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Multidimensional Latent-Construct Analysis of Children's Social Information Processing Patterns: Correlations With Aggressive Behavior Problems

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Abstract

Social information processing (SIP) patterns were conceptualized in orthogonal domains of process and context and measured through responses to hypothetical vignettes in a stratified sample of 387 children (50% boys; 49% minority) from 4 geographical sites followed from kindergarten through 3rd grade. Multidimensional, latent-construct, confirmatory factor analyses supported the within-construct internal consistency, cross-construct discrimination, and multidimensionality of SIP patterns. Contrasts among nested structural equation models indicated that SIP constructs significantly predicted children's aggressive behavior problems as measured by later teacher reports. The findings support the multidimensional construct validity of children's social cognitive patterns and the relevance of SIP patterns in children's aggressive behavior problems.

A substantial body of empirical evidence indicates that children develop social–cognitive patterns that are correlated with individual differences in their social maladjustment, particularly aggressive behavior problems (Coie & Dodge, 1998; Huesmann, 1988). Patterns such as a child's lack of emotion understanding, the tendency to attribute hostile intent to peers, instrumental (rather than social) goal setting, ready accessing of aggressive responses to social problems, and the favorable evaluation of the outcomes of aggressing all have been significantly correlated with measures of aggressive conduct problems (Crick & Dodge, 1994) and have proven useful in predicting growth and change in aggressive behavior across time (Dodge, Pettit, Bates, & Valente, 1995). Furthermore, these patterns have been targeted for change through intervention (Conduct Problems Prevention Research Group, 1999). In spite of this evidence and growing interest, relatively little is known about the psychometric

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characteristics of social–cognitive assessment responses and instruments: Are within-construct item responses highly intercorrelated, and are social–cognitive constructs empirically distinct from each other? The major goal of the current study was to examine the psychometric and structural characteristics of social–cognitive factors using contemporary data-analytic methods, and the second goal was to test hypotheses about how these constructs relate to children's chronic aggressive behavior problems.

Measurement of Social Information Processing Patterns

The psychometric evaluation of social–cognitive responses must be made in the context of social–cognitive theory. Although some practitioners would prefer to think of social cognition as a singular dimension on the order of social intelligence, social–cognitive theorists have articulated a complete set of distinct mental steps through which individuals proceed in responding to social stimuli (Dodge, 1993; Huesmann, 1998). Before enactment of a response, these steps include encoding of cues, mental representation of those cues, association with emotion states and goals, generation of potential behavioral response alternatives, and evaluation of those alternatives and decision making. It is proposed that individuals develop stable patterns or styles of processing cues at each of these steps of processing, which then act as acquired personality-like characteristics to guide future social behavior. It is further proposed that measurements of these separate constructs can be made with internal consistency, convergent validity, and discriminant validity.

According to one such model (Crick & Dodge, 1994), when confronted with a problematic social stimulus, individuals first engage in an encoding process, during which some but not all of the situational cues are sensed, perceived, and placed into working memory. A key proposition of this model is that children develop internally consistent patterns in encoding (e.g., a tendency to be hypervigilant to threats to the self or to demonstrate a general attention deficit) that characterize their most common encoding response within a particular type of situation and become stable over time. Thus, encoding patterns take on features of an acquired personality characteristic (Cervone, 1999; Zelli & Dodge, 1999). Measures of individual differences in encoding responses have been found to be internally consistent ($\alpha = .62$, $p < .01$) and moderately stable across 4 years (4-year $\alpha = .70$, $p < .01$; Dodge et al., 1995). Both deficits in attention to relevant cues and biases in selective attention to self-threatening cues have been correlated with aggressive behavior (Dodge & Newman, 1981; Dodge et al., 1995; Gouze, 1987).

Once cues are encoded, they are represented in memory and given meaning; thus, the second step of processing is mental representation of encoded cues. Individual differences in mental representation, as measured by hostile attributional bias, have been found to display robust internal consistency ($\alpha = .71$, $p < .001$; Dodge et al., 1995; $\alpha = .90$, $p < .01$; Crick & Dodge, 1996) and temporal stability (4-year $\alpha = .73$, $p < .01$; Dodge et al., 1995). Chronic individual differences in hostile attributional biases have been found to correlate with aggressive behavior patterns in numerous studies (Graham & Hudley, 1994; Lochman, 1987; Milich & Dodge, 1984; Slaby & Guerra, 1988).

A mental representation of a social stimulus becomes associated in memory with particular goals, and the on-line reorientation of goals constitutes the next step of processing. Patterns of goal setting (e.g., some children generate cooperation goals, whereas other children generate instrumental or revenge goals) have been measured with strong internal consistency ($\alpha = .90$, $p < .001$; Crick & Dodge, 1996) and found to predict aggressive tendencies (Erdley & Asher, 1996).

Once goals are clarified, one or more possible behavioral responses are accessed from long-term memory, called *problem solving*. Individual differences in the tendency to generate aggressive responses have been measured with strong internal consistency ($\alpha = .88$, $p < .01$; Dodge et al., 1995) and temporal stability (4-year $\alpha = .79$, $p < .01$; Dodge et al., 1995). It has been found that aggressive children have a rich array of aggressive responses and a dearth of competent nonaggressive alternatives available to them in memory (Asarnow & Callan, 1985; Waas, 1988).

A difference exists between *accessing* and *selecting* a response. The latter refers to decision making that constitutes the next step of processing. Measures of the tendency to evaluate aggressive responses favorably have been found to be internally consistent (αs = .69 to 77, $p < .01$; Dodge et al., 1995; αs = .65 to .84, $p < .01$; Crick & Dodge, 1996) and temporally stable (4-year $\alpha = .71$, $p < .01$; Dodge et al., 1995). Relative to nonaggressive children, aggressive children have been found to expect more positive instrumental outcomes (Hart, Ladd, & Burleson, 1990) and fewer sanctional outcomes (Perry, Perry, & Rasmussen, 1986) for aggressing.

Situation Specificity

A key principle of social–cognitive theory is that one's mental activities develop within social contexts or situations. Individuals assign psychological meaning to situations and respond consistently to social tasks that are construed as similar (Higgins, 1996, 1999). Situations contribute to this process of meaning construction, and meaning arises from the interaction of information in the environment and personal knowledge that people bring into situations (Cervone, 1999). According to this perspective, it is not expected that children will show processing biases indiscriminately across distinct social situations (Zelli & Dodge, 1999). Nor is it expected that a certain stimulus situation will elicit deviant processing (and aggressive responding) in every aggressive child (Zelli & Dodge, 1999). Rather, the most promising inquiry is to evaluate situation specificity, that is, to investigate how patterns of children's responding vary across different types of situations. For example, some aggressive children may display deviant processing patterns (and aggression) in provocation situations, whereas other aggressive children may exhibit deviant processing patterns (and aggression) in situations involving initiation of play activity with groups of peers.

Dodge, McClaskey, and Feldman (1985) used clinicians' and schoolteachers' observations to classify children's social competence according to a situational taxonomy. Teachers' ratings converged factorially onto six situational dimensions that were empirically distinct from each other. Teachers' ratings of competence in peer group entry situations ($\alpha = .95$, $p < .01$; Dodge et al., 1985) and in responding to provocations ($\alpha = .97$, $p < .01$; Dodge et al., 1985) were found to be internally consistent. Furthermore, ratings indicated that the group of socially rejected children experienced more problems, on average, than the group of socially well-adjusted children, particularly in situations of peer provocation and group entry failures. However, rejected children differed among themselves in the situations that presented problems for them.

Dodge, Pettit, McClaskey, and Brown (1986) demonstrated that situational specificity in aggressive behavior is related to situational specificity in deviant processing patterns. Processing patterns in response to peer provocations predicted aggressive behavioral responding to a laboratory-induced peer provocation but did not predict aggressive behavior in a peer group entry situation. In contrast, patterns of processing peer group entry information significantly predicted aggressive behavior in the peer group entry situation but not in the peer provocation situation. This work suggests that a child's pattern of on-line social information processing is optimally conceptualized as a matrix of components of mental activity (e.g., attribution bias, goal setting, response access, and response evaluation) and distinct situations or contexts of social challenge (e.g., provocation and peer group entry).

