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Developmental Foundations and Clinical Applications of Social Information Processing: A Review

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Abstract

Social information processing has emerged as an important construct in understanding children's interpersonal functioning. This article reviews (a) the theoretical models guiding research, (b) the development of normative and atypical social problem solving, and (c) the connection between social information processing and individual differences in functioning. Finally, this review ends with a summary of efficacy of programs aimed at preventing social information processing biases or intervening with youth who display dysfunctional social information processing skills.

In D'Zurilla and Goldfried's (1971) seminal article, the authors conceptualized social information processing as a broad and multifaceted construct encompassing individuals' processing and action upon entering interpersonal situations in which no immediately effective response is available. One primary component of social information processing is the cognitive-behavioral process of generating potential solutions to the social dilemma. The steps in this process were posited to be similar across individuals despite the wide variability of observed behaviors. The revised model (D'zurilla & Nezu, 1999) is comprised of two interrelated domains: problem orientation and problem solving style. Problem orientation describes each individual's meta-cognitive schema, which tends to be a stable approach to understanding problems. Problem orientation has been defined in two primary ways, positive and negative. Individuals with a positive problem orientation believe that problems are challenges to be solved rather than threats and have the confidence that the problems can be solved. This positive orientation has been associated with more rational and adaptive information processing efforts and adjustment. In contrast, a negative orientation is characterized by beliefs that social problems represent major threats to well-being, that one lacks self-efficacy to solve problems, and that one will experience emotional distress when confronted with problems. This negative orientation has been associated with dysfunctional social information processing styles and problems in adaptation (i.e., anxiety, depression, and conduct problems).

The cognitive and behavioral skills that comprise individuals' general responses to stressful or novel problems characterize their problem solving style. The three styles outlined by D'Zurilla and colleagues (D'Zurilla & Goldfried, 1971; D'Zurilla & Nezu, 1999; D'Zurilla, Nezu, & Maydeu-Olivares, 2002) include rational, impulsive/careless, and avoidant styles. Classification into problem solving style is based on the utilization of the four major

problem solving skills: problem definition and formulation, generation of alternative solutions, decision making, and solution implementation and verification. Rational problem solving is characterized by a planful and systematic use of these skills to solve problems. In contrast, impulsive/careless and avoidant styles are considered dysfunctional because individuals classified into these categories do not systematically process each step of the model. Instead, the impulsive/careless problem solving style attempts to utilize problem solving strategies, but does so in an incomplete and inadequate manner. The avoidant problem solving style is characterized by passivity, procrastination, and avoidance. In this model, one's orientation together with their problem solving style represents one's social information processes.

The model presented by D'Zurilla and Goldfried was primarily developed with attention to adult problem solving processes to explain variations in social behavior. Their model was applied and expanded by Spivack and Shure (1974) to explore developmental factors that influence social information processing. The authors examined interpersonal cognitive problem solving skills that would distinguish maladjusted children from their well-adjusted peers. Spivack and colleagues (Spivack & Shure, 1974; Shure & Spivack, 1980) suggested that there were several prerequisite cognitive skills that were necessary for effective social information processing. Specifically, skills of mean-ends thinking (i.e., the ability to consider step-by-step plans to achieve a goal), causal thinking, developing alternative solutions, anticipating consequences, and understanding the motives of others were all recognized as cognitively advanced skills that require sophistication and perspective taking. In the authors' series of studies, Shure and Spivack (1974, 1980) identified the relationship between interpersonal cognitive problem solving skills and normative age-related changes. Moreover, the authors illustrated that deficiencies in these skills were related to problematic social skills, impulsiveness, and withdrawn behavior in preschool to elementary school aged children (Shure & Spivack, 1980).

