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# The Role of Child Emotionality in Child Behavior and Maternal Instruction on Planning Tasks

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## Abstract

*This study explored the relation of children's emotional functioning to children's behavior during individual planning and mother's and children's behaviors during joint planning. Participants were 118 mothers and their second-grade children. Mothers rated children on their emotional intensity and children rated themselves on their use of emotion regulation strategies. Children and mother-child dyads were videotaped during planning tasks and independent observers rated their behavior. Child emotional intensity was directly related to children being less engaged in the task and to an emphasis in maternal instruction on regulatory behaviors. Some types of emotion regulation strategies modified these relations. Findings suggest that child emotionality may play an important role in the early school years in children's opportunities to learn during social-cognitive activity.*

*Keywords:* mother-child interaction; child planning; child emotional intensity; child emotion regulation

The purpose of this study is to examine how children's emotional functioning relates to opportunities for the development of cognitive skill during interaction with mother. This research attempts to integrate social, cognitive, and emotional functioning, a goal consistent with research and theory which suggests that these psychological processes work together to shape human development (Miller & Goodnow, 1995). The current study is based on the theoretical and empirical foundation provided by a sociocultural approach to cognitive development that considers social interaction a mechanism for intellectual growth (Gauvain, 2001; Vygotsky, 1978). Through processes such as scaffolding (Wood & Middleton, 1975) and guided participation (Rogoff, 1990), more skilled partners assist children in a way that is sensitive to and adjusted to meet children's learning needs. Sensitive instruction facilitates learning by allowing children to participate in cognitive activities in which they would not be capable when working alone and thereby provides opportunities for the development of thought and action. Such processes may be particularly important for the development of a complex cognitive skill like planning, which is the focus of this research.

Planning is the deliberate organization of a sequence of actions oriented toward achieving a goal. Planning requires various intellectual abilities, such as the anticipa-

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tion and evaluation of future-oriented actions, as well as monitoring action while a plan is executed (Rogoff, Gauvain & Gardner, 1987). Planning ability becomes increasingly important as children get older and are expected to assume more responsibility for regulating their own behavior. Children's planning, especially that of young children, benefits greatly from the assistance of adults who can assume some of the more difficult components during joint planning and who model planning behaviors for children (Gauvain, 1992; Gauvain & Rogoff, 1989;). Significant changes emerge in the early school years in both individual and social planning, which is one reason why this age range was chosen for the current study.

Parents may play an especially important role in the development of planning skills. As a sustained social setting, the family frequently organizes or plans future activities. Moreover, the different cognitive status of family members allows for the social transmission of cognitive skill. Thus, by its nature and its structure, the family context is a primary site for the development of planning. While considering social interaction a mechanism for cognitive development, it is also important to remember that parent-child interactions are embedded within the larger context of their relationship (Hinde, 1989) and that interactions in the family are, in part, defined by emotional climate (Saarni, 1999). Thus, scaffolding and guided participation may not only be influenced by the cognitive needs of the child and the constraints of the cognitive task, but also by the concurrent and historical socio-emotional experience the interactive partners have with each other, what Gauvain and DeMent (1991) refer to as *shared social history*. This history includes many emotionally significant interactions between parents and children. These interactions range from the child looking to parental emotional reactions for guidance as to how to respond to novel events, as in social referencing (Saarni, Mumme & Campos, 1998), to parental coaching and contingent responses to children's emotionality (Denham, 1998). Thus, the shared social and emotional history of mothers and children may be evident in, as well as influence, mother-child collaboration during joint cognitive activity.

Although research has demonstrated that sensitive instruction by parents may lead to benefits for children (Gauvain, 2001), what is also clear from the research is that sensitive instruction, for varying reasons (e.g., child behavior and compliance problems, child temperament, parental incompetence or poor teaching skills), does not always take place (Gauvain & DeMent, 1991; Winsler, Diaz, McCarthy, Atencio & Chabay, 1999). During joint problem solving parents will often provide more instruction when they perceive that the task will be difficult for the child (Rogoff, Ellis & Gardner, 1984). In addition, stable characteristics of the child, such as temperament, may influence both mothers' instructional approach and children's own behavior during problem solving over time and across contexts (e.g., at home in the preschool years and at school later in development) (Fagot & Gauvain, 1997; Gauvain & Fagot, 1995). When sensitive instruction does not occur, fewer cognitive gains for children emerge as seen in poorer performance on follow-up tasks, based on the tasks used in the parent-child interaction, in comparison to the performances of children who receive more sensitive instruction.

The socio-emotional context of the mother-child relationship, and specifically children's emotional intensity and regulatory abilities, may influence the process of mother-child interaction in the context of joint cognitive activity, as well as children's opportunities to develop cognitive skills in social context. One interesting possibility, as evidenced in Winsler *et al.* (1999), is that the child may not need to display problematic characteristics (e.g., impulsivity) in the context of the

immediate task interaction for mothers to display differences in their instructional approach that are related to these child characteristics. Mothers may anticipate the needs of their children based on previous experience with them as well as respond in particular ways to behaviors that coincide with these difficulties as they arise in the interaction.

The current study examines aspects of children's emotional functioning that may contribute to children's opportunities to develop cognitive skills in the context of a joint problem-solving activity involving planning. This investigation addresses areas that have previously been neglected in developmental research. Specifically, it investigates how children's emotionality, that is, combinations of emotional intensity and emotion regulatory abilities, may influence children's ability to engage effectively in complex cognitive tasks involving planning.

### *Emotional Intensity, Emotion Regulation, and Cognitive Activity*

According to Frijda and Mesquita (1998), emotions and their call for action or action tendencies have precedence in psychological functioning and tend to direct thought and behavior. Thus, emotional experience, and in particular intense emotional experience or arousal, may interfere with cognitive activities that involve delay, inhibition, or the pursuit of long-term goals (Thompson, 1991), processes associated with planning. Difficulty in emotional functioning may also contribute to problems in parent-child interaction during joint cognitive activity and thus limit children's opportunities to learn and practice new skills during social interaction. Specifically, mothers who perceive interactions with their children to be difficult, due to the child's high emotional arousal, may be more focused on managing the interaction to enable completion of the task, resulting in directive and controlling behavior during joint cognitive activity. Mothers who do not perceive such difficulty may approach the task with the child in a way that is focused on the promotion of learning versus behavior management.

This research extends our understanding of children's emotionality, which has increasingly been recognized as playing a central role in children's development (see Saarni *et al.*, 1998). Emotional competence, which includes awareness of one's emotional states, knowledge and strategy use regarding emotional self-presentation, and the capacity for adaptive emotion-related regulation or coping, is considered essential for mature functioning (Denham, Mitchell-Copeland, Strandberg, Auerbach, & Blair, 1997; Saarni, 1997). Emotional competence is considered to be particularly important in social contexts in that it determines to some extent the way in which a person navigates transactions with others and contributes to the consequences of these transactions (Saarni, 1999).

