The Quality of the Mother-Child Relationship During Collaborative Problem Solving

by

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Abstract

The quality of the mother-child relationship was examined in relation to joint planning, maternal teaching strategies, maternal emotional support, mutual positive affect and attachment security. Fifty-five grade five children and their mothers participated in a laboratory session comprised of various activities and completed questionnaires to evaluate attachment security. Joint planning and social problem solving were assessed observationally during an origami task. Problem solving effectiveness was unrelated to maternal teaching strategies, maternal encouragement and mutual positive affect. A marginally significant relationship was found between maternal encouragement and active child participation. Attachment security was found to be significantly related to sharing of responsibility during local planning, but only for child autonomous performance. An examination of conditional probabilities revealed that mutual positive affect did not increase the likelihood of subsequent mother-child dyadic regulation. However, mutual positive affect was found to be significantly related to both active child participation and dyadic regulation. The hypothesis predicting a mediational model was not supported. The implications of these findings in the theoretical and empirical literature were considered and suggestions for future research were made.
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What is Problem Solving?

A mother-child dyad is working on origami, a paper-folding activity. The child is folding the paper while the mother watches and follows with the instructions.
Mother: “Ok, we did step 1. What do you have to do next?” (Both mother and child examine the instructions.)
Child: “I think I do it like this and fold it again.”
Mother: “You flip these up.” (She flips up one side of the paper.)
Child: “Oh ok. I see how to do it.” (He folds over both sides.)
Mother: “That’s right”. (The mother smiles at the child and pats him on the arm.)

Interactions such as that described above provide an opportunity for researchers to examine many different aspects of problem solving in general and, in particular, the collaboration between mother and child. The problem-solving situation consists of a goal, one or more obstacles that make achieving the goal not immediately possible, one or more strategies that can be used to solve the problem, other resources (knowledge, other people, etc.) that can affect which strategies are used, and evaluation of the outcome of the problem-solving situation (Deloache, Miller, & Pierroutsakos, 1998).

In the above problem-solving example, the goal is what to do in the next step of the origami task. To execute the second step, the child has to make two folds in the paper. The obstacle may be that the child does not know how to perform this cognitive task and requires the help of the mother to complete it. The mother uses an open-ended question as a strategy in this problem-solving situation. She asks the child how to proceed and the child must try to plan what to do next. Thus, the mother is seen as a resource in that she affects the strategies that are used. As the dyad continues to work on the origami, the mother may alter her teaching strategies or reduce the amount of assistance as she notices the child’s participation increasing. The mother is able to tailor her support for the child’s
efforts to the child’s skill and this may advance the child’s cognitive development. Also, the mother provides positive reinforcement to the child (e.g., “That’s right”). While evaluating that particular step, the mother also encourages the child to keep going.

Success in this problem-solving situation demands active participation and regulation from both the mother and child. In this study, I will be examining how the mother and child share task responsibilities and regulate one another’s actions. In addition, maternal teaching strategies and emotional support to the child during the collaborative task will be investigated.

Such collaborative processes may allow the child to learn and develop the skills necessary to handle a variety of cognitively challenging situations. It is important to remember, “problem solving is not ‘cold’ cognition, but inherently involves emotion, social relations and social structure.” (Rogoff, 1990, p.10). The child is learning about the task, as well as developing collaborative problem-solving skills.

Problem-solving skills are essential in the cognitive and social development of young children. These skills lead to a variety of successful outcomes, such as academic achievement (Portes, 1991), social competence (Rubin & Rose-Krasnor, 1992), and cognitive self-regulation (Freund, 1990). Problem solving also allows the child to become effective and efficient in developing metacognitive skills, such as the use of control processes for completing a task, planning task activities, coordinating strategies, and monitoring his or her own actions (Deloache et al., 1998).

Participation in the task is one important aspect of successful problem solving in terms of the child monitoring, evaluating and regulating his/her own behaviour and perhaps that of a partner. Increased task engagement and active participation in the
collaborative task may lead to advancing the child’s problem-solving skills. St. Laurent and Bergeron (2001) found that active child participation with maternal guidance in planning decisions was associated with greater subsequent individual planning skills. Family patterns of social interaction, such as in the problem-solving context, may be regarded as instrumental in knowledge acquisition and cognitive development (Portes, 1991). Gauvain & Rogoff (1989) found that sharing responsibility for planning with a peer or adult was related to planning effectiveness in later individual planning efforts. Understanding how a parent interacts with the child during collaborative problem-solving tasks is likely to provide insight into how the child will function in subsequent, independent problem solving tasks (Freund, 1990).

Gauvain and Rogoff (1989) stated that research on the influence of social interaction on cognitive development has emphasized the role of parents and other adults as expert models of mature cognitive skills and guides for children’s problem solving. Rather than just assuming that the presence of a partner inevitably promotes cognitive development, researchers should examine the process of social interaction in joint cognitive tasks. According to Hoogsteder, Maier, and Elbers (1996), it is important to focus on interaction patterns rather than solely on the process of teaching and learning. These patterns display how adults and children negotiate and reach an agreement about how to cooperate. For example, didactic interactions may be oriented towards the process of increasing the child’s competence, not towards the product of the task (Hoogsteder et al., 1996). These researchers emphasize the need to understand the collaborative problem solving process as one that involves both mother and child actively working together to attain success in the task.
This reciprocal relationship implies that the child’s behaviours may influence his or her mother’s behaviours. (Dix, 1991; Kuczynski, Harach, Bernardini, 1999). For example, Westermann (1990) found that the mother’s behaviour was adjusted based on her appraisals of her child’s willingness to participate. Neitzel (2001) stated that an important contributor to differences in adults’ scaffolding is the children’s behaviours during the collaborative problem-solving interaction. Mothers who perceived their children as difficult were less likely to regulate task difficulty and encourage their children to take an active role than mothers who did not perceive their children as difficult (Neitzel, 2001). This research highlights the importance of both mother and child in the collaborative problem solving process.

In the following paragraphs, I will discuss the nature of collaboration in the context of Piaget, Vygotsky and other theories of cognitive development. The importance of the parent in the collaborative setting also will be discussed. This will be followed by a discussion of the importance of the attachment security and affective quality of the mother-child relationships in children’s cognitive development. Finally, many researchers have focused on collaborative problem solving in preschoolers (e.g., Freund, 1990; Parent, Gosselin, & Moss, 2000) but few have examined children in mid-childhood (ages 9-11 years). There are many reasons why middle childhood is a valuable age to study and these will be addressed, followed by a summary of my hypotheses.

The Nature of Collaboration

Researchers have investigated the role of social interaction in children’s problem solving in a collaborative setting, with either a peer or an adult. What is meant by collaboration? Rogoff (1998) defined it as “including face-to-face mutual involvements,
such as routine conversation, teaching, tutoring, and cooperative learning; side-by-side engagements; and participation in shared endeavours without physical correspondence. These engagements may or may not strive to promote cognitive development” (pp. 679-680). Collaboration involves more than the mere transfer of knowledge from the parent to the child. Rather, it involves the process of the child becoming an active participant in his or her own learning, with the assistance and support of a caregiver.

Children’s problem solving is marked by flexibility and usefulness from an early age but their performances are limited by the strategies to which they have access, resources available for problem solving, and the social contexts in which problems are presented (Deloache et al., 1998). Planning how to solve a problem, monitoring progress, and correcting the solution process can themselves be difficult problems. In general, planning and regulation appear to constitute a late-emerging aspect of problem solving, with few reports of planning before 24 months of age. The extent to which young children plan and monitor their problem solving is affected greatly by factors such as the familiarity and complexity of the task, nature of the child’s participation in it, and goals the children bring to the problem-solving situation (Deloache et al., 1998).

There are several strategies for achieving one’s goals and successful attainment of a goal requires management of the problem-solving process. The introductory example of the mother and child jointly participating in an origami task provides evidence of task management. To achieve their next goal of completing the following step, the mother and child share in the planning and execution of the step. Both may monitor and evaluate one another’s performance. Thus, in the collaborative context, successful planning depends on the dyad’s regulation of the task to achieve its goals (Parent et al., 2000).
Theoretical Views on Collaborative Problem Solving

Peer and adult-child are the two types of collaborative problem solving (CPS) and each has different implications for cognitive development. The bulk of the research focusing on peer collaboration has relied on Piaget, who stressed collaboration between peers rather than adult-child collaboration. Piaget (1952) argued that only when children are able to discuss problems as equals are they likely to take into account new ways of thinking. He asserted that peer discussion and its ability to foster socio-cognitive conflict is a critical factor in children’s cognitive development. With the adult acting as an authority figure over the child, the child is likely to adjust his or her behaviour in order to comply with the adult. According to Piaget, such behavioural compliance does not require any internal cognitive adjustments. On the other hand, the process of peer conflict and cooperation results in disequilibrium and the internal cognitive adjustments necessary for development. However, Piaget’s primary focus was on the individual’s experience in the physical world, rather than on how social interaction contributes to individual development. Vygotsky, on the other hand, placed a greater emphasis on the role of social factors in cognitive development (Rogoff, 1990).

Vygotsky’s concept of the zone of proximal development (ZPD) was described as “the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with a more capable peer” (Vygotsky, 1978, p. 86). Vygotsky (1978) believed that collaboration with more competent individuals is likely to lead to development when assistance is provided within the less competent child’s ZPD. Further, adults facilitate the child’s internalization of cognitive
self-regulation by the manner in which task responsibilities are divided between the adult and child and the way in which the child's task behaviors are regulated.

Vygotsky's model for the mechanism through which social interaction facilitates cognitive development resembles, apprenticeship, in which a child works closely with a more skilled partner in the zone of proximal development during joint problem solving (Rogoff, 1990). According to Rogoff (1990; 1998), children are apprentices in thinking, active in their efforts to learn from observing and participating with more skilled partners and appropriating what was carried out in collaboration to extend existing knowledge and skills. Guided participation involves children and caregivers in the collaborative process of building bridges from the child's present understanding to new skills (Rogoff, 1990). As well, the caregivers jointly arrange and structure children's participation in sociocultural activities (Rogoff, 1990). Guided participation was demonstrated in the introductory example. During the collaborative task, the mother provided guidance in the form of questioning and modeling. As the child's skill level increased, the mother adjusted her teaching strategies and the child's participation in the task in order to advance the child's learning. Gauvain and Rogoff (1989) investigated an activity in which peer dyads and mother-child dyads planned errands in a model grocery store. The mothers appeared to encourage their child partners to participate in item location and item choice, concentrating on activities that were likely to fall within the child's ZPD. This may reflect efforts by the mother to arrange mutual participation in a way that will reveal her task goal to the child and facilitate involvement at a level appropriate to the child's skill.
Underlying the concept of guided participation is "intersubjectivity", a sharing of focus and purpose between children and their more skilled partners (Mulvaney, 2001; Rogoff, 1990). Vygotsky (1978) believed that collaboration was likely only to be successful to the extent to which intersubjectivity was attained by collaborating partners. For example, Parent et al. (2000) examined differences in mother-child joint planning. The children had to plan routes for an errand task with the assistance of the mother. This task is difficult for preschoolers. Thus, the mother must be able to view the task as the child views it, in order to tailor her support appropriately to facilitate joint understanding. If the mother has a better understanding of planning efficient routes, she can attempt to pass this understanding to the child. Once the dyad shares a mutual understanding of the task, the child can begin to acquire skills necessary to perform in subsequent independent problem solving tasks.

Werstch (1979) argued that there are shifts across development that moves from the control of the adult to that of the child. For example, at the start of the problem-solving situation, the adult is in control of most of the decision-making regarding task goals and strategies. Eventually, the adult aims questions and hints at the child to reveal the overall strategy. With the general assistance by the adult, the child is able to carry out the details of the task strategies (Wertsch, 1979). Researchers have investigated this mother-child task regulation and responsibility sharing in the problem-solving context (Parent et al., 2000).

Mother-Child Joint Planning

Parent et al. (2000) defined four levels of joint planning based on an effort to integrate both mother and child contributions to defining the collaborative situation. The
four levels are based on a continuum of increasing child participation in the planning task. Different dyadic patterns of responsibility sharing correspond to each level of planning. The mother controls the planning operations in the first level. The second level is the acquisition or modeling phase. The expert introduces a skill into the dyad by modeling its performance. These operations are predominately performed by the mother, as the child observes but does not participate. For example, the mother may demonstrate one part of the task or organize the strategies for the task. The consolidation or coaching phase is the third level, in which there is joint performance of a planning operation. The child is capable of participating in the execution of strategy, but adult guidance and support is still actively provided. An example of the third level can be found in my introductory example. Both mother and child are actively participating in task and with the guidance of his mother, the child is able to execute a particular step to complete the goldfish model.

The fourth level refers to the inhibition or fading phase. The planning skills are in the process of being fully mastered by the child as the adult is reducing support for child performance. The child performs the task autonomously and the mother may provide encouragement (Parent et al., 2000). For example, the child self-instructs his or her own behaviour throughout the task (“First, I have to fold it this way”) and the mother may verbally praise the child on his or her performance (“That looks good”).

Parent et al. (2000) developed a coding scheme to capture these four levels of joint planning during an episode of mother-child collaboration. Similar to Parent et al. (2000), the frequencies of patterns of responsibility sharing corresponding to these four levels will be observed for different planning skills during an origami task in my study. In
addition, I will examine maternal teaching strategies and emotional support toward the child during the CPS task.

**Maternal Teaching Strategies and Maternal Emotional Support**

Adult experts may adjust support of the novice’s behaviour. Expert partners can encourage the child to take more task responsibility as the child gains skill in a certain task process. (Freund, 1990; Westerman, 1990). Effective transfer of such responsibility is facilitated by sensitivity to children’s competence in particular tasks so that responsibility is given according to the children’s skills (Rogoff, 1990). Adults may evaluate the children’s needs for assistance based on task difficulty (Rogoff, Ellis & Gardner, 1984) or the child’s performance (Rogoff & Gardner, 1984). Perhaps one goal of these attempts at assistance is to connect the child’s current understanding to more cognitively advanced ways of approaching the task. In a study by Gleason and Schauble (2000), parent-child dyads were effective problem solvers mainly due to the guidance and assistance provided by the parents. For example, the parents helped manage the task goals and subgoals, as well as emphasizing the structure of the scientific reasoning problem.

Many researchers have examined the use of maternal cues and teaching strategies in an attempt to create effective problem solvers. Some of these strategies regulate the child’s way of thinking and perceiving (Portes, 1991) and can be evidence of parental respect for the child’s ability to profit from active engagement in problem-solving activities (Sigel, 1982). In an attempt to engage the child in the joint activity, some adults have used verbal prompts and close-ended questions (Bloomquist, August, Brombach, Anderson & Skare, 1996; Portes, 1991); hints (Gauvain & Rogoff, 1989); and
directives, open-ended questions and non-verbal instructions with six-year-old children (Rogoff, Ellis & Gardner, 1984). Pellegrini, McGillicuddy-DeLisi, Sigel & Brody (1986) found that the origami task was characterized by parents’ use of both cognitively demanding strategies (e.g., questions, medium mental demand, verbal support) and less demanding, supportive strategies (e.g., statements and turns). Mothers also may choose to use more controlling strategies such as physically performing the task for the child.

Bloomquist et al. (1996) found that high rates of mothers’ taking over the task were related to children being less focused on completing the problem-solving task.

Westerman (1990) examined whether and in what way the behaviours of one person coordinate with the behaviours of the other person in order to engage in joint activities. Mothers in healthy dyads, compared to dyads that had compliance problems, exhibited higher maternal coordination of the task and followed a pattern of homing in and out as a function of the child’s success or failure at each point in time. These mothers shifted to more specific interventions when the child failed and to more general instructions when the child was successful. Tudge, Winterhoff, and Hogan (1996) found that contingent feedback to children from a more advanced partner, which was geared to provide assistance at the level of the target child, led to significantly improved results on a joint problem-solving task.

Careful monitoring of and adjustment to the child’s state is required in a meaningful collaborative context. van der Veer and van Ijzendoorn (1988) found that a sensitive response pattern included the mother responding to the children’s request for advice with prompt and consistent verbal and nonverbal assistance. The adult leads the child toward
greater affective or cognitive self-regulation by making developmentally appropriate demands (van der Veer & van Ijzendoorn, 1988).

Thus, my first hypothesis is that problem solving effectiveness will be positively correlated with maternal guiding strategies (such as hints and questions) and negatively correlated with maternal controlling strategies (such as commands and taking over).

While adults may utilize various strategies to engage the child in participating in the task, adults may also provide emotional support and motivation. Perceived support or motivation from the parent may promote the growth of problem solving skills in children. Portes (1991) and Goncu and Rogoff (1998) found that positive reinforcement, agreement with child and encouragement led to an increase in the child’s scholastic achievement and improved subsequent performance.

Therefore, my second hypothesis is that maternal emotional support, in the form of encouragement, will predict greater sharing of responsibility and active child participation. I also expect that maternal encouragement will be positively correlated with effective completion of the task, perhaps because the child feels motivated to continue.

In summary, effective dyadic collaboration is expected to be characterized by maternal guiding behaviours, maternal encouragement and child’s active participation. While maternal teaching strategies and emotional support are important in the joint problem solving context, the mother-child attachment relationship also may provide insight into the collaborative process.
Attachment and CPS

According to Bowlby (1973), a secure attachment is defined as a relationship between a child and a particular caregiver, in which the child is confident in the responsiveness and availability of that attachment figure in times of stress or threat. In a cognitively demanding and stressful situation (e.g., problem-solving task), a securely-attached child may be more likely to look to the caregiver for support than an insecurely-attached child.

Past research has investigated the relationship between attachment security and stress reactivity. For example, Nachmias, Gunnar, Mangelsdorf, Hornik-Parritz and Buss (1996) examined the role of mother-toddler attachment relationship in moderating relations between behavioural inhibition and changes in salivary cortisol levels in response to novel events (e.g., a noisy, mechanical clown). Physiological stress reactivity involves activity of the neural and neuroendocrine systems. As a part of the neuroendocrine system, the hypothalamic-pituitary adrenocortical (HPA) system secretes cortisol from the cortices of the adrenal glands. Cortisol levels have been used by many researchers as a physiological measure of stress (e.g., Gunnar, Hertsgaard, Larson, & Rigatuso, 1992). Higher levels of cortisol are associated with higher levels of stress.

Elevations in cortisol levels were noted only in the group of insecurely attached toddlers. Elevations in cortisol for the insecurely attached 18-month year olds appeared to derive from overzealous or intrusive attempts by the mothers to have their children remain calm and interact with novel stimuli (Nachmias et al. 1996) Thus, sensitive and responsive caregiving provides the securely attached toddler with the resources to reduce activation of the HPA system.
By the third year of life, a true collaborative context for joint problem solving emerges with the transformation of the attachment relationship into a goal-corrected partnership (Bowlby, 1973). The child’s perception of experiences within the mother-child relationship is expected to generalize to other close relationships, creating complex mental representations or an internal working model of relationships (Bretherton, 1985). In turn, these internal working models function to guide the child’s behaviours in future interactions with the attachment figure or others.

Most collaborative problem solving research have investigated the relationship between attachment security and joint cognitive activity with infants and preschoolers (Moss, 1992; Moss, et al., 1997; Parent et al., 2000; van der Veern & van Ijzendoorn, 1988). Although the frequency and intensity of attachment behaviour declines with age, this does not mean that the attachment bond from child to attachment figure is attenuated (Bowlby, 1979). Thus, in the proposed study, I will focus on the attachment security of elementary school-aged children in the mother-child collaborative context.