Crick and Dodge (1994) provided a comprehensive review and model of the social cognitive processes leading to maladjustment in childhood. Again, these authors proposed that when faced with a social problem, children engage in a number of steps before implementing a response and that differences in these processes may account for the differences observed in children's social behavior. Similar to the D'Zurilla and Goldfried model, Crick and Dodge suggested the essential steps in social information processing included encoding the problem, interpreting cues in the social situation, clarifying goals, generating possible responses, selecting a response, and enacting the behavior. In an important distinction from the D'Zurilla and Goldfried model, the authors suggested that differences in processing styles may be most predictive of differences in social behavior and could be illuminated at each step in the problem solving process. For example, they suggested that children may act aggressively because they use a hostile bias when interpreting cues. Moreover, the Crick and Dodge reformulation included an explicit emphasis on the importance of the interaction between individuals' internal processes and environmental factors on social information processing efforts (e.g., emotion processes; access of social scripts, schemas, and knowledge in memory). The model also attended specifically to developmental changes in cognitive skills (i.e., increases in experiential knowledge; improved attention, memory, and organization; and increased speed of processing information) as a means for understanding increasing effectiveness of social information processing across development. Arsenio & Lemerise (2001) extended the Crick and Dodge model by including morality and emotion processes of children and their social partners into social information processing.

In a model similar to Crick and Dodge's (1994) reformulation, Rubin and Krasnor (1986) focused on the development of automaticity to account for the stability and change in the development of social behavioral patterns. Specifically, the authors suggest that children

learn standard scripts for common and routine social situations. The scripts are stored and cued by internal or external stimuli and are easily and unconsciously accessed in familiar social situations. However, when in novel situations, situations that violate expectations, and situations that have been unsuccessful in the past, children are required to deviate from script-driven behavior. Rubin and Krasnor classified such situations as “social problems.” Once a social problem is encountered, children must select the social goal, examine the task environment (the social status, familiarity, type of relationship, age of others); generate, retrieve, and select strategies (automatic or deliberate); implement a strategy; and examine the outcome.

The four models presented for social information processing have several common elements. The seminal social information processing model (D’Zurilla & Goldfried, 1971) and the revised models all share core steps in the social information processing process, including recognizing the problem, generating alternatives, deciding on an action, and implementing the action. The following section will examine the relevance of social information processing to child development and adjustment. Specifically, the next section will elucidate the development of social information processing ability and psychosocial correlates of social information processing, followed by links between social information processing and adjustment through an illustrative review of the literature. As can be seen in Table 1, the models differ somewhat with respect to the extent they have been evaluated with different age groups. For this reason, the following age specifiers are used in the review that follows: *preschool* (3–5 years), *school age* (6–12), *adolescent* (13–17) and *adult* (18+).

Development of Social Information Processing Abilities

The attention to developmental factors highlighted by Spivack and Shure as well as models articulated by Crick and Dodge (1994) and Rubin and Krasnor (1986) represent significant steps toward understanding social information processing in youth. The majority of research has emphasized the importance of social influences on the development of effective social information processing skills. The following sections describe influences including attachment relationships, parenting practices, peer influences, and cultural context on these skills.

Socialization

Attachment and parenting

Classic attachment theory emphasizes the importance of children’s relationships with their primary caregivers and the manner in which those relationships affect future relationships (Bowlby, 1982). In the attachment framework, early relationships provide children with internal working models, which serve as guides for subsequent social interactions. Applied to the study of social information processing, secure attachments have been frequently emphasized as essential to the transmission of social information and the development of effective and appropriate levels of independence and social competency (Rubin & Rose-Krasnor, 1992). Within the context of their attachments to caregivers, children are believed to engage in social learning processes (e.g., observation of models) through which they internalize strategies for managing ambiguous social situations. It has been suggested that secure attachments are more likely to foster adaptive social information processing, whereas insecure attachments may be associated with maladaptive strategies (Rubin & Rose-Krasnor, 1992).

Although few data are available to elucidate the relationship between child attachments and social information processing, a significant body of research exists to support a more general connection between parent-child relationship patterns and children’s social competence in

preschool (Pettit, Dodge, & Brown, 1988). In one such study, Jones, Rickel, and Smith (1980) found that maternal restrictiveness was positively associated with evasive problem-solving whereas maternal nurturance was negatively related to preschooler's reliance on authority figures to solve their problems. Additional research has confirmed the relationship between supportive parenting and the use of prosocial and nonaggressive problem solving strategies in school age children (Domitrovich & Bierman, 2001). In a study linking parenting style and school-age children's social adjustment, Kaufmann and colleagues (2000) found that authoritative parenting, characterized by high warmth, respect, and limit-setting, was associated with higher child social competence than was authoritarian parenting. Significant parental stressors, such as parental psychopathology (e.g., depression), may also negatively impact child adjustment by interfering with effective parenting behavior (Downey & Coyne, 1990).