This study examines two components of emotional functioning, emotional intensity and emotion regulation, as they relate to cognitive activity involving mothers and children. Although emotion regulation is related to emotional intensity, emotion regulation is considered to be a distinct aspect of emotional functioning that predicts unique variance with respect to children's social competence (Eisenberg *et al.*, 1993, 1995). This distinction is found even when children's emotional intensity and emotion regulation are assessed by the same reporter (e.g., mothers). In the current study, these two aspects of emotional functioning will be further distinguished by having mothers report on children's emotional intensity while having children report on their own emotion regulation strategies.

Emotional intensity (EI) characterizes an individual's style of emotional responding to environmental change. EI is posited to have a physiological base and represents stable individual differences over time in the strength with which one experiences emotion and the ease or quickness with which one responds (Eisenberg *et al.*, 1995; Eisenberg & Fabes, 1999; Larsen & Diener, 1987; Rothbart & Bates, 1998). Children exhibiting high levels of EI tend to display lower levels of constructive coping, increased distractibility, impulsive and disorganized behavior, and are perceived by adults as less socially mature and by peers as less attractive playmates (Eisenberg *et al.*, 1993, 1995). Thus, children with high levels of EI may have difficulty with tasks that require mental concentration and behavioral restraint, such as planning. Furthermore, these children may often experience difficult interactions with adults. We expect that maternal instruction may be related to children's emotion-related difficulty. However, it may also be that children who have learned to manage effectively their level of EI may not have as much difficulty with complex cognitive activities or in their social interactions. Thus, we also consider children's emotion regulation, as this ability may buffer or moderate the impact of EI during joint planning.

Emotion regulation (ER) refers to the processes and characteristics involved in coping with positive and negative emotions (Kopp, 1989). Such coping is especially needed when positive or negative emotions are at high levels or persist for long periods of time. ER involves strategies used to regulate the experience of internal emotional states and external behaviors that result from or are associated with such states (Eisenberg & Fabes, 1999). Examples of ER strategies aimed at altering the internal experience of emotions include self-soothing behaviors (e.g., deep breathing), cognitive reframing (e.g., replacing a negative thought with a positive thought), and distraction (e.g., watching television) (Brenner & Salovey, 1997; Denham, 1998; Saarni, 1999). Examples of ER strategies aimed at altering external behaviors associated with emotional experience include changing expressive behavior (e.g., smiling despite feelings of anxiety) or doing something to change the situation (e.g., withdrawing from others, help seeking, conflict resolution) (Denham, 1998). Internal and external ER strategies may be either more or less adaptive, particularly with regard to social functioning (Eisenberg *et al.*, 1993, 1995). Saarni (1999) suggests that problem-solving strategies, support-seeking strategies, distraction, and cognitive reframing tend to be more adaptive ER methods in comparison to avoidance strategies (e.g., withdrawing from others), internalizing strategies (e.g., covering up anxious feelings), or externalizing strategies (e.g., venting, blaming).

Research suggests that the combination of high EI and less adaptive ER (e.g., avoidance, venting) may result in poor outcomes for the child in social contexts (Denham, 1998; Eisenberg *et al.*, 1993). Another way to conceptualize this issue is to say that ER strategies may moderate the impact of EI. Thus, research suggests that these two components of emotion, EI and ER, may contribute to the performance of tasks that require voluntary control of behavior and regulation of actions, the exact behaviors needed for effective planning. It is hypothesized that children who are rated as high in EI by their mothers may have more difficulty planning on their own. Furthermore, we expect that the child's ER strategies will moderate the impact of EI. Specifically we expect that children high in EI who use non-adaptive strategies to regulate their emotions, such as venting, will experience more difficulty during individual planning, and children low in EI who use adaptive coping strategies will experience the least difficulty planning. We also expect that these behaviors will play a role in collaborative planning involving mothers and children.

During joint planning, mothers of children perceived to be high in EI are expected to display more behaviors aimed at regulating their child's behavior and exhibit fewer behaviors aimed at promoting learning than mothers of children perceived to be low in EI. It is further hypothesized that children's ER strategies will moderate the impact of child EI during the mother-child interaction, with more adaptive strategies related to more effective planning interactions. Finally, we hypothesize that during joint planning, children high in EI will be less engaged in the task than children low in EI. Though, again, we expect that children's ER strategies will moderate the impact of emotional intensity on children's behavior during the task. Together, these hypotheses suggest that children's emotionality may affect the nature of children's planning behavior as well as the opportunities children have to learn about and develop planning skills during interaction with more experienced planners, such as their mothers. We examine children's learning following the interaction by observing their performance on an individual post test that involves planning.

In this research, second-grade boys and girls and their mothers from two cultural communities in the United States, European- and Latino-American, participated. Although no specific patterns are expected with respect to gender or ethnicity, patterns of relations between these variables and the variables of interest will be examined. Second-grade children were chosen because this age represents a point in early to middle childhood during which children's cognitive skills are increasing and parents expect children to be more self-reliant. In addition, joint planning involving children of this age is more likely to include collaboration between partners than joint planning involving adults and preschoolers (Gauvain, 1992), and increased collaboration enhances children's opportunities to learn in a social context in this area of cognitive functioning.

Although much research on emotional development has focused on preschool children, there are important developmental changes in emotional functioning taking place in middle childhood that correspond with cognitive development (Schaffer, 1996). For instance, children of this age develop a more complex understanding of emotion, including the role of emotional expressions in the regulation of social interactions and relationships, social and cultural norms of emotional expression, how such expressions may be used strategically, and when emotion regulation is needed and which strategies are most appropriate for different situations (i.e., controllable vs. uncontrollable events) (McDowell, O'Neil & Parke, 2000; Saarni, 1999; Saarni *et al.*, 1998; Underwood, 1997; Zeman & Garber, 1996). As a result of this increased understanding, children begin to use display rules, rely less on others for assisting with emotion regulation, and shift from using only behavioral coping to more cognitive emotion regulation strategies such as self-distraction and cognitive reframing (Brenner & Salovey, 1997; Murphy, Eisenberg, Fabes, Shepard & Guthrie, 1999). Thus, children of this age are expected to be able to report on their own ER strategies. In addition, children are at a point in emotional development when the interaction between EI and ER may be particularly meaningful in the context of mother-child joint planning.

## Method

Participants included 118 mothers and their second-grade children (mean age = 8.00, *SD* = .42, range 7.08 to 9.33), with 83 European-American (39 boys) and 35 Latino-American (18 boys). Participants were recruited from a public school district in

Southern California. All Latino-American mothers and their children spoke English as their primary language. For European-American families, annual income ranged from less than \$15,000 to \$60,000 and above with a median of \$60,000 or more a year. For Latino-American families, annual income had the same range as European-American families, though their median income was \$40,000 to \$50,000 a year. Thus, these groups differed in reported annual income  $F(1,115) = 16.02, p < .05$ , though both groups would be considered middle class. Regarding mothers' education, there were a range in the European-American participants from some high school to graduate school with a median of some college. Among Latino-American mothers, education ranged from some high school to graduate school with a median of vocational school (post high school). European- and Latino-American mothers differed in their mean level of education,  $F(1,115) = 16.40, p < .05$ .

