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Developmental Trends in Social Cognition for Children with and without Disabilities

Irene Ngai

DEVELOPMENTAL TRENDS IN SOCIAL COGNITION FOR

CHILDREN WITH AND WITHOUT DISABILITIES

by

IRENE NGAI

Under the Direction of Frank J. Floyd

ABSTRACT

The purpose of this investigation was to explore the impact of disability status on age-related changes in social-information processing skills including children's attributions of peer intent and response generation to hypothetical social scenarios may. SIP skills were evaluated using an adaptation of the Social Problem Solving Interview. One-hundred and seventeen children aged 7-13 years-old provided 1 to 4 sets of interview data, collected annually. The groups included 28 children with mental retardation, 56 with a specific learning disability, and 33 comparison children. Hierarchical linear modeling revealed that both groups of children with disabilities demonstrated less cognitive flexibility than comparison children in their attributions about peers. Regarding response strategies, children with mental retardation generated fewer social strategies overall and offered more retaliatory strategies than comparison children. With increasing age, children with learning disabilities increased their use of avoidant strategies and decreased their proportion of retaliatory strategies compared to children without disability.

INDEX WORDS: Social Cognition, Social information processing, Children with mental retardation, Children with a specific learning disability

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IRENE NGAI

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IRENE NGAI

Major Professor:	Frank J. Floyd
Committee:	Christopher Henrich
	Diana L. Robins

Electronic Version Approved:

Office of Graduate Studies
College of Arts and Sciences
Georgia State University
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The quality of children's relationships with their peers has been an area of research interest because of longitudinal evidence that suggests a link between social maladjustment in childhood and later life difficulties (Crick & Dodge, 1994; Vaughn & Hogan, 1990). Children with developmental disabilities and learning disabilities generally experience difficulty with peer relationships. These difficulties may put them at risk for adjustment problems both in childhood and adulthood. Thus, it is important to understand factors that may lead children with disabilities to develop more effective peer relationships.

To understand the abilities that underlie successful peer relationships for children, researchers have used a social-cognitive approach to investigate how adjusted and maladjusted children perform social information-processing tasks and how this processing is associated with both short-term and long-term social competence. Research and theory on children's social information-processing originally focused on understanding the development of the social difficulties experienced by children with aggressive behavior problems. However, because this research included normative comparison children at different ages, researchers can infer a developmental profile of age-related differences in social-information processing skills.

The purpose of this investigation is to comprehend the development of social-information processing skills and how the development of these skills may be affected by disability status. This study will draw on research and theory regarding these processes in aggressive children and non-aggressive controls as well as more recent applications to children with disabilities. The present study will address developmentally related differences in two ways, through examination of the effects of developmental disabilities, that is, mental retardation and learning disabilities, on specific aspects of children's social information-processing, and through longitudinal evaluation of age-related changes during middle childhood.

A Model for Understanding the Development of Social Cognition

Crick and Dodge (1994) created a reformulated model of social information-processing which describes the underlying cognitive processes that account for individual differences in social behavior and social adjustment. This model was derived from an earlier model proposed by Dodge in 1986. Social information-processing models such as this one depict an individual's ability to make sense of and react to information present in different social situations, such as peer or family interactions, and different contexts, such as home or school. Moreover, social information-processing models differentiate multiple social-cognitive processes, each of which contributes uniquely and in tandem to the ability to comprehend social cues and enact situationally appropriate social behavior (Leffert & Siperstein, 2002). As a result, such models enable researchers to examine the discrete and cumulative impact of each social-cognitive process in determining an individual's response to a social encounter.

Crick and Dodge's (1994) model demonstrates how the processing of a stimulus in the form of a social cue follows a sequence of steps from perception of a particular stimulus to the enactment of a behavioral response (Crick & Dodge, 1994). The steps include (1) encoding of external and internal cues, (2) interpretation and mental representation of those cues, (3) clarification or selection of a goal, (4) response access to previously used responses or construction of new solutions, (5) response decision, and (6) behavioral enactment. Crick and Dodge (1994) also attempt to capture the "on-line," that is, parallel processing aspect of the social information processing model by including feedback mechanisms to illustrate that children engage in interpretation processes while they are encoding cues, and that they continue to consider the meaning of another's behavior as they access responses. Crick and Dodge (1994) caution that the stepwise framework of their social information-processing model is not meant to imply that, in all circumstances, children are consistently reflective and active thinkers when engaged in social interactions. That is, familiar circumstances probably require less cognitive effort. Yet, the model can explain how children process information and generate responses in novel social situations.

Crick and Dodge (1994) proposed that children approach each social situation with their acquired social knowledge and a set of biologically limited capabilities such as general cognitive ability. The authors describe elements such as schemata and scripts as well as working models of relationships as examples of latent mental structures that guide future social information-processing and constitute an individual's social knowledge. General cognitive ability subsumes discrete cognitive abilities such as attentional abilities and the ability to represent, organize, and interpret social information. Thus, general cognitive ability is likely to enhance or reduce an individual's ability to skillfully process and respond to incoming social information, which will in turn, contribute to event outcomes. The combination of each child's general cognitive ability level and knowledge gained through past social experiences combine to influence the child's performance within each social interaction, which in turn, and over time, affects their overall social competence.

Researchers can employ social information-processing models to examine how children's discrete social cognitive processing abilities relate to overall social competence, which is associated with future adjustment. Social cognition is one aspect of a larger set of abilities indicative of social competence. Specifically, social competence is considered to include the following four components: (1) positive relations with others, (2) accurate/age-appropriate social cognition, (3) absence of maladaptive behaviors such as disruptive conduct, poor attention, or anxiety, and (4) effective social skills (Vaughn & Hogan, 1990). Performance in any of these domains early in development is expected to predict future social adjustment, such as, acceptance by peers, whereas deficits may contribute to social maladjustment, such as, rejection or neglect by peers.

The stepwise framework of Crick and Dodge's model specifies how maladaptive social behaviors follow from deficient processing abilities. Dodge (1986) notes that a breakdown or deviation in processing at any step can occur in any of three forms. First, a child may completely fail to engage in a particular processing step. Second, a child may display a skill deficit in processing, such as by inaccurately interpreting a social cue. Lastly, a child may demonstrate a deviant bias in processing. Biases can include assuming that a social cue has qualities it does not have, such as interpreting a benign social cue as hostile, or selecting a response based on its cognitive accessibility rather than its appropriateness for a particular situation. If performance at some point in the progression is unskilled for any of these reasons, the child is likely to enact a maladaptive social behavior (Bryan, 1997; Tur-Kaspa, 2002). Such behavior may then contribute to further difficulties in social interactions by eliciting reciprocally negative reactions from peers, such as hitting or ignoring the child. Over time, responses such as these are likely to diminish the quality and frequency of a child's social interactions.

Development of Social Cognitive Skills for Children without Disabilities

Many researchers have sought to understand the processes of encoding and interpretation in order to illuminate skill deficits that lead to negative behavior. The encoding of cues is the process of becoming aware of and selectively focusing on the most relevant social events or elements in the external environment, as well as focusing on the internal cues about one's own emotional state. Social cues can include physical actions, words, facial expressions, and body language (Crick & Dodge, 1994). The interpretation of cues refers to the process of integrating these elements to form a personal mental representation that reflects one's understanding of the social situation (Leffert & Siperstein, 2002). That is, the interpretation of cues may involve causal inferences such as attributions about the cause of an event or about the intent of a peer (Crick & Dodge, 1994; Leffert & Siperstein, 2002). In research, these two processes are often linked because encoding cannot be explicitly examined; rather, it is inferred from a child's causal interpretations of social information.

Interpretation processes are important to investigate because research findings suggest that normative groups of children as young as five and six years of age react to others according to their perceptions of the intentions of others (Dodge, 1986). The magnitude of this effect appears to grow with development such that children's reliance on their perceptions of another's intent in determining their behavioral response increases with age (Dodge, 1986). Research findings also indicate that young children tend to focus on concrete features of specific stimuli, that is, whether the impact or outcome of the event was positive or negative, whereas older children learn to attend to generalities and psychological aspects of the stimulus person, including their traits, habits, and beliefs (Dodge, 1986). Thus, as children grow older, their capacity and inclination for encoding many features of social cues, such as, content and affective quality before making an attribution of intent, appears to increase (Dodge, 1986).

Empirical data supplies additional evidence for age-related changes in children's interpretation of intent. Dodge, Murphy, and Buchsbaum (1984) examined children's ability to detect intent, and demonstrated age-related differences both for children with good and poor peer adjustment. The investigators presented 8- and 9-year-old children with five video vignettes in which a pair of children portrayed a potential provocation situation in which one child destroyed the toy of the other child. Each scenario portrayed an intention by the perpetrator that was either hostile, prosocial, accidental, or ambiguous, or when the perpetrator was merely present, which occurred when the child destroyed his/her own play object and blamed the act on the other child. The participant's task was to discriminate between the types of intention portrayed by the actors across various scenarios. Results indicated that children's accurate detection of intention-cues increased with age, and that children with good peer adjustment obtained higher scores than did children who were neglected or rejected by peers. Specifically, adjusted and older children were more accurate than children labeled as neglected or rejected and younger children in their identification of prosocial or accidental intentions. Additionally, when neglected or rejected children made inaccurate evaluations of intent, their errors tended to involve labeling prosocial intentions as hostile. All groups were similar in their ability to detect hostile intention. The authors concluded that the ability to identify hostile intent cues may be achieved earlier in development than the ability to identify prosocial cues. Similarly, Dodge and Price (1994) used video recorded stimuli to assess processing patterns for 6-8-year-old children. The authors found significant linear effects of age such that older children relative to younger children were more accurate in encoding both hostile and non-hostile cues.

Age effects are also relevant to changes in children's behavioral response repertoires. That is, a child's database of social knowledge is likely to change over time as a result of the child's greater experience in social interactions with peers and through socialization by adults with respect to social norms and behavioral consequences (Crick & Dodge, 1994; Meadan & Halle, 1994). This expansion of children's social knowledge includes the development of a larger and more competent response repertoire for managing social situations. For instance, older children are typically able to generate a greater number and more varied responses to hypothetical social problems than younger children (Dodge, 1986; Mayeux & Cillessen, 2003). Older children also demonstrate a preference for selecting competent responses for social situations (Tur-Kaspa & Bryan, 1994). Specific to response quality, older children endorse aggressive responses less than younger children (Dodge & Price, 1994). Moreover, they increase their use of direct and pro-social strategies, such as requesting to play with a peer or for a compromise, and decrease their use of less effective avoidant strategies, such as waiting to see what happens or playing with a different peer (Mayeux & Cillessen, 2003). These preferences may be explained by Dodge, Murphy, and Buchsbaum's (1984) finding that as children grow older, social norms dictate a larger proportion of behavioral responses than do attributions of intent. Thus, over the course of social maturation, awareness of social norms, especially those based on adult expectations, could lead to a decrease in aggressive behaviors in favor of pro-social, that is, competent behavior (Dodge, Murphy, & Buchsbaum, 1984). In summary, with age, the quality of children's strategy repertoires is likely to change such that a larger proportion of the strategies becoming relatively more competent, that is, more skillful and adaptive, and less aggressive (Crick & Dodge, 1994).

In summary, as typically developing children grow older, it is expected that their ability to accurately interpret the intent of another person will increase. Age effects are also expected in terms of the quality and quantity of response strategies. Specifically, quality is reflected in the competence of response strategies whereas quantity as measured according to the number of unique solutions generated in response to social stimuli. The present study will evaluate whether the development of social cognitive abilities for children with mental retardation or learning disabilities parallel the process for a group of normative comparison children, and if not, how their developmental trajectories differ.

Development of Social Cognitive Skills for Children with Mental Retardation

The use of a social-cognitive perspective to explore the social competence of children with mental retardation is a method for examining the juncture between cognitive ability and adaptive behavior. Leffert and Siperstein (1996) noted that the processes involved in navigating social situations are highly cognitively saturated, that is, they require high-level cognitive skills. For children with developmental disabilities, the skills associated with each component of the social cognition model, such as the ability to organize incoming information, may not yet be fully formed or may function less effectively than expected for their normative comparison peers (matched according to chronological age). Thus, children with mental retardation are expected to lag behind their normative comparison peers in the development of their social cognition skills due to limited general cognitive abilities.