Unfortunately, research examining the specific mechanisms responsible for the observed links between parenting and social competence remains underdeveloped. Interestingly, children's social information processing has emerged as one potential mediator to explain the connection between parenting and later social adjustment/competence. In partial support of this relationship, prosocial information processing practices among youth have been found to be positively associated with parental warmth and support in school age children (Domitrovich & Bierman, 2001). Furthermore, Jaffee and D'Zurilla (2003) found that adolescents' social information processes were positively associated with those of their mothers. Additional research has suggested that school age children raised with harsh parenting practices may learn to model hostile attributional biases and aggressive problem solving strategies (Nelson, Mitchell, & Yang, 2008).

Peer influences

Beyond the home environment, various aspects of children's broader social ecologies appear to be linked to social information processing. Socially accepted, rejected, and neglected children differ in their social information processing abilities at each step of the social information processing process. Research has documented that children who experience relational problems have difficulties interpreting the actions of their peers, when compared to socially-accepted children (Dodge, Murphy, & Buchman, 1984). Indeed, socially-rejected school aged children appear more likely to make attributional errors regarding peers' intentions in social situations and are more likely to infer hostile or negative intent (Crick & Dodge, 1994; Schultz, Izard, & Ackerman, 2000). When generating behavioral response options, school age children who experience social rejection are also more likely to identify avoidant or aggressive strategies to solve social problems (Warden & Mackinnon, 2003). In contrast, socially-accepted school age children tend to generate behaviors that are competent and effective rather than incompetent or aggressive (Rubin & Daniels-Bierness, 1983). Additionally, there is evidence for differences between popular and unpopular children with regard to their evaluations of different behavioral options and their expectations for success. Socially-accepted children tend to attribute social success to internal and controllable causes when compared to unaccepted children (Dill, Vernberg, Fornagy, Twemlow, & Gamm, 2004). Moreover, research exists to suggest that individuals develop interpretative styles for future social cues based in part on past social experiences. Not surprisingly, school age children who report negative experiences such as neglect or social rejection appear more likely to demonstrate negative, or even biased, interpretative styles (Crick & Dodge, 1994; Feldman & Dodge, 1987; Gibb, 2002). In turn, these learning experiences may result in the selection and application of additional maladaptive social responses.

Although the available research has generally supported the links between prosocial information processing and peer acceptance, there are also documented exceptions in which school age children who frequently utilize aggressive rather than prosocial responses (i.e.,

“bullies”) are rated as popular by their peers (e.g., Warden & Mackinnon, 2003). Furthermore, little is known about the direction of the connection between social status and problem solving (i.e., whether social rejection follows or precedes deficits in social information processing).

Community and cultural context

Naturally, beliefs about the appropriateness of different problem solving strategies are also rooted in community norms and experiences as well as cultural values related to assertiveness and individualism. Drawing from social learning and information processing models, Schwartz and Proctor (2000) investigated whether exposure to community violence was associated with positive evaluations of aggressive responses to social situations in a sample of low-income, ethnic minority, urban school-age children. The authors found that witnessed violence was associated with beliefs about the acceptability, efficacy, and appropriateness of aggressive social information processing strategies. In addition, results indicated that those social-cognitive evaluations mediated the relationship between violence witnessed in the community and actual aggressive behavior. Interestingly, witnessed violence was not associated with functional social impairments, such as peer rejection.

Broader cultural differences in individualistic and collectivistic values have also been observed in adolescents' preferred social problem solving methods, even among geographically and ethnically similar societies (Keltikangas-Järvinen & Terav, 1996). For example, relative to more individualistic cultures, adolescents living in cultures that endorse more collectivistic values may be more likely to use the tactic of withdrawing to deal with peer problems. Nevertheless, the extent to which various culturally-specific approaches to problem solving are consistent with a “rational” problem solving approach, as defined by D’Zurilla and colleagues, remains largely uninvestigated. Drawing from the literature on youth aggressive behavior, it seems that the extent to which aggressive responses are detrimental to youth functioning may be moderated in part by the cultural acceptability of aggression versus disengagement as a problem solving strategy (Chen & French, 2008).