The major goal of the current study was to examine the psychometric characteristics of measures of social cognition. First, the internal consistencies of these measures were examined. Next, the hypothesis was tested that empirically, a multidimensional latent-factor structure including four processing factors and two situational factors would more adequately account for covariation among processing factors than a structure including either, but only one, dimension. In the current study, we tested this hypothesis through confirmatory factor analyses and contrasts of nested models.

Latent Knowledge Constructs

In addition to these mental operations, it is hypothesized that processing is partially guided by latent knowledge structures that are stored in memory (Bargh, Chaiken, Raymond, & Hymes, 1995). These structures are much less situationally dependent than processing patterns and are presumed to guide processing and behavior across many diverse situations (Dodge, 1993). One example is general knowledge and understanding about emotions (Ribordy, Camras, Stefani, & Spaccarelli, 1988). Childhood aggressive behavior has been correlated with normative beliefs about aggression (Huesmann & Guerra, 1997), beliefs that social rejection is common (Downey, Lebolt, Rincon, & Freitas, 1998), and negative general conceptions about peers (Burks, Dodge, Price, & Laird, 1999).

A goal of the current study was to measure the latent knowledge construct of emotion understanding, assess the internal consistency of measures of this construct, and test the correlations among these measures. Because this emotion construct was conceptualized and measured without regard to situation specificity, it was not included in the multidimensional analyses of processing patterns and situation types. Instead, we assessed the distinctiveness between measures of latent knowledge constructs and measures of the four processing constructs.

How Knowledge Leads to Aggressive Behavior: Mediation Through Processing Patterns

Social–cognitive theory posits that latent knowledge about social behavior will have an effect on aggressive behavior that is partially mediated through intervening effects on processing patterns. Both emotion knowledge and processing activities contribute to aggressive behavior, but general knowledge also has an effect on how children process their social world (Clore, Schwarz, & Conway, 1994; Dodge, 1989, 1991; Lang, 1984). Thus, a child who generally does not understand emotions may erroneously interpret others' actions as hostile, fail to adopt social goals, readily call on aggressive solutions, and evaluate aggression as an appropriate response. Any or all of these processing patterns may eventually lead to aggressive behavior and may, in part, explain the relation between lack of emotional understanding and child aggression. In the present study, we tested this hypothesis through contrasts among nested structural equation modeling.

Evaluation of Construct Validity

In spite of the rich theory and empirical literature linking aspects of social information processing (SIP) and social knowledge to children's aggressive behavior problems, a number of questions remain regarding the measurement, convergent validity, and discriminant validity of these constructs. The main goal of the current study was to rectify the measurement and validity problem for five theoretically important social–cognitive constructs, four involving aspects of on-line processing (attribution bias, goal setting, response accessing, and response evaluation), and one involving latent knowledge of emotions.

The most appropriate source of measurement information for children's social cognitions comes from the child's responses to a tester's questions. Most measurements involve the presentation of a hypothetical stimulus (e.g., “Imagine that a peer bumps you from behind”) to the child and elicitation of a response that is presumed to measure one aspect of cognition (e.g., to measure response accessing, the child is asked, “What could you do if this happened to you?”). Following from the literature reviewed above, this strategy was followed in the current study. Internal consistency of item responses was evaluated by coefficient alpha, which reflects both the reliability of responding and the degree of similarity across stimuli. In the current study, the goal was to develop scales for which responses to multiple instantiations of hypothetical stimuli within similar situations yield scale scores with moderate internal consistency. Complete consistency in scores could reflect either high reliability of the construct score or artifactual redundancy in the stimuli. Moderate internal consistency (i.e., well above chance but less than 1) would be optimal.

Convergent validity of constructs was evaluated by the correlations among each of the five constructs and measures of children's aggressive behavior. *Discriminant*, or *divergent*, validity refers to the degree to which “a measurement instrument can discriminate between constructs which are theoretically different” (Haynes, 1978, p. 178). To support discriminant validity, the degree of internal consistency of items measuring one construct needs to be greater than the degree to which these items correlate with measures of other constructs (Campbell & Fiske, 1959). The five constructs targeted in this study are hypothesized as distinct phenomena rather than reflections of a single, underlying, more general construct (of social intelligence, perhaps), but an empirical test of this distinctiveness has rarely been attempted. The multitrait–multimethod matrix (Campbell & Fiske, 1959) has been used in past studies to inspect visually the possibility of discriminant validity, but recent developments in confirmatory factor analysis and the contrasting of nested models in structural equation modeling offer a statistical test, as suggested by Widaman (1985), that was used in this study.

Method

Participants and Procedure

The 332 participants in this study represented a substantial portion (86%) of a sample of 387 elementary school children who received no intervention in a longitudinal multisite investigation of the development and prevention of conduct problems. The details concerning sample recruitment and selection criteria of this investigation have been described elsewhere (Conduct Problems Prevention Research Group, 1992; Lochman & Conduct Problems Prevention Research Group, 1995). Briefly, all kindergarten children enrolled in high-risk control schools were rated by their teachers for the presence of behavior problems. Within each of the four sites (Durham, NC; Nashville, TN; Seattle, WA; and rural central Pennsylvania), a normative sample of 100 children was then obtained by selecting 10 children from each decile of the teacher-rating score distribution (see Lochman & Conduct Problems Prevention Research Group, 1995). This selection represented the race and sex composition in each decile of the teacher screen as much as possible. At one site, only 87 children were selected because one of the schools dropped out of the study during the 1st year. Across the four sites, the sample included 50% boys and 50% girls and 49% minority children (45% African Americans and 4% other). In the present report, ethnic group comparisons included only European American and African American children.

Summer interviews lasting approximately 2 hours were conducted with parents and children in their homes by interviewers who had completed 4 weeks of training and had achieved high reliability. Data on children's social information processing were collected during interviews conducted during the summer after Grade 2, whereas data on children's emotion knowledge were collected in interviews conducted 2 years earlier (i.e., in the summer after kindergarten).

In the summer after Grade 2, parent ratings on child behavior problems also were collected. In particular, in addition to behavioral ratings collected during the home interviews, parents rated the daily frequency of their children's problem behaviors in telephone interviews conducted in three separate occasions over the summer. Finally, additional data on child behavior problems also were obtained from school-teachers during the spring of Grade 3.

Data on SIP were available for the entire sample of 332 children. Data on children's emotion knowledge and on parent ratings of child behavior problems were available for 322 (97%) of the participating children. Finally, teacher data on child behavior problems were available for 291 (88%) of the children. Data attrition did not vary significantly with sex, ethnicity, or initial level of behavior problems.

Measures

The child interview included measures representing five social–cognitive domains, including four aspects of social information processing (i.e., attribution of peer intent, generation of responses to peer relationship dilemmas, evaluation of presented responses to peer relationship dilemmas, and endorsement of instrumental as opposed to social goals) and children's knowledge about emotions. The four processing patterns were assessed within each of two social situation types (peer provocation and peer group entry). All responses were recorded verbatim, and protocols were scored immediately during the interview. To evaluate intercoder agreement on the scoring of all social–cognitive assessments, protocols from a random sample of 100 children (25 from each of the four sites) were scored independently by a master coder at the Nashville site.

Social information processing—Three instruments designed to assess SIP patterns presented the child with hypothetical social situations in which he or she was asked to imagine being personally involved. Stories depicted either ambiguous peer provocation (e.g., being bumped from behind) or problematic group entry situations (e.g., not being allowed to sit with a group of kids at lunch).

Hostile attributions were assessed using the Home Interview With Child, adapted from a similar instrument first used by Dodge (1980). After each of eight stories, children were prompted by open-ended questions to state why the peer–actor acted the way that he or she did. Responses were coded immediately by the interviewer as indicating either a *benign intent* (coded 0), a *hostile intent* (coded 1), or a *no intent judgment* (i.e., “don't know”; coded 2) explanation for the events in the story. Independent coder agreement was high ($\kappa = .94$, $p < .01$). For each story, the score was dichotomized to index whether the child attributed hostile intent to the peer–actor.[1]

Accessing of responses to peer relationship dilemmas was assessed using the Social Problem Solving Scale, adapted from instruments used by Rubin and Krasnor (1986) and Dodge, Bates, and Pettit (1990). After each of eight situations (four depicting ambiguous peer provocation and four depicting peer group entry dilemmas), the child was asked what he or she could do or say that would resolve the situation favorably (e.g., after a vignette depicting a child being pushed out of line, the child is asked what he or she could do to get a place back in line). The interviewer elicited a response from the child, then prompted for two additional responses. Each response was immediately coded as (a) aggressive (i.e., physical or verbal aggression or threats), (b) competent (i.e., socially appropriate way of handling the situation), (c) authority–punish (i.e., appeals to an authority figure to punish the provocateur), (d) authority–intervene (i.e., appeals to an authority figure to intervene on the child's behalf rather than to punish), (e)

[1] A “don't know” coding was assigned to fewer than 1% of the total number of responses measuring children's hostile intent attributions.