Research indicates that children with mild mental retardation (MMR) have a clear developmental lag in the encoding and interpretation of multiple cues that involve judging another person's behavioral intentions. These processes are expected to pose a significant challenge for children with MMR for three reasons: (1) to perform these processes an individual needs to act instantaneously and swiftly in relation to a continuously changing social environment, (2) to properly encode social stimuli, individuals must selectively focus their attention on the most useful social information while ignoring irrelevant cues, and (3) to arrive at an accurate interpretation, individuals must simultaneously focus on important information and integrate this into a unified interpretation (Leffert & Siperstein, 2002). These processes are further complicated when a child is faced with multiple competing cues that would lead to alternative inferences regarding an actor's intention (Leffert & Siperstein, 2002). That is, children with mental retardation experience difficulty reconciling conflicting messages between an actor's intentions and the outcome of the event (Leffert & Siperstein, 1996).

Cognitive maturation theories can be used to explain why children with mental retardation experience difficulty with reconciling conflicting social cues. A sign of growing cognitive maturity is the ability to "de-center," which is the ability to focus on multiple aspects of the perceptual field as opposed to "centering" on only one feature (Leffert, Siperstein, and Millikan, 2000). Children with MMR likely experience difficulty with reconciling multiple cues because they focus on one cue, which is usually the negative effect of a peer's actions, to the exclusion of other cues such as those indicating benign intentions such as a peer's presence at the time of an incident (Leffert and Siperstein, 2002). Moreover, Chandler, Greenspan, and Barenboim (1973) suggested that children with MMR are likely to focus on negative outcomes because these are highly concrete in impact whereas social cues suggesting benign intentions are less concrete in their impact and also demand that the child make more cognitive inferences.

In addition to these "de-centering" theories, Leffert and Siperstein (1996) explain the difficulty children experience reconciling conflicting social cues from a Piagetian perspective. According to this perspective, the "either/or" approach to evaluation, in which only one quality of the event can be acknowledged, is the expected ability level for children of average intelligence in the 5- to 8-year-old range, that is, the pre-operational period. The ability to simultaneously process both intent cues and their consequences occurs upon attaining the concrete operation stage at age 9 to 10. Due to delays in general cognitive ability, 9-10 year old children with mental retardation are likely to experience delays in the development of their ability to reconcile conflicting social cues. Thus, not until adolescence are individuals with MMR able to engage in concrete operations, that is, to generate plausible explanations for resolving the discrepancy between conflicting cues (Leffert and Siperstein, 2002).

Leffert and Siperstein (2002) described a series of studies that were conducted to examine whether children with developmental disabilities (DD) would demonstrate social information processing difficulties in hypothetical social situations. To study children's understanding of social situations, researchers used both verbal stories and video taped vignettes. In the studies reviewed by Leffert and Siperstein, children with MR were usually presented with vignettes of social problem situations that involved a negative event outcome, such as the child's books being knocked off of his or her desk. The vignettes also portrayed social cues that indicated either a hostile, benign, or ambiguous intention of a peer. For example, hostile intention was implied when the books were centered on the desk and the peer laughed at the child after the books were knocked off the desk. In contrast, benign intention was implied when the books were clearly protruding off the edge of the desk and the peer said "Oops" after knocking the books to the ground. An ambiguous intention was suggested when the books were knocked off the desk, the peer shrugged and kept walking. Each child was required to provide an explanation for the peer's behavior following each vignette. Overall, the findings indicated that children with mental retardation were consistently accurate in their interpretation of hostile intentions but they had difficulty with interpreting benign intentions (Leffert & Siperstein, 1996). Specifically, Leffert and Siperstein (1996) found that children with MR showed an accuracy level of no greater than chance in interpreting benign intentions. Moreover, Leffert, Siperstein, and Millikan (2000) found that when benign intention social cues were presented in social conflicts involving peer entry, children with MR resembled younger children without MR in misinterpreting the other child's intentions as "being mean." That is, children with MR tended to perceive benign intentions as hostile.

In addition to the complex process of learning how to interpret social cues, children must also acquire the ability to generate socially appropriate responses based on the demands of each social situation. Research findings indicate that children with mental retardation lag behind their peers in the strategy generation process of the social information processing sequence. For example, Smith (1986) presented hypothetical problem-solving situations to children with mental retardation and compared their performance to two other groups of children matched according to either mental age or chronological age. The children with mental retardation were similar to children matched according to mental age on both the types and numbers of strategies generated (Smith, 1986). That is, they generated fewer socially appropriate strategies and fewer strategies overall than their chronologically age matched peers. Moreover, Leffert, Siperstein, & Millikan (2000) demonstrated that children with MR experienced difficulty varying their social strategies to fit the social situation and often resorted to suggesting an appeal to authority. These findings indicate that children with MR are more similar to younger children than their same age peers in terms of their skill level in response strategy generation.

Development of Social Cognitive Skills for Children with Learning Disabilities

Regarding children with LD, researchers have discovered that students with LD experienced difficulties encoding and interpreting social cues (Bryan, 1997). That is, children with LD were less competent than non-disabled students in understanding and interpreting social cues such as detection of lies or others' intentions. Furthermore, in response to "real-life" situations, using video or verbal vignettes, students with LD perceived more situations as unfriendly compared to students without LD (Weiss, 1984) and were less accurate in their inferences regarding the feelings and intentions portrayed by characters through direct or subtle facial, behavioral, or verbal cues (Pearl & Cosden, 1982). Tur-Kaspa and Bryan (1994) employed audio taped vignettes to assess the social-information processing skills of children with LD in the third, fourth, seventh, and eighth grades compared to their low achieving (LA) and average achieving (AA) peers, as determined by the children's academic performance. Results of this study indicated that AA students outperformed LD students on all social information-processing steps evaluated. With regard to the interpretation process, AA students were more likely to generate multiple interpretations for the social situations than were their LD and LA peers. LD and LA students tended to exhibit "black and white" interpretations of the situations, that is, they were likely to interpret situations as either hostile or non-hostile, and were likely to expect either negative or positive outcomes without considering the impact of context. In general, these findings suggest that children with LD are less accurate in their interpretation of intention cues and generate fewer alternate interpretations for social situations than their normative comparison peers. Moreover, children with LD also seem to demonstrate a hostile bias in their interpretation of social situations,

Children with LD also experience difficulty with the strategy generation process of social cognition, wherein the variety of solutions proposed by these children is less than that of their normative comparison peers. For instance, in studies involving role-playing measures of social problem-solving skills, children and adolescents with LD experienced more difficulty with generating alternative solutions to hypothetical social situations than their peers without LD (Tur-Kaspa, 2002). Toro, Weissberg, Guare, and Liebenstein (1990) obtained a similar finding when they compared the social problem-solving skills of children with learning disabilities to non-learning disabled peers. Toro et al., used the Open Middle Interview, an individually administered interview including four hypothetical social scenarios to assess each child's ability to generate an array of alternative solutions. The authors defined alternative solutions as novel, goal-directed protagonist actions in response to social problem situations. The results indicated that the children with LD generated significantly fewer alternatives for solving social problems situations than their normative comparison peers.

Research also indicates that, in addition to creating less diverse strategies, children with LD select strategies that are less socially competent than those selected by their peers without learning disabilities. That is, children with LD seem to have knowledge of socially accepted solutions, but consistently select a restricted range of response strategies. For instance, when presented with a set of goals and strategies from which to choose, students with LD demonstrated an awareness of the effectiveness of competent versus incompetent strategies (Oliva & LaGreca, 1988; Tur-Kaspa & Bryan, 1994). Yet, Tur-Kaspa and Bryan (1994) found that students with LD demonstrated a significantly lower preference for competent strategies than their LA and AA peers. Similarly, Oliva and La Greca (1988) found that in response to hypothetical interpersonal situations presented in an open-ended and multiple-choice format, boys with LD created social strategies that were as friendly as their non-disabled, same age peers, yet their goals for the social situations were less socially appropriate or specific. These findings suggest that children with LD can distinguish between competent and incompetent response strategies, yet they tend to select strategies that are less competent than those of their normative comparison peers. Yet, as Tur-Kaspa and Bryan (1994) suggested, with age, improvements in the competency of their response decision processes may be expected.

Hypotheses

Overall, research suggests that children with MR or DS experience significant general cognitive delay and children with LD experience specific cognitive deficits that are likely to impact the development of social cognitive skills. However, researchers have not tested the developmental lag hypothesis comparing children with different types of disabilities to children without disabilities, and using a longitudinal research design. The purpose of the present study was to examine whether children with MR (including children with DS) and LD differ from their normative comparison peers in their ability to interpret social cues and generate response solutions to hypothetical social situations, and whether these differences remained stable over time. That is, the overarching goal of the present study was to determine whether differences in developmental trajectories are associated with group membership.

Data for the present study were obtained from that of a larger multi-site, longitudinal investigation of the impact of social facilitation by families on social outcomes for children with developmental disabilities, learning disabilities, and children without disabilities. Children were presented with scenarios that required them to interpret the intent of a child whose actions are associated with a negative event outcome. Children's interpretations of the intent of the child in these social situations were coded as either hostile, benign, mixed (i.e., combination of hostile and benign), or self-blaming. Interview data were obtained for as many as four waves of data collected at yearly intervals. The use of longitudinal data enabled an exploration of cross-sectional age differences (i.e., differences between children of different ages at each time point) as well as longitudinal trends (i.e., changes that occur or accumulate across time points).

However, because this study used incomplete longitudinal data, fewer data points were available for statistical estimation of developmental trajectories. To address this statistical limitation, hierarchical linear modeling was used to estimate growth trajectories. Using this method, the present study was intended to build on existing research findings to better reflect the development of social cognitive skills in children with and without disabilities.

Hypothesis 1

Due to delays in general cognitive functioning, as a group, children with mental retardation and Down syndrome (MR group) would be expected to make the highest proportion of hostile attributions for hypothetical stressful social events compared to children without disabilities. Similarly, because children with learning disabilities (LD group) have specific cognitive deficits that may impact their ability to accurately interpret intention cues, these children are also anticipated to make more hostile attributions than their peers without disabilities.

Hypothesis 2

Based on differences in cognitive ability, both the quantity and quality of children's proposed responses to hypothetical social scenarios would be expected to differ according to the child's disability status. Specifically, children with MR are expected to suggest a fewer number of potential response strategies than their normative comparison peers because this ability is likely to be affected by their general cognitive delay. Likewise, children with LD are expected to generate a smaller array of response strategies than their normative comparison peers.

Regarding the quality of response strategies, children with MR would be expected to generate a higher proportion of aggressive and avoidant responses, and fewer prosocial strategies than comparison children. Children with LD are also anticipated to suggest fewer prosocial strategies as well as more avoidant and aggressive responses than their comparison peers. Yet, the magnitude of the differences between children with LD and the comparison children are expected to be less than those observed between children with MR and children without disabilities.

Hypothesis 3

With increasing age, it is expected that the overall sample would evidence maturational gains in their types of causal attributions. Specifically, it is predicted that children would make a higher number of benign attributions and a lower number of hostile attributions in response to stressful social situations (presented in the scenarios). Moreover, although children with MR are expected to demonstrate a developmental trend toward making more accurate inferences with increasing age, their rate of growth would be anticipated to be less than that of their normative comparison peers. Similarly, children with learning disabilities are anticipated to make continuous developmental gains, however, their ability would be expected to lag behind that of their normative comparison peers.

Hypothesis 4

Children's strategy generation skills would also be likely to demonstrate maturational gains such that, with increasing age, the number of qualitatively unique responses and the proportion of socially appropriate response strategies generated would be expected to increase. Specifically, children with MR would be expected to provide a larger array and higher number of socially appropriate response strategies with age. Yet, across ages, these are likely to be fewer than those provided by their normative comparison peers. Likewise, children with learning disabilities would be likely to show an increase in the number of unique strategies and proportion of mature response strategies suggested, yet the rate of increase in skills for children with LD is predicted to remain behind that of their normative comparison peers.

