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# Knowledge Structures, Social Information Processing, and Children's Aggressive Behavior

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## Abstract

Although a multitude of factors may be involved in the development of children's violent behavior, the actual aggressive act is preceded by a decision-making process that serves as the proximal control mechanism. The primary goal of this longitudinal study was to understand the nature of this proximal control mechanism involved in children's aggressive acts by focusing on two aspects of social cognitions: social information processing and stored knowledge (i.e., internal knowledge structures that are the latent memories of past events). It was hypothesized that: (1) children with hostile knowledge structures will display more biased patterns of aggressive social information processing than children whose knowledge structures are less hostile and negative; (2) children who display hostile knowledge structures will behave in chronically aggressive ways; and (3) the development of hostile knowledge structures and hostile patterns of social information processing contribute to the stability of aggressive behavior and thus partially mediate the relation between early and later aggressive behavior. 585 boys and girls (19% African-American) were followed from kindergarten through eighth grade. Results from this investigation support the hypotheses and are discussed in terms of the significance of the inclusion of knowledge structures in our theories of the mental processes involved in children's violent behaviour.

### Keywords

Knowledge structures; aggression; social-information processing

There can be little doubt that severe aggressive behavior is a multiply determined phenomenon with many contributing factors. These can include genetic, pre- and perinatal, neurological, hormonal, physiological trauma, or other biological anomalies, as well as ecological, cognitive, and social variables. Although these factors may predispose an individual to behave violently, any specific display of aggression must have a proximal control mechanism that accounts for

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each specific act of aggression at a particular moment. With the possible exception of hallucinogenically induced rage, the moment before an aggressive act is undertaken, a decision (either conscious or unconscious) is made to strike out. It is this decision-making process that serves as the proximal control for specific acts of aggression (Dodge, 1986; Ladd & Mize, 1983; Rubin & Krasnor, 1986). Online decision-making processes, in turn, may be guided by *knowledge structures* that are acquired in experience and are organized in long-term memory. These structures are internal mental representations which have been derived from memories of past experiences and are a major determinant of how people represent, categorize, and interpret ongoing social events (Higgins, 1990; Murphy & Medin, 1985; Stromquist & Strauman, 1991). Various paradigms have labeled these structures as schemata (Gerrigg, 1988; Kelley, 1972; Winfrey & Goldfried, 1986; Wyer, 1981), scripts (Nelson, 1986; Huesmann, 1988), stereotypes (Mackie & Hamilton, 1993), stories or narratives (Shank and Abelson, 1995), and working models (Bowlby, 1973, 1980, 1982). The primary goal of this longitudinal study was to address three problems concerning the nature of the mental processes involved in children's aggressive acts: (1) the relation between latent knowledge structures and online social information processing, (2) the relation between knowledge structures and aggressive behavior in children, and (3) the role of these mental processes in the maintenance of stable patterns of aggression in childhood.

## General Model

When an individual encodes a social cue, the first task is to create a working representation of that event (Kintsch, 1977) in order to interpret it and ultimately decide upon the ‘best’ behavioral response. By representing only the important information concerning that cue and ignoring irrelevant information, the processing workload is reduced, enabling individuals to function in a world that would otherwise be paralyzingly complex (Abelson, 1981; Rumelhart & Ortony, 1977). This working representation is categorized into an existing memory store and matched with a similar knowledge structure. If the initial social cue is particularly unfamiliar, ambiguous and/or complex, the knowledge structure will facilitate the representational process by ‘filling-in’ missing information until a ‘complete enough’ representation is constructed (Bruner, 1957; Higgins, 1990; Higgins & King, 1981). This information may also include such data as the proportion of times that playmates have aggressed against oneself in the past and the effectiveness of previously attempted responses. Once this initial working representation is complete or when the environmental cue is clear enough to warrant minimal ‘filling-in’ by the knowledge structure, the knowledge structure can aid in the further elaboration of that representation by supplying information concerning past histories (either real or fantasized) about such things as the consequences associated with various behavioral responses. The online representation, therefore, contains both the information gathered from the environment and information from the stored knowledge structure (Beck, 1967, 1976; Lazarus, 1968; Lazarus, Kanner, & Folkman, 1980). The advantage of using already existing knowledge is that it is one of the most effective ways of comprehending new information (Carey, 1986). Once a representation is formed, the processing required for enactment of a selected behavior will be based on the information contained within the representation. This processing of social information includes interpreting the other person's intent as well as generation, evaluation, and selection of behavioral strategies (Crick & Dodge, 1994; Dodge, 1986), and results in the enactment of a chosen response. Thus, a primary role of knowledge structures is to serve as the distal cognitive control mechanism of aggressive behavior.