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passive-inept (i.e., responses that indicate a passive or nonassertive response to the situation), (f) irrelevant– other (i.e., nonsense responses or other responses that do no fit into any other category), and (g) unable to provide further responses. For each of the eight stories, a score was then computed that indexed the proportion of responses that were coded as aggressive or authority–punish. Independent coder agreement was extremely high ($\kappa = .91$, $p < .01$).

Children's evaluations of assertive and aggressive responses to peer relationship dilemmas were assessed using the Things That Happen to Me scale (Crick & Dodge, 1996). For each of eight stories (four depicting provocation and four depicting peer group entry), the interviewer read a description of the situation depicted in the story and then asked the respondent to answer two sets of questions about how effective assertive and aggressive responses would be in that situation. The respondent answered yes or no to indicate whether the (assertive or aggressive) response was effective at attaining instrumental goals (e.g., "getting to play with the other kids"), friendship goals (e.g., "getting the kids to be your friends"), and general social acceptance goals (e.g., "getting the other kids to like you"). For each story, the item score was computed by subtracting the number of yes responses obtained in evaluating the assertive solution from the number of yes responses obtained in evaluating the aggressive solution. Higher scores indicated a more positive endorsement of aggressive responses.

Finally, the same instrument (i.e., Things That Happen to Me) was also used to assess the children's goal orientation in peer relationships. Following each story, the child was asked which of two goals was more important to him or her. For example, after reading a vignette in which the target child is pushed out of line by another child, the respondent was asked whether it was more important to "get back your place in line or to have the other kid like you." The child was then asked to choose between the instrumental goal (coded 1 if endorsed) or the prosocial goal (coded 0 if endorsed).

Emotion understanding—Two instruments were used to assess children's emotion knowledge. In particular, children's understanding of their own emotions was measured using the Interview on Emotional Experiences (IEE; Greenberg & Kusche, 1992). For each of four emotions (i.e., happiness, sadness, anger, and anxiety–being worried), children were asked, "What kinds of things make you feel______?" Using standard probes, two responses were elicited from each child, and each response was coded as either *appropriate* (coded 1) or *inappropriate* (coded 0). For each emotion, a score was then computed that represented the number of responses coded as appropriate (i.e., score could be 0, 1, or 2). Independent coder agreement was excellent ($\kappa = .81$, $p < .01$).

The second instrument was the Emotion Recognition Questionnaire (ERQ), which measures a child's understanding of how others experience emotion-inducing situations. This instrument is based on vignettes and was created for emotion research and therapy by Ribordy et al. (1988). The original questionnaire consisted of 30 vignettes depicting six emotions (happiness, sadness, fear, anger, surprise, and disgust) and was administered orally. The ERQ was adapted for the current study by using 4 vignettes depicting each of four emotions (happiness, sadness, fear, and anger; 16 vignettes total). The administration was adapted to include a nonverbal response mode, using drawings of facial expressions representing each of the four emotions. The experimenter first ascertained that the child could identify the emotion depicted in the four drawings. Then after the experimenter read each vignette (e.g., "Johnny/Susie was dreaming about a monster in his/her nightmare"), the child chose the emotion response that the child in the story would most likely feel. Correct responses were coded 1, and incorrect responses were coded 0.[2]

[2]Inspection of the ERQ item data indicated that the score distributions of three of the four happiness items were very negatively and highly skewed, with most children responding correctly. It was decided to remove the four happiness items from any further analysis.

Aggressive behavior—Three parent-completed instruments and two teacher-completed instruments were used to index child aggressive behavior. Parents completed the Child Behavior Checklist (CBC), the Parent Checklist (PCL), and the Parent Daily Report (PDR). The CBC is a standard instrument designed to index a variety of common child behavior problems (Achenbach, 1991). Parents rated how well each item described their child on a 3-point scale ranging from *not true* (0) to *very true* (2). The sum of the 20 items forming the CBC Aggression scale was computed. The PCL (Dodge & Coie, 1987) is a checklist indexing proactive and reactive aggression in children. Parents were asked to indicate how well each of six statements (e.g., “When your child has been teased or threatened, he or she gets angry and strikes back” or “Your child threatens or bullies others in order to get his or her way”) described their child using a 5-point scale ranging from *never true* (0) to *almost always true* (4). A PCL Aggression score was computed by adding the 6 items' scores. The PDR (Chamberlain & Reid, 1987) is a 30-item checklist of behavior problems (e.g., “hit anybody” or “teased anyone”). For each item, parents are asked to indicate whether the problematic behavior has occurred in the past 24 hr (coded 1 if yes and 0 if no). The first administration of the PDR took place during the parent summer interview. Two additional administrations were made through follow-up telephone calls that took place within 2 weeks after the summer interview. For each item, a score was created by averaging responses across the PDR administrations. A PDR Aggression score was then computed by taking the mean of the 10 items measuring child aggression.

Teacher-rated aggression scores were computed from the Teacher Rating Form (TRF; Achenbach, 1991) and the Teacher's Observation of Child Adaptation—Revised (TOCA–R). The TRF Aggression score was computed by taking the mean of the 25 aggression items. The TOCA is a 31-item instrument designed to assess the behavioral aspects of *Diagnostic and Statistical Manual of Mental Disorders* (3rd ed., American Psychiatric Association, 1980) child conduct disorder criteria (Werthamer-Larsson, Kellam, & Wheeler, 1991). Each item is rated on a 6-point scale ranging from *almost never* (0) to *almost always* (5). Factor analyses with the current data set (Conduct Problems Prevention Research Group, 1995) generally confirmed the three-factor structure reported by Werthamer-Larsson et al. (1991). A scale score was computed by averaging across the 10 items measuring authority acceptance (e.g., “fights,” “yells at others,” “harms others,” and “has trouble with authority”). Because the items were scored so that higher scores indicated more aggression and less authority acceptance, the scale score is referred to as TOCA Aggression.

Results

Analyses were conducted in three separate phases. The first series of analyses examined the psychometric characteristics of measures of SIP and evaluated the general hypothesis that a child's SIP is best conceptualized in terms of distinct components of mental activities and distinct contexts of social challenge. In these analyses, we used structural equation modeling with latent variables to conduct confirmatory factor analyses to evaluate the measurement characteristics, goodness of fit, and validity of the hypothesized model. In the second phase of the analyses, we used similar analytical methods to evaluate the distinction between the knowledge construct of emotion understanding and factors of SIP. Finally, structural equation modeling was used to examine the general hypothesis that early emotion understanding influences later child aggression primarily through intervening patterns of SIP.

Measurement and Factor Structure of Social Information Processing

Table 1 lists the means, standard deviations, and skewness for the 32 items designed to measure hostile intent attributions, aggressive response generation, positive evaluation of aggression, and orientation toward instrumental goals, in situations of both provocation and peer group entry.

Our first goal was to evaluate the measurement characteristics and factorial validity of these item data. Descriptively, we first examined the patterns of correlations between each item and the four SIP scales hypothesized within each type of conflict situation. These correlations are shown in Table 2. Each item was first correlated with a corrected score of its own scale (i.e., a scale score computed without including the target item; see Item–total in Table 2) and then correlated with the seven remaining scales. The hypothesized factorial structure of the data would be supported if within-construct (i.e., item–total) correlations were higher than across-construct correlations (Campbell & Fiske, 1959). The patterns of correlations were highly consistent with this hypothesis. For 24 of the 32 items, the within-construct correlation was higher than every one of the 7 across-construct correlations. For each of the remaining 8 items, only 1 of the 7 across-construct correlations was higher than the within-construct coefficient (these 8 coefficients are marked in Table 2). In all 8 cases, the cross-construct correlation that was highest was the correlation for the same SIP construct in a different social situation. In all, data were consistent with the hypothesized factor structure for 216 (96%) of the 224 across-construct correlations.