### Procedure

Mothers and children visited a university laboratory on one occasion. Children were taken into a separate room and given a planning pretest. While children completed the pretest, mothers completed a family demographics questionnaire. Then, mothers and children worked together on a planning task. Following the interaction, mothers left the room to complete other questionnaires, including a measure of children's emotional intensity, while the child worked on a planning post test. Following the post test, the child was interviewed about his or her emotion regulation strategies in response to three emotionally charged scenarios. All planning sessions were videotaped.

### Materials

Mothers completed a ten-item questionnaire, *Children's Reactions*, focusing on children's intensity of emotional reactions. This measure was adapted from Larsen and Diener's (1987) *Affective Intensity Scale* and is similar to a five-item scale described by Eisenberg and her colleagues (see Eisenberg *et al.*, 1993). This measure included ten items (e.g., 'When my child feels an emotion, either positive or negative (s)he feels it strongly'; 'My child responds very emotionally to stories, movies, and events that (s)he observes'). The items were rated on a 5-point scale (1 = never, 2 = rarely, 3 = sometimes, 4 = usually, 5 = always), items reflecting lower emotional intensity were reverse scored, and the items were averaged for a single score with higher scores reflecting higher emotional intensity ( $\alpha = .77$ ). As a means of assessing the validity of mothers' ratings of child emotional intensity, these ratings were correlated with a set of fathers' ratings collected on a subset of the sample. Mothers' and fathers' scores were significantly correlated  $r(44) = .26, p < .05$ , indicating consistency across these raters of the same child's emotional intensity.

Children were interviewed about their strategies for coping with three emotionally charged scenarios using a measure adapted from McDowell *et al.* (2000). During the interview, three scenarios intended to generate anger, sadness, or excitement were presented to the children and the children were asked to imagine that the scenario is something that happened to them. In the anger scenario, the protagonist in the story (i.e., the child) is riding his or her bike home from school when another child 'whizzes by' and knocks the child off the bike and the child ends up with scraped knees and his or

her favorite jacket is ripped. In the sad scenario, the protagonist takes the classroom hamster home for the weekend and on Monday, when it is time to go back to school, the child discovers that the hamster has died. In the excitement scenario, the child's class has been planning an exciting field trip for a long time and when 'the big day finally arrives' there is a long bus ride and the bus is filled with the child's classmates and friends. Children were asked to rate the likelihood of utilizing six emotion regulation strategies (described below) in response to the scenarios on a 7-point scale ranging from 1 (never) to 7 (definitely would).

Principal components analysis of the coping strategies with oblique rotation to allow for correlation among the factors was conducted. The analysis yielded three factors accounting for 68% of the variance (see Table 1). The factors included *externalizing or venting* (e.g., 'I'd just let my upset out to get it out of my system, like cry a lot or yell') tapped by one item averaged across the three scenarios; *internalizing or non-adaptive coping* tapped by three items averaged across the three scenarios including internalization (e.g., 'I'd feel nervous, fidgety, or shaky inside, but not let anyone see it'), sadness (e.g., 'I'd feel sad and not really feel like doing much'), and social withdrawal (e.g., 'I'd spend the rest of the day by myself'); and *adaptive coping* taped by two items averaged across the three scenarios including cognitive reframing (e.g., 'I'd think of a good reason why it happened and figure that it could have been worse') and distraction (e.g., 'I'd do something else I like to do to help me think of something else, like watch TV'). Only one variable, sadness, cross-loaded at  $-.31$  with the venting factor, whereas its loading was  $.82$  on the non-adaptive ER factor. This item was retained with the non-adaptive ER factor because it loaded negatively on the venting factor, and conceptually was more related with internalization and social withdrawal as forms of ER. Because the oblique rotation method allowed these factors to be correlated, for purposes of ease of interpretation, mean scores, rather than weighted composites, were computed for each factor. The alphas for the three scales were  $.55$ ,  $.64$ , and  $.68$ , respectively. The relatively lower reliability of the venting scale may be related to the small number of items making up the scale (1 item for each of the scenarios). Although low reliability may negatively bias regression analyses in which it is a predictor (i.e., significant results may be more difficult to attain due to increased measurement error), venting is retained as a variable due to its importance for research

**Table 1. Pattern Matrix Factor Loadings from Principal Components Analysis with Oblique Rotation for Children's Self-reported Emotion Regulation Strategies**

	Pattern Matrix		
	Venting	Non-adaptive ER	Adaptive ER
Venting	.928	.066	-.030
Internalization	.229	.662	.096
Sadness	-.308	.818	-.055
Withdrawal	.151	.651	.019
Cognitive Reframing	-.144	.077	.809
Distraction	.098	-.066	.833



purposes in examining differences in patterns among adaptive and less adaptive ER strategies.

### *Planning Tasks*

Children participated in an initial solitary problem-solving task (pretest), a problem-solving task with their mother (interaction), and a follow-up solitary problem-solving task (post test) (see Table 2). All the tasks pertained to everyday activities involving chore and errand planning that are familiar to early school-age children and adults in the U.S. At the beginning of each problem-solving session, participants were asked if they understood the task and in all cases responded affirmatively.

In the pretest, children were presented with a chore-planning task. They were provided with a map of an imaginary classroom, drawn on 8-1/2 × 11 inch (216 × 279 mm) paper, and a list of chores to be completed after school (see Pea & Hawkins, 1987). The task objective was for the child to plan the shortest (best) way of completing the chores. The child was allowed to try out different plans until the best plan was decided on. Children were asked to talk aloud as they worked on the task.

During the interaction, mother-child dyads were presented with an errand-planning task in which the dyad worked together to plan the shortest route to complete a list of errands in an imaginary town. The dyad was given a list of errands (e.g., buy gas for your car, drop off clothes at cleaners) and a map of an imaginary town drawn on 8-1/2 × 11 inch (216 × 279 mm) paper. They were asked to pretend that they had all day to do the errands, but that they needed to complete them all in one trip. They were told that they could practice as many times as they liked until they decided on the shortest route. The experimenter left the room and returned when the dyad indicated they had completed the task and traced the final route on to the map.

Following the interaction, children worked alone on a post test in which they were presented with a chore-planning task similar to the pretest task but somewhat more complex. Children were provided with a map of an imaginary house, drawn on 8-1/2 × 11 inch (216 × 279 mm) paper, and a list of chores to be completed after school. They were asked to plan the shortest way of doing all the chores. The child was allowed to try out different plans until the best plan was decided on and was asked to talk aloud while working on the task.

### *Coding and Reliabilities*

General behavior patterns of the child during individual planning and the mother-child dyad during joint planning were coded from transcripts of the videotapes that included verbal and nonverbal content. Nonverbal behaviors in the transcripts included off-task behavior (e.g., looking around the room, looking away from task) and task-related behavior (e.g., pointing to locations on the map, writing down final plan). Affect-related behaviors (to be defined below) were coded directly from the videotapes. Three independent coders, unaware of the hypotheses of the study, overlapped on 15% of the transcripts and videotapes. Kappa reliabilities were calculated for categorical variables. For variables rated on a scale, effective reliability estimates for multiple coders were calculated as described in Rosenthal and Rosnow (1991) and both the average correlation, interpreted as the average reliability of a single coder (average  $r$ , calculated using Fisher's  $z$  transformation) and effective reliability estimate, interpreted as the average reliability of the set of coders ( $R_{est}$ ) will be reported.