As can be seen in the above discussion, processing is directly influenced by the information stored in the knowledge structures. Critical to the understanding of the importance of including knowledge structures in a theoretical model of the cognitive models of aggressive behavior is the understanding that consistent individual differences in the processing of social information

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are primarily a reflection of the consistent activation of a chronically accessible knowledge structure (Graham & Hudley, 1994). That is, a child who has a knowledge structure that consists of remembered events in which his social peer group is hostile will be more likely to process information in a hostilely biased manner (e.g., to interpret ambiguous situations as intentionally hostile and to generate and evaluate aggressive responses favorably). Information processing, therefore, can be re-conceptualized as the product of a chronically accessed knowledge structure.

The distinction between these two components is really a theoretical one. In much the way that computer programs and software use commands to process data stored on the hard-drive, information processing is the executor which translates stored knowledge into current actions. The executor integrates stored data with current stimulus demands. A primary goal of the current project was to introduce additional measures of knowledge structures, in addition to consistent patterns of information processing, in order to test hypotheses concerning the roles of the constructs in aggressive behavior.

In addition to their role as the distal cognitive control mechanism of aggression, knowledge structures serve a second function. They, in part, account for the stability in aggressive behavior over time. When the current situation faced by a child activates a knowledge structure utilized in a past situation, it will fill in similar information as it did the previous time it was accessed. The mental representation of the current situation and the previous situation will therefore share the information contained in the knowledge structure. Since processing is directly influenced by that knowledge structure, a similar behavior reaction is likely to be chosen in the current situation as was chosen in the previous situation. The second goal of this project, therefore, was to investigate the role of social information processing patterns and knowledge structures in the stability of aggressive behavior.

Recent theorizing about the important aspects of knowledge structures suggests that there are several fundamental aspects of knowledge structures including their categorization, organizing themes, and quality, all of which can affect their access, storage, and impact. Because the current study is an initial attempt to investigate the role of knowledge structures in the stability and maintenance of aggressive behaviors, we have chosen to focus on only one aspect of knowledge structures, namely their quality. Past work investigating the quality of knowledge structures in other samples suggests that children who display aggressive, externalizing behaviors have knowledge structures that are relatively antisocially oriented (Burks, Dodge, Price, & Laird, in press). Burks et al. measured the quality of knowledge structures by asking children to describe the peers that they like and dislike. The categories spontaneously used by children to describe others were coded as antisocial, neutral, or prosocial. It was found that children who used antisocial categories were likely to behave aggressively toward peers. What is still unknown is how antisocial knowledge structures lead a child to behave aggressively.

## Knowledge Structures and Social-Information-Processing: Hypothesis 1

We hypothesized that negatively-oriented knowledge structures lead children to process social cues in a more hostilely biased manner, perceiving hostile intent in others even when the cue is ambiguous in nature and endorsing more aggressive retaliation to such ambiguous provocations. These processing actions, in turn, potentiate aggressive behavior during social encounters. Although social information processing provides the protocol for responding to social cues, it does not provide a mechanism for understanding whether or why individuals would process information in a consistent manner. Introduction of knowledge structures into this procedure provides an explanation for stable processing patterns. If a given social cue regularly evokes a particular knowledge structure (for example, hostile schemas) and this knowledge structure consistently contributes to the creation of a particular working representation, then all processing actions will be influenced by the negative quality of the

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knowledge structure. Therefore, it was hypothesized that *children with hostile knowledge structures will display more biased patterns of aggressive social information processing than children whose knowledge structures are less hostile and negative.*

### The Nature of Knowledge Structures, Social Information Processing, and Children's Aggression: Hypothesis 2

A great deal of research has consistently supported the correlation between patterns of processing social information and individual differences in aggressive behavior (e.g., Crick & Dodge, 1994; Dodge, 1986). Because knowledge structures and social information processing are intrinsically and functionally intertwined, it was hypothesized that *not only would aggressively biased processing be positively related to children's displays of aggressive behavior, but that children who display hostile and negative knowledge structures will behave in chronically aggressive ways.*

### The Mediational Role of Social Cognitions: Hypothesis 3

The stability of aggressive behaviors has been consistently observed to begin in early childhood (Caspi, Elder, & Bem, 1987; Eron & Huesmann, 1990; Huesmann, Eron, Lefkowitz, & Walder, 1984; Olweus, 1979). A number of factors are likely to account for this stability. As described in the general model, behavioral events involving aggression become stored in memory as knowledge structures. In future social interactions, these knowledge structures guide processing of cues, which leads to aggressive responding. Thus, it was hypothesized that *hostile knowledge structures and hostile patterns of social information processing would contribute to the stability of aggressive behavior and thus partially mediate the relation between early and later aggression.*

## Method

This study was completed within an ongoing longitudinal investigation of the development of children's social difficulties (Dodge, Bates, and Pettit, 1990). Data collection with a community sample began in the summer prior to the start of kindergarten. Measures of children's social and behavioral adjustment at home and in school have been obtained on a yearly basis through parent and teacher report and constitute the behavioral component of this investigation. Relevant data from these sources were collected when child participants were in kindergarten (T1) and again when they were in the eighth grade (T2). In addition, children's social cognitions were also assessed at this second time point (T2).