Next, we used AMOS 4.0 (Arbuckle & Wothke, 1999) to estimate the measurement parameters and goodness of fit of a model including six latent factors. In particular, we used confirmatory factor analysis to test a model that (a) included four SIP factors (i.e., Intent Attribution, Response Generation, Response Evaluation, and Goal Orientation) and two situation factors (i.e., Provocation and Peer Group Entry), (b) allowed each of 32 items to have nonzero loadings on one SIP factor and one situation factor, (c) posited that the four latent processing factors were correlated with each other, (d) posited that the two latent situation factors were correlated with each other, and (e) included uncorrelated errors of measurement. This model is diagrammed in Figure 1.

Table 3 contains the standardized estimates of the loadings for each of the six latent factors as well as the error terms for the 32 items. Overall, all six latent factors appeared to have been well measured. As hypothesized, all 32 item loadings of the four SIP factors were statistically significant (i.e., nonzero loadings). The loadings ranged from .32 to .76, and the median was .48. Also consistent with the hypothesized model, the majority (22 of 32, or 69%) of the item loadings of the two situation factors were also statistically significant. Most of the nonsignificant situational loadings implicated the entire set of items (8 items) measuring intent attributions, suggesting that individual differences in hostile attributions did not vary systematically across types of conflict situations. For the other 24 items, 22 yielded significant item loadings on the appropriate situation factor. As hypothesized, this model yielded moderate to substantial, positive, and statistically highly significant correlations ($p < .01$ for all r_s) among the four latent factors of SIP (i.e., estimates ranged from .21 to .47), and between the two latent factors of situational challenge (.73).

These fitted estimates reproduced the patterns of observed interitem correlations quite well, thus substantiating measurement validity. Table 4 summarizes the goodness-of-fit indices for the guiding six-factor model (see Model A). Despite a statistically significant chi-square (sensitive to relatively large sample sizes), the model's χ^2/df ratio was smaller than 2 (1.35), suggesting an adequate fit (Bollen, 1989;Marsh, Balla, & McDonald, 1988). In addition, both the model's comparative fit index (CFI; .95) and root-mean-square error of approximation (RMSEA; .03) also suggested quite adequate model fitting. These findings were encouraging, given the complexity of the model, the size of the covariance matrix used as input data, and the lack of any post hoc changes in model specification.

Following suggestions made by Widaman (1985) and an excellent analytical guide to structural equation modeling provided by Byrne (1994), we adopted a nested-model approach to evaluate further the convergent and discriminant validities of the factor structure diagrammed in Figure

1 (i.e., nested models are models that are hierarchically related to one another in the sense that particular parameters that are freely estimated in one model are then fixed to some predetermined value in a second model). In particular, we examined the extent to which there would be a decline in model fitting as a result of hypothesizing: (a) no processing factors and freely correlated situation factors (Model B), (b) no situation factors and freely correlated processing factors (Model C), (c) no distinction among the four processing factors (Model D), and (d) no distinction between the two situation factors (Model E). Models B and C tested the convergent validity of hypothesizing a processing and a situation dimension, respectively, and Models D and E tested for the discriminant validity of hypothesizing distinct factors within each dimension. Table 4 shows the summary goodness-of-fit statistics and comparisons for each of these alternative models.

As expected, none of the alternative models (Models B through E) fitted the item data as well as the hypothesized six-factor model (Model A). Moreover, there was clear evidence of convergent and discriminant validity of the guiding factor structure, especially with regard to the factors of SIP. When the processing factors were not specified (Model B), the fit indices deteriorated substantially, as evidenced by a very large increase in the model's chi-square, $\chi^2(463, N = 425) = 1{,}660.33$, and by very substantial declines in both CFI (.59) and RMSEA (.09) statistics. Likewise, when we assumed a perfect correlation among the four SIP factors (i.e., covariance paths fixed to 1), all the fit indices again worsened to a great extent (see Model D). These declines in model fitting for Models B and D were associated with highly significant changes in model's chi-square: $\Delta\chi^2(38, N = 425) = 1{,}086.21$, $p < .01$, for Model A versus Model B; $\Delta\chi^2(6, N = 425) = 590.54$, $p < .01$, for Model A versus Model D. Thus, assuming that Model A is the correct model, we could statistically reject Models B and D and support the convergent and discriminant validity of hypothesizing distinct patterns of SIP.

We found significant but weaker evidence for the convergent and discriminant validity of the situation factors. As expected, when the two situation factors were not specified (Model C) as assumed to be perfectly correlated (Model E), there were statistically significant changes in models' chi-square: $\Delta\chi^2(33, N = 425) = 155.62$, $p < .01$, for Model A versus Model C; $\Delta\chi^2(l, N = 425) = 27.94$, $p < .01$, for Model A versus Model E. However, as Table 4 also shows, the CFI and RMSEA fit indices of these alternative hypotheses (CFIs = .91 and .94, and RMSEAs = .04 and .04 for Models C and E, respectively) were only slightly worse than the indices obtained for the full model (.95 and .03 for Model A).

In sum, analyses supported a multidimensional model of SIP. The findings were strong in favor of the hypothesis of a processing dimension including the four distinct mental activities of Intent Attribution, Response Generation, Response Evaluation, and Goal Orientation. Albeit less strong, the findings also supported the hypothesis that peer provocation and group entry represent distinct contexts of social challenge for conceptualizing and measuring the different components of children's SIP.

The Distinction Between Emotion Knowledge and Social Information Processing

An important test of the validity of social–cognitive constructs rests on the ability to distinguish constructs of SIP from other cognitive constructs, such as more general knowledge of emotions. We examined this distinction for the knowledge factor of Emotion Understanding and the four SIP factors of Intent Attribution, Response Generation, Response Evaluation, and Goal Orientation.

The knowledge construct of Emotion Understanding—First, we evaluated the measurement characteristics of the 16 items that measured emotion understanding in kindergarten children. The bottom section of Table 1 shows the descriptive statistics of the 16 (i.e., 12 ERQ and 4 IEE) emotion items. Each item referred to a specific emotion in the context of either self- (i.e., IEE) or other-related (i.e., ERQ) experiences. We thus decided to test a second-order confirmatory factor analysis model of Emotion Understanding in which item responses could be explained by four first-order factors (i.e., the three emotion factors of Others' Sadness, Anger, and Fear, and a factor of Self-Related Emotions) and one second-order factor (i.e., Emotion Understanding). In this higher order model, (a) the four IEE items had a nonzero loading on the Self-Related factor, (b) each of the 12 ERQ items had a nonzero loading on the Other-Emotion factor it was designed to measure (i.e., 4 items per factor), and (c) the second-order factor of Emotion Understanding explained the first-order emotion factors to an equal degree (i.e., the paths linking Emotion Understanding to the first-order factors were constrained to be equal).[3]

This model represented a very good fit to the data, as $\chi^2(102, N = 425) = 128.63$, *ns*, CFI = .96, RMSEA = .03. The measurement loadings for the 16 items were each positive, ranged from .38 to .68, and were highly significant ($p < .01$ for all loadings). The estimated loadings linking the four first-order factors to the higher order factor of Emotion Understanding were also significant. These loadings ranged from .41 to .61. Finally, the second-order model solution appeared to be clearly superior to an alternative model positing solely that the 16 emotion items measured a single factor of Emotion Understanding, $\chi^2(104, N = 425) = 472.64$, $p < .01$, CFI = .44, RMSEA = .11.

Testing models of the relation between Emotion Understanding and social information processing patterns—We then turned to testing the hypothesis that emotion understanding would predict SIP but would also represent a relatively distinct component or construct of mental activity. To this end, we again adopted the method of confirmatory factor analysis to test a model that integrated the factor solutions we had obtained in the separate analyses of the emotion and SIP items. In this integrated model, each SIP item had a nonzero loading on its designated processing factor (i.e., Intent Attribution, Response Generation, Response Evaluation, or Goal Orientation), each emotion item had a nonzero loading on its designated emotion-specific factor (i.e., Self-Emotion or Other-Related Anger, Sadness, or Fear), the four emotion-specific factors were explained to the same degree by a general factor of Emotion Understanding, there was residual covariance between Other-Related Anger and Sadness, and, finally, the SIP factors and the general factor of Emotion Understanding were allowed to covary.