Method

Participants

The families were participants in a larger two-site, longitudinal study of the impact of facilitation by families on social outcomes for children with developmental disabilities or learning disabilities and typically developing children. The participants included three groups of families with a target child between the ages of 7-13 years across the assessment phases. Families were recruited from public schools in several school districts in the vicinity of Atlanta, Georgia and Chapel Hill, North Carolina. School officials were sent letters explaining that the aim of this project was to understand the family and peer relationships of children with mental retardation or learning disabilities. To preserve the confidentiality of children enrolled in special education classes, school officials were asked to distribute these letters to families of children with mild or moderate mental retardation enrolled in special education classes or children diagnosed with a learning disability. Interested parents were then encouraged to contact the project coordinator for additional information.

MR group: Families of children with mental retardation

This group was comprised of 28 families with a target child who had either mild or moderate mental retardation or Down syndrome. Children were also identified for special education services within the school system. Criteria for mental retardation included evidence of impairments in cognitive (IQ range = 40-70) and adaptive functioning as indicated by school testing records. Data for two children not included in the 28 families mentioned above were eliminated due to either missing or invalid data.

LD group: Families of children with learning disabilities

This group included 56 families of children with learning disabilities. The diagnosis and the nature of the disability were confirmed with school testing records and IEP reports. A diagnosis of LD was based on a significant discrepancy between IQ scores and achievement test scores, without evidence of a generalized cognitive delay. In the effort to ensure the absence of generalized cognitive delays, only children with an IQ score above 80 were selected for inclusion in this study. Data for three children not included in the 56 families mentioned above were eliminated due to either missing or invalid data.

Comparison group: Families of typically developing children

The comparison group was composed of 33 families of typically developing children with no identified disabilities. The criteria for inclusion were that no child in the family was identified as having mental retardation, a physical disability, a learning disability, or a psychoemotional disorder. Participants were selected to be similar to the other two groups on family demographic characteristics.

Sample Characteristics

A total 117 of children provided data for at least one time point (45 girls and 72 boys). Child specific demographic variables assessed included age, sex, ethnicity, grade level, special education setting, and general cognitive ability. Additionally, the family's socio-economic status was assessed based on parent education and occupational status. Table 1 displays the descriptive statistics for these variables for each group. For the overall sample, at the time of first assessment, the children were enrolled in grades 1 through 6 (M = 3.52, SD = 1.24). Their ages ranged from 7.51 to 12.21 years with a mean of 9.56 years (SD = 1.10). With regard to their ethnic background, 47% of the children were identified as European American, 42.7% African American, 9.4% of mixed ancestry, and 0.9% Latino. Family socioeconomic status was indicated by parent's scores on the Duncan scale; higher scores reflect greater occupational prestige. The mean family socioeconomic status on the Duncan scale was 38.98 (SD = 18.30) for mothers and 41.08 (SD = 22.17) for fathers. The mean score for the mothers corresponds to occupations such as a radiological technician, postmaster, and surveyor whereas the fathers' mean score indicates occupations such as sales manager, department head, and administrator.

Univariate analysis of variance tests were conducted to determine whether the three groups differed on the key demographic variables. No differences in ethnic distribution, parents' occupational status (as indicated by a Duncan score), parents' educational attainment, and household income were indicated for the three groups of children. However, at assessment phase 1, post-hoc analyses indicated that the mean age of children with mental retardation (M = 10.06, SD = 1.24) was significantly older than that of children with learning disabilities (M = 9.23, SD = 0.96), $F(2, 116) = 5.96$, $p < .05$. Additionally, the mean grade level of children in the comparison group (M = 4.12, SD = 1.08) was significantly higher than that of children with mental retardation (M = 3.46, SD = 1.23) and children with learning disabilities (M = 3.21, SD = 1.23), $F(2, 116) = 6.06$, $p < .05$.

For the three groups of children, 49 provided data for only one time point, 41 supplied data for two time points, 25 had data for three time points, and 2 children generated data for four time points. Data for 24 children were either truncated or eliminated due to invalid responses. Missing values analysis using the SPSS 12.0 software package indicated that the data for the present study were missing at random (MAR). Missing values are considered to be missing at random so long as the observed units are a random sub-sample of the sampled units. Specific to the present study, MAR was assumed because the probability that the score for a social cognitive outcome variable was observed varied according to the child's disability status and not according to the particular social cognitive outcome being investigated. That is, children with MR or LD provided invalid, and thus deleted responses, more often than their comparison peers. Yet, this pattern did not vary across social cognitive outcome variables. Moreover, no pattern of missing data was observed based on demographic variables such as age, sex, grade, and parents' socio-economic status.

Table 1

Demographic Characteristics of the Sample at Assessment Phase 1 (N = 117)

	Group		
Characteristic	MR	LD	Comparison
Age of Target Child (in years)			
Mean	10.06	9.23	9.66
SD	1.24	0.96	1.04
Grade Level of Target Child			
Mean	3.46	3.21	4.12
SD	1.23	1.23	1.08
Sex of Target Child (%)			
Female	46.40	33.90	39.40
Male	53.60	66.10	60.60
Ethnicity of Target Child (%)			
African American	35.70	39.30	54.50
European American	57.10	48.20	36.40
Latin American	0.00	1.80	0.00
Other (mixed descent)	7.10	10.70	9.10
Mother's Education (%)[a]			
> College graduate	9.50	9.00	21.20
College graduate	38.10	25.00	27.30
Technical or Trade School	0.00	12.50	6.10
Some college	23.80	21.40	36.40
High school graduate	14.30	21.40	3.00
< High school graduate	14.30	10.70	6.10
Father's Education (%)[b]			
> College graduate	15.80	12.00	22.60
College graduate	26.30	12.00	22.60
Technical or Trade School	0.00	12.00	12.90
Some college	5.30	14.00	16.10
High school graduate	31.60	38.00	16.10
< High school graduate	21.10	12.00	9.70
Duncan Score for Mothers[c]			
Mean	34.92	36.25	45.33
SD	16.61	17.28	20.45
Duncan Score for Fathers[d]			
Mean	44.64	33.95	48388
SD	20.82	19.64	23.52
Household Income[e]			
Median	63360.14	47626.41	59569.68
SD	68388.19	38198.00	42994.52

Note: [a]Sample size per group MR = 21, LD = 56, and Comparison (CO) = 33. [b]Sample size per group MR = 19, LD = 50, and CO = 31. [c]Sample size per group MR = 17, LD = 40, and CO = 28. [d]Sample size per group MR = 11, LD = 35, and CO = 27. [e]Sample size per group MR = 28, LD = 53, and CO = 32.

Measures

Child and Family Demographics

A standardized 30-minute interview was used to obtain information regarding the age, education and employment history, and ethnicity of each family member. Information regarding the household composition, such as the marital status of the parents of the target child, and the number of siblings also was obtained.

General Cognitive Ability

School records were used to obtain the most recent IQ scores for children in the MR and LD groups.

Social Information-Processing Skills Interview

To assess children's social cognitive skills, researchers administered an adaptation of the Social Problem Solving Interview (Dodge, Pettit, McClaskey, & Brown, 1986). The interviewer presented the child with three scenarios – one involving exclusion (e.g., child's request to join a play group is rebuffed), one involving an ambiguous aggressive incident (e.g., spilling a tray in the cafeteria), and one involving social aggression (e.g., talking behind the child's back). For each scenario the intent of the perpetrator was made ambiguous so we could assess the child's interpretation of intent. The interviewer presented the child with a picture that portrayed each scenario, with all children in the picture the same gender as the child. First, the interviewer told the child a brief story to describe the incident, asking the child to imagine him/her self as the central character (i.e., the victim) in the story. The child was also asked to repeat the story in order to assess their understanding of the content. Subsequently, the child was engaged in a dialogue about the story to determine the child's view of the incident, presumed emotional reaction if it happened to him/her, and attributions about possible causes for the incident. The interviewer also led the child through a series of problem-solving questions in order to assess the child's understanding of and proposed reactions to each social scenario. The child's responses were written down by the interviewer and also audio-recorded for later scoring.

Children's responses were coded based on the reformulated social information processing model developed by Crick and Dodge (1994). The data were used to obtain information reflecting each step involved in the child's social problem solving process. These included the encoding of cues, cue interpretation, attribution of intent, goal identification, strategy generation and elaboration, perceived ability to act, outcome expectancies associated with each response choice, and the selection of an optimal response decision. The present study focused on data obtained for children's attribution of intent as well as the strategy generation and elaboration processes.

To assess the child's causal attributions, researchers asked, "If this [the event] happened to you, why wouldn't the other kids let you play?" Children's attributions about the cause of the event were categorized into four types: (1) self-blaming, (2) benign, (3) hostile, and (4) mixed – both benign and hostile interpretations. For the present study, hostile and mixed interpretations were of primary interest. Hostile interpretations were reflected in responses such "he [the peer] was being mean." A mixed interpretation was indicated by both a benign statement such as "maybe there wasn't room to play" accompanied by a hostile interpretation such as "maybe they didn't want me to play."

Scores for causal attribution were calculated as follows. The proportion of hostile interpretations was computed by dividing the number of hostile interpretations the child suggested by the total number of interpretations provided across the three scenarios. Similarly, the proportion of mixed interpretations by each child was computed by dividing the number of mixed interpretations suggested by the total number of interpretations provided across the three scenarios.

To evaluate the strategy generation and elaboration process researchers asked, " What are all the things you could do if [brief description of problem portrayed in scenario]?" Each child was given the opportunity to offer an unlimited number of strategies for handling each problem scenario. Twenty-six codes were used to categorize the responses. The description for each code is included in Table 2. Each of these 26 codes was subsequently assigned to one of four coding categories; these are also described in Table 2.

Coding was completed by a team of three coders who assigned codes for both causal attribution and response strategies. Forty-six percent of the scenarios were coded by more than one coder. Kappa coefficients were calculated as an indicator of inter-rater reliability. For the first scenario, the kappa coefficient was .74 for causal attribution and .70 for response strategies. Codes for the second scenario reflected a higher rate of agreement with a kappa of .97 for causal attribution and .84 for response strategies . The third scenario yielded kappa coefficients of .65 for causal attribution and .74 for response strategies.

For solution strategies, the total number of strategies offered was computed by summing the number of strategies suggested across the three scenarios. These values ranged from three to twelve. The proportion of strategies for each of the coding categories was computed by dividing the number of strategies in a coding category by the total number of strategies provided across the three scenarios. Although the proportion of instrumental strategies was calculated, these scores were eliminated from the analyses because this category of response strategies was not of interest for the present study.

Table 2

Description of Strategy Codes for the Social Information-Processing Task

Category	Code	Description
Prosocial		Play with them, any means to be included, play with others
	04	Skillful positive social behavior (e.g., skillful prosocial approach, give perpetrator the benefit of the doubt, give a non-aggressive explanation for the negative outcome before even asking)
	07	Play with others, ask another group
	08	Play with others, be resourceful and initiate an appealing activity for others to join
	09	Play with others, method unclear
	12	Accommodate (to the interest of a peer)
	13	Compromising (each person gets something and gives up something)
Instrumental		Get new shirt, do something else fun
	01	Think - logical analysis
	05	Seek positive adult intervention to help solve the problem (e.g., get advice)
	06	Seek support from peers to help solve the problem
	10	Play by self as a strategy to be appealing to others
	11	Play by self
	19	Instrumental action (e.g., get a dry shirt)
	25	Do something to manage, control, fix, or change one’s emotions (see the good side of the situation, control temper)
Avoidant		Do nothing, give up, no attempts to feel better
	02	Ignore
	03	Do nothing at the moment and get information later or hope the situation improves
	17	Leave situation/disappear/avoidance
	18	Cry
	22	Clearly unskillful social behavior (e.g., ingratiating, eavesdrop)
	24	Do nothing or give up
	26	Hold a grudge, continue to be angry or sad, not try to fix or change your feelings
Retaliatory		Physical or verbal aggression, threats to get in trouble
	14	Verbally aggressive (threaten, insult, or argue)
	15	Physically aggressive
	16	Act in a relationally aggressive manner (exclude other or gossip about perpetrator)
	20	Threaten to or actually tell the teacher or other adult to get perpetrator in trouble
	21	Paranoid confrontation with peer or confront perpetrator in an unskillful way
	23	Assertive with peer – invoke rule, says "watch it"

Procedure

Data Collection

All procedures and all measures were identical at both sites (Georgia and North Carolina). The larger research study used an overlapping cohort design to identify developmental features of family facilitation, children's social outcomes, and the associations among these factors. During Year 1 (1999), three cohorts of participants aged 8, 9, and 10-years-old were recruited. Subsequently, each year for 3 consecutive years (2000-2004), new cohorts of children aged 8, 9, and 10-years old were recruited. In addition, returning families were asked to complete yearly follow-ups until the child reached age 11. For the present study, 109 children provided data for wave one, 59 for wave two, 34 for wave three, and 10 for wave four. The number of data points obtained from participants for each wave varied according to two factors. Specifically, children from 74 families participated in each follow-up assessment until the child aged out of the study and 43 families left the study prior to completing the assessments for which their child remained eligible.