### Subjects

Subjects were recruited in each of two annual cohorts at each of three geographic sites (Nashville, TN; Knoxville, TN; and Bloomington, IN). Parents from these schools were recruited at the time of kindergarten preregistration (April preceding the September of matriculation). Parents were approached individually and consecutively by research staff as they registered their child and were asked to participate for pay in a longitudinal study of child development. About 75% of parents agreed to participate. Because about 15% of children at these schools do not preregister, that proportion of subjects was recruited on the first day of school in September through letter or telephone.

In all, 585 children (315 in cohort 1 and 270 in cohort 2; 204 in Nashville, 204 in Knoxville, and 177 in Bloomington) participated in the pre-kindergarten phase of the project. Fifty-two percent of the sample was male and 18.4% was of minority ethnic background (17.0% = African-American and 1.4% other, including Asian and Middle Eastern origins). The mean family Hollingshead four-factor index of socioeconomic status for this sample was 39.6 (SD = 14.01, range = 8–66), which is in the lower-middle to middle class range.

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## Subject Retention

Of the 585 subjects whose parents completed home interviews, 559 (95.5%) were assessed in kindergarten by teachers. Retention did not vary significantly according to race, gender, SES, or cohort. Although not reported in the current paper, peer sociometric interview data were available for most of the participating subjects, as well as dropouts and never-participating peers in the same schools as the participants. Examination of peer nomination scores for aggressive behavior indicated that in no year did these three groups differ significantly, suggesting that the sample of participating subjects is representative of the school population in terms of aggressive behavior.

Three hundred-ninety-three child participants completed the social cognitive assessments at T2 (start of eighth grade). Again, retention did not vary significantly according to race, gender, SES, or cohort.

## Child Externalizing Behavior Problems

During the latter half of kindergarten (T1) and the latter half of eight grade (T2), the child's homeroom teacher completed the Teacher Rating Form (TRF; Achenbach, 1991), a standard 113-item checklist of child behavior problems. For each item, the teacher was asked to respond 0 if the problem statement is not true for the child, 1 if the statement is somewhat or sometimes true, and 2 if the statement is very true or often true. Sample items are: 'gets in many fights,' 'disobedient at school,' and 'threatens people.' The score used was the nationally normed, within gender, Externalizing Behavior Problems Score, consisting of 55 items for girls and 61 items for boys.

During the home visit in the first year and annually thereafter through the mail, mothers completed the 110-item parent version of the Child Behavior Checklist (CBCL; Achenbach, 1991), analogous to the one administered to teachers. Again, items were scored on a Likert-type 3-point scale. This measure has also been shown to be valid and reliable with nationally normed data (Achenbach, 1991).

## Social Cognitive Interview (T2)

This interview was completed during the summer when each cohort was between the seventh and eighth grades. Interviews were conducted in the participants' homes by a trained researcher.

**Social-Information-Processing—**A series of nine hypothetical vignettes was presented to each child. These vignettes depicted various social challenges including ambiguous provocation, mild peer rejection, and authority confrontation (e.g., '*Imagine that you get your lunch at school and then walk over to a table. You want to sit at this table. Several other kids are already seated there and there is one empty seat. As you begin to sit down, one of the kids says, "You can't sit there. It's taken." A couple of other kids laugh.*'). Participants were asked a series of questions following each vignette that included: (1) attribution of hostile intent ('*Why do you think this happened?*' which was coded as either hostile, ambiguous, or non-hostile), (2) unprompted aggressive response generation and selection ('*What would you do or say if this happened to you?*' which was coded as either aggressive, competent, inept, seek authority intervention, or other), and (3) prompted aggressive response generation and selection (where an explicit instrumental goal was provided and the participant was asked '*What would you do to [achieve this goal]?'*) Again, responses were coded as either aggressive, competent, inept, seek authority intervention, or other. Three derived scores were calculated from this instrument: (1) proportion of the nine responses that indicated hostile intent, (2) proportion of aggressive response generation and selection endorsements when no goal was provided, and (3) proportion of aggressive response generation and selection endorsements when a goal was provided.

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**Knowledge Structures—**Two instruments, based on work in traditional cognitive psychological inquiry and clinical psychology, were adopted to evaluate the hostility of children's knowledge structures: (1) The Sentence Completion Task, and (2) Assessment of Schema Typicality (see appendix). These instruments are designed to highlight the central tendency that knowledge structures exert on the elaboration of the working representation described earlier in the general model section. Finishing sentences such as 'My mother is …' with consistently aggressive words lends evidence in support of the argument that the knowledge structures stored in memory are more aggressive than for someone with a tendency to complete the sentences with benign concepts. The Sentence Completion Task was adapted from clinical psychological inquiry and was selected because this method has been used extensively with young children and has demonstrated validity and test-retest reliability (Anastasi & Urbina, 1997;Hart, 1986). We chose 14 sentence stems to represent four important social domains for children this age: mother ('My mother …'), father ('My father …'), peers (e.g., 'If a group of kids were going to have a party, but they could invite only a small number of other kids, they would probably …'), and authority figures (e.g., 'School principals are …'). A single derived score was calculated in each of these four domains that was the proportion of responses that were hostile in nature relative to the total number of responses given. These four scores were then standardized and averaged to obtain a single 'sentence completion' score (alpha = .44).