This model solution represented a quite acceptable and parsimonious fit to the data, $\chi^2(1066, N = 425) = 1{,}381.19$, *ns*, $\chi^2/df = 1.29$, CFI = .92, RMSEA = .03, especially in lieu, again, of the complexity of the model and the size of the input data matrix being fitted (i.e., 1,176 sample moments). The measurement loadings for all 48 items, as well as the loadings linking emotion-specific factors to the general factor of Emotion Understanding, were positive and statistically highly significant. As expected, the latent factor of Emotion Understanding was significantly but only moderately correlated with the SIP factors (i.e., standardized path estimates ranged in absolute value from about .23 to .42, all ps < .01).

A series of nested-model analyses provided a more formal test of the discriminant validity in distinguishing between Emotion Understanding and SIP. In particular, making the assumption that the hypothesized model was indeed correct, we were able to reject statistically a series of alternative model solutions that posited either no difference (i.e., covariance paths fixed to 1) between each of the SIP factors and Emotion Understanding, $\Delta\chi^2(4, N = 425) = 1{,}438.16$ –

[3]Preliminary inspection of the confirmatory factor analysis suggested a post hoc model-specification change, namely, to model and estimate the latent correlation between the two other-related factors of Sadness and Anger. This change amounted to hypothesizing that the relation between these two factors was not solely a function of the second-order factor of Emotion Understanding. This change seemed appropriate and was added to the model.

1,381.19 = 56.97, $p < .01$, CFI = .88, or a single social Cognition factor that could account for the relations between emotion and SIP items, $\Delta\chi^2(10, N = 425) = 2{,}322.14 - 1{,}381.19 = 940.95$, $p < .01$, CFI = .65.

These findings need to be taken with great caution, however. There was a time lag between the measurement of children's emotion understanding (i.e., assessed immediately after kindergarten) and patterns of SIP (i.e., assessed immediately after Grade 2). Modeling and estimating covariation rather than structural (i.e., causal) paths between Emotion Understanding and SIP might thus be questionable. Furthermore, one could question whether the evidence supporting the distinction between the factor of Emotion Understanding and the four SIP factors is an artifact of the time differences in the measurement of these factors.

We attempted to address both issues and corroborate our findings by performing a new set of analyses on SIP data collected in the summer after kindergarten (i.e., concurrently to the measurement of emotion understanding). The measurement and confirmatory factor model was identical to the original analysis with the only exception that SIP data were available only on Intent Attribution and Response Generation (i.e., the model included only two of the four SIP factors). Again, the model represented an acceptable fit of the data, $\chi^2(459, N = 425) = 686.30$, *ns*, $\chi^2/df = 1.49$, CFI = .90, RMSEA = .04. More important, it represented the best model solution when it was compared with plausible alternative models. In particular, we could again reject statistically a model that posited no difference between Emotion Understanding and the two SIP factors, $\Delta\chi^2(2, N = 425) = 740.30 - 686.30 = 54.0$, $p < .01$, as well as a model positing a single Social Cognition factor, $\Delta\chi^2(3, N = 425) = 1{,}096.53 - 686.30 = 410.23$, $p < .01$.

Testing Models of the Relation Between Social Cognition and Aggressive Behavior

The last series of structural equation modeling analyses was devoted to testing the general hypothesis that knowledge structures influence social behavior through intervening effects on SIP. This hypothesis was evaluated by examining whether emotion understanding in kindergarten influenced later aggressive behavior and whether any detected effect was partially mediated by the intervening action of SIP (i.e., hostile intent attributions, generation of aggressive responses, positive evaluation of aggression outcomes, and orientation to instrumental goals). These analyses were performed separately for teacher-rated and parent-rated child aggression because the two aggression constructs were not strongly correlated with each other, In each analysis, Emotion Understanding was modeled as a latent factor measured by four emotion scales (i.e., Recognition of Others' Anger, Fear, and Sadness, as well as Recognition of Self-Emotions), each of four aspects of SIP was modeled as a latent factor measured by two scale scores (i.e., Provocation and Peer Group Entry scales for each SIP construct), and Aggressive Behavior was modeled as a latent factor measured by within-rater scale scores.

Descriptive statistics and alphas for all scales included in analyses are shown in Table 5. The table also shows the bivariate correlations between aggression scales and the emotion and SIP scales.

Teacher-rated aggression—Two of the 4 kindergarten emotion scales correlated significantly and in the expected direction with third-grade teacher-rated aggression. Greater child aggressive behavior was predicted by poorer understanding of others' fear and sadness.

Six of the 8 second-grade SIP scales correlated significantly and in the expected direction with third-grade teacher-rated aggression. Child aggressive behavior was not significantly predicted by hostile attributions but was predicted by a tendency to generate aggressive solutions to social conflict, to evaluate positively the outcomes of aggression, and to opt for instrumental (rather than social) goals in social interactions.

We then specified hierarchical structural equation models with latent factors to test the mediation hypothesis. We first evaluated a partial-mediation model. This model included structural paths linking the latent factor of Emotion Understanding to the four latent SIP factors and the latent factor of Aggression, as well as structural paths linking the four SIP factors to the Aggression factor. In addition, the measurement errors for Provocation and Peer Group Entry scales were allowed to be correlated across SIP factors (to take into account the source of situational variance on measurement), and the disturbance terms of the four SIP factors were allowed to covary (to account for variance shared by the SIP constructs that was not shared wife Emotion Understanding). The fitting solution of this partial-mediation model was then compared statistically with a nested-model solution obtained after assuming that processing factors exerted no effect on aggression (i.e., a no-mediation model in which the paths linking the four SIP factors to the Aggression factors were set to zero). The mediation hypothesis would be supported if (a) the partial-mediation model represented an adequate fit to the data, (b) early Emotion Understanding exerted a statistically significant effect on later SIP, (c) early Emotion Understanding exerted a statistically significant effect on later Aggression, (d) the estimated direct effect of Emotion Understanding on Aggression (i.e., the effect estimated assuming partial mediation) was substantially lower than its total effect (i.e., the effect estimated bivariately between Emotion Understanding and Aggression), and (e) the no-mediation model could be rejected on statistical grounds.

In line with predictions, the partial-mediation model represented a very good fit of the data, $\chi^2(49, N = 425) = 79.82$, *ns*, $\chi^2/df = 1.63$, CFI = .98, RMSEA = .05. The standardized regression weights for the structural paths of this model are shown in Figure 2. Emotion Understanding exerted a highly significant effect on later Aggression (i.e., a total effect of −.28). Emotion Understanding also exerted significant effects on all four SIP factors (i.e., for the tendencies to make hostile biases, to generate aggressive solutions, to evaluate aggression outcomes positively, and to opt for instrumental goals, path coefficients of −.26, −.27, −.47, and −.45, respectively). The estimated direct effect of Emotion Understanding on Aggression was only marginally significant and was substantially lower (−.19) than the total effect estimate. That is, about one third (i.e., 1 – |.19/.28|) of the total effect of Emotion Understanding on Aggression accrued indirectly through intervening patterns of SIP. This conclusion is not at odds with the fact that only one of four SIP factors (i.e., Evaluation of Aggression Outcomes) exerted a positive and unique effect on Aggression (see Figure 2). Because SIP is hypothesized to comprise multiple components, the total correlation between processing and aggression could be large even in presence of relatively small relations between any one of the processing components and aggression. The partial-mediation model was configured with this important notion in mind, and in keeping with it, the four latent factors were moderately and significantly correlated with each other, as Figure 2 also shows (i.e., standardized correlations ranged from .20 to .41). Finally, assuming the partial-mediation model was correct, we could reject statistically the model solution positing no effect from the four SIP factors on aggression, $\Delta\chi^2(4, N = 425) = 89.22 - 79.82 = 9.4$, $p < .05$.

Parent-rated aggression—Only 2 of the 12 correlations between Emotion Understanding scores and Parent-Rated Aggression scores were significant (see Table 5). The partial-mediation model was tested with respect to a latent aggression factor measured by parent (rather than teacher) ratings of child aggression. The fitting solution yielded a nonsignificant estimate of the total effect of Emotion Understanding on Aggression (−.005). No further mediation analysis was deemed warranted.

Discussion

The findings of this study are among the first to support the psychometric soundness and convergent, discriminant, and construct validities of key constructs growing out of an SIP theory of child aggression. These findings support the hypotheses that children display internally consistent patterns in emotion knowledge and information processing, that these patterns are reliably distinct from each other, and that these patterns predict individual differences in aggressive behavior in the classroom. Thus, this study provides a psychometric foundation for the assessment of multiple, distinct, social cognitive patterns in children for use in developmental research and clinical applications in the classroom.