Attachment is a life-span concept, with children maintaining attachment bonds to their parents across childhood and perhaps into adulthood (Bowlby, 1979). Children continue to rely on attachment figures as a secure base from which to explore and as a source of comfort in times of stress in middle childhood. In older children, the emotional availability of the attachment figure becomes more important than physical proximity. Availability of the attachment figure is determined by a child’s belief that the attachment figure is open to communication, physically accessible and responsive if called on for help (Bowlby, 1982; Kerns, Klepac, & Cole, 1996). For example, Schueuerer-English (1989) examined 10-year-old children’s reported perceptions of their parents’
supportiveness and emotional organization. Children with an early secure attachment to their mother more readily admitted negative feelings and more often reported going to someone for help or comfort when confronted with daily problem situations in schools than avoidantly-attached children (Scheuerer-English, 1989).

The caregiver is a potential source of emotional warmth and feeling of security, as well as a cognitive agent (Hartup, 1987). Hartup (1987) argued that the quality of the mother-child attachment has an impact on maternal teaching of metacognitive skills. These skills depend on finely tuned dialogues with a competent mediator who can give meaning to the task, help organize actions, and monitor behaviour. Furthermore, such collaboration may be more efficient within relationships characterized by secure attachments, in which the mother and child seem to be sensitively tuned to one another in terms of their emotion and communications (Hartup, 1987). Through the experience of sensitive mothering, the secure child develops a feeling of self-confidence in his or her own capacity to exert control over external events (Moss et al., 1997) This, in turn, encourages the child to participate in cognitively challenging tasks with his/her mother. Parent and Moss (1995) found that a secure mother-child relationship provides the most appropriate socio-affective context for learning, planning and self-regulatory skills.

Moss et al. (1997) examined how attachment quality affected three and four year olds’ collaborative problem-solving interactions. The collaborative style of mothers of securely-attached children was more in synchrony with their children’s level of participation in the task than with mothers of insecurely-attached children. Securely-attached mother-child dyads shared both high engagement in and metacognitive
responsibilities for the task, whereas the mothers in the insecurely attached dyads assumed full metacognitive responsibility (Moss, 1992; Moss et al., 1997).

Additional findings by Moss et al. (1997) provided a greater understanding of the influence of attachment security on the children's role in the collaborative process. Securely-attached children showed greater task engagement and metacognitive participation in problem solving regulation than insecurely-attached children. The securely-attached preschoolers were more likely to share responsibility for problem monitoring and evaluation during mother-child collaboration than the insecurely-attached children, who were less likely to display task relevant or metacognitive behaviours during monitoring and evaluation (Moss et al., 1997).

van der Veer and van Ijzendoorn (1988) examined the relation between early mother-child attachments and later joint problem solving. The mother-child dyads had been classified into attachment security categories when the infants were 24 months of age. Three years later, the dyads jointly participated in a box-fitting task and both the mother's and child's affective and cognitive behaviours were observed. Children from the securely attached reference group seemed to be more optimistic and self-confident about solving the problem than the anxiously attached children. In addition, the securely attached children asked less for advice but requested feedback more often than the anxiously attached children. In the securely attached dyads, asking for advice led to more frequent global instruction from the mother, as well as the mother doing some part of the task. Therefore, the mothers reacted meaningfully to their children's initiatives (van der Veer & van Ijzendoorn, 1988). In a similar vein, Meins (1997) found that mothers of securely attached children also were more likely than mothers of insecurely attached
children to engage in positive feedback and use physical intervention only when suggested by the child. Mothers of securely-attached children are likely to recognize their children’s needs and respond more appropriately to them than mothers of insecurely-attached children (Meins, 1997).

Therefore, based on the research by Parent et al. (2000), I expect there to be a positive relationship between attachment security and sharing of responsibility during local planning. Children who perceive their relationship as more secure will be more likely to be involved in the performance of local planning strategies and thus consolidate mastery of these skills than children who perceive their relationship as insecure.

In addition to overall attachment, it is important to consider the affective quality of the parent-child interactions in investigations of collaborative problem solving.

**Positive Affect and CPS**

The affective exchanges between children and their parents have implications for the quality of the parent-child relationship, as well as the development of the child’s self-regulatory skills (Moss et al., 1997; Parent et al., 2000). Parental expression of positive affect during parent-child interactions has been linked to positive social outcomes for children (Cassidy, Parke, Butkovsky, & Braungart, 1992; Isley, O’Neil, Clatfelter, & Parke, 1999). For example, Isley et al. (1999) examined parent and child expressed affect during a free play session and the relationship between parental and child affect and the child’s social competence. The expression of positive, rather than negative, affect by parents toward their children was related to better peer relationships for children in kindergarten and first grade (Isley et al., 1999).
Researchers such as Kochanska (1997) and Liable and Thompson (2000) also have demonstrated how positive emotions may promote positive socialization outcomes in young children. Kochanska (1997) introduced the concept of mother-child mutually responsive orientation. This concept encompasses two major components: the mother’s and the child’s cooperation and responsiveness to each other and shared dyadic positive affect. Mutual positive affect in the mother-child dyad was found to be important for the child’s future readiness to accept the mother’s agenda (Kochanska, 1997). For example, shared positive affect during mother-infant interaction predicted child compliance and internalization of parental standards (Liable and Thompson, 2000; Kochanska, 1997; Kochanska & Askan, 1995).

The above research reveals the importance of the mother-child mutually responsive relationship and positive long-term outcomes. In addition, Conway, McDonough, Clark and Smith (2001) examined the role of maternal positive affect in long-term infant cry reduction. Mothers and infants were observed engaging in a three-minute free-play interaction. Maternal positive affect in free play at seven months significantly predicted less crying at fifteen months (Conway et al., 2000). These findings emphasize the important role of positive affect for optimal developmental outcomes.

Parents’ and children’s affective expressions have been examined in many parent-child interactions, such as free play sessions (Isley et al., 1999) or story-telling activities (Denham et al., 2000). Interestingly, the role of positive affect in mother-child problem solving has not been examined, although it has been studied with individual problem solving. Researchers such as Alice Isen have conducted studies on problem solving and the induction of positive affect. In a typical experiment, positive affect is induced by
compliments and small gifts and then the participants complete various problem-solving tasks. Isen et al. (1987) have found that positive affect allows the participants to relate and integrate divergent material, form new associations and recombine mental elements. Overall, they were more successful in the task than individuals who did not experience positive affect. Greene and Noice (1988) also found that the induction of positive affect promotes creativity and facilitate problem solving by young adolescents. If a task is presented as important or of interest, people who experienced positive affect participated more seriously and, when they did, were more efficient, thorough and creative and integrative in solving it than those who did not experience positive affect (Isen, 1999).

Positive affect displayed by either or both of the dyad members may facilitate the collaborative problem-solving process. It is possible that the relationship between positive affect and task efficiency found in the experimental conditions also may be found in the mother-child context, in which positive affect is not induced but naturally occurring. If the mother and child experience positive affect, they may become more focused and motivated to work jointly to complete the task more effectively than dyads that experience less positive affect or negative affect.

The role of positive affect as a motivational factor in peer-peer joint problem solving was examined by Perlmutter, Behrend, Kuo, and Muller (1989), who suggested that social interaction can influence behaviour by increasing motivation or by varying, regulating or directing cognition. Perlmutter et al. (1989) found that peer interaction increases positive affect, engagement, and effectiveness of the preschool dyads’ problem solving. Instances of positive affect were used to assess children’s task enjoyment. Twice as many instances of positive affect by the children in the paired rather than the alone
condition were found. It is possible that the collaborative context itself is what increases task participation and enjoyment rather than the just the experience of positive affect alone. In addition, significantly more instances of positive behaviour were observed for older (five-year-olds) than for younger children (four-years-old) and older pairs displayed more positive affect than the younger children. Thus, working in pairs appeared to increase older children’s enjoyment more than younger children’s.

On the basis of the above findings, I hypothesize that the mutual expression of positive affect will positively predict overall task effectiveness. As well, I expect that a high frequency of shared positive affect is expected to be positively related to the child’s willingness and openness to the mother’s use of teaching strategies during the collaborative task. In addition, shared positive affect will increase the likelihood of subsequent responsibility sharing.

Mutual positive affect has been studied in the mother-child context but not in a collaborative setting. Furthermore, not many studies have examined children in middle childhood engaging in joint activities with adults.

**Overall Model**

The final goal of this study was to identify processes that might explain any demonstrated attachment security-planning relationship at elementary school age. Based on previous research (e.g. Isen, 2002; Meins, 1997; Moss et al., 1997) the following model was proposed: Attachment security provides the context for the maternal teaching strategies, maternal emotional support and positive affect. These three maternal behaviours, the mediator variables, in turn predict task effectiveness, responsibility sharing, and child engagement.
Past research by Meins (1997) and Moss et al. (1997) has contributed to the belief that attachment security will lay the foundation for this overall model. Attachment security has been linked to maternal support and positive feedback (Meins, 1997) and how affect is expressed. For example, Matas, Arend and Sroufe (1978) found that mothers of securely attached infants were more affectively positive than mothers of insecurely attached infants. Furthermore, according to Oatley and Johnson-Laird (1996), happiness is usually the mood of active engagement in what one is doing and encourages one to continue until the goal is reached. Thus, how emotion relates to active engagement may explain how mutual positive affect may mediate the relationship between attachment security and active child participation.

As well, direct effects also may be found between attachment and task effectiveness, responsibility sharing and child engagement. It is possible that these direct relationships may not be explained fully by the mediator variables. For example, Moss and St. Laurent (2001) found that children who showed a higher level of cognitive engagement in the planning task were more likely to be secure in their attachment relationships than children who were insecure in their attachment relationship. In addition, Moss (1992) found that secure mother-child dyads showed greater reciprocity and more cognitively mature levels of information exchange than insecure mother-child dyads. These findings provide evidence that may explain the direct link between attachment security and active child participation and dyadic regulation. The proposed mediational model is presented in Figure 1.
Developmental Perspective: Children in Middle Childhood

Many researchers have investigated various components of collaborative problem solving in preschool children (e.g., Parent et al., 2000; Freund, 1990; Goncu & Rogoff, 1998; Westermann, 1990). Elementary school-aged children have not been widely studied in the context of joint problem solving. This age group is important to consider in the development of cognitive self-regulation. By the age of 5 years, children are able to plan in daily activities but they experience difficulties with complex problems (DeLoache et al., 1998). Older children have the ability to extract the relevant information needed to make appropriate decisions during a problem-solving task, unlike the younger children. They were also able to act independently and carry out the subsequent steps in the task (Wertsch et al., 1980). As well, older children were able to interpret the adults’ communicative moves as strategic actions for a particular goal. Five-year-old children may not be as skilled as collaborating even when told to do so as 9-year-old children, who successfully collaborated in adult-child dyads on an errand-route planning task.
(Gauvain & Rogoff, 1989). According to Piaget, the schoolchild’s thinking is at a stage in which there is an emergence and more consistent use of more complex analysis and strategy than preschool children. The collaborative problem-solving situation may be a place for the child to develop his or her ability to analyze or strategize in cognitively challenging situations.

An elementary-school child approaches new tasks differently than a preschool child. Perlmutter et al. (1989) found that elementary-school children were equally motivated and engaged in the joint activity as the preschool children but in a more active manner. Elementary-school children were found to take more cues for behaviour from the task, engage more meta-task and instrumental activity, be more active in peer interaction, and learn more than the preschool children.

Due to the plethora of research examining preschool children in the mother-child collaborative problem-solving context, the aim of my study is to investigate the interactions between mother and elementary-school children during a joint planning task.

Summary of Hypotheses

In summary, theorists have emphasized the importance of social interaction in collaborative problem solving activities. Joint activity promotes the development of effective problem solving skills, as well as cognitive self-regulatory competence in children. Beyond enhancing the child’s cognitive skills, mother-child collaborative problem solving also involves emotion. In an attempt to explore the role of emotion in joint problem solving, I will investigate the contributions of attachment security and positive affect to the collaborative process.
The main goal of this study is to examine mother-child interactions during a collaborative problem-solving task. In addition to observing the dyads’ task performance and task regulation, I also will specifically focus on the behaviour of the mother. In the present study, the mother-child dyads will complete an origami collaborative problem-solving task. Previous research, such as Bloomquist et al. (1996) and Pellegrini et al. (1986), used an origami task to examine collaboration between mother and child. This task should provide opportunities to observe dyadic regulation in joint planning, as well as maternal strategies and emotional support.

This study is significant because I will investigate many areas that have not been widely studied. Most research on collaborative problem solving, attachment and their relationship have focused on preschoolers whereas my study will focus on elementary school-aged children. Furthermore, the role of positive affect in mother-child interactions has never been specifically examined in the collaborative context. For example, Metsapelto, Pulkkinen, & Poikkeus (2001) examined positive affect under the rubric of emotional warmth. Thus, I will be examining the mutual expression of positive affect during the joint planning task.

My hypotheses are as follows:

Maternal Teaching Strategies and Maternal Emotional Support

1) Problem solving effectiveness will be positively correlated with maternal guiding strategies (such as hints and questions) and negatively correlated with maternal controlling strategies (such as commands and taking over).

2) Maternal emotional support, in the form of encouragement, will positively predict sharing of responsibility and active child participation.
3) Maternal encouragement will be positively correlated with the dyads successful task completion.

Mother-Child Attachment Security and CPS

4) There will be a positive relationship between attachment security and sharing of responsibility during local planning. Children who perceive their relationship as more secure will be more likely to be involved in the performance of local planning strategies than children who perceive their relationship as insecure.

Positive Affect and CPS

5) The mutual expression of positive affect will positively predict overall task effectiveness.

6) Frequency of shared positive affect is expected to be positively related to the child’s willingness to comply with the mother’s use of teaching strategies during the collaborative task.

7) Shared positive affect will increase the likelihood of subsequent responsibility sharing.

Overall Model

8) Attachment predicts maternal teaching strategies, maternal emotional support, as well as positive affect, which are the mediator variables, and in turn, these maternal behaviours predict task effectiveness, responsibility sharing and child engagement. Direct effects may also be found between attachment and task effectiveness, responsibility sharing and child engagement.
Method

Procedure

Recruitment

The present study is part of a larger study designed to investigate the role of children’s friendships and mother-child relationships during the transition from elementary school (grade five) to middle school (grade six). Approval by University of Maryland and Brock University’s Research Ethics Board was obtained for the study (see Appendix A). The participants for this study were recruited from four representative elementary schools within the Montgomery County Board of Education System in Maryland. Home classroom teachers gave the Grade 5 students permission letters to bring home for parental consent to participate in the classroom and laboratory phases of the study. Upon receipt of the signed permission letters, all parents were contacted by phone to arrange laboratory phases of the study. During the telephone conversations with the mother, the laboratory procedures were described in full detail. Classroom assessments were administered only to those children for whom parental permission had been obtained.

Participants

The participants of this portion of the study included 55 children and their mothers. The participating children ranged in age from 10 to 11 years ($M = 10.22$, $SD = .420$). Approximately 73% of the children’s biological mothers and fathers were married at the time of the study. The children’s demographics are further described in Table 1. The demographic characteristics of the participating children’s biological mothers and fathers are presented in Table 2.
Table 1

Demographic Characteristics of Participating Children

<table>
<thead>
<tr>
<th>Variables</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>27</td>
<td>48.2</td>
</tr>
<tr>
<td>Female</td>
<td>28</td>
<td>51.8</td>
</tr>
<tr>
<td>Number of Siblings</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>6</td>
<td>10.9</td>
</tr>
<tr>
<td>1</td>
<td>22</td>
<td>40.0</td>
</tr>
<tr>
<td>2</td>
<td>20</td>
<td>36.3</td>
</tr>
<tr>
<td>3</td>
<td>6</td>
<td>10.9</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>1.8</td>
</tr>
</tbody>
</table>

Table 2

Demographic Characteristics of Participating Children’s Biological Mothers and Biological Fathers

<table>
<thead>
<tr>
<th>Variables</th>
<th>Mothers</th>
<th>%</th>
<th>Fathers</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Education</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elementary School</td>
<td>0</td>
<td>0.0</td>
<td>1</td>
<td>1.8</td>
</tr>
<tr>
<td>High School</td>
<td>2</td>
<td>3.6</td>
<td>4</td>
<td>7.1</td>
</tr>
<tr>
<td>Vocational School</td>
<td>1</td>
<td>1.8</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Some College</td>
<td>15</td>
<td>26.8</td>
<td>9</td>
<td>16.1</td>
</tr>
<tr>
<td>University Degree</td>
<td>15</td>
<td>26.8</td>
<td>20</td>
<td>35.7</td>
</tr>
<tr>
<td>Some Graduate School</td>
<td>5</td>
<td>8.9</td>
<td>4</td>
<td>7.1</td>
</tr>
<tr>
<td>Graduate Degree</td>
<td>15</td>
<td>26.8</td>
<td>11</td>
<td>19.6</td>
</tr>
<tr>
<td>Other</td>
<td>2</td>
<td>3.6</td>
<td>2</td>
<td>3.6</td>
</tr>
<tr>
<td>Ethnicity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>43</td>
<td>76.8</td>
<td>40</td>
<td>71.4</td>
</tr>
<tr>
<td>Latino/Hispanic</td>
<td>1</td>
<td>1.8</td>
<td>1</td>
<td>1.8</td>
</tr>
<tr>
<td>Black</td>
<td>7</td>
<td>12.5</td>
<td>7</td>
<td>12.5</td>
</tr>
<tr>
<td>Asian</td>
<td>1</td>
<td>1.8</td>
<td>2</td>
<td>3.6</td>
</tr>
<tr>
<td>Other</td>
<td>2</td>
<td>3.6</td>
<td>1</td>
<td>1.8</td>
</tr>
</tbody>
</table>

Marital Status (Mother and Father)
<table>
<thead>
<tr>
<th>Status</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Married</td>
<td>41</td>
<td>73.2</td>
</tr>
<tr>
<td>Separated</td>
<td>5</td>
<td>3.6</td>
</tr>
<tr>
<td>Divorced</td>
<td>4</td>
<td>7.1</td>
</tr>
<tr>
<td>Common Law</td>
<td>1</td>
<td>1.8</td>
</tr>
<tr>
<td>Single</td>
<td>5</td>
<td>8.9</td>
</tr>
</tbody>
</table>

Mother-Child Laboratory Sessions

Upon arrival at the laboratory, children and parents were given an overview of the procedure. During the mother-child laboratory sessions, the mothers and children completed questionnaires and participated in a number of activities. The mother-child activities were conducted in a playroom equipped with two motion-detecting video cameras and two one-way mirrors. The mothers and children were informed that they would be videotaped.

The first activity performed by the mothers and children was an origami task. The mother-child dyads were presented with three paper models (windmill, jet plane and goldfish) and instructions for each. Children were asked to choose one model and work on it with the help of the mother. The dyads were given two pieces of origami paper and told they could start a second model if they finished the first one before the experimenter returned. The mother-child dyads were left alone for 10 minutes.

After the origami activity, the mother and child were asked to plan a vacation together (10 minutes), given a moral dilemma discussion task (10 minutes) and finally asked to discuss 5 special times the mother and child had shared together (5 minutes). However, only the origami task is relevant to the present study.

Following the aforementioned procedure, children were given a number of questionnaires. The details of the instructions for the mother-child visit are in Appendix B.
A summary of all the measures used in this study is presented in Table 3.

Attachment security was assessed using a self-report questionnaire completed by the children. Observational coding of the mother-child videotapes was used for the measures of joint planning and social problem solving.