A second instrument, The Assessment of Schema Typicality, assessed children's tendencies, in a paired-comparison forced choice format, to describe various categories of people in hostile versus non-hostile terms (e.g., '*Of these two items, which is more typical of the kids at your school? Friendly or Mean?*'; adapted from Medin & Shoben, 1988, and Barrett, Abdi, Murphy, & Gallegaher, 1993). Note that the typicality measure was not designed to be an accurate measure of the child's actual social environment. That would be better obtained from third party direct observations or extensive interviews of those interactive partners. Rather, it was designed to reflect the child's schema for that reality. Because knowledge structures fill in and elaborate working representations during ongoing social interactions, any subsequent report of those interactions or the relationships associated with them must, in part, be filtered by those knowledge structures. Three series of nine pairs of statements each were presented to represent three domains: parents, peers at school, and teachers (see appendix for a complete list of the paired comparisons). A single score for each of these three domains was derived that was the proportion of the nine sets of choices in which the child endorsed a hostile attribute. These three scores were standardized and then averaged to obtain a single 'typicality' score (alpha = .47).

## Results

A correlation matrix presenting the bivariate correlations for externalizing problems at both T1 and T2 as well as social information-processing and knowledge structures at T2 are presented in Table 1.

The three hypotheses were tested by contrasting structural equations models using AMOS (Arbuckle, 1996). A simple latent variable regression model was fitted to assess the relation between hostile knowledge structures and hostile social information processing (hypothesis #1), and to evaluate hostile knowledge structures and biased social information processing as correlates of externalizing problems (hypothesis #2). A second set of models was fitted to assess whether hostile knowledge structures and biased social information processing accounted for the stability in externalizing behavior problems from T1 to T2 (hypothesis #3).

In the first model, externalizing problems at T2 were predicted by latent factors representing hostile knowledge structures and biased social information processing. Parent- and teacher-

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reported externalizing problems served as indicators of the externalizing factor. Three variables (unprompted aggressive response generation and selection; aggressive response generation and selection with goal provided; attribution of hostile intent) served as indicators of the social information processing factor and two scores (a derived score from the Sentence Completion instrument and a derived score from the Schema Typicality instrument) served as indicators of the knowledge structures factor.

As shown in Figure 1, each of the factor loadings was significant (at $p < .01$), although one of the social information processing variables (attribution of hostile intent) was a relatively poor indicator. Analyses were repeated without this indicator but resulted in no substantial differences, so the analyses that are reported include this indicator. Although the fit indices indicated that model provided an adequate fit to the data (GFI = .98, CFI = .96), the chi-square for the model was still significant, $X^2$ (11) = 23.74, $p < .05$.

### Hypothesis #1

Consistent with hypothesis 1, the social information processing and knowledge structures factors were significantly related (standardized path = .65, $p < .001$) suggesting that children who report more hostile knowledge structures process social information in a more hostile manner.

### Hypothesis #2

The model depicted in Figure 1 was fitted two additional times, once with the path from knowledge structures to Time 2 Externalizing behaviors deleted and a second time with the path from social information-processing to Time 2 Externalizing deleting (note that these two models are not represented in Figure 1). Consistent with hypothesis 2, the social information-processing factor was significantly related to externalizing problems (standardized path = .47, $p < .001$), indicating that children who process social information in a hostile manner are more likely to display externalizing problems. Also consistent with hypothesis 2, the knowledge structure factor was significantly related to externalizing problems (standardized path = .59, $p < .001$), indicating that children who have more hostile knowledge structures are more likely to display externalizing problems. However, when paths to externalizing problems were predicted from social information processing *and* knowledge structures factors simultaneously, only the knowledge structure path was significant (standardized path = .53, $p < .001$; see Figure 1). There is variance shared by knowledge structures and externalizing problems that is not shared by social information processing. Furthermore, all of the significant relations between social information processing patterns and externalizing problems was statistically accounted for by the latent knowledge structures that presumably guide processing.

### Knowledge Structures and Social Information Processing as Mediators of the Stability in Externalizing Problems

To test the third hypothesis that social information processing patterns and knowledge structures account, in part, for the stability of externalizing problems, a T1 externalizing problems factor was added to the model (see Figure 2).[1] As with the T2 externalizing factor, parent- and teacher-reported externalizing problems served as indicators. To account for measurement variation by source, the error terms for the parent scores at T1 and T2 were allowed to covary, as were the error terms for the teacher scores. Note that these paths are not shown in Figure 2. Likewise, to account for the relation between social information processing and knowledge structures not due to their common association with early externalizing

[1]Note that the path coefficients that are replicated from Figure 1 differ slightly in Figure 2 due to differences that occur in estimates as additional paths are simultaneously calculated.

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problems, the error terms for the social information processing and knowledge structures factors were allowed to covary.