Contemporary social cognition theories of personality development (Cervone, 1999) propose that children acquire a complex array of patterns of social knowledge and mental processing that form the core of personality. Although these constructs have been well conceptualized and used in over a hundred studies (Crick & Dodge, 1994), psychometric support for their use has been lacking. The current study provides that support at several levels.

First, the study provides evidence of the internal consistency of children's response patterns in five distinct domains of social cognition (Emotion Understanding, Intent Attributions, Social Goals, Response Generation, and Response Evaluation). Second, confirmatory factor analytic methods supported the convergent validities of these five constructs. Third, confirmatory factor analyses supported the discriminant validities of these constructs as well. This study is among the first to use this method with these constructs, and the obvious merit of this method is the statistical rigor that it provides over the more intuitive requirements of traditional multitrait–multimethod analysis (Campbell & Fiske, 1959). The confirmatory factor analytic method also allows for testing alternate model fitting. In the current study, the hypothesized factor structure provided a superior fit to the data than did alternate plausible models. Support for a multiple-factor model of children's social–cognitive patterns lends credence to the developing complexity of children's social thought and refutes simpler models, such as one of a singular construct of a social intelligence quotient. Comprehensive assessment of children's social cognition will require measurement of multiple constructs, and clinical interventions to enhance children's social–cognitive development (e.g., Conduct Problems Prevention Research Group, 1999) may well involve multiple, distinct intervention activities.

Orthogonal to the support of the assessment of multiple cognitive constructs is the support found in this study for situationally based SIP. Situational theories of social behavior have proposed that children respond in different ways across socially meaningful constructs, but this study is among the first to demonstrate empirical support that children reliably differentiate among situations in their social thought. Individual differences in children's processing of peer provocations are distinct from their processing of peer group entry situations. The situation specificity of processing patterns is not nearly as strong, however, as the differences across cognitive constructs. It may be that peer provocations and peer entry situations are relatively similar from the perspective of children and that greater differentiation would be found between peer and authority situations. Nonetheless, the degree of situation specificity that was found is impressive given that it cross-cuts assessment instruments, that is, three different instruments were used to measure processing patterns, and children's responses to items depicting a particular type of stimulus social situation (e.g., provocation) were more similar to each other across instruments than to responses to other situational items within an instrument. Clearly, as Dodge et al. (1985) had proposed, some children reliably have problems in processing peer provocations, whereas other children reliably have problems in processing peer group entry stimuli. Again, these findings suggest that comprehensive clinical assessments need to include multiple situations and that clinical interventions may well include distinct efforts to change children's performance in multiple situations.

One glaring exception to this situation specificity was found for hostile attributional biases. Apparently, children's perceptions of peers' motives follow a more general pattern, like emotion understanding, than situationally specific patterns. This psychometric finding has implications for social–cognitive theory, in that children's general beliefs about the social world may outweigh situational parameters as children learn to negotiate social interactions. Whether situationally specific patterns in hostile attributional biases emerge as children mature awaits further empirical study.

The model that is supported here is that a child's profile of processing social information is multidimensional, including multiple aspects of social thought in each of multiple types of situations. The empirical findings support individual profiles that are highly complex. Inclusion of additional processing constructs (e.g., selective attention to cues) and additional situations (e.g., responding to authority demands) in future research may provide an even more complex profile in children.

This study also provided a test of substantive hypotheses of how social–cognitive constructs are related to individual differences in children's aggressive behavior. Lack of emotion understanding is generally correlated with aggressive behavior in the school setting. This finding supports the importance of this kind of general understanding for socially adaptive functioning and provides an empirical basis for intervention efforts directed toward the improvement of emotion understanding in aggressive children. Whereas emotion understanding guides behavior at a general level, it apparently operates by influencing information-processing patterns in specific situations. Processing patterns of goal selection, response generation, and response evaluation are empirically structured in distinct situations of responding to peer provocations versus peer group entry demands. Furthermore, processing patterns in these peer situations are related to aggressive behavior as rated by teachers and partially account for the effect of emotion understanding on aggressive behavior. These processing patterns represent yet another potential target for interventions designed to reduce or prevent aggressive behavior.

The findings of this study must be tempered with several caveats. First, even though the findings indicate robust relations between social–cognitive factors and aggressive behavior, the magnitude of these correlations is modest. Improved measurement and a broader array of social–cognitive variables might increase the prediction of aggressive behavior. Furthermore, improved theory that accounts for additional factors might be necessary. Second, the correlational nature of the analysis limits the confidence that one can claim with regard to causal streams. Even though alternate models were tested, it is still possible that unexamined third variables exert causal influence over both social–cognitive and behavioral variables or that causal influences are virtually reversed (or reciprocal). A third caveat is the discovery of the need to improve the psychometric structure of certain processing variables in future research. Still another caveat is the limited generalizability of findings. Even though children of diverse ethnicity and gender at four geographic sites were sampled, the findings may not generalize to other populations or age levels. The limited sample sizes precluded strong tests of the generalizability of these findings across groups. Such tests await further inquiry.

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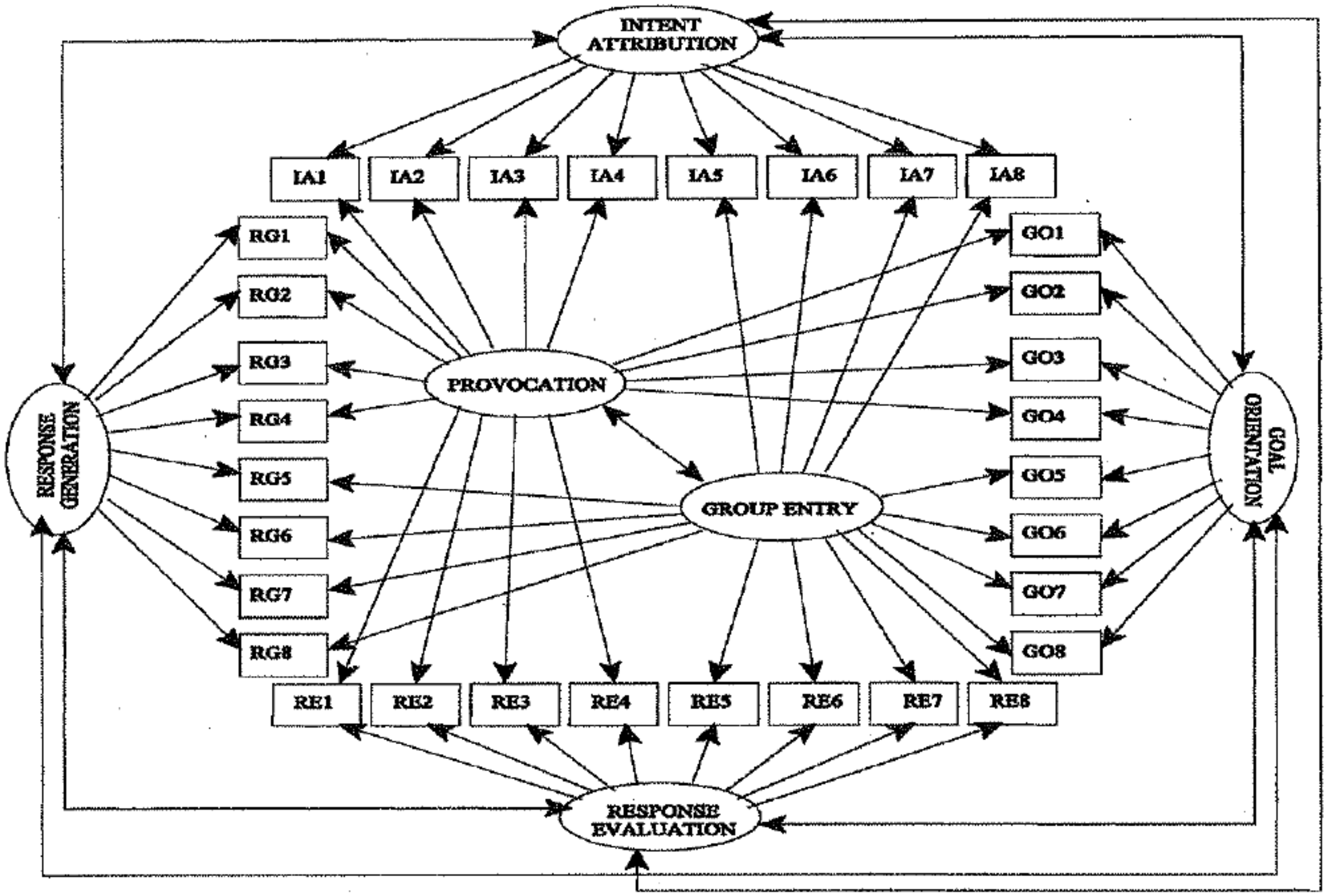

Figure 1.
The hypothesized model of social information processing and situation specificity. IA = Intent Attribution; RG = Response Generation; RE = Response Evaluation; GO = Goal Orientation.

