. The fit statistics for this model came closer to meeting the fit statistics criteria discussed previously and provided a somewhat better fit to the data than the five-factor model, $\chi^2(90) = 280.18, p < .001$, TLI = .91, CFI = .93, RMSEA = .09. In addition, when comparing the revised six-factor model to the five-factor model, the Akaike information criterion was lower in the six-factor model (404.18) than the five-factor model (620.76), suggesting that the six-factor model is preferred (Akaike, 1974).

Next, modification fit indices were examined for ways in which to improve model fit that were theoretically justifiable and meaningful. The uniqueness for Dominance Responses and the uniqueness for Dominance Goals were allowed to correlate, indicating that the two cognition scales shared variance that is not reflected at the factor level. These two cognition scales are theoretically and behaviorally related and represent a unique set of cognitions that may or may not be associated with aggressive or even prosocial behaviors. Although the chi-square was significant, $\chi^2(89) = 252.11, p < .001$, the fit of the modified six-factor model was significantly better than that of the original six-factor model, $\Delta\chi^2(1) = 28.07, p < .001$.

The fit statistics were also an improvement over the previous model, $TLI = .92$, $CFI = .94$, $RMSEA = .09$.

Finally, Hostile Attributions were allowed to load on both the Cue Interpretations factor and the Goals factor. This cross-loading made empirical and conceptual sense in that believing that the behavior of a peer is motivated by hostility has been strongly associated with other attributions, anger, and revenge goals in previous studies. Consequently, this model was significantly better than the previous model, $\Delta\chi^2(1) = 28.51$, $p < .001$, and provided an adequate fit to the data, $\chi^2(88) = 223.60$, $p < .001$, $TLI = .94$, $CFI = .95$, $RMSEA = .08$. This modified six-factor model represents the best fitting SIP model for the current data set. As can be seen in Table 3, the factor loadings for the final model were all significant and high (Stevens, 2002). No other model modifications were made.

As shown in Table 4, all but one of the SIP mechanisms were significantly correlated with one another in the expected directions. The one exception was the correlation between Encoding Appraisals and Cue Interpretations. The more boys reported needing more information to decide about the intent of a peer perpetrator, the more boys had a hostile attributional bias.

Internal consistencies of the six composite scales were calculated and suggested that the composites had high reliability. The Cronbach's coefficient α for Encoding Appraisals was .83, for Cue Interpretations was .89, for Goals was .78, for Response Access was .95, for Response Evaluations was .82, and for Prosocial cognitions was .76.

Testing the Relations Among SIP Mechanism Factor Scores and Antisocial Behavior

Next, analyses turned to assessing the relations among the SIP mechanisms and the behavioral outcome of antisocial behavior. The observed variable, Antisocial Behavior, as rated by parents and teachers, was added to the final model and allowed to correlate with the SIP factors. As can be seen in Table 5, Antisocial Behavior was significantly related to all of the SIP factors with the exception of Encoding Appraisals and Response Evaluations. The more the boys had hostile attributional biases, antisocial goals, and endorsed aggressive responding, the more they exhibited antisocial behavior.

The correlations between the six derived SIP mechanisms and boys' antisocial behavior explored the linear relations between SIP scores and antisocial behavior; however, given the skewed nature of the social cognitive and antisocial behavioral measures, this analytic approach did not fully capture the behavioral differences between boys highly elevated on the SIP-AP, indicating SIP skills deficits compared with the others. Thus, boys with scores that were equal to or greater than one standard deviation above the mean on each of the SIP mechanism factors for social cognitive deficits (Interpretation, Goals, Response Access, and Response Evaluations) were classified as being elevated on the social cognitive mechanism, whereas boys with scores less than one standard deviation above the mean were considered in the acceptable range. In contrast, the elevated group on Encoding Appraisals included boys with scores that were equal to or less than one standard deviation below the mean. In this case, low scores indicated not needing more information to make a decision about the intent of the perpetrator in an ambiguous situation. Finally, because the Prosocial mechanism factor represents social cognitive strengths, boys with scores that were equal to or less than one standard deviation below the mean on the Prosocial mechanism factor were classified as being elevated, whereas boys with scores greater than one standard deviation below the mean were considered in the acceptable range (see Table 6 for means and standard deviations for the six SIP mechanisms for the groups with acceptable and elevated scores).