Table 3

Summary of Measures

<table>
<thead>
<tr>
<th>Measure</th>
<th>Procedure</th>
<th>Construct Measured</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mother Social Problem-Solving (Rubin &amp; Krasnor, 1986)</td>
<td>Video Coding</td>
<td>goals, strategies, and outcomes; openness to guidance</td>
</tr>
<tr>
<td>Joint Planning (Parent &amp; Caron, 2001)</td>
<td>Video Coding</td>
<td>Global and local planning responsibility sharing, affective climate, emotional support</td>
</tr>
<tr>
<td>Effectiveness of Collaboration</td>
<td>Video Coding</td>
<td>Overall rating of effectiveness based on how much of the task is completed and weighted by its difficulty level.</td>
</tr>
</tbody>
</table>

Security Scale (Kerns, Klepac, & Cole, 1996). This measure was designed to assess children’s perceptions of security in parent-child relationships in middle childhood and early adolescence (see Appendix C). It is composed of 15 items that are rated on a 4-
point scale using Harter’s (1982) “Some kids…..Other kids…” format. Children read statements such as “Some kids find it easy to trust their mom BUT other kids are not sure if they can trust their mom.” They were told to indicate which statement was more characteristic of them and then to indicate whether this statement was “really true for them” or “sort of true for them”. Each item was scored on a 4-point scale, with higher scores indicating a more secure attachment than lower scores. Scores across items were averaged so that children received a score on a continuous dimension of security. Scores on the Security scale showed adequate range (2.33 – 3.87) and internal consistency (Cronbach’s α = .75). The sample mean was 3.34 (SD = .374).

Mother Social Problem-Solving. (SPS; Rubin & Krasnor, 1986). SPS attempts were defined as socially-oriented initiations that one person uses to influence another person. For each SPS attempt, social goals, strategies used to achieve the goal, outcome of the SPS attempt, affect of initiator, proximity of initiator to target, and orientation of initiator were recorded (see Appendix D for coding scheme). A brief description of each category can be found in Table 4. For the purpose of my study, all socially-directive attempts of the mother during the mother-child interaction were coded. Specifically, I investigated the maternal goals, strategies and outcomes, as well as the child’s openness to maternal guidance. This allowed me to examine the mothers’ use of guiding and controlling strategies during the task, as well as the relationship between these strategies and task effectiveness.

Two trained observers independently coded the videotapes. Inter-rater reliability was established before video coding began. To ensure the stability of ratings, 20% of the tapes were selected at random and coded by two observers. The percentage agreement
and kappa statistic were calculated to measure inter-rater reliability for each of the 3
coding categories (see Table 5). According to Cicchetti and Sparrow (1981), these kappa
value evidence good to excellent inter-rater reliability.

The aggregation of the observational data provided a total frequency of SPS attempts
for the mother, as well as the relative frequency of each code. The total frequency of SPS
attempts ranged from 14 to 58 ($M = 31.78$, $SD = 10.06$). The percentage of successful
attempts made by the mother also was calculated. The percentage of successful attempts
ranged from .61 to .97 ($M = .814$, $SD = .093$). These values were not correlated with any
of the demographic variables.

The percentages for guiding strategies and goals were calculated based on the total
frequency of SPS attempts. The guiding goals included joint action, information and
prosocial goals. The percentage of guiding goals ranged from .46 to .96 ($M = .680$, $SD =
.121$). The guiding strategies included questions and indirect requests. The percentage of
guiding strategies ranged from .17 to .75 ($M = .399$, $SD = .111$).

The percentages for controlling strategies and goals were calculated based on the total
frequency of SPS attempts. The controlling goals included elicit action, object acquisition
and stop action goals. The percentage of controlling goals ranged from .00 to .47 ($M =
.208$, $SD = .108$). The controlling strategies included commands and reaching and
grabbing. The percentage of controlling strategies ranged from .04 to .50 ($M = .279$, $SD
= .105$).

Table 4
### Social Problem-Solving Coding Categories

<table>
<thead>
<tr>
<th>SPS category</th>
<th>Definition</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Goal</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elicit Action</td>
<td>Attempts to get the target to engage in some activity not codable elsewhere</td>
<td>“Go ahead”</td>
</tr>
<tr>
<td>Elicit Action – Self</td>
<td>The initiator asks for permission to do something for him or herself</td>
<td></td>
</tr>
<tr>
<td>Object Acquisition/access</td>
<td>Attempts to acquire any object or gain control of any object that is in the possession of the target</td>
<td>(The mother grabs origami out of child’s hands)</td>
</tr>
<tr>
<td>Joint Action</td>
<td>Attempts to initiate social play or a joint activity. Both mother and child are involved in activity.</td>
<td>“Let’s start with this model”</td>
</tr>
<tr>
<td>Play Solitary</td>
<td>Attempts to initiate or maintain solitary behaviour.</td>
<td>“I am going to make my own windmill”</td>
</tr>
<tr>
<td>Prosocial – Sharing/Assisting</td>
<td>Attempts to share with or give assistance to the target within the task.</td>
<td>“Fold it in half again”</td>
</tr>
<tr>
<td>Attention</td>
<td>Attempts to get the attention of the target.</td>
<td>“See how it has the dotted lines here?”</td>
</tr>
<tr>
<td>Information</td>
<td>Attempts to acquire information about the self, target, place, event or thing</td>
<td>“What is this step telling you?”</td>
</tr>
<tr>
<td>Assistance</td>
<td>Attempts to gain help, comfort or instruction from the target.</td>
<td>“How do I fix this fold?”</td>
</tr>
<tr>
<td>Stop Action</td>
<td>Attempts to get the target to cease doing some activity either inside or outside of the context of the task.</td>
<td>“No, no, no. Flip it around this way.”</td>
</tr>
<tr>
<td><strong>Strategy</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aggressive – Physical</td>
<td>Initiator uses physical aggression</td>
<td></td>
</tr>
<tr>
<td>Aggressive – Verbal</td>
<td>Initiator uses verbal aggression</td>
<td></td>
</tr>
<tr>
<td>Positive incentives</td>
<td>Initiator uses bribes to gain the target’s</td>
<td></td>
</tr>
<tr>
<td><strong>Negative incentives</strong></td>
<td>Initiator uses threats of retribution for non-compliance to the request.</td>
<td></td>
</tr>
<tr>
<td>------------------------</td>
<td>-------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td><strong>Questions</strong></td>
<td>Initiator asks a question. Questions are requests for information.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>“What does the other part of the model look like?”</td>
<td></td>
</tr>
<tr>
<td><strong>Indirect Request</strong></td>
<td>Requests for action. Initiator uses directed declaratives (i.e., declaratives directed at the target specifically, for example, through physical orientation to the target or use of the target’s name).</td>
<td></td>
</tr>
<tr>
<td></td>
<td>“Now you need to make the same fold on the bottom”</td>
<td></td>
</tr>
<tr>
<td><strong>Command</strong></td>
<td>Initiator uses the imperative to issue a direct request</td>
<td></td>
</tr>
<tr>
<td></td>
<td>“Turn it over”</td>
<td></td>
</tr>
<tr>
<td><strong>Non-verbal – Gestures</strong></td>
<td>Attempts that carry communicative intent such as showing or pointing</td>
<td></td>
</tr>
<tr>
<td><strong>Non-verbal – Reaching</strong></td>
<td>Touching or handling of or otherwise physically interfering with anything in possession of the target child.</td>
<td></td>
</tr>
<tr>
<td><strong>Non-verbal – grabbing</strong></td>
<td>Taking, without permission, of anything in the possession of the target child.</td>
<td></td>
</tr>
<tr>
<td><strong>Outcome</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Success</strong></td>
<td>Target complies with request or action, without further involvement by the initiator.</td>
<td></td>
</tr>
<tr>
<td><strong>Partial Success</strong></td>
<td>Target complies partially with request or action.</td>
<td></td>
</tr>
<tr>
<td><strong>Rejection</strong></td>
<td>Target refuses to comply</td>
<td></td>
</tr>
<tr>
<td><strong>Self-Solution</strong></td>
<td>The initiator achieves the goal by his/herself after The request has been made.</td>
<td></td>
</tr>
<tr>
<td><strong>No response</strong></td>
<td>Target does not respond to initiator’s request</td>
<td></td>
</tr>
</tbody>
</table>
Table 5

Inter-rater reliability for Social Problem Solving

<table>
<thead>
<tr>
<th>Category</th>
<th>% Agreement</th>
<th>Kappa</th>
</tr>
</thead>
<tbody>
<tr>
<td>Goal</td>
<td>85</td>
<td>.776</td>
</tr>
<tr>
<td>Strategy</td>
<td>83</td>
<td>.709</td>
</tr>
<tr>
<td>Outcome</td>
<td>86</td>
<td>.738</td>
</tr>
</tbody>
</table>

p<.001

Joint Planning – modified from Parent and Caron (2001). The objective of this coding scheme was to evaluate the extent to which mother and preschool children participate in the performance of the cognitive operations needed to solve the task. Parent et al. (2000) completed a task analysis and identified target events (e.g., global goal definition; role exchange) that served as coding units. This coding scheme was originally created for observing the dyadic regulation of two numeration tasks between preschoolers and their mothers. This scheme has been modified to fit an origami task with elementary school-aged children (see Appendix E).

The coders’ task was to locate these target events within the flow of the mother-child interactions and assign to each of them a code reflecting dyadic responsibility sharing. Additional codes were assigned for affective climate and offers and demands of help from mother or child. I have added the category of emotional support, which also was identified within the target events.

For each event, there are four dimensions to be coded. The first dimension refers to the relative participation of the mother and child (responsibility sharing) during the task. In the second dimension, the affective climate was evaluated. The third dimension
involves offers of and demands for help from both mother and child. Next, any form of maternal emotional support is coded.

In a pilot study, I compared time sampling and event sampling methods for five mother-child interactions in order to determine which technique would allow me to best capture the collaborative process. I found that the events were too variable in length to judge what was happening and, thus, determining the appropriate length for time interval would be difficult. I selected event-based coding as the best method to use for my study. Parent et al. (2000) also utilized this coding strategy because “an event-based coding scheme provides a more natural division of behaviours in comparison with time-interval-based coding schemes” (p. 456). Event-based coding permits the location of target events (global or local planning) within the flow of the mother-child interactions and allows the assignment of various codes reflecting responsibility sharing, positive affect, emotional support, as well as demands and offers of help from the mother and child.

I also utilized the cross-classification strategy discussed by Bakeman and Gottman (1986). This strategy allowed observers to classify one planning event (e.g., global goal definition) on several dimensions, as mentioned previously. An event begins when a particular target event (e.g., sub-goal definition) is identified. The end of that event is determined either by the actual execution of a particular step or when a new event is located. Whenever a codable target planning event was identified in the stream of behaviour, I classified it under one of the planning operations (global or local). Global planning focuses on the overall task planning, whereas local planning focuses on the planning of an intermediate step. Global planning includes four target events: goal definition, role definition, organization and global strategy choices, and evaluation. Local
planning also includes four target events: subgoal definition, role exchange, strategy exchange and evaluation and monitoring of performance. A target event may be classified as one of the aforementioned global or local target events. After the event has been classified, the following variables were coded: patterns of responsibility sharing, affective climate of the interaction, maternal emotional support and offers or demands for help. The coding system is outlined in Figure 2.

As a demonstration of the system described above, I will explain the coding of the mother-child scenario presented at the beginning of the introduction to the thesis. The mother and child first discuss the next origami step to be carried out and, thus, this target event is identified as a sub-goal definition. Within this same target event, the pattern of responsibility sharing was coded for both mother and child. Since they are jointly working on the task (i.e., the child is performing the task while the mother monitors his actions), they would both receive codes for dyadic regulation. Next, the affect displayed by both mother and child is coded. The mother received a code for positive affect because she smiled and patted her child. The child received a code for neutral affect because he focused on the task but does not appear happy or sad. Next, if the mother provides any form of emotional support, is coded. In this example, the mother provided emotional support in the form of encouragement by saying "That's right" to the child. Offers and demands for help also would be coded, if identified during this particular target event. The mother asks the child what to do next and this is coded as the mother demanding help. The end of the event is identified when the dyad completes the step or another event is identified. A description of the target events can be found in Table 6. The categories of responsibility sharing, affect and maternal emotional support are described next.
Figure 2

Joint Planning Coding Scheme

Has a planning event been identified?

If yes, is it global or local?
  - If global, is the event a goal definition, role definition, organization and global strategy choice or evaluation?
  - If local, is the event a sub-goal definition, role exchange, strategy exchange or evaluation?

How is the responsibility shared or divided?

Both mother and child are coded for their level of participation during that particular event.

What is the affective climate?

Both mother and child are coded for their expression of affect

Does the mother offer emotional support or not?

If yes, code for encouragement
If no, code for rejection
If no, code for no demonstration of support

Does the mother offer or demand help?

If yes, code for offers or demands

Does the child offer or demand help?

If yes, code for offers and demands
## Table 6

**Categories of Target Events**

<table>
<thead>
<tr>
<th>Target Event</th>
<th>Definition</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Global planning (GP)</strong></td>
<td>Focuses on the overall task planning</td>
<td></td>
</tr>
</tbody>
</table>
| Goal definition                  | Verbal definition of the task to be carried out. It concerns WHAT to do in | M: “Which one would you like to make?”
|                                  | the task, the goal.                                                       | C: “Let’s make the goldfish.”                                           |
| Role definition                  | All the physical and verbal performances that concern the way the         | The mother places the origami paper in front of the child and then picks up the instructions and starts to read. |
|                                  | responsibilities are divided between the mother and child during the      |                                                                        |
|                                  | activity.                                                                 |                                                                        |
| Organization and global strategy | Making the decisions for strategies to use during the course of the       | M: “Let’s start by going step by step.”                                  |
| choices                          | activity. It concerns HOW to do the task.                                 |                                                                        |
| Evaluation                       | Reviewing all the steps they have gone through so far to assess their    | M: “I think we made a mistake at the beginning. C: “Ok. At step one, folded here and then step 2...” |
|                                  | progress                                                                  |                                                                        |
| **Local Planning (LP)**          | Focuses on the planning of an intermediate step                           |                                                                        |
| Subgoal definition               | Concerns the next specific step to be carried out                         | M: “Next, step 3, fold to the edge.”                                    |
| Role exchange                    | The roles that were established at the beginning of the task have been   | M: “Let me see it, you are going too slow.” The mother takes the origami from the child. |
|                                  | reversed between the mother and child                                     |                                                                        |
| Strategy change                  | Modification of the adopted strategies at the beginning of                | M: “No wait, that’s wrong. You have to                                  |
or during the activity

or during the activity

Evaluation and monitoring of the performance

Evaluation of the accomplished progress or performance

C: "Let's go back to step 2 where we folded it over"

Target Events. As seen in Table 6, the target events were grouped according to two levels of joint planning, either global or local. Summary variables for local and global planning were created by totaling the frequencies of local target events and global target events, respectively. The frequency of local planning ranged from 6.00 to 31.00 (M = 20.60, SD = 5.57) and the frequency of global planning ranged from .00 to 9.00 (M = 3.40, SD = 2.01). Given the low frequency of global planning, only the patterns of responsibility sharing for local planning were analyzed in this study.

Patterns of responsibility sharing. Dyadic patterns of responsibility sharing were classified in one of four categories. These categories correspond to the four levels of joint planning previously defined (Parent et al., 2000) and are arranged in order of increasing child responsibility.

1. No performance: The first category refers to situations where there are no indications that the target event ever occurred. In these situations, the child does not even have an opportunity to observe adult performance.

2. Maternal performance: The second category includes target events that are entirely performed by the mother. The child does not participate in the operation but has an opportunity to observe maternal performance.

3. Joint performance: In this third category, both mothers and children participate together in performing the operation, either on the mother's or
child’s own initiative or on request by the partner. They may or may not be in agreement with regard to the best way to handle the situation.

4. Child autonomous performance: The last category includes target events that are performed by the child without assistance from the mother. The mother may express some unelaborated feedback (e.g. “Good!”).

The patterns of responsibility sharing were based on the child participation and mother participation dimensions from the coding scheme. For each joint planning event, the mother and child received individual codes for participation, based on five possible categories: no performance; attentive observation; feedback to action of partner; participation in execution; dyadic regulation. These participation codes were used to calculate the four patterns of responsibility sharing. The first category, No Performance, consisted of the events during which either partner did not perform the task or only provided support of feedback to the other partner. The second category, Maternal Performance, consisted of all the events during which the mother either received a code for participation in execution or dyadic regulation. The child received codes for not performing, observing or providing feedback. These codes indicated that the mother performed the task alone while the child observed. The third category, Joint Performance, included all the events during which the mother and child both received codes for participation in execution or dyadic regulation. These codes indicated that the mother and child were jointly participating in the task. The last category, Child Autonomous Performance, consisted of all the events during which the child received codes for participation in execution or dyadic regulation. The mother received codes for not
performing, observing or providing feedback. These codes indicated that the child was performing the task alone with or without guidance from the mother.

The frequencies for these four patterns of responsibility sharing for each level of planning (local and global) are reported in Table 11 in the Results section.

In addition to examining the four patterns of responsibility sharing, I also calculated the frequency of mother-child dyadic regulation and active child participation. Events in which mothers and children both regulated the task (e.g., evaluated a completed step) were considered dyadic regulation. If the child participated in executing the task or regulated the task by monitoring a strategy change, the child received a score for active participation. The frequency of mother-child dyadic regulation ranged from 6.00 to 26.00 ($M = 14.75$, $SD = 5.09$) and the frequency of active child participation ranged from 10 to 39 ($M = 22.41$, $SD = 5.52$).

Mother-child dyadic regulation and active child participation are conceptually distinct from the two patterns of responsibility sharing, joint performance and child autonomous performance. Mother-child dyadic regulation focuses on how the mother and child work together in the decision-making process during the task. The Joint Performance category includes codes for both dyadic regulation and participation in execution; however, I specifically examined only the dyad’s regulation of the task. The participation in execution aspect consists of events during which the partners’ may carry out part of the task without communication or monitoring and supervision. They may be jointly performing the task but their behaviours are not aimed at supervising or correcting the dyad’s activities. Behaviours of the mother and child aimed at supervising, monitoring and regulating the actions of the dyad were coded under dyadic regulation.
Therefore, I was interested in specifically focusing on one aspect of joint performance, dyadic regulation.

In addition, active child participation is conceptually distinct from child autonomous performance. The main distinction between active child participation and child autonomous performance is the participation of the mother. The focus of the active child participation variable was on the child’s participation in the task, regardless of whether or not the mother was actively participating in or regulating the task. However, the child autonomous performance category only included events where the child performed the task alone without assistance from the mother. Parent et al. (2000) focused on this category to demonstrate the child’s mastery of planning skills. As described in the introduction, the fourth level of joint planning refers to skills that are in the process of being fully mastered by the child. During this fading phase, the mother is reducing the amount of support for child performance. This corresponds to the pattern of child autonomous performance because the child is beginning to master planning skills as the mother reduces her support. Therefore, the focus of active child participation was on the participation of the child regardless of whether or not the mother performed the task with the child.

Affective climate (Parent et al., 2000). The affective climate of the collaboration can be classified within one of the following five categories. The categories are mutually exclusive.

1. Positive affect: Explicit demonstrations of mutual pleasure. The demonstrations consist of joyous exclamations, physical contact (partners slap their hands, “Hi-five!” or give the “thumbs up” sign.). This category
also includes smiling, laughing, giggling, high-pitched voice, enthusiasm (Kochanska & Askan, 1995) Both mother and child show pleasure carrying out the task together.

2. **Affectionate**: kissing; hugging; child may place their head on the mother’s shoulder or mother puts her arm around her child (Kochanska & Askan, 1995).

3. **Neutral affect**: The partners work together and the climate is agreeable but they do not show pleasure carrying out the task.

4. **Disagreement**:
   a) **Cognitive**: The mother and child do not agree on the best way to accomplish the task.
   b) **Over collaboration**: The mother and child do not agree on their respective roles in the task.

5. **Negative affect**: the mother or child expresses negative affect either at one another or the task.

The frequency of the expression of mutual positive affect was calculated for the purpose of this study. The expression was considered mutual when both the mother and child simultaneously displayed positive affect. The frequency of mutual positive affect ranged from 0.00 to 9.00 ($M = 3.01$, $SD = 2.43$).
Emotional support. The mothers’ emotional support of the child’s efforts can be classified into three categories. The categories were based on previous work by Neitzel (2001). All demonstrations of emotional support must be verbal. Any non-verbal signs that accompanied the emotional support from the mother (e.g. smiling or patting child on the arm) were coded under affective climate.