Correlates of Social Information Processing

Findings from research evaluating the relationships between social information processing and child characteristics such as age, verbal IQ (VIQ), and gender have been inconsistent. As children's cognitive skills advance, not surprisingly, more flexibility and creativity has been observed with respect to social information processing. As children age they are able to generate a greater number of solutions to social problems (Hains & Ryan, 1983) and demonstrate better-developed information processing skills (Jaffee & D’Zurilla, 2003). Other studies have found that problems with social information processing in school age children may not predict problems with social information processing in high school (Lansford, Malone, Crozier, Pettit, & Bates, 2006). Thus, the growth related changes associated with maturation may not be a steady linear trend, but be dependent on the other contextual factors to influence adaptive social information processing. The correlation between verbal abilities and social information processing has also been examined with similarly mixed results. In a study of preschool-aged children, Coy, Speltz, DeKlyen, and Jones (2001) found no correlation between VIQ and social information processing, whereas Lochman and Lampron (1986) found that higher VIQ was associated with greater frequency of verbal assertion strategies to solve problems.

Gender differences in social information processing have also been documented in which girls typically demonstrate patterns of information processing that are judged to be more competent than those of boys (Lansford, et. al., 2006; Walker, Irving, & Berthelsen, 2002). For example, Zahn-Waxler and colleagues (1994) found that preschool-aged girls were more

likely to use prosocial problem solving approaches than boys, especially in unstructured situations. Across situations, they found that girls were more likely to use resolution strategies that fostered interpersonal connectedness. Other studies found no gender differences on any of the social information processing dimensions (Jaffee & D’Zurilla, 2003).

Relationship between Social Information processing and Psychopathology

There is a substantial literature investigating the interrelationship between social information processing, effective social information processing, and adjustment across development. Specifically, both internalizing and externalizing type childhood disorders have been found to have elements of ineffective social information processing skills. Disorders such as oppositional defiant disorder, conduct disorder, and depression have been found to be associated with unique pathways in the development of social information processing deficits. In the following sections, the primary disorders will be discussed as well as potential treatments targeting these deficits.

Externalizing disorders

Studies have investigated the social information processing abilities of children with several externalizing disorders, such as Oppositional Defiant Disorder (ODD), Conduct Disorder (CD), and Attention Deficit Hyperactivity Disorder (ADHD), as well as maladaptive behaviors found in non-clinical samples, including aggression, delinquency, and substance abuse. These studies have found that externalizing disorders and maladaptive behaviors are associated with a variety of deficits in implementing each step of the social information processing sequence. Studies that have examined the number of cues that are encoded while watching a videotaped vignette of a common social problem have found that violent school age and adolescent children encode fewer cues than children with moderate aggression or non-aggressive peers (Lochman & Dodge, 1994) and that children with diagnosed externalizing problems encode fewer cues than typical children (Matthys, Cuperus, & Van Engeland, 1999).

Research has also examined how children interpret the cues in social situations. For example, in a study comparing violent and moderately aggressive children to children with no history of aggression, the violent children were more likely to attribute hostile intent when interpreting social situations compared to the aggressive or non-aggressive children (Lochman & Dodge, 1994). Likewise, aggressive school aged males were found to overly attribute aggression to others’ behaviors during both competitive and cooperative tasks, (Lochman & Dodge, 1998) and in ambiguous situations that result in unpleasant outcomes (Sancilio, Plumert, & Hartup, 1989; Guerra & Slaby, 1989). This tendency to view others’ actions and motivations as driven by hostile intent is often referred to as the hostile attribution bias.

The response/solution generation step of the social information processing model has also been examined among children with externalizing disorders. Studies have found that aggressive children differ in their generation of alternative solutions to a social problem (Gouze, 1987). While some studies have found differences in the total number of solutions that are generated for a social problem, with violent children generating fewer solutions (Lochman & Dodge, 1994), others have not found a relationship between aggression and number of solutions (Guerra & Slaby, 1989). Examination of the quality of the solutions generated has also revealed differences between aggressive and non-aggressive children. Lochman and Lampron (1986) found that aggressive boys were less likely to generate verbally assertive responses to a problem and were more likely to use nonverbal and nonaggressive actions (e.g. walking away) to solve the problem, compared to their

nonaggressive peers. Among aggressive boys, the likelihood of direct action was greatly increased in situations that involved hostile provocation than in situations that involved frustration, indicating the importance of social context in dictating the responses generated by aggressive children. Another study found that preschoolers diagnosed with Oppositional Defiant Disorder were more likely to provide aggressive solutions or aggressive endings to stories that included a provocative event, ambiguous cues, and negative outcome (Coy, et al., 2001).