A series of comparisons was then conducted to test whether boys in the SIP groups differed from one another in their levels of antisocial behavior. As can be seen in Table 6, five out of six analyses yielded significant differences between boys with acceptable and elevated scores on Antisocial Behavior in a series of one-way analyses of variance. Specifically, boys in the elevated score groups for the Cue Interpretations, Goals, Response Access, Response Evaluations, and Prosocial SIP mechanisms were significantly higher on antisocial behavior compared with boys in the group with acceptable scores. The mean effect size for the significant effects according to Cohen's d was 0.42, and all were in the moderate range from a low of 0.31 for the Cue Interpretations mechanism to a high of 0.51 for the Prosocial mechanism.

Discussion

The most important contribution of this study is the successful development and evaluation of the SIP-AP measure, a Web-based assessment tool designed for direct assessment of social information processing skills in 8- to 12-year-old boys. The SIP-AP uses videotaped vignettes filmed from the first-person perspective as stimuli. The results demonstrated factorial validity, internal consistency, and concurrent validity of the SIP mechanism scales as well as the identification of a new construct representing social cognitive strengths in the form of prosocial cognitions. In response to the need for more comprehensive assessment of children's social cognitions, finer grained assessments of the 16 individual cognition scales can also be conducted to pinpoint specific patterns of SIP responding to ambiguous provocations. Finally, this study demonstrates the successful application of research and theory on SIP skills for creating a technologically advanced tool incorporating embedded rich media, which is relevant and useful for research and potentially for clinical purposes.

Although other factors contribute to predicting aggressive behavior beyond SIP (e.g., other cognitions, impulsivity, biology, environmental contextual factors), it is notable that we found mostly moderate effect sizes in the extreme group validity analyses. Moderate effect sizes were probably obtained because of the care taken in the development of this tool. For example, the vignettes were carefully selected and scripted to be developmentally appropriate and relevant to the target audience. Also, the videos were filmed from the first-person perspective. This somewhat novel approach may have elicited more naturalistic and valid responding than previous studies that utilized the third-person perspective. In addition, although the videotaped vignettes are brief, the employment of experienced actors, a video production company, and graphic design artist may have helped to create videotaped scenes and Web interfaces that helped boys better engage in and attend to the task.

Although several previous studies have examined the factor structure of measures of SIP (e.g., Dodge et al., 2002; Hughes et al., 2004), this study is the first known attempt to examine the factor structure with a single direct assessment measure that included diverse situations and multiple items representing all mechanisms constituting the SIP model. These findings are consistent with those previously reported, suggesting that the theorized SIP factor structure could be empirically validated. This study used a measure with several advantages over previous measures, including the fact that each of the six social cognitive mechanisms in the SIP-AP was assessed with multiple items and five of the six scales were assessed with multiple cognitions, which provided a stable assessment of each mechanism.

This study also extends the findings from previous attempts at confirmatory factor analyses of the model to adding a sixth factor in addition to the original five. The most notable modification in the confirmatory factor analysis of the SIP model was the creation of a new factor representing three prosocial cognitions. These cognitions included prosocial goals (i.e., getting along with the perpetrator), prosocial outcome values (i.e., caring about

suffering by the perpetrator following aggression by the victim), and prosocial responses (i.e., forgiving the perpetrator). Each of these three prosocial cognitions has been linked in previous research to prosocial behaviors. For example, in a longitudinal study of adolescents, prosocial goals were related to prosocial behavior (Barry & Wentzel, 2006). The prosocial outcome value cognition assessed in the SIP-AP asks children whether they would care if the perpetrator got hurt, a type of empathy, which has been linked to children's prosocial behavior (Eisenberg & Miller, 1987). Finally, the behavioral response of forgiving the perpetrator has been found to promote a more prosocial orientation toward a perpetrator among adults (Karremans, Van Lange, & Holland, 2005) and is important in therapy as a method for relinquishing anger (Fitzgibbons, 1986). Thus, a prosocial factor was derived that was empirically distinct from the other five factors representing social cognitive strengths.

The discovery of a distinct prosocial factor suggests social cognitive strengths could be explored more thoroughly in future research. For example, prosocial cognitions may be present in each of the five SIP mechanisms. Because only one prosocial goal was explored in the present study, it loaded with other prosocial cognitions derived from other SIP mechanisms. Perhaps if there were, for example, multiple prosocial goals, these goals might form their own Prosocial Goals factor separate from the Antisocial Goals factor. Identification of prosocial cognitions related to all of the SIP mechanisms expands the understanding of decision-making processes and may result in new avenues for research. For example, a thorough assessment of prosocial as well as antisocial cognitions may suggest prevention and intervention strategies related to enhancing prosocial cognitions in addition to minimizing or altering aggressive cognitions.