**Table 2. Chore Lists and Possible Points for the Pretest, Interaction, and Post test Planning Tasks**

Pretest Task	Points Possible
Water plants using watering can by sink	3 points if can retrieved before going to sink
Erase both blackboards	2 points
Feed the hamster	1 point
Put paintbrushes in jar by the sink	2 points if brushes retrieved before going to jar
Throw away scraps of paper in trashcan	2 points if trash retrieved before going to can
Interaction Task	Points Possible
Pick up old clothes from Mrs. Bergen and take to Rummage Sale at church	1 point
Buy gas for car (it's nearly on empty!)	1 point if completed within first 4 steps
Drop off clothes at the cleaners	1 point
Buy cake and ice cream at the market for Ice Cream Social	1 point if completed as second to last stop
Take cat to the vet (it goes CRAZY in car!)	1 point if cat carrier borrowed prior to this errand
Pick up Benny at the ballpark at 5:00 p.m.	1 point if completed as third to last stop
Borrow 'cat carrier' from next-door neighbor	1 point if borrowed before taking cat to vet
Be at the church for Rummage Sale and Ice Cream Social by 6:00 p.m.	1 point if church visited one time only and as last stop
Post test Task	Points Possible
Make the bed in your room	1 point
Put father's clean shirt in the closet	2 points if shirt retrieved before going to closet
Feed the cat, the bowl and food are in the kitchen	2 points if food retrieved before going to bowl
Dust television with feather duster on table	2 points if duster retrieved before dusting television
Pick up socks and put them in laundry basket	2 points if socks retrieved before going to basket
Put silverware and dishes in the sink	2 points if dishes retrieved before going to sink

*Pretest and Post test.* For the pre- and post-test sessions children's *on-task* (average  $r = .95$ ,  $R_{\text{est}} = .98$ ) behavior, defined as the child remaining engaged with the task and making solution attempts, was rated on a 4-point scale (1 = never, 4 = consistently). Children's level of ease in completing the task (displayed understanding of task and completed task without difficulty) (average  $r = .77$ ,  $R_{\text{est}} = .90$ ) was coded on a 3-point scale (1 = never, 3 = consistently). Children were also given a *plan performance score*, in which the child was given one point for completing each chore or step of a chore (some chores had more than one step). For multi-step chores, points were contingent on children completing the steps in the chore in the correct order. For example, one pretest chore involved throwing away scraps of paper in a trashcan near the door of the classroom (2 steps). This chore was worth two possible points (1 point for picking up the scraps of paper, 1 point for taking scraps to the trashcan). Children were only given the two points if they picked up the scraps of paper prior to going to the trashcan, reflecting the correct sequence required for the chore to be completed. The plan performance score was a proportion of the total possible points received (pretest total possible = 10, post test total possible = 11). Finally, the amount of time children took to complete the planning task was recorded and rounded to the nearest quarter of a minute.

*Interaction: Mother Behavior.* For the interaction session, four mother behaviors were rated on a 3-point scale (1 = never/very rare, 2 = sometimes, 3 = consistently) from the transcripts. These behaviors were rated after the coder had read through the entire transcript, with each behavior evaluated in terms of its overall occurrence in the mother's utterances. These behaviors were *provided guidance* (average  $r = .88$ ,  $R_{\text{est}} = .95$ ), defined as explaining the rules of the task or providing information about how best to complete the task (e.g., 'Let's read all the items on the list first'); *directive behavior* (average  $r = .85$ ,  $R_{\text{est}} = .94$ ), defined as directing the child to perform specific actions during the task (e.g., enumerate the errands or identify a location on map); *encouraged independent behavior* (average  $r = .77$ ,  $R_{\text{est}} = .90$ ), defined as being minimally directive and encouraging the child to devise solutions to the task (e.g., 'What do you think we should do next?'); and *kept child involved* (average  $r = .74$ ,  $R_{\text{est}} = .90$ ), defined as prompts or suggestions that encourage the child to remain involved in the task (e.g., 'Why don't you read the next one on the list?'). Two affect-related behaviors were coded directly from the videotapes on a scale of 1 (almost no affect) to 5 (a great deal of affect), resulting in an overall rating for the mothers for each of these types of behavior during the interaction. The affect-related behaviors were *display of positive affect* (average  $r = .72$ ,  $R_{\text{est}} = .89$ ), defined as praise and supportive interaction with the child (e.g., 'That's a good idea', smiling, laughter, supportive or affectionate touching); and *display of negative affect* defined as negative reactions toward the child's involvement in the task (e.g., 'You don't know what you're doing', loud or harsh tone of voice, looks of disapproval). Because negative affect occurred very infrequently in the videotapes selected for coding (i.e., the majority of the ratings was 1 across the coders), there was not enough variation to calculate correlations. However, there was 98% agreement among the coders.

There were moderate to high intercorrelations (ranging from  $r = .26$ ,  $p < .01$  to  $r = .59$ ,  $p < .001$ ) among the three codes reflecting behaviors aimed at promoting learning, specifically provided guidance, encouraged independent behavior and kept the child involved in the task. Positive relations among these behaviors are not surprising

in that, according to theory on sensitive instruction (Palinscar & Brown, 1984), they reflect different yet complementary aspects of effective instruction on challenging cognitive activities. Whereas *providing guidance* includes specific task information that may aid performance, *encouraging independent behavior* emphasizes a general motivational stance necessary for the transfer of task responsibility that is expected to emerge during successful instructional interaction, and *kept child involved* includes behaviors that occur regularly and prompt the child to constructive action and therefore opportunities to learn. These variables were combined to form a scale representing learning promotion ( $\alpha = .65$ ). All other items (directive, negative affect, positive affect) were not significantly correlated with one another and therefore are examined independently.

*Interaction: Child Behavior.* Child behaviors during the interaction were rated on a 3-point scale (1 = never/very rare, 2 = sometimes, 3 = consistently) from the transcripts. These behaviors were rated after the coder had read through the entire transcript, with each behavior evaluated in terms of its overall occurrence in the child's verbal and nonverbal behaviors. Children were rated on three behaviors including whether they were *involved* (average  $r = .79$ ,  $R_{\text{est}} = .92$ ) in the task, defined as participating in solution suggestions, decision-making, and task execution; *cooperation* (average  $r = .86$ ,  $R_{\text{est}} = .95$ ) with mother, defined as responding to questions and directives from mother; and *on-task behavior* (average  $r = .66$ ,  $R_{\text{est}} = .85$ ), defined as remaining engaged with the task, making solution attempts, asking task-related questions, making task-related comments, and minimal off-task behavior (e.g., off-task conversation). Affect-related behaviors were rated from the videotapes and included positive affect (average  $r = .82$ ,  $R_{\text{est}} = .93$ ), and negative affect (average  $r = .82$ ,  $R_{\text{est}} = .93$ ), resulting in an overall rating for the children for each of these types of behavior during the interaction. There were high intercorrelations (ranging from  $r = .53$ ,  $p < .001$  to  $r = .69$ ,  $p < .001$ ) among these three behaviors, which tap different but complementary aspects of the child's engagement in the activity. *Involved* emphasized the child's cognitive contributions, *cooperation* emphasized the child's responsiveness to maternal assistance, and *on-task behavior* described the child's ability to maintain interest in the task. The three items were combined to form a scale reflecting task engagement ( $\alpha = .83$ ). Positive and negative affect will be evaluated separately.