At Time 1, all families completed two family assessment sessions in their homes that lasted approximately 2 hours each and were scheduled one week apart. The measures for the present study were completed during the first family meeting. Teams of two to three research staff conducted the assessments with families. All family members currently residing in the home were asked to participate. Research personnel began the first session by explaining that information obtained from each participating family member was confidential and would not be shared with other family members or people outside of the study. Subsequently, parental consent and child assent were obtained. To maintain confidentiality, each family member was interviewed and completed questionnaires in a separate room. Parents were usually seen in the living room or kitchen, and the children were usually assessed in their bedrooms. A member of the research team helped each child complete the child measures by administering each measure using an interview format. During the first session, parents completed questionnaires regarding family demographic information, child adaptive functioning and behavior problems, and other measures of family stress and relationships that are not included in the present study. The Social Cognitive Information Processing interview was completed with the child near the close of this first session. Upon completion of each set of assessment sessions, the family was paid $75 for their participation.

Results

The longitudinal design with repeated measures provided data with a hierarchical structure. The two levels of the hierarchy for the present study included: Level 1 units composed of the repeated outcome measures over time nested within children and Level 2 units comprised of child characteristics such as disability status. Analyses were conducted using the Hierarchical Linear Modeling (HLM) 6.01 software package. Full maximum likelihood estimation was used for all models. HLM enabled the simultaneous estimation of variance associated with individual (within-group) and population (between-group) growth trajectories (Bryk & Raudenbusch, 1992, p. 7). Additionally, the use of HLM allowed for missing data at the individual level because estimations of growth trajectories are based on data available for the population.

Six sets of unconditional estimation models were created to investigate whether developmental growth trajectories for social cognitive skills vary as a function of disability status. Descriptive statistics for each outcome variable are displayed in Table 3. For these models, the Level-1, child-level predictor variable was the age of the child at the time of assessment. Two Level-2, group-level predictor variables were tested simultaneously to contrast the groups of children according to their disability status. One vector contrasted the children with mental retardation and the comparison group without disabilities and the second vector contrasted the children with learning disabilities and the comparison group. Each developmental trajectory was described by an intercept term, π_0, an estimated score on an outcome variable for the mean age of the sample, and a slope term, π_1, the estimated linear change over time. Each of these two coefficients was specified as random in the Level-2 model. To facilitate the interpretability of the intercept term, age was centered on the mean age of the overall sample (10.22 years) at Time 1. Developmental trajectory estimations for each outcome variable are represented by the following model equations:

Level-1 model:

$$Y \text{ (Social information-processing variable)} = \pi_0 + \pi_1 (\text{Age} - 10.22) + e$$

Level-2 model:

$$\pi_0 = ß_{00} + ß_{01}(\text{MR vs CO}) + ß_{02}(\text{LD vs CO}) + r_0$$

$$\pi_1 = ß_{10} + ß_{11}(\text{MR vs CO}) + ß_{12}(\text{LD vs CO}) + r_1$$

Specific to these models, the estimated intercept for the Level-1 model, π_0, reflects the mean score on the outcome variable for an individual of the population, at age 10.22. This parameter, π_0, varies across groups in the Level-2 model as a function of the intercept for the comparison group ($ß_{00}$), the effects of MR versus comparison group ($ß_{01}$) and LD versus comparison group ($ß_{02}$), and error. Similarly, the estimated slope for the Level-1 model, π_1, is predicted by the mean rate of change for the comparison group ($ß_{10}$), the difference in the level-1 slope between the MR group and the comparison group ($ß_{11}$), the difference in the level-1 slope between the LD group and the comparison group ($ß_{12}$), and error.

The first step in conducting the HLM analyses was to evaluate unconditional level-1 models in order to examine whether there was significant variability in both the intercept (π_0) and slope (π_1) for each outcome variable. Significant variability (i.e., individual differences) in growth trajectories is necessary to justify searching for level-2 predictors to further explain any differences. For every level-2 model, a main effect of disability status as reflected by $ß_{01}$ and $ß_{02}$ was expected such that the mean intercept on the outcome variable for both groups of children with disabilities was anticipated to differ from that of the group of comparison children. Additionally, for each level-2 model, a main effect of disability status and age ($ß_{11}$ and $ß_{12}$) was anticipated such that age-related changes in the outcome variable for the group of children without disabilities would differ compared to the two groups of children with disabilities. All estimations of fixed effects are reported with robust standard errors.

Table 3

Descriptive Statistics for the Social Information-Processing Interview Outcome Variables

Variable	*n*	Mean	SD
Proportion Hostile Interpretations			
Wave 1	106	0.50	0.31
Wave 2	59	0.54	0.33
Wave 3	31	0.53	0.36
Wave 4	10	0.37	0.40
Proportion Mixed Interpretations			
Wave 1	106	0.11	0.21
Wave 2	59	0.18	0.27
Wave 3	31	0.10	0.26
Wave 4	10	0.27	0.26
Total Number of Strategies			
Wave 1	109	6.71	1.89
Wave 2	59	6.90	1.59
Wave 3	34	6.71	2.20
Wave 4	10	8.10	2.28
Proportion Prosocial Strategies			
Wave 1	109	0.32	0.22
Wave 2	59	0.27	0.22
Wave 3	34	0.32	0.23
Wave 4	10	0.51	0.22
Proportion Avoidant Strategies			
Wave 1	109	0.15	0.15
Wave 2	59	0.18	0.15
Wave 3	34	0.17	0.17
Wave 4	10	0.17	0.14
Proportion Retaliatory Strategies			
Wave 1	109	0.33	0.23
Wave 2	59	0.27	0.24
Wave 3	34	0.27	0.28
Wave 4	10	0.10	0.17

Effects of Age and Disability Status on Children's Interpretation Processes

Proportion of Hostile Interpretations

Hypothesis 1 was that children with mental retardation and children with learning disabilities would make a higher proportion of hostile causal interpretations than children in the comparison group. The hypothesis, thus, predicted that both the MR and LD vectors would be significant Level-2 predictors of the intercept for hostile interpretations. However, as shown in Table 5, in contrast to the hypothesis, HLM analysis demonstrated that the group vectors predicting the intercept were not significant. That is, there were no group related differences in the proportion of hostile interpretations offered by children.

Hypothesis 3 predicted that, overall, children would produce fewer hostile interpretations with increasing age. The hypothesis, thus, predicted that there would be a significant negative slope for the Level-1 model. The hypothesis also predicted that children with mental retardation and learning disabilities would lag behind their peers without disabilities in the rate of decrease in their hostile interpretations. That is, at Level-2, the two group vectors were expected to have significant effects on the slope. As indicated in Table 4, HLM analysis showed that the overall sample did not show any significant change in the proportion of hostile interpretations offered with increasing age. Moreover, the Level-2 group vectors did not significantly predict the slope terms.

Estimates of the random effects for the Level-2 model indicate that there was significant additional variance in the intercept that was not explained by the two group vectors included in the Level-2 models and, thus, might be explained by other variables that were not included in the HLM model for the present study, $\chi^2(60, N = 63) = 119.16$, $p < .001$. The additional variance in the slope was not significant.

Proportion of Mixed Interpretations

The first hypothesis also predicted that children with mental retardation and children with learning disabilities would make a lower number of mixed causal interpretations than children in the comparison group. Specifically, the hypothesis predicted that both the MR and LD vectors would be significant Level-2 predictors of the intercept for the proportion of mixed interpretations. Results of the HLM analysis supported this prediction for both group vectors. This is indicated by the significance of the coefficient associated with each group vector, $ß_{01}$ for the children with mental retardation and, $ß_{02}$ for the children with learning disabilities (Table 5). Specifically, at age 10.22 years (intercept), children with mental retardation (M = 0.08) made fewer mixed interpretations than children in the comparison group (M = .23). This difference was statistically significant, $t(114) = -2.67$, $p < .01$. HLM analysis also revealed that, at age 10.22 years, children with learning disabilities (M = 0.10) made significantly fewer mixed interpretations than similarly aged children in the comparison group, $t(114) = -2.56$, $p < .01$.

Hypothesis 3 also predicted that, overall, children would make more mixed interpretations as they grew older. That is, age was expected to significantly predict the beta associated with the overall slope coefficient for the Level-1 model. Additionally, children with mental retardation and learning disabilities were expected to lag behind their peers without disabilities in their rate of increase in the proportion of mixed interpretations offered. Thus, hypothesis 3 stipulated that the group vectors would predict significant slope-related coefficients that indicate positive linear change. Yet, the slopes associated with both group vectors were expected to indicate less positive slopes for the MR and LD groups compared to the group of children without disabilities. Consistent with the hypothesis, as shown by the significance of the slope coefficient for the Level-1 model, there was significant positive linear change in the proportion of mixed interpretations for the overall sample (Table 4). Additionally, significant group effects in predicting growth trajectories are indicated by significant slope coefficients, $ß_{11}$ for the MR versus comparison vector and $ß_{12}$ for the LD versus comparison vector (Table 5). As evidenced by Figure 1, the growth trajectory for the proportion of mixed interpretations indicated positive linear change for children in the comparison group (B = .08) whereas almost no linear change was estimated for children with mental retardation (B = -.006), $t(114) = -2.05$, $p < .05$. Likewise, as shown in Figure 2, comparison peers exhibited significant positive linear change in their proportion of mixed interpretations whereas children with learning disabilities (B = -.008) did not, $t(114) = -2.15$, $p < .05$. Taken together, these findings support the hypothesis that both groups of children with disabilities would demonstrate less positive linear change in their use of mixed interpretations that the comparison children. To further explore these differences, a web-based software program developed by Preacher, Curran, and Bauer (in press) was used to determine the age at which the trajectories differ enough to show significant differences between the groups. Contrasting children with mental retardation and children without disabilities, mean scores for these two groups begin to differ significantly beginning at age 9.6 years. Likewise, mean scores for children with learning disabilities begin to significantly differ from that of their comparison peers at age 9.6 years.

Estimates of the random effects for the Level-2 model indicate that there was significant additional variance in the intercepts and slopes that were not accounted for by the two group vectors and, therefore, might be explained by other variables that were not included in the HLM model for the present study, $\chi^2(60, N = 63) = 118.43$, $p < .001$ and $\chi^2(60, N = 63) = 85.28$, $p < .05$ respectively.