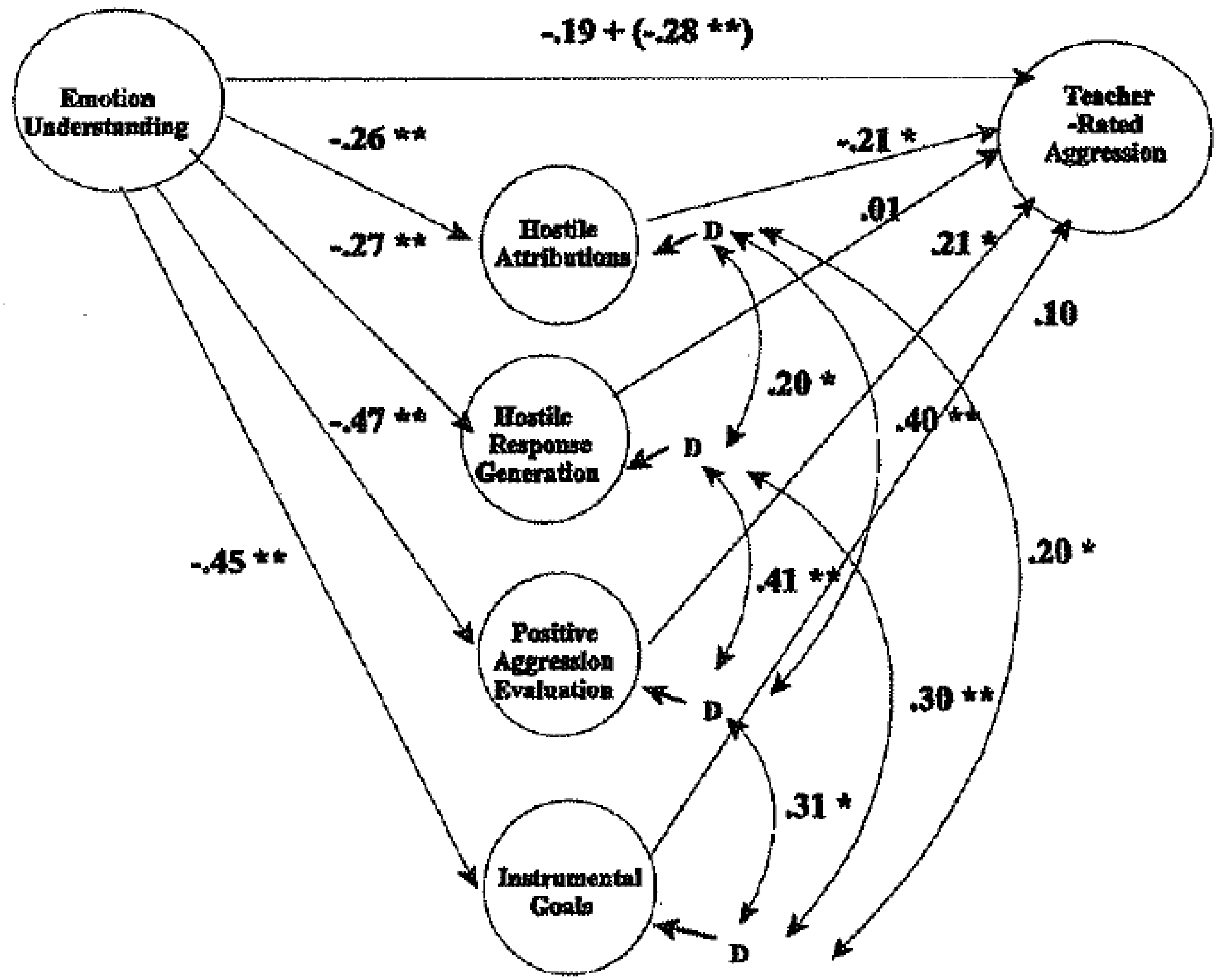

Figure 2.
Partial mediation model for teacher-rated aggression. The path estimate between parentheses represent the path estimate for the total effect of Emotion Understanding on Aggression. D = deviation. † $p < .10$ (marginally significant). *$p < .05$. **$p < .01$.

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Table 1

Scaling and Descriptive Statistics for Items Measuring Situation-Specific Social Information Processing and Emotion Understanding

Item	*M*	*SD*	Skewness	Score type range
Provocation				
Intent Attribution 1	0.39	0.49	0.45	DICH 0–1
Intent Attribution 2	0.69	0.46	−0.82	DICH 0–1
Intent Attribution 3	0.85	0.36	−1.99	DICH 0–1
Intent Attribution 4	0.67	0.47	−0.71	DICH 0–1
Response Generation 1	0.13	0.23	1.96	PROP 0–1
Response Generation 2	0.32	0.32	0.67	PROP 0–1
Response Generation 3	0.23	0.27	1.08	PROP 0–1
Response Generation 4	0.32	0.33	0.62	PROP 0–1
Response Evaluation 1	−0.27	1.03	−0.49	DIFF −3–3
Response Evaluation 2	−0.55	1.13	−0.23	DIFF −3–3
Response Evaluation 3	−1.06	1.37	0.18	DIFF −3–3
Response Evaluation 4	−1.16	1.34	0.15	DIFF −3–3
Goal Orientation 1	0.27	0.45	1.03	DICH 0–1
Goal Orientation 2	0.21	0.41	1.40	DICH 0–1
Goal Orientation 3	0.26	0.44	1.10	DICH 0–1
Goal Orientation 4	0.29	0.46	0.09	DICH 0–1
Peer Group Entry				
Intent Attribution 5	0.79	0.41	−1.45	DICH 0–1
Intent Attribution 6	0.91	0.29	−2.81	DICH 0–1
Intent Attribution 7	0.55	0.50	−0.18	DICH 0–1
Intent Attribution 8	0.57	0.50	−0.26	DICH 0–1
Response Generation 5	0.02	0.11	6.24	DICH 0–1
Response Generation 6	0.03	0.13	4.60	PROP 0–1
Response Generation 7	0.03	0.13	4.55	PROP 0–1
Response Generation 8	0.03	0.11	4.10	PROP 0–1
Response Evaluation 5	−1.93	1.27	1.07	DIFF −3–3
Response Evaluation 6	−0.80	1.29	−0.08	DIFF −3–3
Response Evaluation 7	−2.00	1.22	0.89	DIFF −3–3
Response Evaluation 8	−1.93	1.25	0.90	DIFF −3–3
Goal Orientation 5	0.24	0.43	1.22	DICH 0–1
Goal Orientation 6	0.26	0.44	1.10	DICH 0–1
Goal Orientation 7	0.23	0.42	1.28	DICH 0–1
Goal Orientation 8	0.20	0.40	1.49	DICH 0–1
Emotion Understanding				
ERQ				
Anger Recognition 1	0.38	0.49	0.47	DICH 0–1
Anger Recognition 2	0.48	0.50	0.01	DICH 0–1
Anger Recognition 3	0.62	0.48	−0.51	DICH 0–1
Anger Recognition 4	0.49	0.50	0.05	DICH 0–1
Fear Recognition 1	0.59	0.49	−0.37	DICH 0–1
Fear Recognition 2	0.75	0.43	−1.17	DICH 0–1
Fear Recognition 3	0.82	0.38	−1.75	DICH 0–1
Fear Recognition 4	0.82	0.39	−1.64	DICH 0–1
Sadness Recognition 1	0.66	0.47	−0.67	DICH 0–1
Sadness Recognition 2	0.64	0.48	−0.61	DICH 0–1
Sadness Recognition 3	0.69	0.46	−0.82	DICH 0–1
Sadness Recognition 4	0.79	0.40	−1.49	DICH 0–1
IEE				
Anger	1.61	0.64	−1.43	INT 0–2
Sadness	1.77	0.49	−2.05	INT 0–2
Anxiety	1.30	0.84	−0.60	INT 0–2
Happiness	1.92	0.30	−4.15	INT 0–2

Note. DICH = dichotomy; PROP = proportion; DIFF = difference score; INT = Interval; ERQ = Emotion Recognition Questionnaire; IEE = Interview on Emotional Experience.