*Interaction: Dyadic Behavior.* Dyadic behavior was coded on three dimensions on a dichotomous scale (yes/no). Since these are categorical variables, kappa was calculated for each pair of coders and the average kappa is reported. Codes included whether there was an *orientation* (kappa = .70) to the task, defined as the dyad attempting to understand the task before beginning to plan, such as reading the list of errands and locating where each errand was to be done before devising a plan; whether there was a *review* (kappa = .83) of the plan after planning was completed; and whether *responsibility for decision-making was shared* (kappa = .87), defined as shared discussion regarding strategies, rules and decision-making during planning. Finally, mothers and children were given a *plan performance score*, in which the dyad was given one point for completing each errand and additional points for correctly prioritizing some of the errands. The performance score was a proportion of a total of eight possible points. Finally, the amount of time dyads took to complete the planning task was recorded and rounded to the nearest quarter of a minute.

## Results

### *Plan for Analyses*

The focus of the analyses was to examine emotional intensity as a predictor of mother, child, and dyadic behaviors during joint planning and individual pretest and post-test trials, and to examine emotion regulation as a moderator in the relations between emotional intensity and the mother, child, and dyadic behavior variables. Because of the nature of the sample, preliminary analyses using multivariate ANOVA tested for gender and ethnic differences for all variables of interest. There were no gender differences and so gender was collapsed for all analyses. However, there were ethnic differences on the outcome variables of interest. There were no ethnic differences for the emotion variables. Ethnic differences on the outcome variables were significant at  $p < .05$ . For the pretest, European-American (EA) children performed the task more easily ( $M = 2.96$ ,  $SD = .19$ ) than did Latino-American (LA) children ( $M = 2.65$ ,  $SD = .73$ ), and EA children performed better on the task ( $M = .91$ ,  $SD = .16$ ) than did LA children ( $M = .82$ ,  $SD = .22$ ). For joint planning, EA mothers engaged in more learning promotion behaviors ( $M = 2.58$ ,  $SD = .42$ ) than did LA mothers ( $M = 2.37$ ,  $SD = .63$ ), more EA dyads had an orientation to the task ( $M = 94\%$ ) than did LA dyads ( $M = 78\%$ ), more EA dyads shared decision-making ( $M = 91\%$ ) than did LA dyads ( $M = 71\%$ ), and EA dyads performed better ( $M = .77$ ,  $SD = .14$ ) than did LA dyads ( $M = .70$ ,  $SD = .13$ ). For the post test, EA children performed better on-task ( $M = .96$ ,  $SD = .09$ ) than did LA children ( $M = .88$ ,  $SD = .17$ ).

Given these differences ethnicity was controlled for in all analyses, which enabled us to examine our primary questions about emotionality with any variance due to ethnicity removed. In addition, previous research has indicated that family income and parent education level may have an impact on children's display of cognitive ability and on parent instructional style during joint cognitive activity (Laosa, 1982; Renshaw, 1992). Thus, annual family income and mother's education level were also controlled for in all analyses.

Moderation was established by testing the interaction of the predictor variables, namely emotional intensity and emotion regulation. Interaction variables were created by computing cross-products for emotional intensity with each of the emotion regulation variables. The interaction variables test for *joint effects* of two or more variables of interest and in regression, products of variables carry these interactions. Calculation and interpretation of the interaction effects were guided by the recommendations of Aiken and West (1991) and Cohen and Cohen (1983). Emotional intensity and emotion regulation variables were centered at their means to reduce the correlation between main effect terms and interaction terms (Aiken & West, 1991).

Because the dependent variables are of two types, continuous and dichotomous, hierarchical regression analyses were conducted for continuous variables and logistic regression analyses were conducted for dichotomous variables. Separate models were run for each of the emotion regulation strategies, venting, non-adaptive emotion regulation, and adaptive emotion regulation in order to assess their independent contribution to the prediction of planning behaviors. In all hierarchical regression and logistic regression analyses, ethnicity, maternal education, and family income were entered on step one, emotional intensity was entered on step 2, one of the emotion regulation strategies (venting, non-adaptive, and adaptive) was entered on step 3, and the corresponding emotional intensity and emotion regulation interaction term was

**Table 3. Descriptive Statistics of Child Emotional Intensity and Emotion Regulation**

	<i>M</i>	<i>SD</i>
Emotional Intensity	3.60	.51
Venting	2.71	.97
Adaptive ER	3.62	.70
Non-adaptive ER	2.87	.70

entered on step 4. Interactions were interpreted by computing slopes at high (+1 *SD*) and low levels (−1 *SD*) of the moderator variables (emotion regulation) (see Aiken & West, 1991).

General descriptive statistics for children's emotional intensity and emotion regulation strategies are presented in Table 3. Descriptive statistics for children's pretest and post-test planning and mother, child, and dyad behaviors during joint planning are presented in Table 4.

Examining the pretest and post-test descriptive statistics as a baseline of children's individual planning ability, the means indicated that children performed the task easily and they remained on-task. Children also displayed a high level of plan performance, with an average proportion score of .88 of the total possible points on the pretest and an average of .93 on the post test.

#### *Planning and Child Emotionality*

*Child Pretest.* Correlations between the predictor and the dependent variables indicated no direct associations between children's pretest behavior and children's emotional intensity or regulation. In the hierarchical regression analyses, for children's on-task behavior, ease in performing the task, and time spent completing the task, none of the predictors was significant. For children's plan performance, there was a significant change in *R* squared (total  $R^2 = .13$ ,  $\Delta R^2 = .03$ , *F* change (1,109) = 4.28,  $p < .05$ ) for step 4 indicating a significant emotional intensity by non-adaptive coping interaction ( $\beta = .19$ ,  $t(109) = 2.05$ ,  $p < .05$ ). Evaluation of this interaction indicates that the relation between children's emotional intensity and children's plan performance approaches significance at low levels of non-adaptive ER ( $\beta = .21$ ,  $t(109) = 1.82$ ,  $p = .07$ ), but not at high levels ( $\beta = -.16$ ,  $t(109) = 1.15$ , *ns*). Thus, if children are high in EI, they plan better on their own if they use fewer non-adaptive ER strategies.