To evaluate information processing and knowledge structures as mediators of the stability in externalizing problems, nested models were fitted. A reduced model was compared with the full model that included partial mediation. In the reduced model, the paths from information processing and knowledge structures to T2 externalizing problems were removed resulting in a total effects (or non-mediated) model. This reduced model resulted in a total effect of T1 externalizing problems on T2 externalizing problems of .98, $p < .001$. The fitted indices for the full model indicated that model provided an adequate fit to the data (GFI = .97, CFI = .96), although the chi-square for the model was still significant, $X^2$ (19) = 37.32, $p < .01$. The full model, with partial mediation, fit significantly better than the reduced model, $\chi^2$ (2) = 10.69, $p < .001$.

Coefficients from the full partial-mediation model indicate that externalizing problems at T1 were associated with significantly more biased social information processing and marginally more hostile knowledge structures eight years later at T2. As noted previously, the set of social cognitive factors (knowledge structures and social information processing) significantly relates to externalizing problems at T2, with the knowledge structure factor accounting for the relation. Finally, the path from T1 externalizing problems to T2 externalizing problems was reduced from .98 in the stability model (accounting for 96% of the variance in T2 externalizing scores) to .64 in the partial mediation model (accounting for 41% of the variance in T2 externalizing scores) indicating that 61% ([1 − .41]/.96) of the stability in externalizing problems is mediated through these two cognitive structures. Overall, these results are consistent with hypothesis 3.

## Discussion

Although cognitive theorists have long attempted to examine the nature of knowledge structures, researchers interested in social behaviour have neglected this important component in understanding the control mechanisms of social interactions. Most research traditions, such as work in attachment theory (Crittendon & Ainsworth, 1989) have simply inferred the existence of such structures without any empirical measurement. By adapting research paradigms from cognitive psychology, the current study is unique in its empirical examination of social knowledge structures. These knowledge structures were found to play a crucial role in aggressive behavioral development.

Results from the current investigation support three hypotheses concerning knowledge structures and their relation to social information processing, externalizing behaviors, and the stability of aggression over time. First, findings indicate that children who have more hostile knowledge structures are more likely to process social information in a hostile manner. Second, children who have more hostile knowledge structures (as well as those who process social information in a hostile manner) are more likely to display externalizing problems. Interestingly, when these two cognitive components were evaluated simultaneously, only knowledge structures continued to predict externalizing difficulties, indicating that there is variance shared by knowledge structures and externalizing problems that is not shared by social information processing. This is preliminary evidence that processing is not independent from knowledge structures. Rather, processing serves as the translator from stored knowledge to behavior but does not contribute in and of itself. However, this is only preliminary evidence and this issue deserves a great deal of further inquiry. It is possible that the remainder of the effect of knowledge structures on behavior is mediated through other aspects of social information-processing (e.g., how a child evaluates the consequences of behaviors). Also, these other aspects of social information-processing might exert independent effects on aggressive behavior. Finally, this effect could be due to measurement issues concerning the assessment

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of social-information processing and knowledge structures and difficulties in measuring these two components independently of one another.

Third, results from this study are consistent with the hypothesis that social cognitions partially mediate the stability between early and later externalizing problems. These results highlight the importance of knowledge structures in aggressive development over processing during ongoing interactions. Because we theorized that processing is primarily a reflection of an activated schema, it is not surprising that these knowledge structures account for stability in aggressive behavior.

## The Acquisition of Knowledge Structures

The origin of social knowledge structures was partially addressed in the current study. The predictability of knowledge structures from past externalizing problems implies that early social experiences are crucial to the development of knowledge structures. Several theories concerning the origins of knowledge structures have implicated early exposure to aggression and abuse as having a dramatic effect on the quality of such structures. Crittendon and Ainsworth (1989), building on Bowlby's (1982) attachment theory, hypothesized that chronic child maltreatment will lead a child to develop knowledge structures of the social world as a hostile, threatening place with relationships based on conflict and dominance. Bandura's (1973, 1977, 1986) social learning theory suggests that observation of others provides a powerful framework for organizing one's own future behavior. Observational learning and modeling of physical abuse in particular will lead to later aggression to the extent that it makes aggressive responses salient in one's response repertoire and leads one to evaluate aggressive responses as efficacious in leading to desired outcomes. Both of these perspectives, therefore, suggest there is a link between early exposure to violence and the development of knowledge structures, and between knowledge structures and later behaviors.

The process through which hostile knowledge structures develop may be more complicated, however, than simple exposure to violence. This process may be moderated by the manner in which children process the violent experience (Zelli, Cervone, & Huesmann, 1996). The current model proposes that aversive social experiences and associated cognitive processing are stored in memory in the form of hostile knowledge structures. Children who attend to and interpret early violent social experiences in a hostilely biased manner will develop a hostile knowledge structure. An acquired hostile knowledge structure will then increase the likelihood that the child will display externalizing problems and will continue to do so over time. On the other hand, children who do not attend to early violent social experiences or who interpret them in a non-hostile manner may not develop hostile knowledge structures at all. These issues illustrate how the investigation of the development of knowledge structures of children who have been exposed to physical violence is a vital component in understanding the origins of children's maladaptive social cognitions and deviant behavior and is an exciting next step in this line of inquiry.