1. **Encouragement provided**: praise or motivational statements, positive reinforcement (e.g. “Good job!” “You are so smart!” “That’s great!” “Keep going!”)

2. **Rejection of child’s problem-solving attempts**: criticism, disapproval, dismissal of child’s efforts (e.g. mother ignores child’s attempt to take control of the task), negative reactions to the child (e.g. “You’re so slow!” “That’s wrong” “Don’t do it like that!”)

3. No demonstrations of emotional support or rejection

The frequency of maternal encouragement was analyzed in this study. The frequency of maternal encouragement ranged from 0.00 to 10.0 (M = 2.10, SD = 2.23).

Demands and offers of help. Demands and offers of help were not analyzed in this study.

Effectiveness of the task solution. It is possible to examine the effectiveness of the collaboration based on how many steps of the origami task were completed by the mother and child, relative to the number of steps required to complete each origami model and weighted by difficulty of each design.
In order to compare the origami models with different number of steps, the level of difficulty for each model was rated by twenty university students based on a 5-point Likert scale from 1 (very easy) to 5 (very difficult). The models include a windmill, a jet plane and a goldfish. There were significant differences found among the model difficulty ratings ($F_{(2,38)} = 25.65$, $p < .05$) (See Table 7 for the means and standard deviations for each model). Paired samples t-tests were conducted to determine significance differences among the models. Each model’s difficulty rating was significantly different from each other (see Table 8). Thus, an overall difficulty pattern was found.

Table 7

Means and Standard Deviations For Model Difficulty Ratings

<table>
<thead>
<tr>
<th>Model</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Windmill</td>
<td>2.85</td>
<td>1.14</td>
</tr>
<tr>
<td>Jet Plane</td>
<td>3.55</td>
<td>.69</td>
</tr>
<tr>
<td>Goldfish</td>
<td>4.65</td>
<td>.59</td>
</tr>
</tbody>
</table>

Table 8

Paired Samples T-Test Values for Model Difficulty Ratings

<table>
<thead>
<tr>
<th>Models</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Windmill - Jetplane</td>
<td>-2.33</td>
<td>.031</td>
</tr>
<tr>
<td>Windmill - Goldfish</td>
<td>-7.29</td>
<td>.000</td>
</tr>
<tr>
<td>Jetplane - Goldfish</td>
<td>-5.40</td>
<td>.000</td>
</tr>
</tbody>
</table>
By identifying how many steps the dyad had performed at the end of the ten-minute session, I was able to determine the dyad's effectiveness in completing the task. For example, if the dyad completed 5 out of 8 steps for the jet plane, they were more effective than a dyad that only completed 3 out of the 8 steps for the jet plane. In order to compare across models, I evaluated the steps completed, divided by the number of steps required for that model and multiplied by the model difficulty ratings. For example, if one dyad completes 5 out of 6 steps for the windmill and another dyad completes 6 out of 8 steps for the jet plane, which dyad is more effective? For the windmill dyad, \( \frac{5}{6} \times 2.85 = 2.38 \) and for the jet plane dyad, \( \frac{6}{8} \times 3.55 = 2.66 \) and thus, the jet plane dyad was more effective in completing the task. If the dyad completed more than one model, I added together the effectiveness scores for the two models they completed or attempted to complete. If the dyad received an effectiveness score of 2.38 for the windmill and 2.66 for the jet plane, I added these two scores together for an overall task effectiveness score. Therefore, the score for this dyad would be 5.04.

Reliability for Joint Planning Variables

Before video coding began, inter-rater reliability was established when the two trained observers reached 85% agreement for each coding category. To ensure the stability of ratings over the coding, 20% of the tapes were selected at random and coded by two observers. The percentage agreement and kappa statistic were calculated to measure inter-rater reliability for each of the coding categories (see Table 9). With the exception of one coding category (Maternal Participation), all categories achieved acceptable levels of inter-rater reliability (Fleiss, 1981 as cited in Bakeman & Gottman, 1986). Fleiss (1981) and Cicchetti and Sparrow (1981) characterized kappas of .40 - .60 as
of the distributions from normal, z-scores were computed for the skewness and kurtosis values. The larger the z-score the greater the deviation from the normal curve. Therefore, if the skewness or kurtosis values fall below the $p = .001$ criteria of 3.29 (2-tailed), the distribution is considered to be normal. Values that fall above 3.29, indicate that the distribution is significantly different from normal (Tabachnick & Fidell, 1996).

The significance of skewness is evaluated by dividing it by the SE skewness, as in the following equation for SPS percentage of success, $z = -.518/.322 = -1.609$. Since $z = -1.609$ is below the $p = .001$ criteria of 3.29 (2-tailed), the skewness values do not depart from symmetry. The significance of kurtosis is evaluated by dividing it by the SE kurtosis, $z = -.261/.634 = -.412$. -.412 is also below 3.29. Therefore, SPS percentage of success is normally distributed. The distributions for social problem solving did not differ significantly from normal. The distributions for joint planning were also normal, except for maternal encouragement. This distribution differs significantly from normal only in terms of skewness, indicating that the distribution is positively skewed (see Table 10).

Dyadic patterns of responsibility sharing are classified within one of four categories: no performance, maternal performance, joint performance, and child autonomous performance. Mean frequencies and standard deviations for each of these patterns are given in Table 11 separately for each level of planning (local and global).
Table 10

Frequency Distributions, Skewness and Kurtosis for all Measures

<table>
<thead>
<tr>
<th>Measure</th>
<th>M</th>
<th>SD</th>
<th>Skewness</th>
<th>SE</th>
<th>zSkew</th>
<th>Kurtosis</th>
<th>SE</th>
<th>zKurt</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social Problem Solving</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SPS percentage of success</td>
<td>.814</td>
<td>.093</td>
<td>-.518</td>
<td>.322</td>
<td>-1.609</td>
<td>-.261</td>
<td>.634</td>
<td>.412</td>
</tr>
<tr>
<td>SPS percentage of guiding strategies</td>
<td>.399</td>
<td>.111</td>
<td>.786</td>
<td>.322</td>
<td>2.441</td>
<td>1.672</td>
<td>.634</td>
<td>2.637</td>
</tr>
<tr>
<td>SPS percentage of guiding goals</td>
<td>.680</td>
<td>.121</td>
<td>.296</td>
<td>.322</td>
<td>.919</td>
<td>-.467</td>
<td>.634</td>
<td>-.737</td>
</tr>
<tr>
<td>SPS percentage of controlling strategies</td>
<td>.279</td>
<td>.105</td>
<td>-.231</td>
<td>.322</td>
<td>-.717</td>
<td>-.091</td>
<td>.634</td>
<td>.144</td>
</tr>
<tr>
<td>SPS percentage of controlling goals</td>
<td>.208</td>
<td>.108</td>
<td>.171</td>
<td>.322</td>
<td>.531</td>
<td>-.308</td>
<td>.634</td>
<td>-.486</td>
</tr>
<tr>
<td>Joint Planning</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total joint planning events</td>
<td>24.00</td>
<td>5.91</td>
<td>.057</td>
<td>.322</td>
<td>.177</td>
<td>-.024</td>
<td>.634</td>
<td>-.038</td>
</tr>
<tr>
<td>Maternal Encouragement</td>
<td>2.11</td>
<td>2.22</td>
<td>1.37</td>
<td>.322</td>
<td>4.25</td>
<td>1.99</td>
<td>.634</td>
<td>3.13</td>
</tr>
<tr>
<td>Mutual Positive Affect</td>
<td>3.02</td>
<td>2.43</td>
<td>.733</td>
<td>.322</td>
<td>2.28</td>
<td>-.134</td>
<td>.634</td>
<td>-.211</td>
</tr>
<tr>
<td>Mother-Child Dyadic Regulation</td>
<td>14.75</td>
<td>5.09</td>
<td>.076</td>
<td>.322</td>
<td>.236</td>
<td>-.800</td>
<td>.634</td>
<td>1.26</td>
</tr>
<tr>
<td>Active Child Participation</td>
<td>22.41</td>
<td>5.52</td>
<td>.171</td>
<td>.322</td>
<td>.531</td>
<td>.520</td>
<td>.634</td>
<td>.820</td>
</tr>
<tr>
<td>Global Planning</td>
<td>3.40</td>
<td>2.01</td>
<td>.751</td>
<td>.322</td>
<td>2.33</td>
<td>-.028</td>
<td>.634</td>
<td>.044</td>
</tr>
<tr>
<td>Local Planning</td>
<td>20.60</td>
<td>5.56</td>
<td>-.391</td>
<td>.322</td>
<td>-1.21</td>
<td>-.265</td>
<td>.634</td>
<td>-.418</td>
</tr>
</tbody>
</table>

Note. p < .05
Table 11

Mean Frequencies and Standard Deviations of Observed Patterns of Responsibility Sharing for Global (GP) and Local (LP) Planning (Parent et al., 2000)

<table>
<thead>
<tr>
<th>Patterns of Responsibility Sharing</th>
<th>GP M</th>
<th>GP SD</th>
<th>LP M</th>
<th>LP SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>No performance</td>
<td>.07 (3.0)</td>
<td>.33 (1.1)</td>
<td>.09 (2.3)</td>
<td>.44 (4)</td>
</tr>
<tr>
<td>Maternal performance</td>
<td>.38 (1.7)</td>
<td>.71 (1.2)</td>
<td>1.20 (11.4)</td>
<td>1.54 (3.5)</td>
</tr>
<tr>
<td>Joint Performance</td>
<td>2.83 (2.9)</td>
<td>2.14 (1.3)</td>
<td>18.04 (7.6)</td>
<td>5.18 (3.6)</td>
</tr>
<tr>
<td>Child Performance</td>
<td>.40 (.04)</td>
<td>.68 (.7)</td>
<td>1.36 (8.9)</td>
<td>1.69 (3.8)</td>
</tr>
</tbody>
</table>

The sex of the child, age of the child, and biological mother’s education were correlated with all of the predictor and outcome variables in an attempt to identify these demographic variables as possible covariates to be controlled in subsequent analyses. A summary of child sex, child age and mother education correlations with each measure used in this study is presented in Table 12. Attachment security was not significantly related to child sex, child age or biological mother’s education. As indicated in Table 12, the percentage of guiding goals was significantly correlated only with biological mother’s education. The percentage of guiding strategies was not significantly correlated with any of the demographic variables. After the guiding goals and strategies were aggregated into a maternal guiding index, this new variable was not correlated with any demographic variables. SPS percentages of controlling goals and strategies were negatively correlated with biological mother’s education. These measures was not correlated with any other demographic variable.
Local planning was significantly and positively correlated with child’s age. Table 12 also indicated that global planning was significantly correlated with child’s sex. A comparison of means revealed that girls planned globally more than boys. Sex of the child was significantly correlated with active child participation ($r = .282, p = .039$) but not with mother-child dyadic regulation ($r = .044, p = .754$). A comparison of means revealed that girls ($M = 23.96, SD = 5.40$) were more likely to actively participate during the task than boys ($M = 20.85, SD = 5.40$). These measures were not correlated with any other of the demographic variables. In addition, task effectiveness ($M = 4.36, SD = 1.60$) did not significantly correlate with any of the demographic variables.

The sex of the child significantly correlated with the frequency of mutual positive affect ($r = .312, p = .021$). A comparison of means indicated that girls ($M = 3.78, SD = 2.39$) were more likely than boys ($M = 2.26, SD = 2.31$) to express positive affect along with their mothers. The sex of the child was also significantly correlated with maternal encouragement. A comparison of means revealed that mothers of girls ($M = 2.67, SD = 2.59$) were more likely to encourage their children than mothers of boys ($M = 1.48, SD = 1.65$). Based on these correlations, child sex and child age were controlled in the first order correlation and regression analyses.

In addition, the first order correlations between social problem solving, joint planning and attachment security measures are presented in Tables 13, 14, and 15. As indicated in Table 13, significant associations were found between mutual positive affect and dyadic regulation, as well as mutual positive affect and active child participation. There was a strong correlation found between mother-child dyadic regulation and active child participation. As indicated in Table 14, mutual positive affect was significantly correlated
with both local and global planning. Significant associations were also found between local planning and maternal encouragement, local planning and dyadic regulation, as well as local planning and active child participation. Attachment security was found to be significantly correlated with child performance during local planning (see Table 15).

Table 12

**Correlations Between all Measures and Child Sex, Child Age, and Mother Education**

<table>
<thead>
<tr>
<th>Measures</th>
<th>Child Sex Education</th>
<th>Child Age</th>
<th>Mother Education</th>
</tr>
</thead>
<tbody>
<tr>
<td>Joint Planning</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maternal Encouragement</td>
<td>.268*</td>
<td>-.199</td>
<td>.242</td>
</tr>
<tr>
<td>Mutual Positive Affect</td>
<td>.312*</td>
<td>.143</td>
<td>-.162</td>
</tr>
<tr>
<td>Dyadic Regulation</td>
<td>.044</td>
<td>.216</td>
<td>-.117</td>
</tr>
<tr>
<td>Active Child Participation</td>
<td>.282*</td>
<td>.243</td>
<td>-.120</td>
</tr>
<tr>
<td>Task Effectiveness</td>
<td>.068</td>
<td>.177</td>
<td>.123</td>
</tr>
<tr>
<td>Local Planning (LP)</td>
<td>.232</td>
<td>.275*</td>
<td>-.070</td>
</tr>
<tr>
<td>Global Planning (GP)</td>
<td>.313*</td>
<td>.002</td>
<td>-.049</td>
</tr>
<tr>
<td>No Performance In LP</td>
<td>-.042</td>
<td>.392**</td>
<td>-.097</td>
</tr>
<tr>
<td>Maternal Performance In LP</td>
<td>.212</td>
<td>.181</td>
<td>-.001</td>
</tr>
<tr>
<td>Joint Performance In LP</td>
<td>.147</td>
<td>.222</td>
<td>-.033</td>
</tr>
<tr>
<td>Child Performance In LP</td>
<td>.131</td>
<td>.067</td>
<td>-.125</td>
</tr>
<tr>
<td>Social Problem Solving</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percentage of Success</td>
<td>-.090</td>
<td>.020</td>
<td>.052</td>
</tr>
<tr>
<td>Parameter</td>
<td>Value 1</td>
<td>Value 2</td>
<td>Value 3</td>
</tr>
<tr>
<td>-----------------------------------------------</td>
<td>---------</td>
<td>---------</td>
<td>---------</td>
</tr>
<tr>
<td>Percentage of Guiding Goals</td>
<td>-.082</td>
<td>.029</td>
<td>.314*</td>
</tr>
<tr>
<td>Percentage of Guiding Strategies</td>
<td>-.141</td>
<td>.060</td>
<td>.083</td>
</tr>
<tr>
<td>Guiding Index</td>
<td>-.126</td>
<td>.050</td>
<td>.227</td>
</tr>
<tr>
<td>Percentage of Controlling Goals</td>
<td>-.006</td>
<td>-.106</td>
<td>-.321*</td>
</tr>
<tr>
<td>Percentage of Controlling Strategies</td>
<td>.136</td>
<td>.003</td>
<td>-.205</td>
</tr>
<tr>
<td>Attachment Security</td>
<td>-.137</td>
<td>.127</td>
<td>-.170</td>
</tr>
</tbody>
</table>

Note. *p < .05, **p < .01 (two-tailed)
Table 13

First Order Correlations Between All Key Variables From Social Problem Solving, Joint Planning and Attachment Security Measures

<table>
<thead>
<tr>
<th></th>
<th>Maternal Encouragement</th>
<th>Mutual Positive Affect</th>
<th>Dyadic Regulation</th>
<th>Active Child Participation</th>
<th>Task Effectiveness</th>
<th>No Performance in LP</th>
<th>Maternal Performance in LP</th>
<th>Joint Performance in LP</th>
<th>Child Performance in LP</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>1.00</td>
<td>.253*</td>
<td>.124</td>
<td>.298*</td>
<td>.120</td>
<td>-.142</td>
<td>.101</td>
<td>.289*</td>
<td>-.055</td>
</tr>
<tr>
<td>2.</td>
<td>--</td>
<td>1.00</td>
<td>.340*</td>
<td>.420*</td>
<td>.177</td>
<td>.085</td>
<td>-.031</td>
<td>.266*</td>
<td>.178</td>
</tr>
<tr>
<td>3.</td>
<td>--</td>
<td>--</td>
<td>1.00</td>
<td>.731*</td>
<td>.012</td>
<td>-.097</td>
<td>-.238</td>
<td>.617**</td>
<td>.286**</td>
</tr>
<tr>
<td>4.</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>1.00</td>
<td>.164</td>
<td>-.077</td>
<td>.042</td>
<td>.855**</td>
<td>.286*</td>
</tr>
<tr>
<td>5.</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>1.00</td>
<td>.108</td>
<td>-.055</td>
<td>.194</td>
<td>.017</td>
</tr>
<tr>
<td>6.</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>1.00</td>
<td>.217</td>
<td>-.131</td>
<td>.054</td>
</tr>
<tr>
<td>7.</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>1.00</td>
<td>.099</td>
<td>-.028</td>
</tr>
<tr>
<td>8.</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>1.00</td>
<td>-.143</td>
</tr>
<tr>
<td>9.</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>1.00</td>
</tr>
</tbody>
</table>


Continued on next two pages
## Table 14

First Order Correlations Between All Key Variables From Social Problem Solving, Joint Planning and Attachment Security Measures

<table>
<thead>
<tr>
<th></th>
<th>Maternal Encouragement</th>
<th>Mutual Positive Affect</th>
<th>Dyadic Regulation</th>
<th>Active Child Part-icipation</th>
<th>Task Effectiveness</th>
<th>No Performance In LP</th>
<th>Maternal Performance In LP</th>
<th>Joint Performance In LP</th>
<th>Child Performance In LP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attachment Security</td>
<td>.228*</td>
<td>.087</td>
<td>.063</td>
<td>.154</td>
<td>.183</td>
<td>.213</td>
<td>.163</td>
<td>.032</td>
<td>.304*</td>
</tr>
<tr>
<td>Local Planning</td>
<td>.280*</td>
<td>.293*</td>
<td>.563**</td>
<td>.895*</td>
<td>.170</td>
<td>-.045</td>
<td>.361**</td>
<td>.914**</td>
<td>.163</td>
</tr>
<tr>
<td>Global Planning</td>
<td>.143</td>
<td>.339*</td>
<td>.205</td>
<td>.308*</td>
<td>-.065</td>
<td>.062</td>
<td>-.002</td>
<td>-.094</td>
<td>.271*</td>
</tr>
<tr>
<td>SPS % of Successful Attempts</td>
<td>.144</td>
<td>.066</td>
<td>.063</td>
<td>.114</td>
<td>.035</td>
<td>-.360*</td>
<td>-.171</td>
<td>-.018</td>
<td>.075</td>
</tr>
<tr>
<td>SPS % of Guiding Goals</td>
<td>.039</td>
<td>-.020</td>
<td>-.066</td>
<td>-.006</td>
<td>.207</td>
<td>-.304*</td>
<td>.078</td>
<td>.073</td>
<td>-.094</td>
</tr>
<tr>
<td>SPS % of Guiding Strategies</td>
<td>-.088</td>
<td>.106</td>
<td>.054</td>
<td>.013</td>
<td>.041</td>
<td>.138</td>
<td>.069</td>
<td>.025</td>
<td>.051</td>
</tr>
<tr>
<td>SPS % of Controlling Goals</td>
<td>-.022</td>
<td>.010</td>
<td>.056</td>
<td>-.060</td>
<td>-.119</td>
<td>.274*</td>
<td>-.172</td>
<td>-.096</td>
<td>.036</td>
</tr>
<tr>
<td>SPS % of Controlling Strategies</td>
<td>.013</td>
<td>-.077</td>
<td>-.093</td>
<td>-.085</td>
<td>-.113</td>
<td>.003</td>
<td>.151</td>
<td>-.025</td>
<td>-.119</td>
</tr>
</tbody>
</table>

Note. *p < .05, **p < .01
Table 15
First Order Correlations Between All Key Variables From Social Problem Solving, Joint Planning and Attachment Security Measures

<table>
<thead>
<tr>
<th></th>
<th>Attachment Security</th>
<th>Local Planning (LP)</th>
<th>Global Planning (GP)</th>
<th>SPS % of Successful Attempts</th>
<th>SPS % of Guiding Goals</th>
<th>SPS % of Guiding Strategies</th>
<th>SPS % of Controlling Goals</th>
<th>SPS % of Controlling Strategies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attachment Security</td>
<td>1.00</td>
<td>.167</td>
<td>.093</td>
<td>-.142</td>
<td>-.088</td>
<td>-.036</td>
<td>-.008</td>
<td>-.018</td>
</tr>
<tr>
<td>Local Planning</td>
<td>--</td>
<td>1.00</td>
<td>-.005</td>
<td>-.041</td>
<td>.061</td>
<td>.058</td>
<td>-.126</td>
<td>-.017</td>
</tr>
<tr>
<td>Global Planning</td>
<td>--</td>
<td>--</td>
<td>1.00</td>
<td>.249</td>
<td>-.111</td>
<td>-.051</td>
<td>-.004</td>
<td>-.094</td>
</tr>
<tr>
<td>SPS % of Successful Attempts</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>1.00</td>
<td>.046</td>
<td>-.253</td>
<td>-.014</td>
<td>.000</td>
</tr>
<tr>
<td>SPS % of Guiding Goals</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>1.00</td>
<td>.529*</td>
<td>-.847*</td>
<td>-.471*</td>
</tr>
<tr>
<td>SPS % of Guiding Strategies</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>1.00</td>
<td>-.741*</td>
<td>-.300*</td>
</tr>
<tr>
<td>SPS % of Controlling Goals</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>1.00</td>
<td>.377*</td>
</tr>
<tr>
<td>SPS % of Controlling Strategies</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>1.00</td>
</tr>
</tbody>
</table>

Note. *p<.05
Hypothesis One: Problem solving effectiveness and maternal strategies and goals

It was predicted that problem solving effectiveness would be positively correlated with maternal guiding strategies and goals. In addition, it was predicted that problem solving effectiveness would be negatively correlated with maternal controlling strategies.