Differences in the evaluation of possible solutions, one of the final steps of the social information processing approach, have also been examined. Results of these studies indicate that both overtly aggressive boys and girls rate aggressive responses to conflict situations more positively compared to their nonaggressive peers (Crick & Werner, 1998). Aggressive adolescent boys have been found to rank aggressive solutions as more effective compared to nonaggressive adolescents and aggressive school aged boys (Lochman & Dodge, 1994). When asked to rank solutions to a social problem, aggressive school aged children are more likely to select a second-best choice that is hostile and ineffective, although their first choice solution was rated to be as effective as the first choice solution of nonaggressive children (Guerra & Slaby, 1989). Furthermore, school aged children with externalizing disorders are more confident in their ability to engage in an aggressive response to a social problem than typical children or children with only ADHD (Matthys, Cuperus, & Van Engeland, 1999).

As the reviewed literature illustrates, aggressive behavior is associated with a variety of deficits in each of the social information processing steps; however, research suggests that the relationship between social information processing and aggression may be dependent on whether the aggression is reactive or proactive. Research that has examined subtypes of aggression has found that reactive-aggression is associated with deficits in the earlier steps of social information processing, including deficits in encoding of cues and increased rate of hostile attributions, whereas school aged children and adolescents with proactive aggression were not found to have such deficits (Arsenio, Adams, & Gold, 2009; Dodge & Coie, 1987). Subsequent research also found a distinction between proactive and reactive aggression, with teachers reporting greater social information processing deficits in school aged children with reactive aggression than children with proactive aggression or mixed aggression (Day, Bream, & Pal, 1992).

Internalizing Disorders

Research on child depression has suggested that depressed children exhibit less effective social information processing than their non-depressed peers across most steps in the social information process. Studies indicate that depressed school age children may experience difficulties with correctly encoding relevant information about the problem (Quiggle, Garber, Panak, & Dodge, 1992), exhibit a negative problem orientation (Nezu, Nezu & Clark, 2008), are more likely to generate problem responses that are less assertive and irrelevant to the problem (Quiggle et al., 1992), and are more likely to evaluate ineffective solutions (e.g. withdrawal) more positively than do their non-depressed peers (Garber, Quiggle, Panak & Dodge, 1991).

Depressed individuals are thought to display a negative problem orientation due to negative self-schemas underlying the disorder (Beck, Rush, Shaw, & Emery, 1987). These depressogenic schemas are associated with lower perceived self-competence for effective information processing and a global attribution style that is associated with inaccurate interpretation of environmental cues in both school age children and adolescents (Prinstein, Cheah & Guyer, 2005). Specifically, depressed children tend to have a greater bias toward self-blame across situations, leading to attributions of internal and stable causes in negative situations and attributing external influences to positive situations (Graham & Juvonen,

1998). Other research suggests that depressed children may be more likely to understand ambiguous peer interactions with a hostile intent attribution bias, thereby assigning negative intent to the interactions (Quiggle et al., 1992).

Depression has also been found to interfere with children's ability to generate a number of plausible solutions to the problem. Quiggle et al. (1992) found that depressed children were more likely to view withdrawal as an effective means of problem solving and to select it as a viable behavioral response. This response choice can inadvertently work to increase children's depression by eliciting negative reactions from others and increase the likelihood that they will experience future peer victimization (Olweus, 1994). This transaction between problem solving outcomes and environmental response can reinforce depressed children's initial hostile attribution, thereby increasing their depressed affect.

Although the literature is sparse, there is some evidence that the social information processing deficits seen in depression are more pronounced in suicidal individuals (Speckens & Hawton, 2005). However, after depressive and hopeless symptoms were statistically controlled, social information processing of suicidal adolescents was no different from non-suicidal peers.

Social information processing abilities have been investigated to a lesser extent in anxious children. However, the literature suggests that early fearful and isolative behaviors are significantly associated with less flexible problem solving style and greater use of adult resources rather than using independent strategies (Rubin, Daniels-Beirness, & Bream, 1984).