## The Nature of Knowledge Structures: Beyond Quality

The current investigation focused on only a single aspect of knowledge structures, namely their hostile *quality*. There are many as yet untapped dimensions of these structures that may also prove influential in controlling children's externalizing behavior. Three will be discussed here.

**Affiliative Appropriateness—**Not only might children's knowledge structures be more or less hostilely oriented, they may also be oriented towards more prosocial or antisocial playmate choices. For example, some children may come to like children who are mean and dislike children who are nice. Initial data on this issue of affiliative appropriateness (liking prosocial peers and disliking antisocial peers) suggests an inverse relation between affiliative

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appropriateness and externalizing behaviors (Burks, Dodge, Price, & Laird, in press. That is, children who like prosocial peers and dislike antisocial peers are less likely to experience externalizing difficulties while those who *dislike* prosocial peers and *like* antisocial peers are more likely to experience such difficulties. Perhaps children whose knowledge structures orient them towards valuing more antisocially oriented peers are more likely to seek such individuals out as playmates. In the process, such children may learn to behave in a deviant manner (Akers, 1985; Kaplan, Johnson, & Bailey, 1987). Social learning theory suggests that involvement with deviant peers facilitates engagement in deviant activities primarily through three mechanisms: (1) facilitation, where deviant peers are likely to teach deviant acts either through direct instruction or modeling; (2) gratification, where valued deviant peers serve as a positive reference group; and (3) limiting effectiveness of controls, where deviant peers can function to place limits on the extent to which personal and social controls inhibit the engagement in deviant behavior. Thus, knowledge structures that orient a child towards valuing deviant peers are likely to lead that child, ultimately, to engage in more externalizing behaviors.

**Categorization—**As described in the *general model*, a critical step in this cognitive process concerns bringing stored knowledge of past experiences to bear on current social situations. Identification of the most appropriate knowledge structure requires appreciation of some *similarity or relationship* between the current situation and that stored memory. Because no two social situations are ever exactly the same, the task is more complicated than simply matching the current situation with a past experience. The process of *categorization* allows for nonidentical stimuli to be treated as equivalent and thus becomes the central task in accessing previously stored knowledge relating to this new experience. How this categorization process occurs remains a controversy in the area of cognitive psychology and remains virtually uninvestigated in the area of social knowledge structures. Two prominent hypotheses have been proposed in cognitive psychology to understand the categorization process, namely, prototype and exemplar theories, both of which rely on roughly the same similarity principle. That is, category membership is determined by whether the current situation is sufficiently similar either to the *prototype* or to a set of encoded *examples*.

**Organizing Themes—**Medin (1989) has argued that these ‘similarly’ based approaches need to be updated to include the role of theories and explanations in organizing categories. For example, the objects children, money, photo albums, and pets form a meaningful category only with the addition of the explanatory information of ‘things to take out of a burning house.’ Analogously, diverse social encounters such as: *last week a kid knocked over my drink, I didn't get invited to the party*, and *I sit alone at lunch*, form a coherent category only with the addition of the organizing construct, *I'm not well liked*. Knowledge structures may incorporate these assumptive organizing themes that may become critical in influencing future behavior.

## Limitations and Future Directions

Clearly, social knowledge structures are multifaceted phenomena whose investigation is still in its infancy. The current study evaluated knowledge structures, social information processing, and externalizing problems contemporaneously, thus precluding any testing of the causal relation between these social cognitive structures as well the causal relation between cognitions and subsequent behavior. Such a demonstration of causality is crucial in the determination of knowledge structures as the controlling mechanism of aggressive behavior. In addition, the current study was limited in the extent to which both knowledge structures and social information processing were evaluated. There are, undoubtedly, additional points in the process in which knowledge structures exert their influence. For example, they may be involved in filtering out social cues that are available to the child, perhaps through such processes as selective attention. A hostilely oriented knowledge structure may prevent an aggressive child from attending to the facial cues of a playmate, thus preventing access to important information

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about the emotional state of that person. Several aspects of social information processing were also not included such as attention to relevant cues and response evaluation. Finally, we have selected only two instruments with which to assess knowledge structures. Borrowing techniques from cognitive and social psychology such as priming, spontaneous trait inference, reaction time, and categorization and techniques from psychoanalytic practice such as sentence completion and word association, we hope to improve our ability to investigate knowledge structures directly and assess their role in the development and maintenance of children's aggressive and violent behavior more fully.

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## Appendix A

Schema Assessment of Typicality.