#### *Mother–Child Planning*

*Maternal Instruction.* Correlations between predictor variables and mother behaviors during joint planning indicated that children high in EI had mothers who displayed more directive behavior,  $r(118) = .26$ ,  $p < .05$ , and more negative affect,  $r(118) = .18$ ,  $p < .05$ . For the hierarchical regression analyses, results demonstrate that for mothers' learning promotion behavior, there was a significant change in *R* squared for step 4 indicating a significant EI by venting interaction effect, total  $R^2 = .10$ ,  $\Delta R^2 = .03$ , *F*

**Table 4. Descriptive Statistics of Children's Pretest and Post-test Behaviors, and Mother, Child, and Dyadic Behavior During Joint Planning**

	Pretest		Post-test	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
On-task	3.97	.16	3.95	.29
Ease with Task	2.84	.51	2.97	.18
Plan Performance	.88	.18	.93	.14
Time	9.57	.41	3.06	1.90
Mother Behaviors	<i>M</i>	<i>SD</i>		
Learning Promotion	2.51	.49		
Directive	1.10	.33		
Positive Affect	1.09	.21		
Negative Affect	1.02	.13		
Child Behaviors	<i>M</i>	<i>SD</i>		
Task Engagement	2.80	.38		
Positive Affect	1.08	.16		
Negative Affect	1.01	.05		
Dyad Behaviors	<i>M</i>	<i>SD</i>		
Performance	.75	.14		
Time	4.00	2.57		
Dyad Dichotomous Variables	% Yes			
Orientation	89.0			
Review	33.1			
Shared Decisions	84.5			

*change* (1,109) = 4.16,  $p < .05$ . This interaction indicated that EI was positively related to mothers' learning promotion behavior at low levels of venting ( $\beta = .25$ ,  $t(109) = 2.09$ ,  $p < .05$ ) but not at high levels of venting ( $\beta = -.06$ ,  $t(109) = .49$ , *ns*). In other words, mothers provide more behaviors that promote learning for children high in EI, but only for children who tend not to use venting as a strategy for regulating their emotions.

For mothers' directive behavior, there was a significant change in *R* squared at step 2 (total  $R^2 = .09$ ,  $\Delta R^2 = .06$ , *F change* (1,111) = 6.74,  $p < .05$ ) indicating a significant main effect of emotional intensity,  $\beta = .24$ ,  $t(111) = 2.60$ ,  $p < .05$ . There was also a significant change in *R* squared at step 4 (total  $R^2 = .16$ ,  $\Delta R^2 = .05$ , *F change* (1,109) = 7.02,  $p < .05$ , with a significant emotional intensity by adaptive emotion regulation interaction,  $\beta = -.24$ ,  $t(109) = 2.62$ ,  $p < .05$ . EI was positively related to mothers' directive behavior at low levels of adaptive ER interaction ( $\beta = .54$ ,  $t(109) = 3.81$ ,  $p < .05$ ) but not at high levels of adaptive ER ( $\beta = .06$ ,  $t(109) = .55$ , *ns*). This interaction demonstrates that mothers tend to be more directive of children high in EI, but only for children who tend not to use adaptive ER strategies.

For mothers' negative affect there was a significant change in  $R$  squared at step 2, total  $R^2 = .05$ ,  $\Delta R^2 = .04$ ,  $F$  change (1,111) = 4.39,  $p < .05$ , indicating a significant main effect of emotional intensity,  $\beta = .20$ ,  $t(111) = 2.10$ ,  $p < .05$ . There were no results approaching significance for mothers' positive affect.

These patterns of results are consistent with the hypotheses and demonstrate that mothers' instructional approach during joint planning is related to children's emotional functioning. Specifically, children high in EI have mothers who engage in instruction that is less focused on promoting children's learning, more focused on regulating children's behavior, and more negative. Furthermore, this relation is modified by children's ER strategy use such that children high in EI and using venting and fewer adaptive ER strategies receive more behavior regulation from mothers whereas children high in EI but using fewer non-adaptive ER strategies receive more instruction aimed at promoting children's learning.

*Child Behavior.* Correlations between the predictor and the dependent variables indicated that children who endorsed venting as a form of ER were less engaged in the planning task,  $r(118) = -.21$ ,  $p < .05$ , and children high in EI displayed more negative affect during joint planning,  $r(118) = .19$ ,  $p < .05$ . Results for the hierarchical regression analyses for children's behavior demonstrated that for task engagement, there was a significant change in  $R$  squared (total  $R^2 = .11$ ,  $\Delta R^2 = .04$ ,  $F$  change (1,110) = 4.81,  $p < .05$ ) on step 3 with a main effect for venting ( $\beta = -.20$ ,  $t(110) = 2.19$ ,  $p < .05$ ). This finding suggests that children's endorsement of venting has a direct negative effect on children's task engagement regardless of their EI. For children's negative affect, there was a significant change in  $R$  squared (total  $R^2 = .10$ ,  $\Delta R^2 = .05$ ,  $F$  change (1,110) = 6.12,  $p < .05$ ) for step 2 with a main effect for EI ( $\beta = .23$ ,  $t(110) = 2.47$ ,  $p < .05$ ), indicating that children high in EI also displayed more negative affect during joint planning.

*Dyadic Behaviors.* Correlations between predictor variables and mother-child dyadic behaviors during planning indicated dyads in which children were high in emotional intensity were more likely to have an orientation to the task,  $r(118) = .20$ ,  $p < .05$ . For the hierarchical regression analyses, the variables orientation, review, and shared decision-making were dichotomous variables, thus making logistic regression the appropriate data analytical method. For plan performance scores, multiple regression analyses were conducted. For task orientation, step 2 was significant ( $\chi^2 = 4.60$ ,  $p < .05$ ) with a main effect of emotional intensity ( $B = 1.33$ ,  $p < .05$ ). For task review, step 4 was significant ( $\chi^2 = 4.01$ ,  $p < .05$ ) with a significant EI by non-adaptive ER interaction ( $B = -1.20$ ,  $p < .05$ ). This interaction demonstrates that EI was positively related to whether there was a task review at high levels of non-adaptive ER ( $B = 1.25$ ,  $p < .06$ ), but not at low levels of non-adaptive ER ( $B = -.41$ , *ns*). Thus, dyads were more likely to review the task when children were high in EI and using non-adaptive ER strategies.