This study introduced two new individual cognitions within the context of cue interpretation skills, namely, being rejected or disliked (often studied as a trait; e.g., Downey et al., 1998) and being *dissed* or disrespected by a peer (often studied from a cross-cultural perspective; see Shwalb & Shwalb, 2006, for discussion). The findings from the current study suggest there may be important individual differences in the relevance and salience of interpreting a peer as being disrespectful, given the strong relationship of attributing disrespect to aggressive behavior. Both attributions had excellent internal consistency, validity, and factor loadings on the cue interpretation mechanism and represent important cognitions for future study.

One limitation of the current study is that the single item used in each vignette to assess children's encoding of cues did not fully capture the encoding construct by only addressing encoding appraisals. Traditionally, encoding of cues has been assessed with semistructured interviews requiring hand scoring of errors of omission and errors of commission as well as biases in reporting on disproportionate encoding of hostile cues (e.g. Dodge & Tomlin, 1987). The measurement of encoding skills does not easily lend itself to closed-ended questions and represents an important direction for future research. Novel approaches for directly assessing encoding skills with multiple choice or reaction time responses could be developed. Also, although encoding appraisal was not related to antisocial behavior problems in the normative sample of boys, this relationship might emerge when examined in a clinical sample of aggressive or delinquent youths.

Another limitation of the present study is that the SIP-AP measure was developed for a targeted audience of 8- to 12-year-old boys, which limits the generalizability of the measure for use with other demographic groups. The promising findings from this study suggest that similar methods should be used to develop instruments assessing SIP skills in girls as well as in boys in other age groups, including preschoolers and adolescents. The videotaped

vignettes would need to include gender and age appropriate actors and contexts to reflect the demographic characteristics of the viewers.

An interesting direction for future research with the basic SIP-AP Web-based architecture is to more fully examine the database cognitions associated with aggressive behavior, such as schemas and scripts for aggression (Huesmann, 1988, 1998) as well as normative beliefs about aggression (Huesmann & Guerra, 1997). Also, given the successful use of rich media containing videotaped vignettes of ambiguous provocations and the audio-CASI Web-based application, similar methods should be used for the development of SIP assessment tools containing questions asked in the context of unambiguous hostile provocations to allow for a more fine-grained assessment of response evaluation skills (Fontaine, Burks, & Dodge, 2002).

Despite the extensive history of research on SIP, few attempts have been made to develop clinically useful measurement tools for guiding treatment goals in clinical interventions. Notably, there are no standard measurement protocols of the full SIP model and no normed measures that comprehensively measure all five SIP mechanisms. The Collaborative for Academic, Social, and Emotional Learning (Jennings, Denham, Ji, & Weissberg, 2007) and others (e.g., Maag, 1989) have noted the need for assessment methodologies to provide learning standards and benchmarks for evaluating developmentally appropriate social and emotional learning skills across childhood. Successful universal integration of social and emotional learning into the basic curriculum of schools will require access to developmentally appropriate measures that are easy to administer, use, score, and interpret that also have strong psychometric properties. Measures need to provide information about both individual and group performance to allow for remediation and differentiation in learning objectives and strategies. Future studies on the SIP-AP with normative and clinical samples may add to the clinical relevance and utility of this measure to meet the needs described here.

In summary, the SIP-AP instrument was administered easily through the Web, was found to be user friendly with elementary school-age boys, and yielded adequate psychometric properties, including final factorial validity and internal consistency of scales. Also, all of the SIP mechanisms, with the exception of encoding of cues, were associated with children's antisocial behavior problems in the expected directions. Hence, this Web-based tool and the scoring methods that were produced in this study are ready for use in clinical, educational, and developmental research.

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Appendix

Description of SIP-AP Victimization Contexts

We describe each victimization context, including the type of situation and race of the perpetrator. The vignettes are listed in the order in which they appear in the SIP-AP assessment tool.

Tripped After Sharpening Pencil

The target child is walking back to his desk in a classroom after sharpening a pencil at the front of a class. While walking down the aisle between two columns of desks, the target child walks past the perpetrator, who is seated at his desk, and trips on his foot, which was slightly sticking out in the aisle. The target child looks back at the perpetrator after tripping; however, the perpetrator does not acknowledge that anything has happened. It is not clear if the perpetrator tripped the target child on purpose or by accident. This scenario demonstrates ambiguous physical aggression provocation involving a White male perpetrator.