**1.** Of these two items, which is more typical of the kids at your school?

| | |
|---|---|
| loud | quiet |
| friendly | mean |
| obey the teachers | don't obey the teachers |
| help me with homework | don't help me with homework |
| do things I like to do | do stupid things |
| argue a lot | get along well |
| hate me | like me |
| pick fights with me | get along with me |
| cool | jerks |

**2.** Of these two items, which is more typical of your parent(s)?

| | |
|---|---|
| young | old |
| punishing | forgiving |
| quiet | out of control |
| understanding | self-centered |
| strict | loose |
| lots of rules | few rules |
| cool | out of date |
| loving | mean |
| harsh | gentle |

**3.** Of these two items, which is more typical of your teachers?

| | |
|---|---|
| old | young |
| rigid | fair |
| smart | stupid |
| good teachers | bad teachers |
| punishing | forgiving |
| self-centered | helping kids |
| approachable | unreachable |

| | |
|---|---|
| weird | cool |
| mean | friendly |

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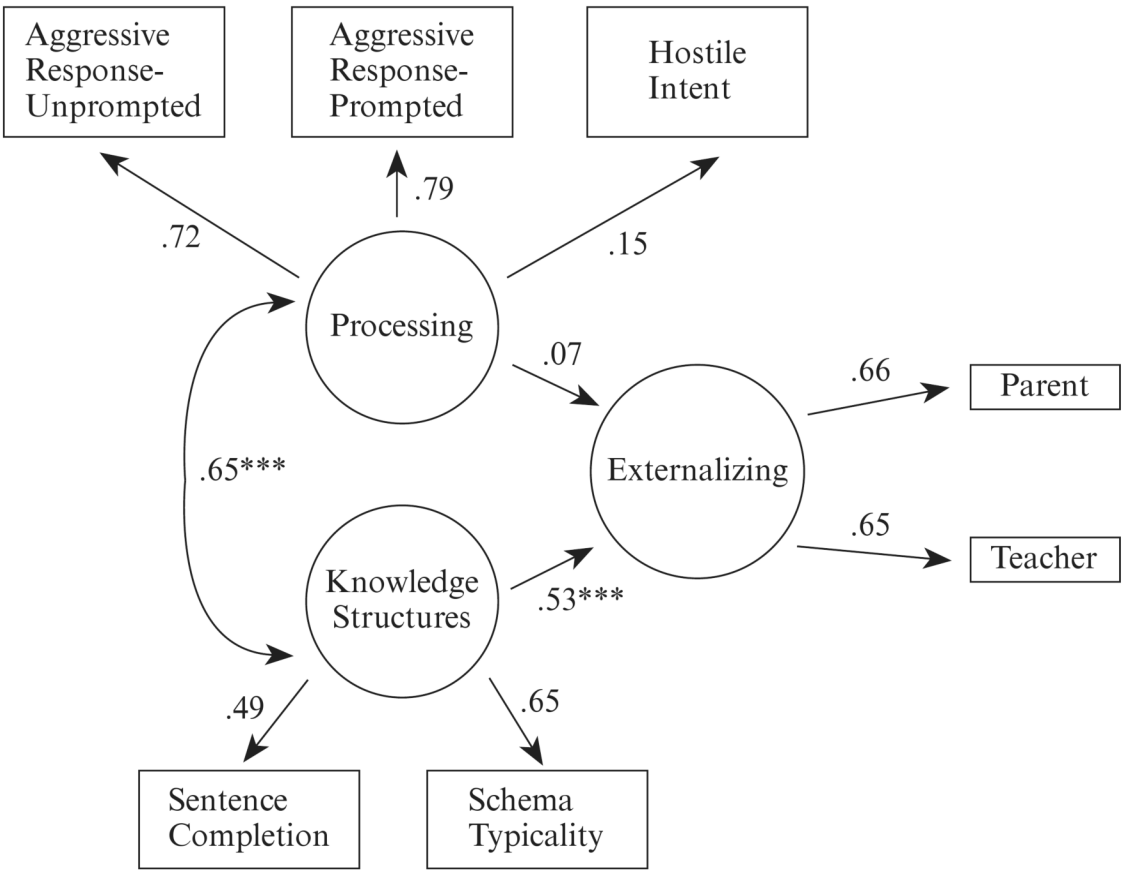