A first order correlation was performed to determine if problem solving effectiveness was related to guiding strategies and goals. There was no significant correlation between problem solving effectiveness and guiding strategies ($r = .041, p = .768$), nor between problem solving effectiveness and guiding goals ($r = .207, p = .129$).

A first order correlation was performed to determine if problem solving effectiveness was related to controlling strategies and goals. There was no significant correlation between problem solving effectiveness and controlling strategies ($r = -.13, p = .411$), nor between problem solving effectiveness and controlling goals ($r = -.119, p = .386$).

In summary, there was no support for the hypothesis that problem solving effectiveness would be positively correlated with guiding or controlling strategies and goals. Although the predicted relationships were statistically non-significant, the correlation coefficients were in the expected direction.

Hypothesis Two: Maternal emotional support and dyadic regulation and active child participation.

The second hypothesis predicted that maternal encouragement would be positively correlated with mother-child dyadic regulation and active child participation. The total number of times the mother and child in each dyad shared responsibility for the task represented the dyadic regulation score. The total number of times the child
participated in the task, either through execution or regulation, represented the active child participation score.

In order to test the hypothesis that maternal encouragement would be related positively to dyadic regulation and active child participation, first order correlations were computed. As indicated in Table 16, maternal encouragement was not correlated significantly with dyadic regulation. A statistically significant relationship was found between maternal encouragement and active child participation. Due to the finding that the sex of the child was correlated with both maternal encouragement and active child participation, sex of the child was controlled for by performing a partial correlation. After controlling for the sex of the child, the correlation between maternal encouragement and active child participation was only marginally significant ($r = .241, p = .083$).

Table 16

First Order Correlations Between Maternal Encouragement and Dyadic Regulation and Active Child Participation

<table>
<thead>
<tr>
<th></th>
<th>Mother Encouragement</th>
<th>Mother-Child Dyadic Regulation</th>
<th>Active Child Participation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mother Encouragement</td>
<td>1.00</td>
<td>.124</td>
<td>.298*</td>
</tr>
<tr>
<td>Mother-Child Dyadic Regulation</td>
<td>--</td>
<td>1.00</td>
<td>.731**</td>
</tr>
<tr>
<td>Active Child Participation</td>
<td>--</td>
<td>--</td>
<td>1.00</td>
</tr>
</tbody>
</table>

Note. *$p<.05$, **$p<.001$, $^t_p<.10$

In summary, there was marginal support for the hypothesis that maternal encouragement would be positively correlated with active child participation but no
support for the hypothesized relationship between maternal encouragement and dyadic regulation.

**Hypothesis Three: Maternal encouragement and dyad's overall problem solving effectiveness**

It was predicted that maternal encouragement would be related positively to the dyad’s overall problem solving effectiveness. A first order correlation was performed to test this hypothesis. There was no significant correlation between maternal encouragement and problem solving effectiveness (r = .120, p = .383).

**Hypothesis Four: Attachment security and sharing of responsibility during local planning.**

It was predicted that attachment security would be positively related to sharing of responsibility during local planning. There are four categories of responsibility sharing (as indicated in Table 12): no performance, maternal performance, joint performance, and child autonomous performance. The frequencies for each category were calculated separately for both levels of planning (local and global). For the purpose of this hypothesis, responsibility during local planning only was examined.

To test this hypothesis, first order correlations were computed. As indicated in Table 17, the relationship between attachment security and child autonomous performance during local planning was statistically significant. Attachment security was not correlated with any other category of responsibility sharing during local planning.

Since the age of the child was correlated with child performance during local planning, a partial correlation was computed to control for the age of the child. The relationship between attachment security and child performance during local planning remained statistically significant after controlling for child age (r = .299, p = .030).
Table 17

First Order Correlations Between Attachment Security and Responsibility Sharing During Local Planning

<table>
<thead>
<tr>
<th></th>
<th>Average Security Score</th>
<th>No Performance</th>
<th>Maternal Performance</th>
<th>Joint Performance</th>
<th>Child Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Security Score</td>
<td>1.00</td>
<td>.213</td>
<td>.163</td>
<td>.032</td>
<td>.304*</td>
</tr>
<tr>
<td>No Performance</td>
<td></td>
<td>1.00</td>
<td>.217</td>
<td>.055</td>
<td>.054</td>
</tr>
<tr>
<td>Maternal Performance</td>
<td></td>
<td></td>
<td>1.00</td>
<td>.099</td>
<td>-.028</td>
</tr>
<tr>
<td>Joint Performance</td>
<td></td>
<td></td>
<td></td>
<td>1.00</td>
<td>-.143</td>
</tr>
<tr>
<td>Child Performance</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.00</td>
</tr>
</tbody>
</table>

Note. *p< .05

In summary, there was support for the predicted relationship between attachment security and responsibility sharing during local planning, but only for child autonomous performance.

Hypothesis Five: Mutual positive affect and problem solving effectiveness

It was predicted that the frequency of mutual positive affect would be related to overall problem solving effectiveness. The number of times both mother and child expressed positive affect during the task represented the mutual positive affect score.

To determine if the relationship between mutual positive affect and problem solving effectiveness was statistically significant, a first order correlation was computed. There was no significant correlation between the frequency of mutual positive affect and problem solving effectiveness (r = .177, p = .197).
Hypothesis Six: Mutual positive affect and child’s willingness to comply with the mother’s use of teaching strategies

This hypothesis predicted that the frequency of mutual positive affect would be positively correlated with the child’s willingness to comply. SPS percentage of successful outcomes (attempts) by the mother represents the child’s willingness to comply with the mother’s use of teaching strategies. A first order correlation was performed to determine the relationship between frequency of mutual positive affect and the child’s willingness to comply. There was no significant correlation between frequency of mutual positive affect and the child’s willingness to comply \( (r = .066, p = .632) \).

Hypothesis Seven: Mutual positive affect and mother-child dyadic regulation

It was predicted that mutual positive affect would increase the likelihood of subsequent mother-child dyadic regulation. Sequential analysis (Bakeman & Gottman, 1986) was used to determine if positive affect increases the likelihood of subsequent mother-child dyadic regulation. Sequential analysis is a set of techniques that allows one to analyze behavioural sequences that unfold over time (Bakeman & Gottman, 1986). These techniques seemed the most appropriate to address the above hypothesis, given that I examined the behavioural antecedents (mutual expression of positive affect) and consequent response (mother-child dyadic regulation of the task) in event sequences.

In the current study, I was interested in examining simple and conditional probabilities of mother-child dyadic regulation. Simple probability is the probability with which a particular target event occurred relative to a total set of events (Bakeman & Gottman, 1986). Thus, the simple probability of dyadic regulation is calculated by dividing the number of times dyadic regulation occurred by the total number of joint
planning events for a particular dyad. In addition, I was interested in assessing the conditional probability of dyadic regulation, given that mutual positive affect occurred immediately before. Conditional probability is the probability with which a particular target event occurred, relative to another given event. Transitional probability is one kind of conditional probability where the target and given events occur at different times (Bakeman & Gottman, 1986).

First, I calculated the simple probability of dyadic regulation. There were a total of 1320 joint planning events. Of these events, mother-child dyadic regulation occurred 811 times across 55 dyads. The simple probability of dyadic regulation occurring during a joint planning event \([p(DR/\text{total JP event})]\) was .614.

Next, the transitional probability of dyadic regulation, given the mutual positive affect occurred immediately before was calculated. A total of 166 expressions of mutual positive affect were identified across 55 dyads. Results indicated that out of the 166 times that mutual expressions of positive affect occurred, mother-child dyadic regulation followed immediately after 108 times. The conditional probability of dyadic regulation, given that mutual positive affect occurred immediately before \([p(DR/PA/PA \text{ total})] = .651\). Examination of the conditional probability at the level of individual dyads indicated the probability of dyadic regulation following mutual positive affect ranged from 20% to 100%.

The next step was to compare the observed frequency of the mutual positive affect to dyadic-regulation sequence to its expected frequency. To determine the expected probability of dyadic regulation following mutual positive affect, the first order model was adopted, as suggested by Bakeman and Gottman (1986). Bakeman and Gottman
(1986) suggest that the first order model is preferable because it only assumes that events are ordered randomly, in contrast to the zero order model, which assumes that events are equiprobable. Therefore, if the codes were ordered randomly, then we would expect that the probability for the joint event of mutual positive affect followed by dyadic regulation would be equal to the simple probability for mutual positive affect multiplied by the simple probability for dyadic regulation, \( p(PADR)_{\text{exp}} = p(\text{PA}) \times p(\text{DR}) = .077 \). The expected frequency was then calculated by multiplying the expected probability for this particular two-event sequence by the number of two-event sequences coded (total joint planning events = 1320). The expected frequency of mutual positive affect followed by dyadic regulation was 101.64 and the observed frequency was 108.

The binomial z test was utilized to assess whether expected frequency was significantly different from the observed frequency. The test revealed the mutual positive affect to dyadic regulation transition did not occur significantly more than expected, \( z = .657 \) (\( z > 1.96, p < .05 \)). Therefore, mutual positive affect did not increase the likelihood of subsequent dyadic regulation over the base rates.

Due to the fact that the conditional probability analyses did not reveal any sequential relationship between mutual positive affect and dyadic regulation in the hypothesized direction, I examined the relationship using a first order correlation. A significant positive correlation was found between frequency of mutual positive affect and mother-child dyadic regulation (\( r = .340, p = .011 \)). Because a significant relationship existed between sex of the child and frequency of mutual positive affect, a partial correlation was performed to control for sex of the child. The significant relationship
between mutual positive affect and dyadic regulation still existed after controlling for sex of the child \((r = .345, p = .012)\).

In summary, no sequential pattern was established between mutual positive affect and dyadic regulation in the hypothesized direction. Mutual positive affect did not increase the likelihood of subsequent dyadic regulation. It may be possible that another sequence, mutual positive affect following, rather than preceding, dyadic regulation could be found. Or, another type of affect code, such as cognitive disagreement, may have increased the likelihood of subsequent dyadic regulation. Although the mutual positive affect-dyadic regulation sequence did not differ significantly from its expected value, correlational analyses provided evidence for a significant association between mutual positive affect and dyadic regulation.

**Overall Model**

Prior to testing the mediational model, the guiding goals and strategies were combined to form an overall guiding index variable. In addition, controlling goals and strategies were combined to form a controlling index variable. These variables were aggregated because the goals and strategies for guiding behaviours were highly related (see Table 14) and provided the same information in the analyses. The same can be said for the controlling behaviours. For example, a frequently occurring SPS attempt included prosocial sharing as the goal and indirect request as the strategy. These are both guiding behaviours. Similarly, stop action (controlling) goals were almost always accompanied by a command (controlling) strategy. The goals and strategies reveal the same information about the type of maternal teaching strategy utilized in the task.
To determine if the two indexes were significantly related, a first order correlation was performed. The guiding and controlling indexes were highly correlated \((r = -.813, p = .000)\) and thus, the controlling index was dropped from the analyses. The guiding index was utilized in the analyses because these strategies may be more likely to mediate the relationship between attachment security and the outcome variables than the controlling index. This is because, more often than not, the mothers used more guiding behaviours than controlling behaviours during the collaborative problem-solving task. The data aggregation strategy described above reduced redundancy and simplified the analyses.

To test mediational models related to collaborative problem solving, I used the multiple regression procedure outlined by Baron and Kenny (1986). To demonstrate mediation, one must establish significant relations between (1) the predictor and the mediating variables, (2) the predictor and the dependent variables, and (3) the mediators and the dependent variables. We therefore conducted three-step tests of mediation for each of the three dependent variables (task effectiveness, mother-child dyadic regulation and active child participation). In the first step, we tested the strength of the relationship between the predictor (attachment security) and the potential mediators (maternal encouragement, mutual positive affect and maternal guiding behaviours).

In the second step, we evaluated the strength of the association between the predictor (attachment security) and the dependent variable (task effectiveness). In the last step, we examined whether this association was attenuated when we controlled for shared variance with the potential mediators (e.g. maternal encouragement). These three-step tests were repeated for two other dependent variables (active child participation and dyadic regulation). These three analyses will be described below.
Task Effectiveness

We tested whether the relation between attachment security and task effectiveness was mediated by the mutual positive affect, maternal encouragement, and maternal guiding index. According to Baron and Kenny (1986), the first step indicates that the variations in the levels of the independent variable must significantly account for variations in the presumed mediator. Three regression equations provide the tests of associations between attachment security and the presumed mediating variables (maternal encouragement, mutual positive affect and maternal guiding index). The first regression equation tested whether attachment security significantly predicted maternal encouragement. Because univariate analyses showed that child sex was significantly correlated with maternal encouragement, it was included as a control variable. Controlling for child sex, attachment security significantly predicted maternal encouragement and accounted for 7% of the variance for maternal encouragement (see Table 18). The second regression equation tested the association between attachment security and mutual positive affect. Again, child sex was found to be correlated with mutual positive affect and was thus used as a control variable. After controlling for sex, attachment security did not significantly predict mutual positive affect (see Table 19). The last regression equation tested whether attachment security significantly predicted maternal guiding behaviours. Attachment security did not significantly predict maternal guiding behaviours (see Table 20).

In the second step of testing mediation, the independent variable must account for a significant amount of variance in the dependent variable. Because attachment security
did not account for a significant amount of the variance, attachment security did not significantly predict task effectiveness (see Table 21).

The third step indicates that the mediator must be related to the dependent variable and the effect of the independent variable must be less after controlling for the mediators. To test if the association between attachment security and task effectiveness was mediated by maternal encouragement, mutual positive affect and maternal guiding behaviours, these presumed mediators were entered in the first step of the regression equation and attachment security was entered next. The results showed that when maternal encouragement, mutual positive affect and maternal guiding index were entered as a block before attachment security, they accounted for only 6% of the variance (Table 21). Thus, the model was not supported for task effectiveness.

Table 18

Multiple Regressions Predicting Maternal Encouragement From Attachment Security

<table>
<thead>
<tr>
<th>Variable</th>
<th>R² change</th>
<th>F change</th>
<th>df</th>
<th>B</th>
</tr>
</thead>
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<td>Step 1 Child Sex</td>
<td>.072</td>
<td>4.029*</td>
<td>1, 52</td>
<td>.305</td>
</tr>
<tr>
<td>Step 2 Attachment Security</td>
<td>.072</td>
<td>4.307*</td>
<td>1, 51</td>
<td>.271</td>
</tr>
</tbody>
</table>

Note. *p<.05

Table 19

Multiple Regressions Predicting Mutual Positive Affect From Attachment Security

<table>
<thead>
<tr>
<th>Variable</th>
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<th>F change</th>
<th>df</th>
<th>B</th>
</tr>
</thead>
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<td>5.624*</td>
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<td>.331</td>
</tr>
</tbody>
</table>
Table 20

Multiple Regressions Predicting Maternal Guiding Index From Attachment Security

<table>
<thead>
<tr>
<th>Variable</th>
<th>$R^2$ change</th>
<th>$F$ change</th>
<th>df</th>
<th>$B$</th>
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</thead>
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<td>.266</td>
<td>1, 53</td>
<td>-.071</td>
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</tbody>
</table>

Note. *$p<.05$

Table 21

Multiple Regressions Predicting Task Effectiveness From Attachment Security, Mutual Positive Affect, Maternal Encouragement and Maternal Guiding Index

<table>
<thead>
<tr>
<th>Variable</th>
<th>$R^2$ change</th>
<th>$F$ change</th>
<th>df</th>
<th>$B$</th>
</tr>
</thead>
<tbody>
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<td>Step 1</td>
<td>.033</td>
<td>1.826</td>
<td>1, 53</td>
<td>.183</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Model 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Step 1</td>
<td>.056</td>
<td>1.007</td>
<td>3, 51</td>
<td>.050</td>
</tr>
<tr>
<td>Maternal Encouragement</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mutual Positive Affect</td>
<td></td>
<td></td>
<td></td>
<td>.142</td>
</tr>
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<td>SPS Maternal Guiding Index</td>
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<td></td>
<td>.148</td>
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<tr>
<td>Step 2</td>
<td>.027</td>
<td>1.472</td>
<td>1, 50</td>
<td>.169</td>
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</tr>
</tbody>
</table>

Note. *$p<.05$
Active Child Participation

Second, we investigated if the relationship between attachment security and active child participation was mediated by mutual positive affect, maternal encouragement and maternal guiding index.

Similar to the findings from first step of testing mediation for the relationship between attachment security and task effectiveness, attachment security significantly predicted maternal encouragement. Attachment security was not significantly associated with mutual positive affect or maternal guiding behaviours.

In the second step of testing mediation, the attachment security must account for a significant amount of variance in active child participation. Because univariate analyses showed that child sex was significantly correlated with active child participation, it was included as a control variable. Controlling for child sex, attachment security did not account for a significant amount of the variance, and thus, did not significantly predict active child participation (see Table 22).