Table 4

Level-1 Model Estimates for Growth Trajectories of Children's Social Interpretation Processes

Predictor Variable	Coefficient	SE
	Proportion of Hostile Interpretations	
For average rate at age 10.22, $ß_{00}$	0.515***	0.027
For linear change, $ß_{10}$	-0.014	0.014
	Proportion of Mixed Interpretations	
For average rate at age 10.22, $ß_{00}$	0.132***	0.018
For linear change, $ß_{10}$	0.028**	0.011

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

Table 5

Level-2 Model Estimates for Growth Trajectories of Children's Social Interpretation Processes

Predictor Variable	Coefficient	SE
	Proportion of Hostile Interpretations	
For average rate at age 10.22, π_0		
Intercept, β_{00}	0.475***	0.049
MR versus CO, β_{01}	0.118	0.075
LD versus CO, β_{02}	0.030	0.062
For linear change, π_1		
Intercept, β_{10}	-0.016	0.026
MR versus CO, β_{11}	-0.009	0.043
LD versus CO, β_{12}	0.005	0.033
	Proportion of Mixed Interpretations	
For average rate at age 10.22, π_0		
Intercept, β_{00}	0.226***	0.045
MR versus CO, β_{01}	-0.146**	0.054
LD versus CO, β_{02}	-0.127**	0.049
For linear change, π_1		
Intercept, β_{10}	0.076**	0.029
MR versus CO, β_{11}	-0.070*	0.034
LD versus CO, β_{12}	-0.068*	0.031

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

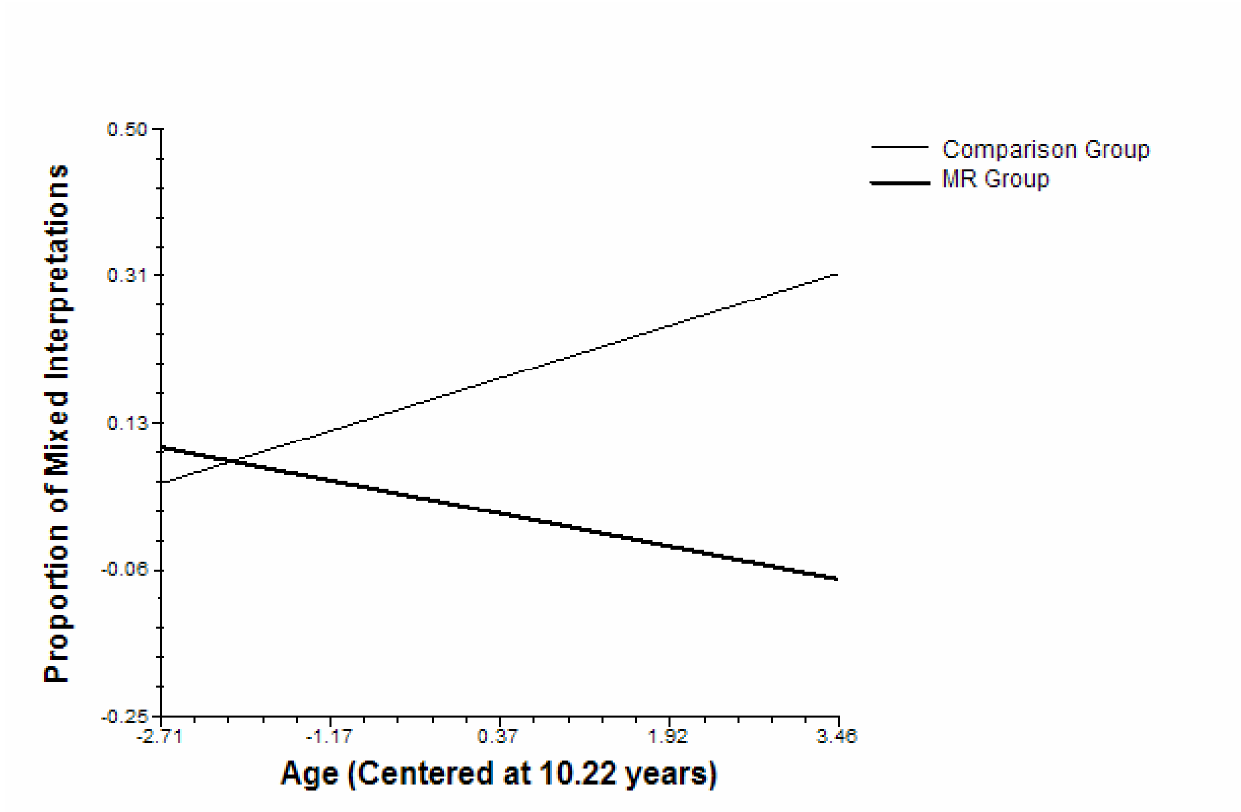

Figure 1
Impact of disability status on age-related changes in the proportion of mixed interpretations for children with mental retardation compared to children without disabilities

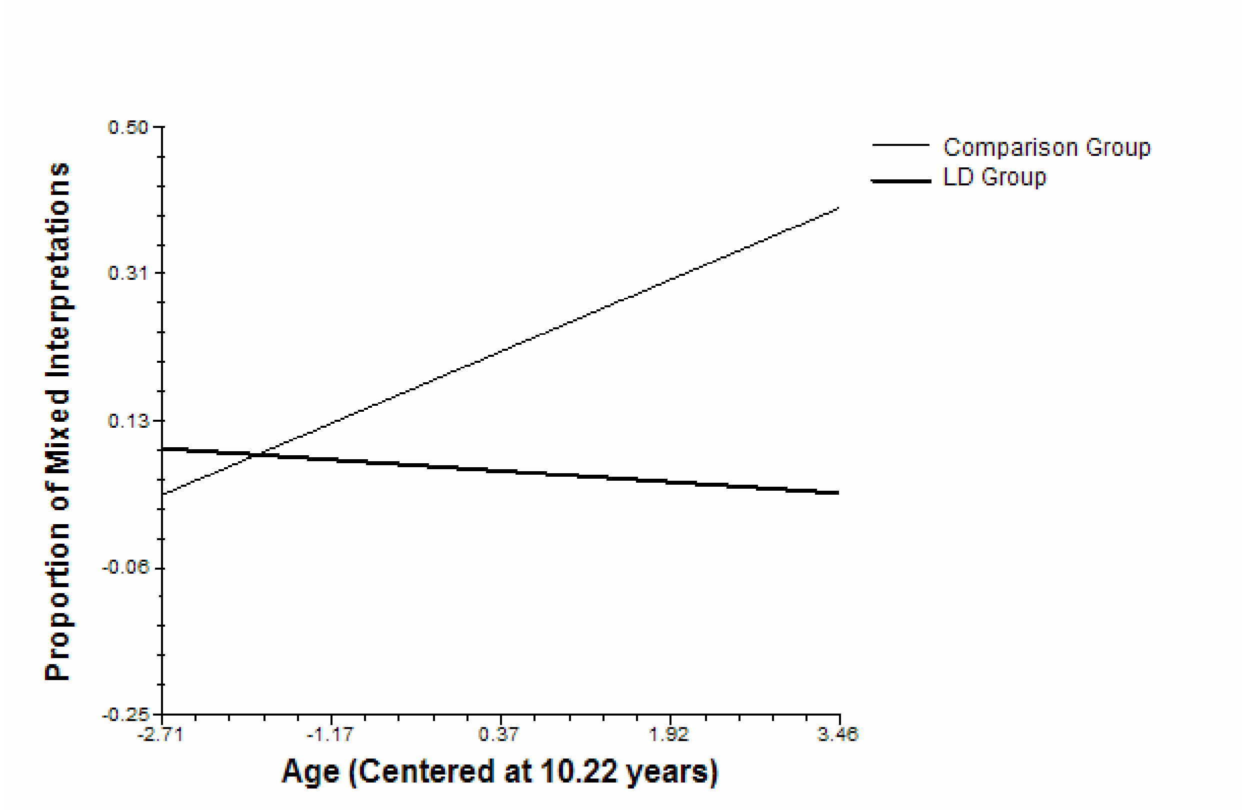

Figure 2
Impact of disability status on age-related changes in the proportion of mixed interpretations for children with learning disabilities compared to children without disabilities

Effects of Age and Disability Status on Children's Strategy Generation Processes

Total Number of Strategies

Regarding the strategy generation process, hypothesis 2 predicted differences in both the quantity and quality of responses suggested by children from each disability group compared to their comparison peers. The first outcome variable investigated was the total number of strategies suggested by children across the three scenarios. Children with mental retardation were expected to generate fewer responses compared to their counterparts without cognitive delay. Similarly, children with learning disabilities were also expected to differ from the comparison group. Taken together, hypothesis 2 stated that the MR and LD vector for the Level-2 model was expected to significantly predict the intercept for the total number of response strategies generated. As shown by the significant intercept coefficient contrasting the children with mental retardation and their peers without disabilities, $ß_{01}$, HLM analyses supported hypothesis 2 (Table 7). Specifically, at age 10.22, there was a significant effect of the MR group vector in predicting the intercept, $t(114) = -5.04$, $p < .001$. That is, children with mental retardation (M = 5.44) suggested significantly fewer strategies than their peers without disabilities (M = 7.45). This finding is depicted in Figure 3. In contrast, the effect of the LD group vector was not significant. Specifically, the total number of strategies offered by children with learning disabilities did not significantly differ from those of the comparison group when the children were aged 10.22 years.

Hypothesis 4 predicted that all groups would demonstrate positive linear change in the total number of strategies suggested by children. That is, a significant slope coefficient for the Level-1 model was expected. In addition, group differences in the growth trajectories for this outcome variable were expected such that the trajectory would be slowest for children with MR. Specifically, the MR vector for the Level-2 model was expected to significantly predict age-related changes in the total number of strategies generated, and the rate of this change was expected to be lower than that of the comparison children. As shown by the non-significant slope related coefficient in Table 6, on average, scores reflecting children's ability to generate strategies did not significantly alter with increasing age. Moreover, the Level-2 slope coefficient for the MR vector indicates no significant differences between the rates of linear change for children with MR compared to their peers without disabilities (Table 7).

Proportion of Prosocial Strategies

Regarding a qualitative aspect of the strategy generation process, hypothesis 2 predicted that children with mental retardation and children with learning disabilities would generate fewer prosocial strategies than the comparison peers. That is, both group vectors were expected to be significant Level-2 predictors of the intercept. As indicated by the beta coefficients for the each vector in Table 7, HLM analysis revealed no significant effects of the group vectors in predicting the intercept of prosocial strategies.

As described in hypothesis 4, maturational gains, as reflected in positive linear change, were expected for the overall sample in the proportion of prosocial response strategies. Thus, a significant intercept related coefficient was expected for the Level-1 model. However, children with MR or LD were expected to demonstrate less positive linear change than their comparison peers. In other words, hypothesis 3 stipulated that both the MR and LD vectors would be significant Level-2 predictors of the slope coefficients, and that the magnitude of the beta coefficients associated with the slopes for both groups of children with disabilities were expected to be smaller than the slope coefficient for the comparison group. As shown by the slope-related coefficient in Table 6, there was non-significant positive linear change for the overall sample. Additionally, there were no significant effects of the group vectors on the slope (Table 7).

Estimates of the random effects for the Level-2 model indicate that a significant proportion of the variance in the intercept at age 10.22 was not sufficiently explained by the two group vectors. Rather, this additional variance is likely explained by other variables that were not included in the HLM model for the present study, $\chi^2(64, N = 67) = 105.23$, $p < .001$. The additional variance in the slope was not significant.

Proportion of Avoidant Strategies

Hypothesis 2 indicated that children with developmental disabilities would offer a higher proportion of avoidant strategies than their comparison peers. That is, the hypothesis stipulated that both the MR and LD vectors would be significant Level-2 predictors of the intercept for the proportion of avoidant strategies. As indicated by the intercept related coefficients in Table 7, group effects on the intercept were non-significant. That is, the mean intercept for children with mental retardation and that of children with learning disabilities did not significantly differ from that of comparison peers.

As outlined in hypothesis 4, the overall sample was expected to demonstrate negative linear change in their proportion of avoidant response strategies. Thus, a significant Level-1 slope coefficient was expected. Furthermore, both groups of children with developmental disabilities were expected to show a less rapid decline than their comparison peers. That is, hypothesis 4 stipulated that both the MR and LD vectors would be significant Level-2 predictors of the slope coefficients, and that the beta coefficients associated with the slopes for both groups of children with disabilities were expected to be smaller in magnitude than the slope coefficient for the comparison group. Results indicated that in contrast to the first prediction, the overall sample did not evidence significant change in the proportion of avoidant response strategies, which is reflected by the non-significant value of the slope coefficient for the overall sample (Table 6). Moreover, as shown in Table 7, the effect of the MR vector, $ß_{11}$, on slope was non-significant. Specifically, children with mental retardation and the comparison group did not differ in their growth trajectories. The only significant finding was an effect of the LD group vector on slope, which is indicated by the significant slope related coefficient, $ß_{12}$ (Table 7). This effect is also graphically depicted in Figure 4. This finding was in opposition to initial predictions. That is, children with learning disabilities increased their proportion of avoidant strategies rather than decreasing their use of this strategy type as did their peers in the comparison group, $t(114) = 2.64$, $p < .01$. Additional analysis using Preacher's et al.'s web-based software revealed that the region of significance included ages less than 8.65 years and greater than 11.97 years. This finding is interpreted as evidence that the proportions of avoidant response strategies were similar for children with learning disabilities and their comparison peers until the age of 11.97 years when their scores for this outcome variable began to differ significantly.