Table 2

Item–Scale Correlations Across Social Information Processing and Situation Scales

Item	Item–total	Provocation IA	Provocation RG	Provocation RE	Provocation GO	Peer Group Entry IA	Peer Group Entry RG	Peer Group Entry RE	Peer Group Entry GO
Provocation									
IA 1	.30	—	.09	.18	.14	.29	.10	.15	.14
IA 2	.38	—	.13	.23	.12	.37	.06	.15	.16
IA 3	.27	—	.01	.04	.02	.22	.02	.03	.03
IA 4	.32	—	.15	.21	.15	<u>.35</u>	.15	.11	.09
RG 1	.36	.14	—	.18	.12	.15	.35	.29	.16
RG 2	.50	.13	—	.32	.25	.13	.32	.24	.24
RG 3	.38	.06	—	.19	.18	.05	<u>.42</u>	.19	.20
RG 4	.48	.12	—	.27	.19	.18	.26	.24	.21
RE 1	.35	.14	.19	—	.23	.21	.12	.27	.18
RE 2	.39	.16	.19	—	.16	.18	.06	.34	.16
RE 3	.38	.26	.29	—	.31	.25	.13	<u>.47</u>	.36
RE 4	.41	.14	.26	—	.24	.18	.09	<u>.44</u>	.20
GO 1	.62	.14	.26	.31	—	.18	.14	.31	.57
GO 2	.65	.12	.25	.29	—	.18	.23	.25	.64
GO 3	.64	.15	.21	.27	—	.22	.09	.28	<u>.68</u>
GO 4	.56	.14	.15	.26	—	.15	.10	.16	.55
Peer Group Entry									
IA 5	.35	.22	.13	.12	.13	—	.02	.05	.11
IA 6	.35	.28	.08	.18	.14	—	.02	.07	.14
IA 7	.46	.41	.15	.29	.20	—	.09	.19	.24
IA 8	.38	<u>.39</u>	.13	.21	.15	—	.13	.12	.19
RG 5	.44	−.05	.27	.02	.08	−.02	—	.14	.11
RG 6	.60	.14	.37	.18	.20	.09	—	.27	.24
RG 7	.50	.14	.38	.10	.10	.09	–	.17	.16
RG 8	.56	.14	.37	.13	.13	.15	–	.13	.18
RE 5	.54	.08	.21	.32	.20	.10	.14	—	.22
RE 6	.34	.14	.20	<u>.45</u>	.16	.18	.16	—	.21
RE 7	.62	.19	.30	.48	.28	.10	.21	—	.27
RE 8	.63	.13	.30	.46	.28	.13	.20	—	.30
GO 5	.66	.19	.23	.29	.64	.23	.23	.22	—
GO 6	.59	.13	.24	.27	<u>.63</u>	.23	.14	.23	—
GO 7	.72	.08	.27	.32	.61	.16	.19	.36	—
GO 8	.73	.16	.22	.24	.65	.24	.21	.29	—

Note. The Item–total column reports correlations between each item and its own scale. IA = Intent Attribution; RG = Response Generation; RE = Response Evaluation; GO = Goal Orientation. Correlation coefficients at or above .14 are statistically significant at $p < .01$. Correlations that are underlined are higher than the item's correlation with its own scale.

Table 3

Standardized Estimates of Measurement Loadings and Error Term Residuals for Social Information Processing and Situation Factors

Item	IA	RG	RE	GO	Provocation	Group entry	Residual
Provocation							
IA 1	.41				<u>.09</u>		.83
IA 2	.51				<u>.09</u>		.73
IA 3	.33				<u>.07</u>		.89
IA 4	.48				<u>.07</u>		.76
RG 1		.36			.36		.74
RG 2		.37			.48		.63
RG 3		.48			.26		.70
RG 4		.32			.43		.71
RE 1			.48		.16		.75
RE 2			.47		.20		.74
RE 3			.47		.38		.63
RE 4			.34		.46		.67
GO 1				.59	.37		.52
GO 2				.67	.26		.48
GO 3				.70	.27		.44
GO 4				.61	.16		.61
Peer Group Entry							
IA 5	.39					<u>.01</u>	.85
IA 6	.44					<u>.03</u>	.81
IA 7	.63					<u>.11</u>	.59
IA 8	.58					<u>.01</u>	.67
RG 5		.50				<u>.10</u>	.74
RG 6		.68				.24	.49
RG 7		.60				.17	.61
RG 8		.69				<u>.10</u>	.52
RE 5			.18			.60	.60
RE 6			.56			.20	.65
RE 7			.36			.66	.44
RE 8			.24			.74	.40
GO 5				.73		.16	.44
GO 6				.67		.16	.52
GO 7				.70		.34	.39
GO 8				.76		.27	.36

Note. The underlined measurement estimates are statistically nonsignificant. IA = Intent Attribution; RG = Response Generation; RE = Response Evaluation; GO = Goal Orientation.

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Table 4

Summary of Goodness-of-Fit Indices and Comparisons of Alternative Models of Social Information Processing

Model	χ^2	*df*	CFI	RMSEA
A. Full model	574.12	425	.95	.03
B. No processing factors	1,660.33	463	.59	.09
C. No situation factors	729.74	458	.91	.04
D. Perfectly correlated processing factors	1,164.67	431	.75	.07
E. Perfectly correlated situation factors	602.06	426	.93	.04

Note. *N* = 425. CFI = comparative fit index; RMSEA = root-mean-square error of approximation.

Table 5

Descriptive Statistics, Reliabilities, and Bivariate Correlations Across Emotion, Social Cognition, and Aggression Scales

Scale	Teacher-rated aggression		Parent-rated aggression						
	TRF	TOCA–R	CBC	PCL	PDR	*M*	*SD*	Skewness	*α*
Recognition of Others' Anger	−.03	.01	.13*	.02	.03	1.97	1.32	−0.05	.59
Recognition of Others' Fear	−.17**	−.20**	−.06	.01	.04	2.99	1.20	−1.14	.66
Recognition of Others' Sadness	−.19**	−.21**	−.11*	−.02	.06	2.79	1.29	−0.78	.67
Recognition of Own Emotions	−.06	−.05	−.02	−.02	.04	6.60	1.51	−1.22	.49
Hostile Attribution (P)	.01	−.02	−.01	−.07	−.12*	0.65	0.29	−0.44	.54
Hostile Attribution (E)	.04	−.01	.07	.05	−.09	0.70	0.29	−0.72	.59
Hostile Response Generation (P)	.10	.12*	.15**	.04	.01	0.25	0.20	0.77	.65
Hostile Response Generation (E)	.13*	.11†	.08	.01	.05	0.03	0.08	4.84	.73
Positive Evaluation of AGG (P)	.22**	.22**	.14*	.09	.02	−0.77	0.83	−0.38	.60
Positive Evaluation of AGG (E)	.13*	.17**	.11	.05	.04	−1.66	0.94	0.67	.72
Instrumental Goal (P)	.20**	.16**	.06	.07	−.06	0.26	0.35	1.06	.80
Instrumental Goal (E)	.23**	.22**	.03	.06	−.06	0.23	1.21	1.21	.81
M	9.68	1.17	9.34	6.43	.19				
SD	11.97	1.08	6.52	4.09	.16				
Skewness	1.32	1.02	0.99	0.86	.98				
α	.87	.93	.88	.84	.93				

Note. TRF = Teacher Report Form; TOCA–R = Teacher Observation of Child Adjustment—Revised; CBC = Child Behavior Checklist; PCL = Parent Checklist; PDR = Parent Daily Report; AGG = Aggression; P = scale scores computed across Provocation items; E = scale scores computed across Peer Group Entry items. TRF and TOCA–R statistics are based on a sample size of 291. CBC, PCL, and PDR statistics are based on a sample size of 322.

† $p < .10$ (marginally significant).

* $p < .05$.

** $p < .01$.