Intervention

Social information processing has been a primary focus of childhood intervention since D'Zurilla and Goldfried (1971) proposed their initial model. The basic problem solving framework has been applied to teach social information processing skills as a means of clinical intervention as well as prevention of future deficits. Although each of the social problem solving interventions is uniquely designed to address the needs of specific groups across distinct developmental stages, a common element among the interventions is explicit teaching of the problem solving steps. Many of the programs use developmentally appropriate teaching strategies that include skill modeling by an adult leader, opportunities for children to role play the newly learned skills, opportunities to practice the skills in vivo, and feedback when skills are implemented.

Prevention Programs

The majority of prevention programs are implemented in the school setting with small groups of children (see Greenberg, Domitrovich, & Bumbarger, 2000 for a review). To enhance efficacy of treatment, parents are typically involved in the programs. Each of the following prevention treatments are empirically supported and have been shown to result in significant improvements in children's social information processing abilities following the intervention.

One of the earliest intervention programs, the Interpersonal Cognitive Problem-Solving (ICPS) program (Shure & Spivack, 1982), was designed for preschool and elementary school children and has been evaluated in a number of clinical trials. In this program, classroom teachers instruct children on fundamental language, listening, and thinking skills as well as interpersonal problem solving skills. Overall, research on ICPS efficacy indicated improvements in problem solving and reductions in impulsivity and inhibition one year post-intervention (Shure, 1997).

Promoting Alternative Thinking Strategies (PATHS) is a multifaceted program with one module of instruction on social information processing (Greenberg, Kusche, Cook, & Quamma, 1995). The program is comprised of three primary units: 1. Readiness and Self-Control (12 lessons), 2. Feelings and Relationships (56 lessons), and 3. Interpersonal and Cognitive Problem-Solving (33 lessons). PATHS has been evaluated in diverse groups of children including those in regular education, special education, and in deaf classrooms. In all groups of children, the intervention was related to longitudinal improvements in social information processing skills. One study, which randomly assigned teachers to incorporate the PATHS curriculum over the course of 9 months, found that preschool-aged children who were included in the PATHS classrooms were rated as being more socially competent and less socially withdrawn than their peers who had not participated in the PATHS program (Domitrovich, Cortes, & Greenburg, 2007).

The Social Relations Program (Lochman, Coie, Underwood, & Terry, 1993) was designed to decrease aggression and peer rejection by increasing social problem solving skills. The intervention was delivered in four modules: 1. Social problem solving (7 sessions), 2. Positive play training (9 sessions), 3. Group-entry skills training (14 sessions), 4. Anger-control (4 sessions). Follow up studies of African American 4th graders indicated that students in the intervention condition demonstrated increased social competence and reductions in aggressive behavior (Lochman, et al., 1993).

The Coping Power Program (Lochman & Wells, 2003), a preventive group-treatment program, is a modification of the Anger Coping Program (Lochman, 1992). One component of The Coping Power Program is focus on the social information processing steps, specifically coding of environmental cues (and attributions), generating alternative solutions, and considering the consequences of the solutions. Other components of the program include: understanding the physiological indicators of anger, relaxation training, learning how to cope with peer pressure, and improving study skills. Studies examining the effects of The Coping Power Program (and associated Coping Power parent component) have found that aggressive preadolescent boys who participated in the Coping Power Program had decreased rates of later substance use (Lochman & Wells, 2003) and covert delinquent behavior (Lochman & Wells, 2004).

Clinical Interventions

Unlike prevention programs, clinical interventions provide treatment for targeted clinical groups. These interventions have included multimodal approaches, which incorporate problem solving skills training as a component of a broader intervention, as well as other more “pure” social problem solving therapies that primarily target deficits in social problem solving skills. Problem Solving Skills Training (PSST), which was developed and studied extensively by Alan Kazdin (2003), is an empirically supported example of a “pure” intervention. PSST is a cognitive-based treatment approach that focuses on teaching and practicing the steps involved in social problem solving to children under the age of 13 who have conduct disorder and oppositional defiant disorder. Specifically, children are taught to monitor their own thoughts related to an interpersonal problem and to ask themselves a series of self-statements, such as “what am I supposed to do” and “I have to look at all my possibilities”. Skills are taught individually to a child through the use of games and role plays across the course of 12 to 20 sessions. Studies have consistently found that PSST leads to reductions in aggressive behavior and increases in prosocial behavior (Kazdin, 2003; Kazdin, Esveldt-Dawson, French, & Unis, 1987), however PSST in combination with a parent training component is more effective than PSST alone (Kazdin, Siegel, & Bass, 1992).