Bumped by Book Bag

As the target child is walking out of a classroom, the perpetrator, who is talking to a peer, slings his book bag onto his shoulder. The book bag hits the target child. Other children in the hall laugh, but it is unclear why they are laughing. It is not clear if the perpetrator intentionally hit the target child with his book bag or not. This scenario demonstrates ambiguous physical aggression involving a Black male perpetrator.

Pushed During Freeze Tag

The target child has been “frozen” in a game of freeze tag and is watching other children run around chasing each other. The perpetrator, who is “it,” is chasing another child, and as they run past the target child, the perpetrator bumps into the target child. It is unclear if the perpetrator intentionally ran into the target child or not. This scenario demonstrates ambiguous physical aggression involving a White male perpetrator.

Losing at Basketball

The target child is playing basketball with two other boys. The perpetrator scores a basket and says that if he gets one more basket the game is over. A third boy is guarding the perpetrator as he shoots his free throw. The perpetrator makes the free throw shot and wins the game. After the basket is made, the target child sees that the perpetrator’s foot is over the free throw line, and it is unclear if it was over the line before or after he took the free throw shot. This scenario demonstrates possible covert aggression in the form of cheating involving a Black male perpetrator.

Cheating on a Test

The target child is in a classroom taking a test. When he looks up from his test he notices that the boy sitting beside him (i.e., the perpetrator) seems to be looking at his paper. The perpetrator is looking in the general direction of the target child; however, it is unclear whether the perpetrator is copying from the target child’s test or not. The teacher notices the target child looking around and motions to the target child to come to his desk and bring his test. The target child walks up to the teacher’s desk with his test. This scenario demonstrates covert aggression in the form of cheating involving a White male perpetrator.

Marble Track Ruined

The target child has just completed setting up a complex marble track. He looks up and sees two other children throwing a ball back and forth in the classroom. As he puts a marble in the track to test out the marble track, he sees the ball bouncing toward his marble track. The ball knocks into the structure and breaks it apart. When the target child looks up, he sees that the two boys are looking back at him, and it is unclear if one of them threw the ball on purpose to ruin the marble track or not. This scenario demonstrates property destruction. One Black and one is White boy are playing with the ball; however, it is not clear which of the two boys is the perpetrator.

Handheld Video Game Taken

The target child is in a school hallway arranging items in his book bag. He puts his handheld video game player on a nearby shelf and walks toward his book bag to get something out of it. Then, he turns around and looks back at the shelf where he had put his game player but sees that it is no longer there. The target child looks around the hallway and sees the perpetrator holding his game player and looking around. The perpetrator has a somewhat guilty look on his face. This scenario demonstrates covert aggression in the form of stealing involving a White male perpetrator.

Excluded From Party

The target child is walking from a baseball field to the bleachers behind the field. Three boys are sitting on the bleachers and talking to each other. As the target child approaches the bleachers, the target child can hear some discussion about an upcoming party. As the target child gets closer to the bleachers, the three boys stop talking and look at the target child. It is unclear whether they stopped talking because the target child walked over and they were excluding the target child or because they had finished their conversation. This scenario demonstrates relational aggression in the form of exclusion involving White male perpetrators.

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Table 1
Cronbach's Alphas, Means, Standard Deviations, Skew, and Kurtosis of Responses for the Social Information Processing Application Individual Cognition Scales

Individual cognition scale (N = 244)	α	M	SD	Skew	Kurtosis
Encoding Appraisals	.83	3.17	1.09	-0.22	-0.68
Hostile Attributions	.69	2.76	0.80	0.11	-0.11
Rejection Attributions	.87	2.46	1.11	0.58	-0.60
Disrespect Attributions	.88	2.59	1.16	0.51	-0.67
Anger	.89	2.80	1.12	0.19	-1.02
Revenge Goals	.89	2.16	1.04	0.72	-0.41
Dominance Goals	.89	2.05	1.10	0.96	-0.01
Prosocial Goals	.86	3.08	1.15	0.10	-1.15
Overt Aggressive Responses	.90	1.68	0.92	1.49	1.53
Dominance Responses	.89	1.62	0.86	1.54	1.83
Relationally Aggressive Responses	.90	1.68	0.92	1.39	1.20
Forgiveness Responses	.87	4.12	0.96	-1.24	1.13
Antisocial Moral Agency	.91	1.89	1.05	1.07	0.21
Self-Efficacy for Aggression	.94	2.79	1.35	0.21	-1.91
Antisocial Outcome Expectancies	.93	2.06	1.16	0.93	-0.13
Prosocial Outcome Values	.90	3.74	1.15	-0.65	-0.47