### *Child Post Test*

Correlations between the predictor variables and children's post-test behavior indicates that children high in EI were less likely to be on-task,  $r(118) = -.25$ ,  $p < .05$  and took longer to complete the task,  $r(118) = .19$ ,  $p < .05$ . Children who engaged in adaptive



ER performed better on-task,  $r(118) = .21, p < .05$ . Results for the hierarchical regression analyses demonstrated that for on-task behavior, there was a significant change in  $R$  squared on step 2, total  $R^2 = .09, \Delta R^2 = .07, F$  change  $(1,111) = 8.61, p < .05$ , with EI as a significant predictor,  $\beta = -.27, t(111) = 2.93, p < .05$ . There was also a significant change in  $R$  squared on step 4, total  $R^2 = .13, \Delta R^2 = .04, F$  change  $(1,109) = 5.39, p < .05$ , with a significant EI by venting interaction,  $\beta = -.21, t(109) = 2.32, p < .05$ . This interaction indicates that child EI was negatively related to on-task behavior at high levels of venting ( $\beta = -.44, t(109) = 3.66, p < .001$ ) but not at low levels of venting ( $\beta = -.09, t(109) = .54, ns$ ). For plan performance, there was a significant change in  $R$  squared on step 4 (total  $R^2 = .18, \Delta R^2 = .03, F$  change  $(1,109) = 3.80, p < .05$ ) indicating an EI by venting interaction ( $\beta = -.17, t(109) = 1.95, p < .05$ ). Evaluation of this interaction indicates that children's emotional intensity is positively related to children's post-test plan performance at low levels of venting ( $\beta = .25, t(109) = 2.11, p < .05$ ), but not at high levels ( $\beta = -.04, t(109) = .34, ns$ ). For the amount of time children took to complete the task, there was a significant change in  $R$  squared on step 2 (total  $R^2 = .05, \Delta R^2 = .04, F$  change  $(1,111) = 4.22, p < .05$ ) with a significant main effect for EI ( $\beta = .19, t(111) = 2.06, p < .05$ ). There was also a significant change in  $R$  squared on step 4 (total  $R^2 = .11, \Delta R^2 = .06, F$  change  $(1,109) = 6.85, p < .05$ ), with a significant EI by venting interaction ( $\beta = .24, t(109) = 2.62, p < .05$ ). This interaction indicated that EI was positively related to the time it took to complete the task at high levels of venting ( $\beta = .41, t(109) = 3.38, p < .05$ ), but not at low levels of venting ( $\beta = .02, t(109) = .13, ns$ ). No other results approached significance for children's post-test behaviors.

These patterns of results suggest that children's emotional functioning plays a role in their ability to plan independently following an individual pretest and joint planning with mother. Consistent with the hypotheses, children high in emotional intensity are less likely to remain on-task and to take longer to complete the task, particularly children who use venting, a less adaptive ER strategy. Children with high EI perform better on the post-test planning task as long as they do not endorse venting as a form of ER.

#### *Relation of Joint Planning Behavior to Child Post-test Planning*

The final question we addressed was whether mothers' and children's behaviors during the joint planning session were related to children's post-test planning behavior. Partial correlations controlling for children's pretest behavior were calculated. These relations demonstrated that post-test plan performance was positively related with the dyad sharing decisions during joint planning,  $r(115) = .23, p < .01$  and to children's engagement in the interaction task,  $r(115) = .20, p < .05$ . This means that even when children's pretest planning is taken into account, sharing decision-making and the child's task engagement during joint planning are positively related to children's individual post-test planning. There was a negative relation between children's post-test performance and mothers' negative affect,  $r(115) = -.27, p < .01$ , and children's negative affect,  $r(115) = -.39, p < .001$ , during the joint task. This suggests that negative interactions between mothers and children during the interaction may in some way limit children's opportunity to learn from joint planning. There was also a positive relation between mothers' learning promotion behavior and children's post-test performance,  $r(115) = .18, p = .05$ . The amount of time children took to complete the post-test task

was positively related with mothers' display of positive affect,  $r(115) = .23$ , and children's display of positive,  $r(115) = .21$ ,  $p < .05$ , and negative affect,  $r(115) = .19$ ,  $p < .05$ , during joint planning. Thus, mothers' instructional approach and child behavior during the interaction are associated with children's subsequent individual performance on the planning task.

## **Discussion**

The results indicate that combinations of children's emotional intensity and emotion regulation are related to some aspects of children's independent planning behavior and mothers' and children's behavior during joint planning. Child emotional functioning predicted plan performance and ability to remain on-task during independent pretest and post-test planning. During joint planning, mothers who rated children as being high in emotional intensity tended to display more behaviors aimed at regulating their child's behavior, including directive behavior and negative affect. Furthermore, children who rated themselves as more likely to use less adaptive emotion regulation strategies had mothers who engaged in more regulatory behavior.

The findings also demonstrated that mothers' instructional approach and display of affect, child engagement in the task, and certain dyadic behaviors during joint planning, especially those that facilitate children's learning and involvement in the task like shared decision-making, are positively related to children's subsequent individual planning performance. These findings suggest a link between children's emotionality, opportunities to develop planning skills during a joint planning task, and children's learning as measured by their subsequent independent planning performance.

Some forms of emotion regulation appeared to moderate the impact of children's emotional intensity on mothers' behavior during the joint planning task. For instance, children rated by mothers as more emotionally intense and by themselves as less likely to use non-adaptive emotion regulation strategies (e.g., venting) or more likely to use adaptive emotion regulation strategies tended to receive more cognitive support (learning promotion behaviors) from mothers and fewer behaviors aimed at regulating children's behavior (directive). This pattern suggests that mothers tend to offer more support and guidance to children that the mothers believe to be high in emotional intensity as long as the child is able to regulate his or her emotions effectively. On the other hand, children who do not regulate their emotions effectively tend to receive less support for learning and more behavioral regulation from mothers. A related finding was that dyads in which mothers rated the child as being more emotionally intense were more likely to engage in an orientation to the task. An orientation to the task not only provides information about the task, but also communicates what is expected behaviorally from the child during the task as well as who is in charge. In addition, dyads in which children were more emotionally intense and more likely to use non-adaptive ER were more likely to review the task. A task review also provides structure for the dyadic interaction and can function as preparation for the individual post test. Perhaps mothers of highly emotionally intense children who use less adaptive ER strategies approach the task in a way that explicitly provides organization to the task in anticipation of the child's subsequent individual performance. The mothers may see this approach to instruction as supportive of children's future learning and performance by reminding them of aspects of the task and its requirements before the children work on their own.

Thus, it may be that mothers view behavioral regulation as a necessary form of support or structure for children who have difficulty regulating their arousal states. Mothers may perceive that without such structure, children high in EI or who do not regulate their emotional arousal effectively may have difficulty focusing on even the simplest aspects of the planning tasks and thus benefit little from joint cognitive activity or maternal instruction. Conversely, children who have less difficulty regulating their arousal, either because they are not high in EI or because they have acquired adaptive strategies for regulating emotional arousal, may be perceived by parents as not requiring as much external structure and support, which in turn allows mothers to focus on more optimal forms of instruction. However, these interpretations of the results assume that children's emotional functioning drives the behaviors we see for mothers. An alternative interpretation is that children who are high in emotional intensity but able to manage their emotions adaptively have developed these more adaptive emotion regulation skills as a result of receiving, on a regular basis, the type of guidance and support we observed in mothers' learning promotion behavior during the task. Or perhaps the children who are less able to manage their emotions adaptively have not developed these skills because of mothers' tendency to exercise behavioral control on a regular basis, resulting in children having less opportunity to develop more autonomy in their use of emotion regulation skills. Because these data were collected from one point in time, we cannot discern a clear answer to these questions. However these data are interpreted, what is apparent is that maternal instructional approach is linked to children's emotional functioning and this link has consequences for children's subsequent individual performance on a planning task.