Estimates of the random effects for the Level-2 model indicate that there was significant additional variance in the overall slope that was not explained by the two group vectors and, therefore, might be accounted for by other variables that were not included in the HLM model for the present study, $\chi^2(64, N = 67) = 83.57$, $p < .05$. The additional variance in the intercept was not significant.

Proportion of Retaliatory Strategies

The final social cognitive variable of interest was the proportion of retaliatory strategies offered. In hypothesis 2, both groups of children with disabilities were predicted to offer a higher proportion of retaliatory strategies than their comparison peers. In other words, both group vectors were expected to be significant Level-2 predictors of the intercept for the proportion of retaliatory strategies variable. As demonstrated by the non-significant coefficient for predicting the intercept, $ß_{02}$, the prediction that children with learning disabilities would significantly differ from their comparison peers was not supported (Table 7). In contrast, the coefficient for predicting the intercept contrasting the children with MR and the comparison group, $ß_{01}$, indicated that the children with mental retardation (M = 0.35) tended to suggest a higher proportion of retaliatory strategies than their peers without disabilities (M = 0.24). This difference was statistically significant, $t(114) = -1.95$, $p < .05$. A graphical depiction of this finding is shown in Figure 5.

Hypothesis 4 proposed that the overall sample would demonstrate negative linear change in the proportion of retaliatory response strategies. That is, this hypothesis predicted a significant negative Level-1 slope coefficient for the proportion of retaliatory strategies. Regarding group-related differences in growth trajectories, children with mental retardation and learning disabilities were expected to demonstrate less negative linear change than the comparison children. Specifically, each group vector was expected to be a significant predictor of the slope, and the magnitude of the beta coefficients associated with the slopes for both groups of children with disabilities were expected to be smaller than the slope coefficient for the comparison group. HLM analysis revealed significant negative linear change in the proportion of retaliatory response strategies for the overall sample; this is reflected by the beta coefficient for the Level-1 model (Table 6). Similarly, as indicated by the coefficient for the group vector predicting slope in the Level-2 model, there was no significant effect of MR status (Table 7). That is, children with mental retardation and their comparison peers did not significantly differ in their growth trajectories. In contrast, there was a significant effect of LD status, which is shown by the slope coefficient for the Level-2 model and is graphically depicted in Figure 6. However, this was in the opposite direction than expected, $t(114) = -0.07$, $p < .05$. Specifically, children with learning disabilities (B = -.07) significantly decreased their proportion of retaliatory strategies compared to their peers without cognitive impairment (B = -.001). Subsequently, Preacher's et al., software was used to probe this interaction and revealed that the scores for these two groups differed for children younger than 9.33 years and older than 14.27, the latter of which is outside the range of ages for the present study. This finding is interpreted as evidence that the proportions of retaliatory response strategies were similar for children with learning disabilities and their comparison peers between the ages of 9.33 and 14.27 years. However, growth trajectories were estimated to diverge significantly for children aged 14.27 years and up.

Estimates of the random effects for the Level-2 model indicate that a significant proportion of the variance in the intercept at age 10.22 was not explained by the two group vectors. Consequently, the additional variance could be accounted for by other variables that were not included in the HLM models for the present study, $\chi^2(64, N = 67) = 101.54$, $p < .01$.

Table 6

Level-1 Model Estimates for Growth Trajectories of Children's Strategy Generation Processes

Predictor Variable	Coefficient	SE
Total Number of Strategies		
For average rate at age 10.22, $ß_{00}$	6.801***	0.141
For linear change, $ß_{10}$	0.107	0.098
Proportion of Prosocial Strategies		
For average rate at age 10.22, $ß_{00}$	0.322***	0.018
For linear change, $ß_{10}$	0.020[a]	0.011
Proportion of Avoidant Strategies		
For average rate at age 10.22, $ß_{00}$	0.162***	0.010
For linear change, $ß_{10}$	0.015[a]	0.008
Proportion of Retaliatory Strategies		
For average rate at age 10.22, $ß_{00}$	0.288***	0.019
For linear change, $ß_{10}$	-0.035***	0.012

[a] $p < .10$. * $p < .05$. ** $p < .01$. *** $p < .001$.

Table 7

Model Estimates for Growth Trajectories of Children's Strategy Generation Processes

Predictor Variable	Coefficients	SE
	Total Number of Strategies	
For average rate at age 10.22, π_0		
Intercept, β_{00}	7.451***	0.263
MR versus CO, β_{01}	-2.015***	0.399
LD versus CO, β_{02}	-0.467	0.316
Linear change, π_1		
Intercept, β_{10}	0.203	0.164
MR versus CO, β_{11}	0.021	0.261
LD versus CO, β_{12}	-0.096	0.208
	Proportion of Prosocial Strategies	
For average rate at age 10.22, π_0		
Intercept, β_{00}	0.371***	0.027
MR versus CO, β_{01}	-0.077	0.056
LD versus CO, β_{02}	-0.067	0.037
Linear change, π_1		
Intercept, β_{10}	0.017	0.015
MR versus CO, β_{11}	0.017	0.037
LD versus CO, β_{12}	-0.002	0.022
	Proportion of Avoidant Strategies	
For average rate at age 10.22, π_0		
Intercept, β_{00}	0.177***	0.018
MR versus CO, β_{01}	-0.051	0.034
LD versus CO, β_{02}	-0.001	0.022
Linear change, π_1		
Intercept, β_{10}	-0.006	0.014
MR versus CO, β_{11}	0.001	0.025
LD versus CO, β_{12}	0.048**	0.018
	Proportion of Retaliatory Strategies	
For average rate at age 10.22, π_0		
Intercept, β_{00}	0.239***	0.032
MR versus CO, β_{01}	0.108*	0.055
LD versus CO, β_{02}	0.037	0.042
Linear change, π_1		
Intercept, β_{10}	-0.001	0.019
MR versus CO, β_{11}	0.004	0.038
LD versus CO, β_{12}	-0.070**	0.024

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

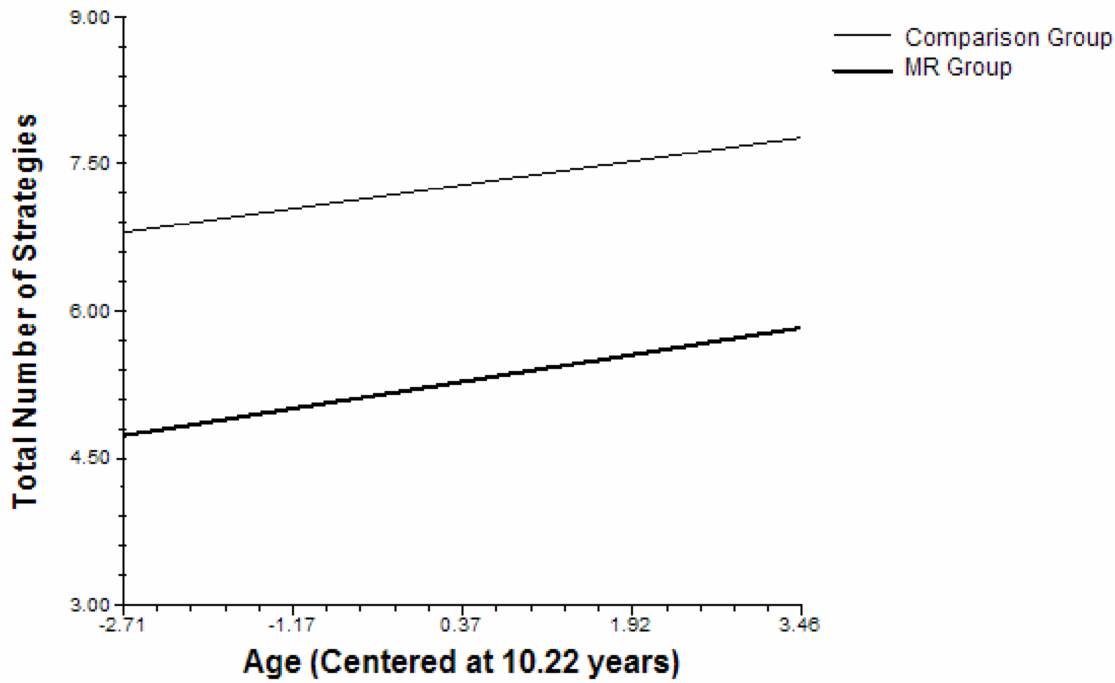

Figure 3
Impact of disability status on age-related changes in the total number of strategies for children with mental retardation compared to children without disabilities

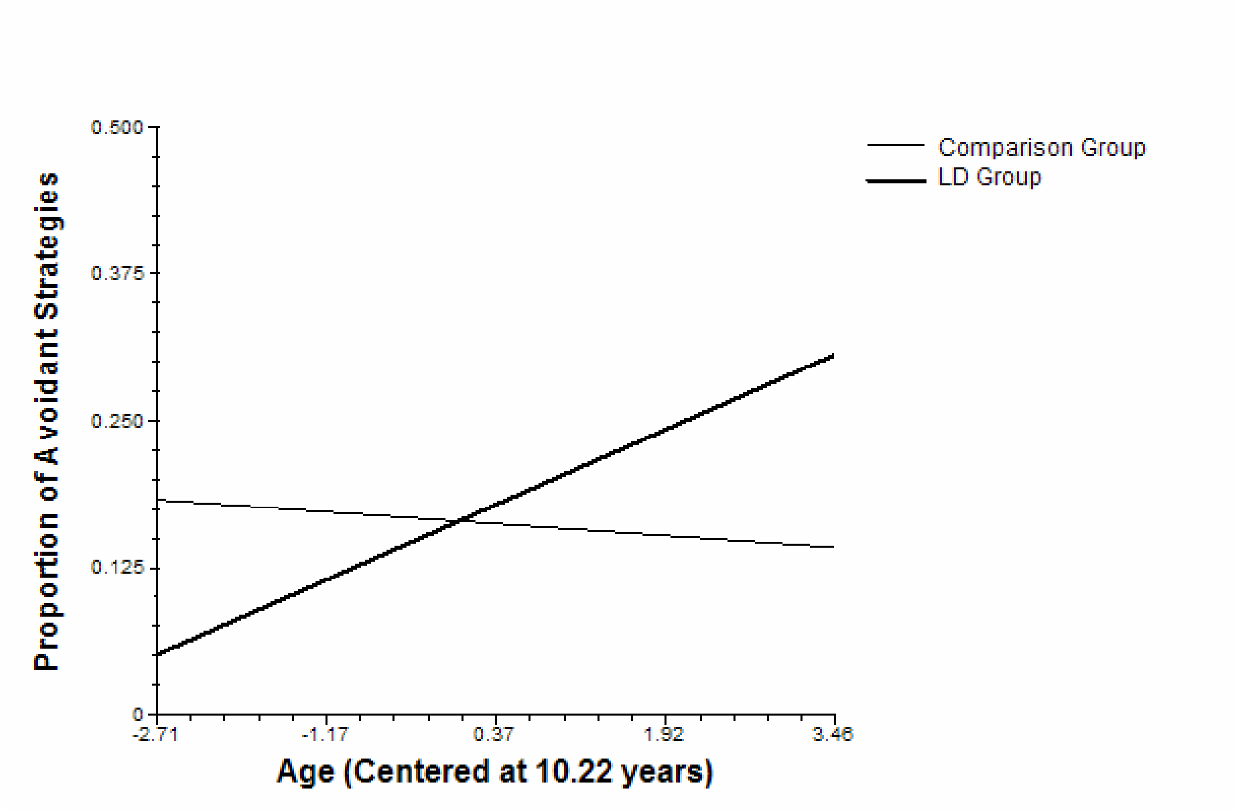

Figure 4

Impact of disability status on age-related changes in the proportion of avoidant strategies for children with learning disabilities compared to children without disabilities