The third step indicates that the mediator must predict the dependent variable and the effect of the independent variable must less after controlling for the mediators. To test if the association between attachment security and active child participation was mediated by maternal encouragement, mutual positive affect and maternal guiding behaviours, these presumed mediators were entered in the first step of the regression equation and attachment security was entered next. The results indicated that when mutual positive affect, maternal encouragement and maternal guiding index were entered in a block before attachment security, they accounted for 15% of the variance, with mutual positive affect as the only significant predictor (see Table 22).
Table 22

Multiple Regressions Predicting Active Child Participation From Child Sex, Attachment Security, Mutual Positive Affect, Maternal Encouragement and Maternal Guiding Behaviours

<table>
<thead>
<tr>
<th>Variable</th>
<th>R² change</th>
<th>F change</th>
<th>df</th>
<th>B</th>
</tr>
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<tr>
<td>Step 1</td>
<td>.079</td>
<td>4.481*</td>
<td>1, 52</td>
<td>.308</td>
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<tr>
<td>Child Sex</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Step 2</td>
<td>.038</td>
<td>2.171</td>
<td>1, 51</td>
<td>.196</td>
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<tr>
<td><strong>Model 2</strong></td>
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<tr>
<td>Step 1</td>
<td>.079</td>
<td>4.481*</td>
<td>1, 52</td>
<td>.160*</td>
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<td>.151</td>
<td>3.198*</td>
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<td>.147</td>
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<tr>
<td>Mutual Positive Affect</td>
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<td>SPS Maternal Guiding Index</td>
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<td></td>
<td></td>
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</tr>
<tr>
<td>Step 3</td>
<td>.012</td>
<td>.742</td>
<td>1, 48</td>
<td>.115</td>
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<tr>
<td>Attachment Security</td>
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<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*p < .05

Mother-Child Dyadic Regulation

The last set of analyses tested whether the relationship between attachment security and dyadic regulation was mediated by mutual positive affect, maternal encouragement and maternal guiding behaviours.

The results from the first step of testing mediation revealed that attachment security significantly predicted maternal encouragement. In addition, attachment security
was not significantly associated with mutual positive affect or maternal guiding behaviours.

In the second step of testing mediation, the independent variable must account for a significant amount of variance in the dependent variable. Because attachment security did not account for a significant amount of the variance, attachment security did not significantly predict dyadic regulation (Table 23).

The third step indicates that the mediator must predict the dependent variable and the effect of the independent variable must less after controlling for the mediators. To test if the association between attachment security and dyadic regulation was mediated by maternal encouragement, mutual positive affect and maternal guiding behaviours, these presumed mediators were entered in the first step of the regression equation and attachment security was entered next. When these variables were entered in a block before attachment security, they accounted for 12% variance in mother-child dyadic regulation with mutual positive affect as the only significant predictor (see Table 23).

Table 23

Multiple Regressions Predicting Mother-Child Dyadic Regulation From Attachment Security, Mutual Positive Affect, Maternal Encouragement and Maternal Guiding Behaviours

<table>
<thead>
<tr>
<th>Variable</th>
<th>R² change</th>
<th>F change</th>
<th>df</th>
<th>B</th>
</tr>
</thead>
<tbody>
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</tr>
<tr>
<td>Step 1</td>
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<td>.214</td>
<td>1, 53</td>
<td>.063</td>
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<tr>
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<td></td>
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</tr>
<tr>
<td>Model 2</td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>Step 1</td>
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<td>2.269*</td>
<td>3,51</td>
<td>.034</td>
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<tr>
<td>Maternal Encouragement</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mutual Positive</td>
<td></td>
<td></td>
<td></td>
<td>.331*</td>
</tr>
</tbody>
</table>
Affect
SPS Maternal
Guiding Index

Step 2
Attachment Security

.001
.035
1, 50

.020
.025

*p<.05, †p< 1.0

Summary of Mediation Model

As mentioned previously, Baron and Kenney (1986) outlined certain conditions that must be met to demonstrate mediation. All these conditions must hold in the predicted directions to establish mediation. Some of these conditions were not met.

Attachment security was only significantly associated with one of the potential mediators, maternal encouragement. There were no significant relations between the predictor, attachment security, and the dependent variables, task effectiveness, active child participation and mother-child dyadic regulation. However, significant relations were found between the mediating variables and dependent variables. Specifically, mutual positive affect significantly predicted active child participation and mother-child dyadic regulation. However, due to the fact that there were no predictor-criterion relationships established, the existence of mediation could not be determined.

Discussion

Researchers have argued that social interaction is important in collaborative problem-solving activities (Piaget, 1952; Rogoff, 1990; Vygotsky, 1978). The main goal of this study was to examine mother-child relationship quality during a collaborative problem-solving task. Joint activity promotes the development of effective problem solving skills, as well as cognitive self-regulatory competence in children (Freund, 1990).
In addition, mother-child interactions involve expressions of affect, which may also enhance the child’s cognitive skills. One goal of this study was to explore the role of emotion in joint problem solving by examining the contributions of attachment security and positive affect to the collaborative process. Both observational and self-reported data were used in this study. In the next few pages, the results of this study will be summarized and discussed in light of theoretical positions on mother-child relationship quality and collaborative problem solving.

Maternal Teaching Strategies and Encouragement and Planning

Guiding goals and strategies were expected to be positively related to problem solving effectiveness and controlling goals and strategies were expected to be negatively related to problem solving effectiveness. These two hypotheses were not significant. However, the trends were in the expected direction. For example, the trend for the relationship between guiding goals and strategies and effectiveness was positive, as expected. A positive correlation between guiding goals and strategies and problem solving effectiveness may not have been significant because of the measurement of task effectiveness. It may be possible that the child’s subsequent, independent performance would be a better measure of effectiveness than the dyad’s overall task effectiveness. This would have enabled us to see if the mother’s strategies and goals were internalized by the child and utilized when planning alone. There may have been a significant association between the mother’s teaching strategies and the effectiveness of the child in a subsequent problem solving task. Freund (1990) explored individual differences in children’s performance in relation to the mother-child dyad’s performance. Freund (1990) found that the greatest improvement in children’s independent problem solving
resulted when the mothers varied their regulation of their children consistent with the task demands and tailored their use of strategies, goal directing and monitoring. Although the goal of the current study was to examine the dyad’s overall task effectiveness, rather than the child’s independent problem-solving effectiveness, it would be interesting to examine if the more the mother exposes the child to processes necessary for successful problem solving, the more the child’s performance can improve.

However, it is also important to remember that independent and collaborative problem solving contexts are different and many factors may play a role in overall problem solving effectiveness. For example, in the collaborative context, the mother’s competence level or personality may play a role in her teaching behaviours (Neitzel, 2001). Depending on the focus of the study, many factors may play a role in the independent and collaborative problem-solving context.

Another possibility for the lack of association between teaching strategies and the mother-child dyad’s overall problem solving effectiveness may be that mothers may have been more focused on behaviour or task regulation and less focused on promoting learning through the use of teaching strategies. Mothers may have believed that the task was within the child’s mastery level and thus, rather than focusing on teaching, the mothers supervised and monitored the child’s actions during the task. Kuczynski (1984) demonstrated that parents may choose the strategies for controlling children’s behaviour that are most appropriate to their socialization goals in particular situations. Although Kuczynski (1984) investigated parental choice of disciplinary techniques in compliance contexts, the findings may extend to the mother’s choice of teaching strategies in the collaborative problem-solving context. In the compliance study, two conditions (short-
term compliance and long-term compliance) were created to investigate how mothers would influence their child depending on the goal of the condition. The main difference between the two conditions was that mothers in the long-term goal condition were told that their children’s compliance would be observed in a future test in addition to the session with the mother. Kuczynski (1984) found that mother’s perceptions of their compliance goals influenced them to choose different patterns of control strategies, which in turn affected the behaviour of their children. Specifically, mothers in the long-term-goal condition used reasoning more frequently, used more different and complex kinds of explanations and followed a more nurturant interaction than did the mothers in the short-term goal condition (Kuczynski, 1984). It may possible that the mother’s perception of the collaborative problem-solving task influenced the use of teaching strategies. Perhaps the mothers perceived the goal of the task to be regulating the child’s behaviour rather than teaching the child how to utilize planning skills. The mothers’ socialization goals may have influenced the dyad’s overall task performance.

Furthermore, the type of guiding goals and strategies by mothers in this study were similar to maternal teaching strategies used in past collaborative problem solving studies with younger children (Bloomquist et al., 1996; Portes, 1991). The mothers in the current study used mainly guiding goals and strategies as their social problem solving attempts. Questions and indirect requests were the most frequently used guiding strategies. The most frequent goals were prosocial, where the mother shared and assisted with the task and information, where the mother attempts to gain information from the child about the task. However, while there were similar types of maternal teaching behaviours, the frequency of these behaviours were different than in past research.
Past studies have found that mothers also may choose to use more controlling strategies such as physically performing the task for the child. Bloomquist et al. (1996) found that high rates of mothers' taking over the task were related to children being less focused on completing the problem-solving task. The differences between the use of guiding and controlling behaviours may be due to age. Research by Freund (1990) and Pellegrini et al. (1986) included mothers and their preschool-aged children, whereas the current study included mothers and their elementary-school aged children. According to Vygotsky (1978), parents tend to adjust their teaching and facilitating behaviour to match the child's age and level of competence as their children attempt to solve a problem. Therefore, a parent should provide more direct instruction when the problem solving task is beyond the child's capability and more guidance when the problem solving tasks are only slightly beyond the child's capability. In this study, it may have been possible that the origami task was not beyond the child's capability and therefore, the mothers relied on guidance more than direct instruction. Children in middle childhood also may benefit from more guidance than younger children. Rogoff et al. (1984) found that children who are older or more proficient in their problem solving ability may benefit more from guidance during problem solving tasks than younger children, who require more direction and specific instruction. Children in middle childhood may also benefit from emotional support from the mother during the task.

Maternal encouragement was hypothesized to be positively related to mother-child dyadic regulation but this prediction was not supported. The use of positive reinforcement or encouraging remarks to the child's performance did not appear to influence the dyad's overall regulation of the task. Mothers may have used
encouragement more to engage the child or continue the child’s success of a step than facilitate the dyad’s regulation of the task. This relates to the third hypothesis that predicted the positive relationship between maternal encouragement and active child participation.

Maternal encouragement was found to be marginally correlated with active child participation after controlling for child sex. Encouragement from the mother may have led to increased active participation. This relates to Goncu and Rogoff’s (1998) finding that children actively made decisions for each item in the task but seldom attempted to make these decisions when they were not encouraged to. On the other hand, it may be possible that active participation by the child led to an increase in the amount of encouragement from the mother.

In addition, differences between girls and boys were found with respect to active participation and maternal encouragement. Girls were more likely to actively engage in problem solving than boys. These results are in contrast to past researchers (e.g. Portes, 1991) who have not found gender differences during problem solving interactions characterized by the mother’s use of positive reinforcement, encouragement and agreement. However, the sex difference found in the current study may be due to the fact that mothers of girls were more likely to encourage their children than mothers of boys. These findings have implications for the development of gender differences during problem solving. It may be possible that mothers play a different role in problem solving with boys than girls. Denham, Renwick & Holt (1991) found that during mother-child collaborative teaching tasks, compared to girls, boys experienced more allowance of autonomy and were also less reliant on the mother. Mothers’ pleasant structuring of the
task and allowance of autonomy positively contributed to their daughters', but not sons', positive social behaviour (Denham, Renwick, & Holt, 1991). Therefore, it may be possible that the mothers in the current study socialized their children differently during problem solving. The mothers may have felt that the girls benefited from more emotional support than the boys during the problem-solving task. This interaction style may contribute to children’s cognitive competence in future tasks, such as in their ability to perform the problem solving task autonomously.

Furthermore, Pellegrini et al. (1986) and Gauvain and Rogoff (1989) did not find any differences in problem solving performance between boys and girls. However, findings by Goncu and Rogoff (1998) pointed toward a possible difference between boys and girls in their collaboration with a female adult. The findings suggested that boys benefited more than girls in tasks where the adults were responsible and girls benefited more than boys in tasks where responsibility was transferred between adult and child (Goncu & Rogoff, 1998). In the current study, girls were more actively engaged in the collaborative planning task than boys. It may be possible that girls learn better by actively engaging in the task with the adults, whereas boys prefer to learn by observing the adults perform the task.

In addition, maternal encouragement was expected to be related to problem solving effectiveness. The relationship between maternal encouragement and problem solving effectiveness was not significant. Again, this insignificant association may be due to the measurement of task effectiveness. Encouragement may have facilitated the child’s performance and not necessarily the dyad’s overall performance. Tudge and Winterhoff (1993) found that children who received feedback from their partners improved more in a
subsequent problem-solving task than children who did not. In addition, Tudge and Winteroff (1993) suggested that assistance or feedback may not be seen as helpful by the less competent partner if the feedback’s relevance was not obvious. Perhaps the support provided by the mother was not perceived by the child as relevant to the goal of completing the task successfully.

Furthermore, it also may be possible that there is an interaction between some individual characteristic, such as gender, and maternal encouragement in predicting task effectiveness. It may be possible that boys and girls respond with different emotions to maternal encouragement in this task. In addition, the relationship between maternal encouragement and task effectiveness may have been mediated by another process. Denham et al. (1991) found that when mothers allowed their children freedom to perform the task without any emotional support, the interaction was experienced negatively by children. In the current study, it may be possible that girls experienced more positive emotions from the maternal encouragement than boys and this experience may have mediated the relationship between encouragement and task effectiveness.

In summary, while encouragement from the mother may relate to the engaging the child in the task but whether or not this may help the dyad successfully regulate or complete the task is unknown.

**Attachment Security and Planning**

One goal of this study was to explore problem-solving and planning skills in middle childhood in comparison to what was done in previous studies, such as Parent et al. (2000). To accomplish this goal, a measure of joint planning was translated and adapted to fit an origami task and children in middle childhood. The original measure
was used with a grocery store planning task with preschool-aged children. The results of this study demonstrated that this measure reliably measured planning and collaborative problem solving with mothers and children in middle childhood. As well, the results further demonstrated that planning is observable in an origami task. The measure of joint planning was successful because it was significantly associated with expected variables, such as attachment security and mutual positive affect.

Comparison of the sharing of responsibility frequencies from the present study and Parent et al.’s findings (2000) (see Table 12) suggests a developmental change in responsibility sharing from preschool to middle childhood. During global planning, there was less maternal performance and more child autonomous performance by the middle school-aged children than by the preschool-aged children. Parent et al. (2000) suggested that global planning may not be beyond the range of the preschool child’s zone of proximal development. However, it may be possible that as the children age, global planning may be increasingly within the child’s range of capabilities and they are able to perform the task without the mother’s assistance. The most distinct differences were during local planning. Again, the mothers performed less of the task during local planning with the middle school-aged children than with the preschoolers. The mothers may be adjusting their support to the child’s age and/or task. Rogoff, Ellis and Gardner (1984) examined how mother-child dyads compensated for the perceived difficulty of a school task for younger children. It appeared that mothers adjusted instruction to provide support for the younger children in the school task, in which the children were least expert (Rogoff, Ellis & Gardner, 1984).
Furthermore, in the current study, there were higher frequencies of joint performance during local planning than in the study of preschoolers. However, in comparison to the preschool-aged children, the middle-school aged children did not perform as often on their own. Intuitively, one would expect that as older children gain more experience with the task, they are more likely to take initiative and complete the task without the mother’s help, in comparison to younger children. It may be possible that older children have developed the ability to use their collaborative problem-solving skills and jointly perform the task with their mother. Rather than relying completely on the mother or performing autonomously, the children are able to share responsibility for the task and thus enable the further development of their planning and regulating skills. Recent studies have found that children in secure relationships are significantly more likely to engage in collaborative regulation of joint problem-solving activities than their peers in insecure relationships (Moss et al., 1997; Moss, St. Laurent & Parent, 1999). This relates to the next hypothesis.

Based on findings from Parent et al. (2000), I expected that there would be a positive relationship between attachment security and sharing of responsibility during local planning. This hypothesis was supported. Attachment security was positively associated with the child’s autonomous performance during local planning. These results relate to Parent et al.’s (2000) finding that children who perceive their relationship as more secure were more likely to be involved in the performance of local planning strategies than children who perceived their relationship as insecure. However, this observed pattern was moderated by familial adversity. Mothers of secure children from high-risk families tended to take unique responsibility for the performance of local
planning operations more frequently than the mothers of secure children from low-risk families (Parent et al., 2000). Future studies may attempt to examine the moderating effect of family adversity on joint planning with mothers and children in middle-childhood.

Furthermore, the current study provides evidence related to Hartup’s (1987) argument that the quality of the mother-child attachment has an impact on maternal teaching of meta-cognitive skills. Moss et al. (1997) found securely-attached children showed greater task engagement and meta-cognitive participation in problem solving than insecurely-attached children. In addition, Moss and St. Laurent (2001) found that children who showed a higher level of cognitive engagement in the planning task were more likely to be secure in their attachment relationships. These findings relate to the present study because the children who perceived their relationship as secure were more likely to perform the local planning operations autonomously, in contrast to the child who perceived their relationship as less secure. This implies that these secure children took greater responsibility for the performance of meta-cognitive skills in the collaborative problem-solving context.

According to the attachment theory (Bowlby, 1969), children who perceive their relationship as secure may be more likely to use their mother as a secure base from which to explore. In the current study, the children in secure mother-child relationships may have been more likely than children in insecure mother-child relationships to take more responsibility for the task because they knew their mother was available for support and guidance. By middle childhood, children in secure mother-child relationships should be capable of maintaining a goal-directed partnership with their mothers involving open
emotion expression, negotiation of mutual plans and reciprocal control of behaviour (Bowlby, 1982).

Furthermore, the role of the mother in a secure mother-child relationship is also important to consider in the collaborative context. The mothers in the current study observed attentively or provided feedback to the child while the child performed the task autonomously. Meins (1997) found that mothers of securely attached children were more likely than mothers of insecurely attached children to engage in positive feedback and physical intervention only when suggested by the child.

The current study provides further implications for the association between the quality of the mother-child attachment relationship and other close relationships. Kerns et al. (1996) found that securely attached children may learn a cooperative and responsive interaction style within the mother-child relationship that generalizes to interactions with peers. The children in the current study may have learned to share responsibility for the task, either by regulating the task with their partner or performing the task autonomously. These children may utilize this collaborative skill in future problem-solving activities with other adults or peers. For example, Moss et al. (1997) found that securely-attached preschoolers were more likely to share experience for problem monitoring and evaluation during mother-child collaboration and in executing a subsequent task with a stranger. Therefore, the findings in the current study provide further evidence that attachment security is likely to influence execution of developmentally advanced levels of cognitive thinking.

Positive Affect and Planning

The affective quality of the joint problem-solving interaction was investigated to add to the lack of research examining the influence of mutual positive affect mother-child
problem solving. There are two competing positions in the area of positive affect and its influence on problem solving. Alice Isen (1987, 1999) has been the leading researcher in the area of positive affect induction and problem solving. Recently, Isen (2002) argued that one of the most robust and widely confirmed findings in the affect literature is that positive affect increases cognitive flexibility and enhances creativity and problem solving. In opposition to this position, Forgas (2002) argued that the effect of positive affect, when it does have an impact on thought and behaviour, is generally to cause superficial, lazy, inattentive processing and to interfere with careful, effortful, and effective problem solving. Isen (2002) stated that there is substantial evidence in the literature against Forgas’s (2002) assumption. For example, research by Greene and Noice (1988) and Isen et al. (1987) has demonstrated that positive affect promotes flexible and adaptive thinking that is effective and responsive to the details of the problem. In addition, Isen (2002) defined the term, “flexibility”, to refer to the ability to switch perspectives or entertain alternative perspectives to solve a problem. This construct relates to the joint planning term, “dyadic regulation”, in which the mother and child are able to discuss their decision-making process and monitor and supervise the task. As well, the mother and child may be more open to responses or suggestions made by their partner. This may explain the link found between mutual positive affect and dyadic regulation in the current study.

A positive association was found between mutual positive affect and dyadic regulation and active child participation, as well as both levels of joint planning. This indicates that the more frequently positive affect is displayed during the collaborative problem-solving interaction, the more frequently the mother and child jointly perform the
task and work together to regulate the task. According to Oatley and Johnson-Laird (1996), happiness is usually the mood of active engagement in what one was doing and encourages one to continue until the goal is reached. This relates to the current findings that the expression of mutual positive affect in the dyad was associated with greater active participation from the child.