Contrary to the hypotheses, results did not demonstrate that children high in emotional intensity were less cooperative with mother, less involved with the task, and more off-task. These results are somewhat surprising considering the role of emotional functioning in children's ability to remain on-task during independent planning in the current study as well as previous research demonstrating that children high in emotionality tend to display increased distractibility and impulsivity and have difficulty in social relations (Eisenberg *et al.*, 1993). There were also few relations between children's behavior during the joint planning task and their emotion regulation strategies. Although there was evidence that emotion regulation functions as a moderator of the relation between emotional intensity and mothers' behavior during joint planning, there was no evidence that emotion regulation functions as a moderator of the relation between emotional intensity and children's behavior during joint planning. The one finding regarding emotion regulation was that children who rated themselves as more likely to utilize venting as a form of emotion regulation were less likely to be engaged in the task, a finding that held regardless of their level of emotional intensity. Thus, it is the manner with which children tend to display their emotions and not their emotional intensity per se that may influence joint cognitive activity on complex cognitive tasks.

The pattern of relations found in this research may be indicative of the nature of the planning tasks used. These tasks are typical of one type of task used in developmental research on children's planning (Scholnick, Friedman & Wallner-Allen, 1997) and are age-appropriate for the children in this study. They are relatively constrained in that there is a specified set of rules, clear goals, and an attainable solution. The tasks were designed to be enjoyable to participants and they resemble benign daily activities with which most children of this age would be expected to have some familiarity

(doing chores, running errands). Thus, there is nothing inherent in these planning tasks that would necessarily lead to highly disruptive and disorganized behavior by the children.

We purposefully chose tasks of this nature to see if child emotionality presents perturbations in a fairly conventional adult-child problem-solving situation. It is important to stress that despite the relatively small number of relations between children's emotional functioning and children's behavior that appeared during cognitive interaction, there were nonetheless several relations between children's emotionality and mothers' instruction even on these types of tasks. Thus, it appears that children's emotional functioning plays a meaningful role in cognitive interaction, and this contribution is primarily evident in what mothers bring to the interaction rather than in what children display when they collaborate with mother. How can the relations between mothers' behavior and children's emotional functioning that were observed in the current study be explained given that the children's behavior during the interaction did not seem sufficient to warrant the differences in maternal instruction observed? One possible explanation is that mothers' behavior reflects *expectations* of how children will engage in such a task. Expectations of behavior have been found to play an important role in social psychological experiences (Rosenthal & Rubin, 1978). Applying this general principle of psychological functioning to the current study, it appears that in studying mother-child dyads during joint cognitive activity, one must consider the prior experience that partners have with one another or, in other words, the social-historical context of their relationship, in addition to the behavior observed in the laboratory (Gauvain & DeMent, 1991).

Interactions between intimate partners, such as mothers and children, are different from interactions between strangers. As Maccoby (1994) has stated regarding parent-child dyads, 'Partners develop coherent expectations concerning each other's behavior, joint goals, shared scripts from which each acts, and shared meanings that make fuller coordination of their activities possible' (p. 608). Thus, mother-child dyads come to the laboratory context with a shared understanding of each other that likely influences the ways in which they interact with one another, and this understanding appears to impact how mothers instruct their children. Gauvain and DeMent (1991) demonstrated that mothers of non-compliant children tended to initiate the instructional activity by adopting an explicitly regulatory role with the child. In that study the main concern for mothers seemed to be to control the child's behavior, a concern that stemmed from a history of difficult interactions with the child. Similarly, Winsler *et al.* (1999) demonstrated that children identified as having behavior problems had mothers who engaged in more behavioral regulation, commands, and physical interventions during joint cognitive activity in comparison to mothers of children not identified as having behavioral problems *despite* the absence of behavioral problems from these children during the task.

Mothers' tendency to adopt a regulatory approach to instruction in relation to children's emotional functioning may be especially pronounced on some tasks, such as those that involve planning. Planning requires skills that may be particularly challenging for children who have difficulty in emotional functioning, skills such as the suspension of action, delay of gratification, and reflection. Mothers may anticipate difficulty with such tasks for children they consider high in emotional intensity and less able to manage their emotions effectively, and thus mothers may be more apt to provide more directive instruction in this context.

### *Limitations and Conclusions*

Because the data were from one time period and not tested experimentally, the direction of effects cannot be known. In addition, the effect sizes of the significant results are relatively small. Finally, the low reliability of the emotion regulation predictor variables may have made significant results more difficult to attain due to increased measurement error. Thus, any interpretations provided for the findings should be considered in light of these limitations.

Although the effect sizes in the current study are small, the pattern and consistency of the results suggest that these findings are meaningful. However, when observing complex behaviors and interactions, such as those studied here, it is likely that there are many factors that contribute to observed patterns. As previously stated, mother–child interactions are embedded within the larger context of the mother–child relationship and their shared socio-emotional history. The current study focused only on one small subset of possible variables, namely children’s EI and ER, in attempting to predict observed behavior. However, given the broad context of the mother–child relationship, the fact that a consistent pattern of results was obtained for the particular set of variables studied, and that this pattern is consistent with the extant literature on emotional development, these results suggest that the socio-emotional context may contribute in important ways to the process and outcome of mother–child cognitive interaction.

Other aspects of the parent–child relationship, such as parenting style and children’s perceptions of parenting practices, could also be examined. In addition, it may be useful in future research to include assessments of children’s patterns of emotional expression, understanding of emotion, and use of display rules, as well as mothers’ own emotional intensity and reactions to children’s emotionality. It is expected that with the inclusion of more variables that reflect the complex nature of the social, emotional, and cognitive context of development, more of the variance could be explained.

Despite these limitations and given the exploratory nature of the study, the results indicate that children’s emotional functioning may be an important factor to examine in studying parent–child interaction on cognitive tasks and that replication and extension of the current findings are necessary next steps. Combinations of longitudinal analyses and experimental design are required to understand whether children’s emotional functioning drives social interaction with mothers or whether social interactions with mothers are predictive of children’s emotional functioning. This relation is likely a bi-directional one in which mothers and children co-regulate each other’s behavior in various contexts by acquiring a set of expectations and interpretations concerning the other’s behavior and reactions via their experiences with one another (Maccoby, 1994).

In conclusion, this research attempts to integrate the cognitive, social, and emotional aspects of child development by considering the contribution of children’s emotionality to social interactions with parents that involve joint planning. We found that the emotional functioning of the child is related to maternal instruction as well as to children’s performance when working alone and with mother. Given the role that such interactions play in the development of cognitive skills (Rogoff, 1998), better understanding of child emotionality in this process is warranted. Although the social context is recognized as one of the mechanisms of children’s cognitive growth, there is still minimal understanding regarding how the complex and dynamic interplay of social

and cognitive factors influence children's opportunities to learn in social contexts (Gauvain, 2001). This study advances our understanding by pointing to the contribution of child emotionality to the process of parent-child cognitive interaction involving planning. As planning skills are important to many aspects of children's lives, especially in the years of middle childhood (e.g., see Jacobs & Eccles, 2000), this research underscores the need for further study of the links between emotional development and children's planning in social context.

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