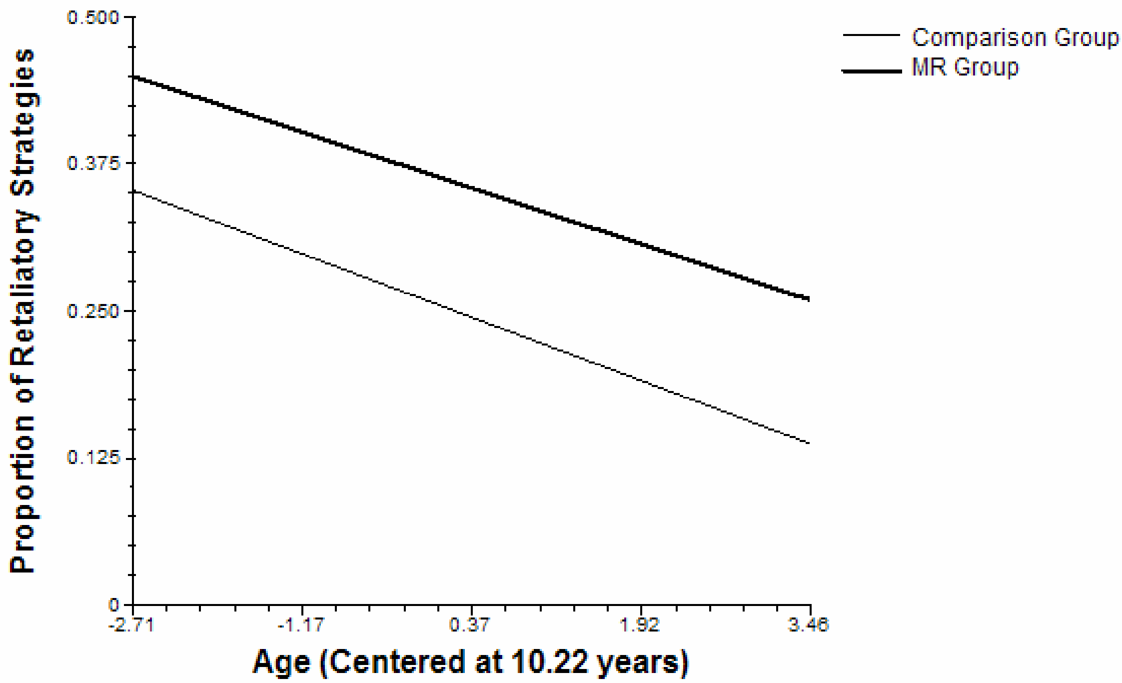

Figure 5
Impact of disability status on age-related changes in the proportion of retaliatory strategies for children with mental retardation compared to children without disabilities

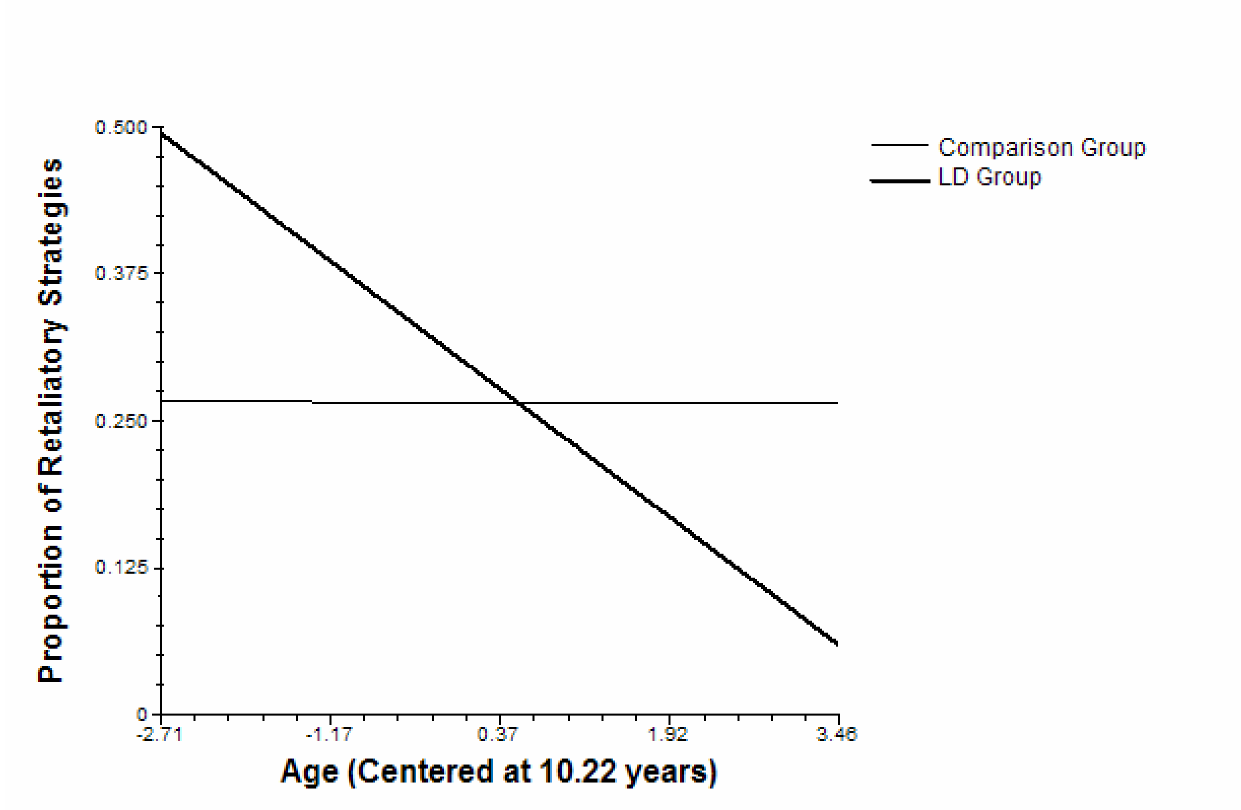

Figure 6

Impact of disability status on age-related changes in the proportion of retaliatory strategies for children with learning disabilities compared to children without disabilities

Discussion

The present study sought to contribute to research on peer adjustment for children with disabilities by investigating the impact of disability status on age-related changes in social cognitive abilities. In general, it was expected that children with MR as well as those with LD would lag behind same-aged peers without disabilities in the development of social cognitive skills such as formulating causal attributions and generating strategies for resolving social problems. The results indicated that only a few of the expected effects of disability status were supported. Though most of the significant effects were in the expected direction, there were unexpected findings as well. The findings thus indicate a pattern of limitations as well as strengths in the social cognitive abilities of children with disabilities, and differences in cognitive ability as well as other factors such as social experience, likely contributed to variations in the development of social cognitive skills.

Impact of Disability Status on Causal Attributions

Contrary to expectations, children with MR and LD did not demonstrate a higher tendency to make hostile causal attributions compared to their peers without disabilities. That the three groups of children did not significantly differ in the number of hostile interpretations they suggested may be partially explained by two factors. First, the sample only comprised children in grammar school. Hostile causal attributions are rated as more acceptable by children in this age range than by those entering their middle school years (Crick & Dodge, 1996). Second, for the overall sample, hostile causal attributions were the most common type of causal attribution made suggesting that this was a normative interpretation for this social task, at this age range. Lastly, the use of social scenarios that portrayed instances of potential social aggression or rejection may have contributed to a tendency for children in all three groups to suggest a high number of hostile causal attributions, thereby limiting the probability of finding significant differences between the groups.

In contrast to the negative findings for hostile attributions, the findings for mixed interpretations were consistent with expectations that children with MR would demonstrate social cognitive deficits. Specifically, whereas children without cognitive delays tended to provide mixed interpretations of intentions, children with MR tended to suggest only one type of interpretation per scenario. Moreover, with increasing age, the proportion of mixed interpretations increased for the comparison children whereas children with MR offered fewer mixed interpretations as they matured. Taken together, these findings can be interpreted as evidence that children with MR fail to recognize that there may be multiple explanations for another person's behavior, and with increasing age, children with MR may become increasingly rigid in their interpretation of events. Moreover, because children with MR have been shown to be less successful at accurately interpreting social cues (Maheady, Maitland, & Sainato, 1984) and fail to request clarification regarding ambiguous social information (Abbeduto, Short-Meyerson, Benson, & Dolish, 1997), the types of causal attributions they make may either simply reflect their misunderstanding of social situations. Alternately, when presented with ambiguous social situations, children with MR exhibit a response accuracy that is due to chance (Leffert & Siperstein, 2002).

Limited flexibility in forming causal attributions was also demonstrated by the children with LD. Similar to children with MR, children with LD suggested fewer mixed interpretations than their normative comparison peers. Moreover, they showed a developmental trajectory such that, with increasing age, this difference increased. That is, children with LD offered fewer mixed interpretations as they were older, whereas their comparison peers increased their rate of suggesting mixed interpretations. Since children with LD do not experience general delays in cognition that may limit their ability to generate diverse explanations for events, it is possible that the types and range of causal attributions made by children with LD are shaped by other factors, such as negative social experiences (Meadan & Halle, 2004; Tur-Kaspa & Bryan, 1994). For instance, children with LD who experience ongoing social difficulties may develop a hostile attribution bias.

Impact of Disability Status on Strategy Generation

The failure to support the hypothesis about age-related growth in the use of prosocial strategies is likely a result of the type of social situations portrayed in this study. Contrary to expectations, none of the groups of children increased their use of prosocial solution strategies over time, which may be explained, at least in part, by the types of social situations portrayed as well as the social experiences of children. For example, the peer entry conflict situation poses serious difficulty for even the most socially competent children (Leffert & Siperstein, 1996) and failure to obtain entry prohibits any further social interaction that may dispel hostile causal attributions made in response to the social rebuff. Regardless of disability status, children are unlikely to suggest prosocial responses to events, such as the peer entry conflict and situations involving peer provocation, that are perceived as the result of hostile intent by peers. That is, specific types of social situations type may elicit particular response tendencies for all children. In the future, researchers may employ social vignettes that portray ambiguous peer intent to better determine children's ability to generate prosocial solution strategies. For example, a scenario in which a peer replies, "I don't know" to a child's request to enter a play group may improve researchers ability to investigate the extent to which children are able to perceive this situation as non-hostile and whether non-hostile causal attribution are necessary to generate prosocial responses.

The findings supporting the hypothesis that children with MR would generate fewer response strategies overall compared with their non-disabled peers is consistent with past research indicating that the breadth of the response repertoire for children with MR is narrow (Leffert & Siperstein, 2002). In addition, qualitative differences in their responses also occurred. Although the findings did not support the hypothesis that children with MR would employ a higher number of avoidant strategies than other children, as expected, they produced a higher number of retaliatory strategies than their comparison peers. This finding is consistent with past research indicating that children with MR evaluate aggressive responses more positively (van Nieuwenhuijzen, de Castro, Wijnroks, Vermeer, and Matthys, 2004), and in general, suggest more aggressive responses than their comparison peers (Leffert, Siperstein, & Millikan, 2000). As explained by Leffert and Siperstein (2002), children with MR may demonstrate a preference for retaliatory strategies when presented with social situations involving negative outcomes because replying to impact of the outcomes requires less cognitive ability that generating a response based on inferences of ambiguously portrayed peer intent. In addition, that children with MR continued to employ this response more than comparison children with increasing age indicates cognitive rigidity. Leffert and

Siperstein (1996) suggested that children with MR who fail to alter their responses in the face of an ineffective initial strategy demonstrate developmental immaturity. Moreover, children with MR tend to experience problems generating social strategies to fit different social conflicts, and thus, they appear to rely on more "general strategy preferences" (Leffert, Siperstein, & Millikan, 2000). That is, children with MR may generate multiple response options, but the strategies only differ superficially and reflect the same type of response (Leffert & Siperstein, 2002). For instance, a suggestion such as, "tell the teacher" or "get the other kid punished" are both retaliatory responses though they differ superficially. To better develop programs for helping children with MR to diversify their response repertoires, researchers and clinicians must first understand the factors that contribute to strategy preferences.