However, the association between mutual positive affect and dyadic regulation does not tell us if mutual positive affect will cause an increase in the likelihood of mother-child dyadic regulation. To address this, sequential analyses were utilized to determine the extent to which mutual positive affect increased the likelihood of subsequent dyadic regulation. Contrary to the expectations of the hypothesis, mutual positive affect did not significantly increase the likelihood of mother-child dyadic regulation occurring immediately after. While the pattern of dyadic regulation occurring immediately after mutual positive affect was observed 65% of the time, it did not occur significantly more than the base rates. Despite this fact, it may be possible that the pattern could be reversed and mutual positive affect was more likely to follow dyadic regulation. Perhaps the mother and child would be more likely to express positive affect after they successfully regulated the task.

This above idea stems from Dix’s (1991) discussion of the affective model of parenting which claimed that emotions are vital to effective parenting. Emotions organize sensitive and responsive parenting when the parents are invested in the interests of the children (Dix, 1991). Dix (1991) claims that the affective model emphasizes that parenting is a process of formulating, enacting, evaluating and maintaining interaction plans so that the parents’ concerns are effectively promoted. One aspect of this model is
concerned with how parents experience less negative and more positive emotion if they can coordinate interactions with children such that mutually satisfying behaviours and outcomes occur. This may relate to the possibility of positive affect following dyadic regulation during the collaborative task. Once the dyad has regulated the task successfully, mutual positive affect may be experienced and expressed because the parents and children worked together to coordinate the shared plans and concerns for the task.

In addition, there may be other plausible explanations for the lack of sequential direction. Oatley and Laird (1996) discussed the communicative theory of emotions and implications for social interaction. They assumed that emotions are based on signals within the brain that reflect priorities of goals and that predispose people toward appropriate classes of action. For example, happiness, encourages people to continue doing what they are doing. It may be possible that positive affect is signaling to the dyad that their plan is unfolding and the task is being completed successfully. This may lessen the need for dyadic regulation of the task because the positive affect encourages the dyad to keep doing what they are doing. However, a display of negative affect may signal that the planning goals are not being met and regulation is needed to get the dyad back on track. Therefore, it may be more likely that negative affect, rather than positive affect, would increase the likelihood of subsequent dyadic regulation. Due to the fact that not many dyads displayed negative affect, it was not possible to observe and analyze this pattern. Future studies may address this possibility.

Furthermore, mutual positive affect also was expected to be related to the child’s willingness to comply with the mother’s SPS attempts. Kochanska and Murray (2000)
found that children who experienced shared cooperation and positive affect with their mothers were more eager to accept the rules and requests of the mother. This was not confirmed in the current study.

In addition, it may be possible that the goals and requests of the mother were different in the problem solving context than in the discipline context used in the Kochanska and Murray (2000). The children had to comply eagerly and enthusiastically to the mother’s directives during an episode that prevented the child from touching an attractive toy. The children may have more willing to comply with this directive than with a directive regarding their problem-solving attempts. The age of the children and type of task may partially explain why there was no association between mutual positive affect and willingness to comply.

Overall Model

The possibility of a mediational model was analyzed. I will review the premise for this model. I expected that attachment security would provide the context for maternal teaching strategies, maternal encouragement and mutual positive affect. These three mediator variables would, in turn predict task effectiveness, dyadic regulation and active child participation. As well, direct effects may also be found between attachment and task effectiveness, dyadic regulation and child engagement. The overall model was not supported. Attachment security was found to only be associated with maternal encouragement. There were no significant relationships between attachment and maternal teaching strategies or mutual positive affect. In addition, there were no significant relations between the predictor, attachment security, and the dependent variables, task effectiveness, active child participation and mother-child dyadic regulation. However,
significant relations were found between the mediating variables and dependent variables. Specifically, mutual positive affect significantly predicted active child participation and mother-child dyadic regulation. No direct effects were found between attachment and the outcome variables. Due to the fact that there were no predictor-criterion relationships established, a mediational model could not be found in this current study.

There may be many explanations for the lack of support for the mediational model. For example, variables such as responsivity and sensitivity (e.g., mother is responsive if called on for help) or openness to communication may have mediated the relationship between attachment and the outcome variables. For example, Moss et al. (1997) found that child security was associated with a more sensitive maternal style. Sensitivity was defined as an intervention style which allows room for the practice of emerging child social and cognitive self-regulatory skills (Moss et al., 1997). Mothers used a moderate level of structuring with secure children whereas mothers used the highest level of structuring with insecure children (Moss et al. 1997). It may be possible that maternal sensitivity mediated the relationship between attachment security and active child participation or mother-child dyadic regulation.

Furthermore, it was expected that there would be a positive association between attachment security and maternal encouragement as part of testing for mediation. The measure of attachment security by Kerns et al. (1996) was a self-report measure completed by children. These questions pertained to perceived support and availability of the caregiver, not the expression of affect in the family. Thus, it makes sense that attachment security and maternal encouragement were correlated due to the fact that
mothers of securely attached children were more likely to encourage their children, especially the girls.

Methodological Considerations

Observational Task and Procedure

The origami session used in the present study raises some measurement concerns. A main limitation was the children may enter the session with differing skills. Past researchers (Freund, 1990; Parent et al., 2000) have made independent assessments of the child’s initial competence prior to the collaborative problem-solving session. Children are asked to complete the task alone and thus, the child’s initial competence can be assessed before they work with their mother on the task. Researchers in the present study did not have the opportunity to measure the child’s initial competence. The origami sessions were taped at the University of Maryland and were part of a larger friendship study. These tapes were then coded at Brock University.

Due to the fact that an assessment of the child’s initial competence was not conducted, I was unable to determine if there were differences between the child’s initial competence and the child’s subsequent competence in the task with his/her mother. Some children may have entered the collaboration with greater meta-cognitive skills than other children and this may have affected their ability to problem-solve or share responsibility for the task with their mothers. Therefore, the child’s performance may have been due to their initial competence and not to the mother’s social problem solving attempts. Despite this fact, it may possible that the assessment of the child’s initial competence has no effect on their performance. Parent et al. (2000) assessed the possibility that differences in patterns of responsibility sharing could be the result of the child’s prior competencies.
Parent et al. (2000) discovered that controlling for the child’s prior performance did not modify their results. Similarly, Freund (1999) found no relation between the child’s initial competence and mother regulation of the child. Other researchers, such as Goncu and Rogoff (1998) and Gauvain and Rogoff (1989), have not included independent assessments of the child’s initial competence when examining collaborative problem solving.

Scaffolding is an important part of collaborative problem solving. It has been defined as an adult-expert process that enables a child or novice to solve a problem, carry out a task, or achieve a goal that would be beyond his or her assisted efforts (Wood & Middleton, 1975). The scaffolded interactions provide an opportunity for the children to acquire “tools” needed for academic self-regulation such as metacognitive understanding and cognitive management (Neitzel et al. 2001). Wood and Middleton (1975) found that mothers who scaffolded successfully tended to be responsive to their children, altered their communications based on the children’s communication and selected communications within the intellectual grasp of their children. However, without a measurement of the child’s initial competence, I was unable to assess if the mother was tailoring her response to the child based on the child’s performance. Future studies could address this scaffolding issue.

Another concern with the observational task used in the present study is its artificial setting. The mother-child dyads were observed and videotaped in a university laboratory equipped with two-way mirrors and video cameras. Due to the fact that the dyads were aware that they were being videotaped, the children, more so than the mothers, seemed concerned and sometimes distracted by the cameras. This may have
interfered with task performance. For example, in the current study, one child did not actively participate in completing the origami because he was looking in the mirrors and waving to the camera. As well, he interfered with the mother’s performance because the mother had to focus on controlling the child’s behaviour rather than focus on the performing the task. However, this scenario was not very common and should not be generalized to the other mother-child dyads in the study

**Joint Planning Reliability**

Although one strength of this study is the fact that the joint planning measure was adapted to a new task and new age group for the first time, this also may be a weakness. Coding categories and definitions were adapted from a joint planning scheme used with a grocery store planning task with preschoolers (Parent et al., 2000) to fit an origami task with middle school-aged children. Although inter-rater agreement was established prior to video coding, the reliability did not remain stable throughout. To correct for possible observer drift, coding categories were redefined and additional tapes were coded. However, this did not increase the reliability beyond a moderate level. In some cases, kappas may have been limited by skewed distributions. Nevertheless, as previously mentioned, the percent agreements were within acceptable ranges for this type of complex observational coding system.

One major limitation of the moderate reliability is that the findings must be interpreted with caution, especially those involving maternal participation. Relations between variables may be underestimated in conditions of low reliability.

Future adjustments to the coding manual may increase kappa from fair to good or excellent. For example, redefining the responsibility sharing coding category, especially
the definition of the dyadic regulation code, may reduce the skewness of the distribution. In addition, further training may attempt to establish a consensual definition for the coding categories to reduce code confusion (Bakeman & Gottman, 1986). Observer drift or reliability decay (Bakeman & Gottman, 1986) may be prevented by holding periodic meetings with the two observers to discuss any confusion in coding and confirm that the coding is consistent with the coding scheme definitions. It also may be useful for the two observers to watch a video tape together to discuss their individual coding. These two strategies may help to ensure the continued accuracy of multiple observers over a long period of time.

**Participant Population**

The generalizability of this study is limited in terms of mother’s ethnicity and education level. Almost 80% of this study’s population were of majority status. Therefore, we do not if these results would apply to minority cultures.

In addition, the mothers participating in this study were highly educated, with over half of them holding at least one university degree. Mother’s education was found to covary with the mother’s use of teaching strategies. Neitzel (2001) have found mother’s education to be related with scaffolding behaviours. As well, it is not known if these results differ depending on children’s home environment. Parent et al. (2000) found that whether the children came from an high or low risk environment moderated the relationship between attachment security and planning.

**Measure of Problem Solving Effectiveness**

The measurement of problem solving task effectiveness emerged as a complex issue which raised many methodological concerns. We decided that the effectiveness of the
collaboration could be based on how many steps are completed by the mother and child, relative to the number of steps to complete each origami model and difficulty level of each design. However, the method used to create this variable may have been incorrect, and therefore, may be the reason task effectiveness did not relate to any other variables as hypothesized.

In order to compare the origami models with different number of steps, the level of difficulty for each model was rated by twenty university students based on a 5-point Likert scale from 1 (very easy) to 5 (very difficult). As mentioned previously in the method section, these students rated the windmill to be the easiest, jet plane to be difficult and the goldfish to be the most difficult. These ratings were used as weighted difficulty levels for each respective model. However, it may have been possible to calculate the difficulty levels a less complex way. Difficulty level may be based just on how far the dyad got in comparison to the number of steps required for the model. For example, if a dyad completed 3 out of 6 steps, the unweighted score (before multiplying by weighted difficulty level) would be .50. This may have been more representative of the dyad’s successful completion of the task. Another concern is that the difficulty ratings from the students may not have been representative of the mother-child dyads. For example, the jet plane may have been perceived by the mother-child dyad as more difficult than the goldfish yet the jet plane received a lower difficulty rating from the students. In addition, these university students were not collaborating with anyone, as they autonomously completed each origami model. These issues may have interfered with the results of the study.
Another consideration is that rather than measuring the dyad’s overall task effectiveness, it may have been useful to measure ongoing effectiveness or success. An example of a possible measure of task effectiveness was utilized by Bloomquist et al. (1996). Instead of examining the dyad’s overall task effectiveness, these researchers focused on the effectiveness of the child’s problem solving. For example, the child was seen as an effective problem solver if they were oriented to the task, read directions or asks for information regarding the task or self-instructs own behaviour. It may be possible that focusing on the child’s effectiveness would have provided more fruitful results.

The measurement of ongoing effectiveness would allow examination of how ongoing success may interact with other coding variables, such as participation or affective climate. It may be possible that mutual positive affect is related to ongoing effectiveness and possibly increases the efficiency of the dyad’s performance, rather than simply predicting overall task effectiveness. A reliable measure of ongoing success or effectiveness during collaborative problem solving may be created in future studies.

Social Problem Solving Measure

The variable, child’s willingness to comply, may not have been accurately represented by the SPS percentage of successful attempts. Over 80% mother’s SPS attempts were successful. In addition, there was not much variability within the maternal goals and strategies. The majority of the attempts involved information goals and questions or prosocial goals and indirect requests. This may have effected the associations between the SPS variables and the Joint Planning variables.
Future Research

As suggested in this study, children continue to develop planning and problem solving skills from pre-school age to elementary-school age. However, it would be interesting to use a longitudinal design to assess the developmental changes in problem solving and planning. Savage and Gauvain (2001) found that children’s participation in planning-related activities is stable from second to fourth grade, indicating that those children who participate at a young age in one type of planning-related activity do so consistently across time. Future research may attempt to investigate consistency in planning across the life-span.

Maternal Teaching Strategies and Collaborative Problem Solving

With a longitudinal design, it also may be possible to examine mother’s scaffolding behaviours and teaching strategies and how these change with the child’s developmental age and competence.

The manipulation of the goals of the problem-solving task may be interesting for future research. Similar to Kuczynski (1984), mothers could be divided into two conditions with varying task goals. The mothers in one condition could be told to emphasize having a good time during the problem-solving task, whereas the mothers in the second condition could be told to emphasize the goal of completing the task successfully. Mothers in each condition may use different patterns of strategies depending on their perception of their goals for their children.

Mutual Positive Affect and Collaborative Problem Solving

Future researchers may attempt to find causal relationships between mutual positive affect and aspects of collaborative problem solving (i.e. subsequent dyadic
responsibility sharing) by experimentally manipulating positive affect prior to the
execution of the joint task. Alice Isen (1999) has conducted studies on problem solving
and the induction of positive affect through compliments and small gifts. This research
indicates that induced positive affect enhances innovation, creative problem-solving
ability, as well as task effectiveness. While positive affect was not induced prior to the
problem solving task in the current study, it would interesting to examine the effect of
inducing positive affect on the mother-child collaboration. Since only correlational
relationships were found between some aspects of problem solving performance such as
mutual positive affect and dyadic regulation, attempting to examine a causal link would
be worthwhile. Through the experimental manipulation of positive affect, we can see if
positive affect actually causes the dyad to perform more effectively than a dyad that is
not exposed to the induction of positive affect.

**Collaborative Problem Solving in Other Samples**

Differences have been found between the emotion expressiveness of mothers and
fathers. For example, Halberstadt, Cassidy, Stifter, Parke, and Fox (1995) found that
mother’s positive expressiveness and father’s negative expressiveness were relatively
frequent in social interactions. Due to the lack of research including fathers in the
examination of clinical populations, I would like to examine potential parental gender
differences in the expression of affect during collaborative problem solving. This will
make an important contribution to further understanding the father’s role in children’s
emotion and cognitive self-regulation.

In addition, investigating the mother-child relationship during collaborative
problem solving with children with internalizing or externalizing disorders would be
interesting. Is the quality of the relationship distinct from a typical mother-child relationship? Does the quality of this relationship influence the child’s development of meta-cognitive skills? Past research has found that children with certain internalizing and externalizing disorders manifest characteristic patterns in their emotion functioning that differ from normal children (Casey, 1996). Emotionally competent children can control their emotions during social and cognitive tasks that facilitate problem solving performance. On the other hand, children with externalizing (e.g., aggression or impulsivity) or internalizing (e.g., depression or anxiety) disorders demonstrate dysregulation of emotion and this may be observed in their performance during collaborative problem solving. Based on previous research, I would expect to find differences in collaborative problem solving among these three groups (externalizing, internalizing and emotionally competent). Future research may determine that the induction of positive affect will increase the likelihood of subsequent sharing of responsibility for the task and overall task effectiveness, as well as the expression of positive emotions in all three groups.

Comparison with Peer-Peer Dyads

Social encounters, such as in a collaborative problem-solving context, provide the most salient contexts for exercising skills of emotion management. The efficacy of these skills depends on the responses of social partners, such as parents or peers (Thompson, 1994). Past researchers have examined the differences in problem solving between adult-child and peer-peer dyads (Gauvain & Rogoff, 1989). It would interesting to examine aspects of joint planning, such as responsibility sharing, with peer-peer dyads in elementary school in comparison to mother-child dyads.


**Study Strengths**

One strength of this study is the use of multi-method assessments. Observation and self-report techniques were used to assess the mother-child quality during collaborative problem solving. The perceptions of the mother-child relationship and the actual patterns of interaction were both considered. Cicchetti and Cohen (1995) assert that any singular use of any method reduces the ability to make firm conclusions in a given area of study. Any single methodology is best used in combination with other methods when the issue is studying the processes that underlie child development. The correlation between the attachment security measure and the behavioural measure of joint planning provide evidence for the usefulness of utilizing multi-methods of assessment when investigating child development and mother-child relationships.

**Summary of Findings**

The translated and adapted Joint Planning measure (Parent & Caron, 2001) reliably measured planning and collaborative problem solving with mothers and children in middle childhood. As well, the results further demonstrated that planning is observable in an origami task. There was support for the predicted relationship between attachment security and responsibility during local planning, but only for child autonomous performance.

In addition, the predicted sequence of mother-child dyadic regulation immediately occurring after mutual positive affect was not found. However, a significant positive relationship was found between mutual positive affect and dyadic regulation. Mutual positive affect was not significantly related to the child’s willingness to comply.
Problem solving effectiveness was not correlated with maternal teaching strategies, maternal encouragement or mutual positive affect. Although maternal encouragement was not significantly associated with dyadic regulation, it was marginally related to active child participation. In addition, I found interesting gender differences in maternal encouragement and active child participation. Girls were more likely than boys to actively participate in the task, as well as receive encouragement from the mothers.

The hypothesis predicting an overall mediational model was not supported. The existence of mediation could not be determined, perhaps due to the lack of associations between attachment security and the three outcome measures (task effectiveness, dyadic regulation and active child participation).

Overall, these findings point toward the need for further investigation into how the quality of the mother-child relationship influences planning in middle childhood.

**General Conclusions**

Children are continuing to develop and display planning skills in elementary-school. The quality of the mother-child relationship, in terms of attachment security and affective climate, appears to influence the development of meta-cognitive skills. This supports the notion that parenting is an emotional experience and positive emotions promote the parents’ willingness to teach, comfort and encourage their children (Dix, 1991). It is vital for parents to be aware of their role in children’s social and cognitive development. Competence in problem solving may develop in the rich familial context and these skills may be transferred to various other social contexts. Therefore, parent-child collaboration is essential in the world of children’s learning and development.
null
Raising children with an emphasis on intrinsic rewards is not a technique, a method or trick to get them to do what the parent wants by subtler means, but a way of life, a way of living with children with real respect for their intelligence and for their being.

*Mary Van Doren (2001)*
References


Lawrence Erlbaum.


according to child’s age and task. Developmental Psychology. 20, 193-199.


FROM: D. Butz, Chair  Senate Research Ethics Board (REB)

TO: Linda Rose-Krasnor, Psychology

RE: Annual Progress Report
File #: 98-144
Title: Friendship, the Transition to Middle School, and Psychosocial Adjustment
Researcher: Linda Rose-Krasnor  Department: Psychology
Originally Accepted: February 1, 1999
Estimated Date of Completion: December, 2003

DATE: May 4, 2001

Thank you for completing the Annual Progress Report on Human Research Projects. The Brock University Research Ethics Board has reviewed the Annual Progress Report for:

Friendship, the Transition to Middle School, and Psychosocial Adjustment

The Committee finds that your original proposal and ongoing research conforms to the Brock University guidelines set out for ethical research.

*Approved for current year
Appendix B

NIMH Friendship Project
Mother-Child Visit: Instructions & Interview

Greet mother & child – introduce yourselves. Find out whether the Mom was here before for the friendship visit (some came, some didn’t). Ask mothers if they’ve heard anything about what we’re doing for this part of the project. Give general briefing regarding what kids & parents will do & where, as follows:

First, we’ll ask you & {child’s name} to fill out a few questionnaires – say to mother “You have one long questionnaire” & {child’s name} has several.