Table 2
Interscale Correlations on the Individual Cognition Scales on the Social Information Processing Application

Individual cognition scale	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. Encoding Appraisals	—	.26	.25	.19	.20	.06	.04	.08	-.05	-.09	-.05	.29	.11	.10	.12	.19
2. Hostile Attributions		—	.47	.49	.57	.49	.39	-.27	.42	.40	.45	-.07	.30	.30	.24	-.10
3. Rejection Attributions			—	.90	.76	.42	.28	-.18	.25	.19	.22	.02	.22	.19	.13	-.11
4. Disrespect Attributions				—	.78	.49	.34	-.18	.33	.27	.30	-.06	.27	.24	.16	-.17
5. Anger ^a					—	.55	.37	-.19	.41	.33	.37	-.03	.28	.33	.17	-.17
6. Revenge Goals ^a						—	.64	-.25	.73	.67	.66	-.28	.57	.47	.48	-.42
7. Dominance Goals							—	-.14	.60	.65	.52	-.23	.39	.31	.31	-.33
8. Prosocial Goals ^a								—	-.22	-.24	-.29	.47	-.20	-.09	-.11	.43
9. Overt Aggressive Responses									—	.92	.83	-.40	.49	.38	.36	-.41
10. Dominance Responses										—	.84	-.40	.49	.36	.35	-.39
11. Relationally Aggressive Responses											—	-.37	.44	.33	.30	-.41
12. Forgiveness Responses												—	-.24	-.10	-.13	.70
13. Antisocial Moral Agency													—	.51	.82	-.22
14. Self-Efficacy for Aggression														—	.52	-.16
15. Antisocial Outcome Expectancies															—	.16
16. Prosocial Outcome Values																—

Note. Correlations where $p < .05$ are in bold.

^aIncludes eight vignettes.

Table 3
Final Social Information Processing Application Model Factor Loadings

Individual cognition scale	Social information processing mechanism				
	Encoding Appraisals	Cue Interpretations	Goals	Response Access	Response Evaluations
Encoding Appraisals	1				
Hostile Attributions		.32	.37		
Rejection Attributions		.93			
Disrespect Attributions		.96			
Anger		.83			
Revenge Goals			.92		
Dominance Goals			.72		
Overt Aggressive Responses				.96	
Dominance Responses				.96	
Relationally Aggressive Responses				.87	
Antisocial Moral Agency					.94
Self-Efficacy for Aggression					.57
Antisocial Outcome Expectancies					.87
Prosocial Goals					.53
Prosocial Outcome Values					.82
Prosocial Behavioral Response					.86

Note. All individual scale loadings are significant at $p < .001$.

Table 4
Final Social Information Processing Application Mechanisms: Model Factor Interscale Correlations

Factor	Encoding Appraisals	Cue Interpretations	Goals	Response Access	Response Evaluations	Prosocial
Encoding Appraisals	—					
Cue Interpretations	.23*	—				
Goals	.08	.55*	—			
Response Access	−.07	.33*	.81*	—		
Response Evaluations	.12	.27*	.63*	.52*	—	
Prosocial	.28*	−.12	−.43*	−.50*	−.27*	—

* $p < .05$.

Table 5
Social Information Processing Application (SIP-AP) Factor Scores and Behavioral Functioning Correlations

SIP-AP factor	Antisocial behaviors
Encoding Appraisals	-.03
Cue Interpretations	.18 *
Goals	.22 *
Response Access	.22 *
Response Evaluations	.10
Prosocial	-.25 *

*
 $p < .05$.

Table 6
Comparisons Between Acceptable and Elevated Groups on the Six Social Information Processing (SIP) Mechanisms on Mean Antisocial Behavior Scores

SIP mechanism	Acceptable		Elevated		<i>F</i>	<i>p</i>	Cohen's <i>d</i>
	<i>N</i>	<i>M (SD)</i>	<i>N</i>	<i>M (SD)</i>			
Encoding Appraisals	202	50.10 (8.28)	40	50.31 (8.53)	0.02	.88	0.02
Cue Interpretations	195	49.62 (8.00)	47	52.27 (9.24)	3.90	.05	0.31
Goals	194	49.39 (7.96)	48	53.15 (9.05)	8.12	.005	0.44
Response Access	200	49.43 (8.06)	42	53.49 (8.70)	8.57	.004	0.48
Response Evaluations	195	49.58 (8.48)	47	52.43 (7.15)	4.52	.03	0.36
Not Prosocial	202	49.44 (8.18)	40	53.56 (8.10)	8.86	.003	0.51