**Figure 1.**
Knowledge structures and social information-processing as predictors of externalizing problems.

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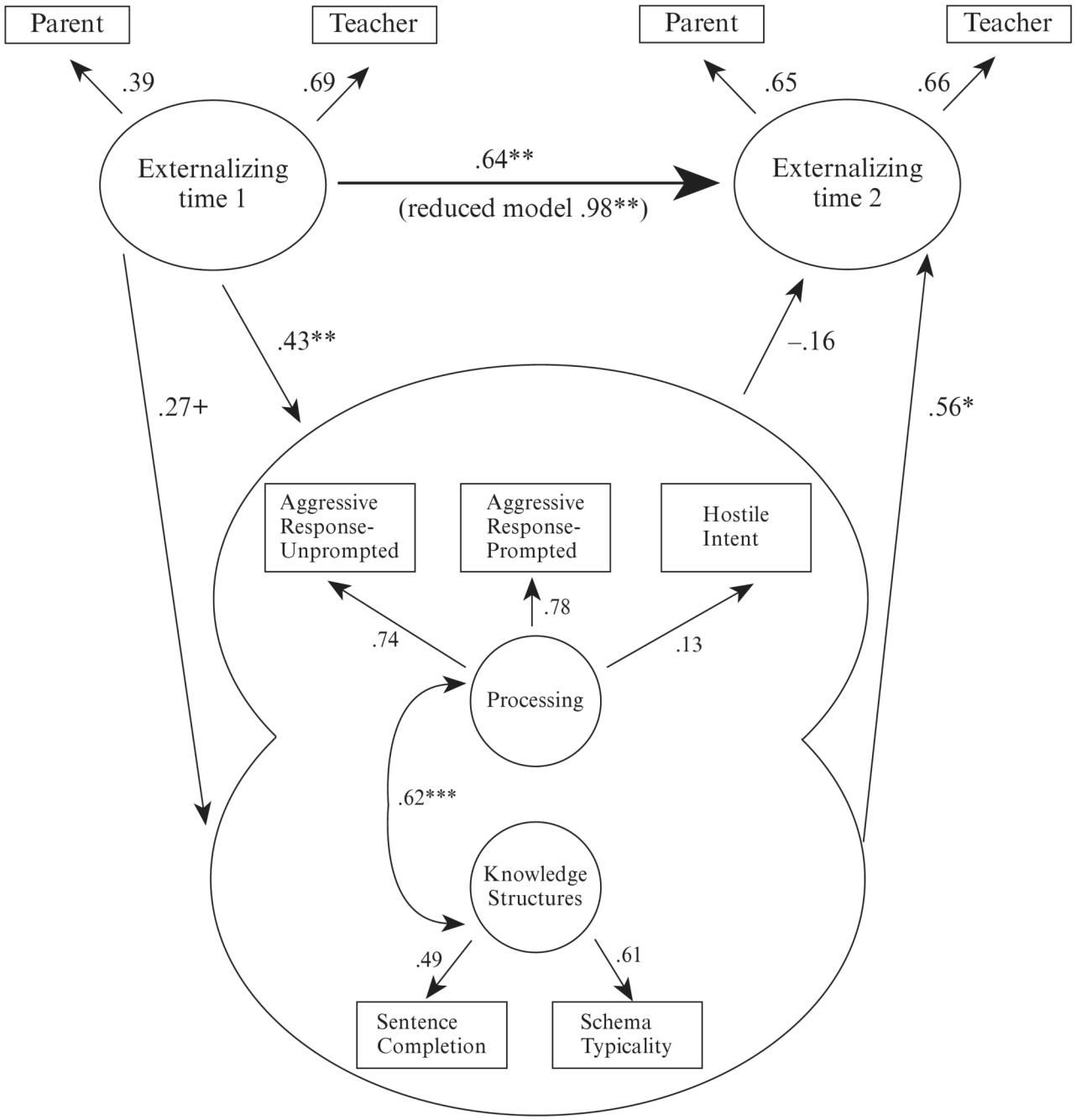


**Figure 2.**
Knowledge structures and social information-processing as mediators of stability in externalizing problems.

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**Table 1**

**Bi-Variate Correlations**

| | Externalizing T1 | | Externalizing T2 | |
|---|---|---|---|---|
| | **mother** | **teacher** | **mother** | **teacher** |
| Externalizing Time 1 | | | | |
| mother | — | .243** | .436** | .252** |
| teacher | | — | .278** | .294** |
| Externalizing Time 2 | | | | |
| mother | | | — | .423** |
| teacher | | | | — |
| Social Information Processing | | | | |
| Interpretation | .021 | .076 | .105* | .138** |
| Unprompted | .088 | .228** | .157** | .174** |
| Prompted | .073 | .223** | .153** | .192** |
| Knowledge Structures | | | | |
| Sentence Completion | .049 | .032 | .230** | .140** |
| Typicality | .107* | .166** | .226** | .231** |

| | Social Information Processing | | | Knowledge Structures | |
|---|---|---|---|---|---|
| | Interpretation | Unprompted | Prompted | Sent Comp | Typicality |
| Externalizing Time 1 | | | | | |
| Mother | .021 | .088 | .073 | .049 | .107* |
| Teacher | .076 | .228** | .223** | .032 | .166** |
| Externalizing Time 2 | | | | | |
| mother | .105* | .157** | .153** | .230** | .226** |
| teacher | .138* | .174** | .192** | .140** | .231** |
| Social Information Processing | | | | | |
| Interpretation | — | .078 | .102* | .210** | .146** |

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| | Externalizing T1 | | Externalizing T2 | | |
|---|---|---|---|---|---|
| | **mother** | **teacher** | **mother** | **teacher** | |
| Unprompted | | — | .558** | .114* | .332** |
| Prompted | | | — | .189** | .330** |
| Knowledge Structures | | | | | |
| Sentence Completion | | | | — | .315* |
| Typicality | | | | | — |

* $p < .05$;

** $p < .01$