One of the most thoroughly studied interventions is the Incredible Years Classroom Social Skills and Problem-Solving Curriculum (Webster-Stratton & Reid, 2004). The program was designed for children ages 3–8 exhibiting early onset conduct problems. The curriculum is comprised of 64 sessions taught in a classroom setting. The lessons are augmented by using puppets and dinosaur themes to deliver the information. Evaluation of the treatment program indicated that after participation in the intervention demonstrated more prosocial interpersonal behavior, less aggression, and improved conflict management skills (Webster-Stratton, Reid & Hammond, 2001).

A variety of other interventions have also incorporated components of social problems solving into their treatment approach. For example, the Adolescent Coping With Depression (CWDA) program (for a description see: Clarke, DeBar, & Lewinsohn, 2003; Clarke, Rohde, Lewinsohn, Hops, & Seeley, 1999), a group therapy program for treating depression, includes four sessions that target impaired interpersonal interactions through the teaching and practice of problem-solving skills. The Coping Course (Rohde, Jorgensen, Seeley, & Mace, 2004), an extension and modification of CWDA for use with adolescent offenders who are incarcerated, also includes a problem solving component. Research has found that these approaches are effective in reducing depressive symptoms (Clarke, et al., 1999) and externalizing symptoms (Rohde, et al., 2004) among adolescents. Although it is difficult to determine the effect of targeting impaired social problem solving on the reduction of internalizing or externalizing symptoms when included in a multimodal treatment approach, one study found that inclusion of social information processing may be a key component in the effectiveness of cognitive-behavioral therapies that target aggression (Landenberger & Lipsey, 2005).

The above studies are meant to illustrate how the social information processing model has been incorporated into a range of preventive and therapeutic programs and is not meant to be an exhaustive list of all approaches that include a social information processing component. Overall, research evaluating the effectiveness of these programs has demonstrated that teaching social problem solving skills to children and adolescents can help reduce aggression and promote prosocial behavior.

Summary and Future Directions

Models of social information processing have proven helpful in understanding the cognitive basis guiding adaptive and maladaptive social behavior. Extant research has illustrated that social information processing affects an individual's adjustment and deficits can be linked to poor social and emotional functioning. Even with the tremendous strides that have been made, many questions regarding the influence of contextual factors and development remain. Specifically, the majority of the research has been conducted with school-aged population at single time points using a vignette or video methodology. In order to understand more fully the processes occurring during the development of more effective (or deficient) social information processes, longitudinal studies with varying methodologies need to be employed. Additionally, context is hypothesized to have large effects on one's information processes approach, however, the literature on mediators, moderators, and critical experiences has much room for sophistication before it can truly advance our understanding how to help facilitate socially competent processes in youth. Finally, theoretical social information processing researchers have begun to incorporate the emotional and moral aspects that interact with the strict cognitive processes. Empirically-based examinations of these interactive influences will also be critical in understanding how social thinking is translated into social behavior.

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Table 1

Developmental Considerations in the Four Social Information Processing Models

Model	Developmental additions over prior models	Examples of age group-specific research supporting the model
D’Zurilla & Goldfried (1971) D’Zurilla & Nezu, (1999)	Original adult model	<u>Adult</u> Bell & D’Zurilla (2009) <u>Adolescent</u> Jaffee & D’Zurilla (2003) Speckens & Hawton (2005)
Spivack & Shure (1974)	<ul style="list-style-type: none"> Means-ends thinking Theory of mind Perspective taking Causal thinking 	<u>Preschool</u> Jones et al. (1980) Gouze (1987) <u>School Age</u> Guerra & Slaby (1989) <u>Adolescent</u> Hains & Ryan (1983)
Rubin & Krasnor (1986)	<ul style="list-style-type: none"> Social scripts Considers prior experience in ability to identify a social problem, retrieve and select strategies. 	<u>School Age</u> Rubin et al. (2005) Schwartz & Proctor (2000) Dwyer et al. (2010)
Crick & Dodge (1994)	<ul style="list-style-type: none"> Prior experience Increased attention and memory capacity Speed of processing 	<u>School Age</u> Domitrovich & Bierman (2001) Lochman & Dodge (1994) Matthys et al. (1999) Nelson et al. (2008) Warden & Mackinnon (2003) <u>Adolescent</u> Lochman & Dodge (1994)