The preference for retaliatory strategies exhibited by children with MR may be related to social experience and behavior problems. Compared to children without disabilities, children with MR in the present sample experienced more social isolation, and were the recipients of more relational and physical aggression than their comparison peers (Ngai, Floyd, & Clayton, 2004). These negative social experiences likely impacted the emotional salience of subsequent social situations. Specifically, children with MR may have been sensitized to detect hostile aspects of the social scenarios, and consequently, exhibited a higher propensity to suggest response strategies that included aggressive components. Moreover, because children with MR have been rated by peers as exhibiting high rates of aggression (Leffert & Siperstein, 1996) and aggressive children tend to frequently generate aggressive strategies (Leffert & Siperstein, 1996), a tendency to employ retaliatory strategies may reflect higher than average levels of aggression for the sample of children with MR in the present study. Taken together, these findings suggest a tendency for children with MR to both perceive and enact more aggression. Thus, researchers and clinicians are encouraged to develop intervention programs that might help children with MR improve their ability to attend to multiple types of social cues and to generate an array of strategy types, which may in turn, contribute to less aggression in social situations.

Past studies have indicated that, although children with LD demonstrate the ability to identify an array of strategies similar to their peers without disabilities, when confronted with social problem scenarios, they tend to select strategies that are developmentally immature (Oliva & La Greca, 1988; Tur-Kaspa & Bryan, 1997). The results for the present study provide partial support for this pattern of past findings. That is, children with LD were able to generate a comparable number of response strategies to their peers without disabilities. However, the quality of their responses differed from that of the comparison children. Specifically, with increasing age, children with LD tended to propose a higher proportion of avoidant strategies whereas their comparison peers suggested progressively fewer avoidant strategies. Moreover, whereas children with LD decreased the rate at which they suggested retaliatory strategies over time, their comparison peers did not change the rate at which they suggested this type of strategy. Taken together, these findings show that, with increasing age, children with LD increase their attempts to avoid conflict and decrease their efforts to retaliate when confronted with social conflict situations. This finding is consistent with the expectation that as children without disabilities mature in age, they tend to make greater efforts to conform their behaviors to social norms than when they were younger. Yet, their tendency to use avoidant strategies prohibits these children from learning how to actively resolve social conflicts.

Understanding the reasons children with LD tend to employ avoidant strategies to manage social situations might assist clinicians in developing programs to improve their social outcomes. Nabuzoka and Empson (2002) reported that children with LD have been rated as more vulnerable and/or inadequate (e.g., shy, help seeking, and victims of bullying) than their non-LD peers. Thus, the authors suggest that children with LD may avoid social interactions due to negative experiences arising from their socially awkward behavior, or their avoidance may simply be a manifestation of this awkwardness. With increasing age, opportunities for social cognitive growth may be limited by continued awkwardness. Fortunately, social interaction difficulties seem to be addressable in interventions involving simulated social situations. For example, Hutchinson, Freeman, and Berg (2004) reported that, in general, interventions involving instruction in mnemonic strategies for dealing with social situations and pairings of children with LD with popular peers without disabilities as coaches improved the social acceptance of the children with LD. Thus, peer buddy programs can be employed to improve the social competence of children with LD.

Similar to children with MR, the social cognitive propensities of children with LD are likely influenced by additional factors, such as their capacity to regulate emotional responses to social stimuli, and language abilities. Emotion regulation can be viewed as an essential aspect of social problem solving because emotions arouse, motivate, and organize decisional processes (Lemerise & Arsenio, 2000). Research has suggested that for children with LD, failure to select an optimal solution may arise from depressed or negative affect (Baumringer, Edelzstein, & Morash, 2005; Bryan, Sullivan-Burstein, & Mathur, 1998). Thus, children who become overwhelmed by negative feelings may make decisions based on alleviating their feeling state rather than objectively developing a solution. In the present study, children with LD suggested efforts to extract themselves from social conflict situations, which may effectively allow them to avoid the source of negative affect in real life situations.

Language difficulties also may underlie inconsistencies observed in both the interpretation and strategy generation processes. Lewandowski and Barlow (2000) estimated that 80% or more of all learning disabilities are language based. Language difficulties may compromise children's ability to comprehend verbally communicated stimuli. Moreover, deficits in the use of internal language may curb the process of integrating social stimuli, problem solving, and planning whereas expressive language difficulties will likely impact social discourse (Lewandowski & Barlow, 2000). Thus, in the present study, children with language-based learning disorders may have experienced difficulty attending to and making sense of the verbally presented social scenarios. Moreover, their ability to effectively communicate their responses may have also been compromised. In the future, inclusion of these additional factors may help researchers to better explain the inconsistencies that typically arise when assessing the social cognitive abilities of children with LD.

Limitations and Future Implications

The present study included several limitations that should be considered when interpreting the findings. The first limitation involves the level of task difficulty inherent in the social information-processing interview. That is, the fact that 24 of the children could not complete the interview indicated that the task was overly cognitively demanding for children with MR, and in some cases, for children with LD. The verbal presentation format made it difficult for children to comprehend the social scenarios. The inclusion of data only for children that were able to comprehend the task likely impacted the probability of finding significant between-group differences. Future researchers may consider using a different presentation format to better determine whether children with and without disabilities differ in their ability to make sense of and respond to social stimuli. For example, previous studies of social information processing skills have successfully employed video vignettes with children that demonstrate general (Leffert & Siperstein, 1996) or specific cognitive delays (as reported by Meadan & Halle, 2004). Moreover, researchers might explore the facility with which children are able to respond to social stimuli by allowing the use of alternate response formats. For instance, rather than limiting children's responses to verbal descriptions, they might also be given the options to supplement their descriptions using acting or visual depictions of their potential responses.

The statistical power of the present study was limited by a few factors. First, due to the level of task difficulty, children in the MR sample likely provided a limited range of responses compared to children in the other two groups. Moreover, if the intra-group variability of responses was limited, then both estimates for the intercept and slope terms for this group may have been biased. Second, if the assumption of homogeneity of variance was violated, that is, the Level-1 variances were unequal, estimations of the Level-2 coefficients were inefficient [inaccurate] and the standard errors terms were biased. The statistical consequences of these inaccuracies are contingent on exact nature of the bias. For instance, if the standard errors were inflated, then between-group differences would be less likely. Lastly, the absence of multiple data points for almost half of the entire sample may have limited the accuracy of estimates of both the mean values and growth trajectories observed for each group. Specifically, within-group variability may have been inflated thereby contributing to a misspecification of both the intercept and slope terms. Depending on the direction of the bias, biased estimates may have both inflated and diminished the probability of finding group and age-related differences for the present study. Given these statistical concerns, future researchers should focus on recruiting larger samples. It may also be prudent to recruit children that represent a larger age range than was used for the present study. This is particularly important when seeking to capture developmental changes in skills that might not occur until later ages. Moreover, because the growth trajectories of children with MR or learning disabilities are expected to lag behind those of the comparison children, extending the age range might enable future researchers to answer the question of whether significant linear changes in social cognitive skills occur in adolescence for children with disabilities, and whether their growth trajectories begin to approach those of the comparison children.

The exclusion of potentially relevant predictor variables may have also impacted the analyses for the present study. Relevant variables are those that are known to be related to both an outcome variable as well as the Level 1 (i.e., age) predictor variable(s). Exclusion of any relevant covariates from the Level 1 model may lead to a bias in the Level 2 estimates of both the intercept and slope coefficients (Bryk & Raudenbusch, 1992, p. 204). Results for several of the social cognitive outcome variables revealed that a significant proportion of the error variance associated with the either the intercept or slope term was not explained by the predictor variables included in the present study. In the future, it may be beneficial to explore whether the impact of excluded variables, such as, social experience, behavior problems, emotion regulation skills, and language abilities, contribute to variations in the development of social cognitive skills. That is, researchers can investigate the question of whether poor social experience, high levels of behavior problems, deficient emotion regulation skills, and both receptive and expressive language difficulties co-vary with aspects of social cognition, such as a tendency to make hostile causal attributions when interpreting situations and a propensity to enact aggressive responses. These co-variates may also be used to formulate sub-groups for investigation, which may in turn, facilitate the identification of intra-group variations.

In focusing on differences between groups of children with and without disabilities, intra-group differences were neglected. Future researchers may benefit from dividing each sample of children according to the quality of their social experiences or behavior problems, and using this as a predictor of social cognitive skills across time. Additionally, the use of a longitudinal study design that investigates the interaction of developmental changes in social experiences, behavior problems, and social information-processing skills may provide an opportunity to explore the feedback mechanisms outlined in Crick and Dodge's (1994) reformulated social-information processing model. Yet, there are other internal and external factors affecting social cognition that warrant further attention.

Future researchers may improve their understanding of children's social functioning by investigating both internal and external factors that contribute to a child's performance in social situations. Internal feeling states and children's ability to regulate affect should be considered because of their potential to influence both children's attributions and response tendencies. In addition, Nabuzoka and Empson (2002) highlight the need to consider both the context (e.g., school, home, playground) as well as the content (e.g., conflict versus non-conflict situation, peer group entry) of the social situation; the context sets the scene for the task whereas the content provides the child with the social task. Accounting for both internal and external influences may facilitate children's ability to both acquire and generalize understanding of how to navigate social situations. Moreover, researchers and clinicians should make sure to attend to key aspects that distinguish types of social situations so as to help children develop situation specific social skills, which might contribute to higher social competence in the short-term and potential for further learning with increased social success.

Differences in the types of scenarios portrayed in the present study likely influenced the pattern of results. Examination of the frequency counts of hostile interpretations for both children with MR and their comparison peers indicates that, regardless of group, the proportion of children that suggested a hostile interpretation was similar for the two social scenarios involving peer entry (scenario 1) and what could be perceived as social aggression (scenario 3). Specifically, children tended make either mixed or hostile causal attributions and few benign interpretations for these scenarios. It is possible that both the emotional impact of these social scenarios as well as the fact that the ability to accurately detect hostility occurs earlier in development (Leffert & Siperstein, 2002) contributed to the high rate of hostile causal attributions made by the three groups of children. In contrast, the second scenario involved the most neutral consequence and elicited a high number of benign responses for the overall sample. Yet, children with MR suggested a higher proportion of hostile interpretations for this scenario than their peers without disabilities. Combining the responses across scenarios likely eliminated any group differences associated with this scenario. In the future, researchers might narrow their focus of research to one type of situation to facilitate the discovery of response tendencies based on group differences rather than scenario type. For instance, for situations involving ambiguous peer intent (e.g., peer knocks child's books off desk and shrugs), Leffert and Siperstein (2002) observed group-related differences such that children with MR demonstrated a higher tendency to perceive hostility and to respond accordingly, than comparison children. Identification of group-related differences may in turn contribute to the development of group-specific intervention programs.

Overall, the findings for the present study indicate that children with either mental retardation or a specific learning disability differ from children without disabilities in their ability to make multiple types of causal attributions. Moreover, children with MR and children with LD demonstrated a tendency to suggest developmentally immature responses to social situations. By integrating the findings and recommendations from this study, researchers may improve their design of future research efforts and clinicians may enhance current programs of instruction in social information-processing. For instance, knowledge of age-related differences related to group status may enable clinicians to select presentation modalities, skill areas for modification, and instruction techniques for social skill training programs, which are specific to the needs of children with varying social and cognitive abilities. Advancements in both research and application may thus, contributed to better long-term social adjustment for children with disabilities.

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APPENDIX

Children's Social Problem Solving Measure

Each of the following scripts was accompanied by a drawing depicting a protagonist of the same sex as the participant. The below scripts were created for a female child.

Script for scenario 1

Imagine that one day you were just like this girl in the picture [interviewer points to child in picture who is left out]. You are outside and you see some other girls playing a game that you really like to play. You want to play the game so you go over and ask one of the girls if you can play with them. She says, "No."

Script for scenario 2

Now, imagine that you are just like the girl in this picture [interview points to child in the story card who is sitting down eating lunch]. You are sitting at a table in the cafeteria, eating lunch. You see this girl coming towards your table with a drink. You turn around to eat your lunch, and the next thing that happens is the girl spills the drink all over your back. A bunch of kids start laughing.

Script for scenario 3

Imagine that one day at lunch you sit at a table with some girls that you know. All through lunch one of the girls whispers to the other girls and you cannot hear what she is saying.