2nd, we’ll go across the hall so you can do some activities like planning a vacation together, Origami -- the paper folding like you did when you were here with {friend’s name}, you’ll be given some dilemmas or problem questions to discuss & answer, and you’ll talk about special times you’ve had.

Last, we’ll come back in here and ask {child’s name} to fill out more questionnaires. These questionnaires are not a test—there are no right or wrong answers. The questions we ask children are about what it’s like at school with friends, things that happen with other kids & what you’d do, and some questions about your relationship with friends & family.

Whatever you do here – the activities & the questionnaires—are all kept private & confidential, just like for the friendship visit. So, instead of putting your child’s name on his/her questionnaires, we use ID numbers. Since we’re interested in the relationship between parents & children, we videotape the activities— but again, it’s totally private & confidential – so nobody else will see anything except us for the project.

Ask mother & child to fill out consents before starting— “Here’s the consent form, if you’d like to read & sign it now before we get started.” Tell them that generally it says what you’ve just told them. {This (point to that paragraph) describes the activities that I just told you about. This says everything is confidential & your questionnaires only have numbers not names to keep it private.}
Do you have any questions? Well, since {child’s name}’s questionnaires will take longer than yours, let me get him/her started; then I’ll come back to you.

ORIGAMI ACTIVITY (Paper folding task) – 10 minutes

Interviewer: The first activity is called Origami. {Say to child} You did this when you were here before. {Ask the Mom} “Have you heard of it? Say “This is a windmill; this is a jet plane; and this is a goldfish” as you lay them out. Here’s a piece of paper (on top middle of table) & the instructions for each model. Place the instructions in front of each model. “We’d like {child’s name} to make one of these designs out of paper with your help. You can do more than one if you want but please use just one piece of paper for each design.” Leave 1 more paper. “You have 10 minutes to do this & then I’ll come back, ok?” {If Mom asks if she can touch it, just say “we’d just like you to help him/her”} Put scissors on the table.

PLAN A WEEK-LONG VACATION – 10 minutes

Interviewer: “For this activity, we’d like the two of you to plan an imaginary one-week vacation together. To plan this vacation you can assume that you have an unlimited amount of money to spend (as much as you want). While thinking about your vacation, you’ll have to consider all the details -- activities for every morning, afternoon, and evening -- and things like where you’ll go, how you’ll get around, & how you’ll get food. Use your imagination to plan everything for the week. If you want, you can write down your ideas on this sheet” (show them the planning sheet). “I’ll be back in 10 minutes & you can tell me about the vacation you two planned.” Place one pencil & the planning sheet in the middle of the table.

DISCUSS IDENTIFIED PROBLEMS – 10 minutes

Interviewer: First ask about their vacation. “In a minute I’m going to give you some topics you can discuss” {hold up cards}. “We’d like you to choose one problem question at a time to talk about together and come up with a solution or answer that you both agree on. Discuss your opinions, what you’d do in this situation, and why; then come to an agreement. Also, discuss as many problems as you can, taking your time with each one.” Lay out all 6 index cards across top of table. “When you finish the first one, go ahead & talk about the next one with each other- in whichever order you want.
Resolve each issue between the two of you and come up with only one answer that you both agree on. Each card has a question on it, but you don’t have to do all 6. You have 10 minutes, so you can take your time & not rush.”

{If asked about timing, can say “If you’re done before 10 minutes is up, just knock on this door (point) – I’ll hear you & then go back to your seat.”}

1) If you saw someone shoplifting in a store, should you report them?
2) If the answers to a test were visible on the teacher’s desk, is it OK to look at them?
3) Should you tell on a friend who has done something wrong or dangerous?
4) Should kids be able to watch any TV program they want?
5) Should parents be allowed to spank their children?
6) Should kids of all ages be allowed to go to any movie no matter what rating the movie has?

When you go back into the room, ask “What did you come up with?” Listen & respond neutrally.

BEST TIME

For the last activity, we’d like the two of you to identify & talk about 5 special times you’ve had together. Talk about these times, what you did together, especially the fun times you’ve had. These times could be special events or things you do together all the time. Just talk about what these times were like. After 5 minutes, I’ll come back & then I’d like to hear about those things.

Before they leave:

Ask them to fill out the payment form and pay them $25 cash.

Also, ask mothers if they already received the check for the friendship visit. If they say “No”, make note of it & tell Erin.
Appendix C

Security Scale

Now we are going to ask you some questions about you and your mom. We are interested in what each of you is like, what kind of person you are like. First let me explain how these questions work. Each question talks about two kinds of kids, and we want to know which kids are most like you. Here is a sample question:

Sample Sentence

(a) Really True for me Sort of True for me Sort of True for me Really True for me

☐ ☐ Some kids would rather play outdoors in their spare time. BUT Other kids would rather watch TV. ☐ ☐

What I want you to decide first is whether you are more like the kids on the left side who would rather play outdoors, or more like the kids on the right side who would rather watch TV. Don't mark anything yet, but decide which kid is more like you and go to that side of the sentence. Now, decide whether that is sort of true for you, or really true for you, and check that box.

For each sentence you will only check one box, the one that goes with what is true for you, what you are most like.
Now we're going to ask you some questions about you and your mom or step-mom. 
(If you have both a mom and a step-mom, describe your relationship with the one that you live with.)

<table>
<thead>
<tr>
<th></th>
<th>Really True for me</th>
<th>Sort of True for me</th>
<th>Sort of True for me</th>
<th>Really True for me</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
<td>Some kids find it easy to trust their mom.</td>
<td>BUT Other kids are not sure if they can trust their mom.</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td>Some kids feel like their mom butts in a lot when they are trying to do things.</td>
<td>BUT Other kids feel like their mom lets them do things on their own.</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td>Some kids find it easy to count on their mom for help.</td>
<td>BUT Other kids think it's hard to count on their mom.</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td>Some kids think that their mom spends enough time with them.</td>
<td>BUT Other kids think that their mom does not spend enough time with them.</td>
<td></td>
</tr>
</tbody>
</table>
5. Really True for me  Sort of True for me

[ ]   [ ] Some kids do not really like telling their mom what they are thinking or feeling.

BUT Other kids do like telling their mom what they are thinking or feeling.

6. Really True for me  Sort of True for me

[ ]   [ ] Some kids do not really need their mom for much.

BUT Other kids need their mom for a lot of things.

7. Really True for me  Sort of True for me

[ ]   [ ] Some kids wish they were closer to their mom.

BUT Other kids are happy with how close they are to their mom.

8. Really True for me  Sort of True for me

[ ]   [ ] Some kids worry that their mom does not really love them.

BUT Other kids are really sure that their mom loves them.
<table>
<thead>
<tr>
<th></th>
<th>Really True for me</th>
<th>Sort of True for me</th>
<th>Sort of True for me</th>
<th>Really True for me</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.</td>
<td>Some kids feel like their mom really understands them.</td>
<td><strong>BUT</strong> Other kids feel like their mom does not really understand them.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>Some kids are really sure their mom would not leave them.</td>
<td><strong>BUT</strong> Other kids sometimes wonder if their mom might leave them.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.</td>
<td>Some kids worry that their mom might not be there when they need her.</td>
<td><strong>BUT</strong> Other kids are sure their mom will be there when they need her.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12.</td>
<td>Some kids think their mom does not listen to them.</td>
<td><strong>BUT</strong> Other kids do think their mom listens to them.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13.</td>
<td>Some kids go to their mom when they are upset.</td>
<td><strong>BUT</strong> Other kids do not go to their mom when they are upset.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
14. Really True for me
    Sort of True for me
[ ]  [ ] Some kids wish their BUT mom would help them more with their problems.

[ ]  [ ] Other kids think that their mom helps them enough.

15. Really True for me
    Sort of True for me
[ ]  [ ] Some kids feel better BUT when their mom is around.

[ ]  [ ] Other kids do not really feel better when their mom is around.
Appendix D

Social Problem Solving Coding Manual

Overview

Social-problem solving (SPS) attempts are socially-oriented initiations which one person (the initiator, referred to also as the focal child) uses to influence another person (the target, referred to also as the nonfocal child). In coding these attempts, the critical variables are: the initiator's goals, his/her strategies used to achieve these goals, the outcome of SPS attempt and the affect associated with the SPS attempt.

The SPS coding scheme has derived from research on dyads of children ranging in age from 4 to 8 years, the present version of the coding scheme has been modified for use with children in groups of four. For the most part, the paradigm used in the development of the coding scheme was naturalistic in nature; typically, groups of same-age, same-sex children were video-taped during play. The present coding scheme was developed for use with these videotapes.

The purpose of this manual is to provide researchers with a useful scheme for coding social-problem solving attempts between children. The manual contains a detailed description of the transcription and coding procedures and includes definitions for all coding categories along with general coding guidelines.

<table>
<thead>
<tr>
<th>Coding Social-Problem Solving Attempts</th>
</tr>
</thead>
</table>

There are six components in the coding of social-problem solving attempts. These components include: goals, strategies, outcomes, affect, proximity and physical orientation. In coding an SPS attempt, one category is chosen from each of the six components; together these units describe the entire SPS episode. In addition to the coding of the above outlined components, a verbatim transcript of the entire interaction is recorded along with the start-time of the SPS attempt and the identification numbers of both the initiator and the target child(ren).

Code 10 minutes of interaction from the start of the episode. In some instances, the episodes (e.g., free play/origami) may go beyond 10 minutes, only the first 10 minutes are coded. By coding the first 10 minutes the number of SPS attempts within the episode are comparable. If the episode is less than 10 minutes please indicate this information on the front of the transcript.
Mark on the front of the transcript: Start Time: & Stop Time:

Do not start until the experimenter has stopped talking.

### Goals

To code as an SPS attempt the goal should be clear, i.e., there is not more than one possible goal. For example, the goal may appear to be to get target child to behave in a different way or the goal may be in response to the target child’s request to continue to play the game, as the goal is not clear, do not code as an SPS attempt. Another instance in which you do not code an interaction as an SPS attempt is bumping, screaming, etc., during/in the context of a game.

If it is **not** clear what is being said between the interactants, do not code as an SPS attempt.

If you are attempting to differentiate whether the focal child’s action is an SPS attempt or self-talk, code as an SPS attempt if the focal child gestures toward, looks at, or appears to be engaging the target child in some manner. If the focal child does not appear to be engaging or orienting him or herself toward the target child, consider the behavior as self-talk and do not code as an SPS attempt.

1. **Joint action**

   Attempts to initiate social play or a joint activity. In social play, an individual's actions are contingent upon his/her partner's actions (i.e., are related in content and occur within 10 seconds) (e.g., "Want to play checkers?"; [While playing 'house'] "Now, you be the mommy and I'll be the daddy."; [while playing cards] "Let's play a different game."). In a joint activity, two or more individuals are engaged in a non-play activity with a common purpose or goal (e.g., "Let's clean the room up now."). The children can already be playing a game and be setting up a new rule within the context of the game (e.g., let's keep it on the table). **Let's** is typically indicative of joint action.

   The goal of an SPS attempt for joint action is to involve both children in the activity.

2. **Play solitary**

   Attempts to initiate or maintain solitary behaviour (e.g., "I'm bored of this game, I don't want to play anymore" [leaves the joint play activity]; [As target is hovering near initiator] "Leave me alone please.").

3. **Object acquisition/access**
Attempts to **acquire** any object or gain **control** (i.e., take any amount of control away from target) of any object that is in the possession of the target (e.g., "Give me Ernie!"); "Can I turn the wheel now?"; [Without asking, initiator reaches over and moves controller of electronic game target child is playing with]; [initiator picks up and moves remote-controlled car that the target is using]).

The only goal of the attempt is to have or be in control of the object.

4. **Attention**

Attempts to get the attention of the target. Attention may be to self or to another person or thing (e.g., "Hey, look at me!"; "Can you see the plane in the sky?"; "Look at her hair!" [points]).

(If the intent of the SPS attempt is to do something rather than just draw attention, e.g., catch a ball, then code as elicit action).

5. **Information**

Attempts to acquire information about self (i.e., feedback or evaluation), the target, a third person, place, event or thing (e.g.; "Does my hair look ok?"; "What is your name?"; "Is that the researcher?"; "When is Saturday?"; "Why is this thing here?"). Two cases not to be coded as 'information' are: 1) requests for verbal repetition (e.g., "What did you say?") and 2) rhetorical questions (e.g., "You know what? I got a new bike today!"). "Information" does not help the task or joint activity.

6. **Assistance**

Attempts to gain help, comfort or instruction from the target (e.g., "Can you tie my shoe?"; "I want my mom, please call her for me."; "Can you show me how to play 'Go Fish'?\)

If the initiator does not really look to friend for assistance or wait for friend’s help when making a request for assistance do not code as an SPS attempt (e.g., I wonder if they have any tape [does not look at friend but continues looking through boxes by his or her self]).

7. **Prosocial (sharing/assisting)**

Any attempt to share with or give assistance to the target (e.g., "Here, Paul, you can play with the car now." [hands Paul car]; [initiator helps the target get up after falling over chair]). These initiations must be **unsolicited**, therefore, responses to requests by the target are not to be coded. Can be positive or negative. Any attempt that helps the task.
(e.g., I’ll start the gimp for you). Sharing of information with respect to play activity is also considered prosocial, (e.g., You knot, and you can pull it with your teeth too).

A child may use a command as a strategy but the goal is prosocial, (e.g., put it here). {If the focal child is correcting the behaviour of the target child then code the goal as stop action rather than prosocial.}.

8. Stop action

The initiator requests that the target cease doing some activity either inside or outside of the context of play (e.g., "Stop singing, I don't like it!"; "Don't talk to me."); [While playing a board game] "Hold on, stop; it's my turn;" "It's not suppose to be like that;" "wait"; "don't"). Highest order goal. The interaction focuses on what shouldn’t be done. If assuming target child is about to do something, e.g., don’t play ping pong, then code as stop action.

9. Elicit action

The initiator requests that the target physically engage in some activity not codable elsewhere in the other goals outlined (e.g., "Come here please."); "Hold this." [hands target a ball]; "Pardon me; what did you say?"). Very specific action. If friend is off task and the goal is get friend back on task then code as elicit action.

10. Elicit Action – Self

The initiator asks for permission to do something themselves. Only coded in the context of joint action (e.g., “I am going to work on the frog now”; “I am going to move this up”) Focal child does not appear to be implicating both his/herself and target child in SPS attempt code as elicit action – self. If it appear focal child is attempting to include both children in activity code as joint activity.

11. Dramatic

Role-playing, make believe or pretend.

<table>
<thead>
<tr>
<th>Strategies</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Aggressive Physical</td>
</tr>
<tr>
<td>Initiator uses physical aggression in conjunction with any other strategy (e.g., &quot;Stop that!&quot; [initiator hits target]; &quot;I want the ball!&quot; [initiator pushes target away from the ball]).</td>
</tr>
</tbody>
</table>
2. Aggressive Verbal

Initiator uses verbal aggression (but not physical aggression) in conjunction with any other strategy. Verbal aggression is considered to be any personal verbal attacks (e.g., "Give me that you dummy!"; "I don't want to play with ugly people like you!").

3. Incentives (negative or positive)

The initiator uses either negative or positive incentives to gain the target's compliance. Negative incentives are threats of retribution for non-compliance to the request (e.g., "Give me the doll or I'll hit you!"; "Leave me alone or I'll tell!") while positive incentives are bribes (i.e., payment for compliance) (e.g., "I will be your friend if you give me the car."; "Let me play with you and I will give you a piece of gum."). The coder is to specify the type of incentive used by the initiator.

4. Questions

Initiator asks a question (e.g., "How does this work?"); "Why did you laugh?"). This does not include suggestions or imbedded imperatives (see Indirect Requests, below). Questions, may take the form of: How do I do something; How does this work; when do you want to do . . .

5. Indirect Request

Indirect requests are directed declaratives (i.e., declaratives directed at the target specifically, for example, through physical orientation to the target or the use of the target's name) (e.g., [looking at target] "I need some paper."); "Sue, I would give anything to have your beach ball."). suggestions (e.g., "How about we play house?", "Why don't we try to escape?"), interrogatives (e.g., "Can you go away?"; "Would you give me the pan?"), or implied requests (e.g., [looking at target] "Your shoe is untied."); "That's not how you should draw a house.").

Indirect requests take the form of 'polite' language. For example, 'can you pass the salt' is not asking are you physically able to pass me the salt, rather 'can you pass me the salt (an indirect request) is asking: would you 'physically' pass the salt. Indirect requests are asking for help and may be prefaced with: can; wanna; would you; how about; why don't we. Indirect requests are requests for action.

6. Commands/direct requests
Initiator uses the imperative to issue a direct request to get attention (e.g., "Get lost!"); "Give that back!"; "look"; "come on"; "see"; "sit"). It is other, not self oriented. Can be a single verb.

7. Non-verbal (gesture/grabbing/reaching)

Initiator uses a strategy that does not require language (i.e., is physical) to be understood by the target as a request. Generally, there are two types of non-verbal strategies, non-invasive and invasive. For non-invasive strategies, the initiator uses some form of gesture to communicate the request to the target (e.g., [initiators hands a toy to the target without speaking or being asked]; [initiator puts finger to lips in request that the target be quiet.]) or the initiator uses some object as a communication device (e.g., [initiator honks horn of play car in an attempt to make target move]).

Gestures are a part of the attempt that carries communicative intent (e.g., showing/waving/pointing). Invasive strategies, on the other hand, include grabbing and reaching.

Grabbing is considered to be the taking, without permission, of anything in the possession of the target child and is a special case of non-verbal strategies, as it might or might not involve aggression. If the action is simply the taking of an item from the target child and does not involve either physical or verbal aggression, it is simply coded as 'non-verbal: grabbing'. However, if the attempt involves physical aggression or seems to be inherently aggressive in nature (i.e., is not simply the initiator taking something in the targets possession but is of a more offensive nature), the strategy is coded as 'aggressive-physical'. Furthermore, if the grabbing is in conjunction with verbal aggression, then 'aggressive-verbal' is coded. To distinguish between aggressive and non-aggressive grabbing, the coder should use cues such as facial expression, tone of voice and the situational context.

Reaching is the touching or handling of or otherwise physically interfering with anything in the possession of the target child (e.g., [initiator brushes the hair of the doll the target is holding]; [initiator pushes the buttons of a calculator being used by the target]; [initiator puts hand in front of the remote-controlled car that the target is operating]). Reaching is distinct from grabbing in that the initiator does not attempt, at any point, to take the object, or control of the object, away from the target child.

8. Other

Initiator uses a strategy not codable into one of the above categories. The coder should try to specify the strategy on the comment line as is best possible.

[Statement=give reasons, e.g., I'm going to decorate these]
Note: Statement by itself would not be coded as an SPS attempt, since no action or information is being solicited.

9. Unknown

The strategy cannot be determined by coder (e.g., [children whisper and cannot be heard]).

<table>
<thead>
<tr>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Success</td>
</tr>
<tr>
<td>Target complies with request or action, without further involvement by the initiator, within 10 seconds. Looks at (or watches) and verbally acknowledges (includes laughing) focal child.</td>
</tr>
</tbody>
</table>

Special circumstance: if the goal is attention and the target child looks at the focal child but does not say anything, code as success.

2. Partial Success

Target complies partially with request or action, within 10 seconds (e.g., [child gives only one block when ten were requested]. A partial success may also be one in which a compromise of the original goal has been made (e.g., [child states she will share later instead of at the present moment]). If the focal child asks the target child a question, and the target child acknowledges the question, but cannot answer the question, outcome is coded as partial success. Also, acknowledgement of the initiator's SPS attempt without actual compliance to the attempt is also considered a partial success (e.g., I:"Can I have the toy now?", T:"Sure." [Target continues to hold toy]).

If the target child “appears” to respond to the subject/request of the focal child, e.g., just laughs but doesn’t look at the focal child, code as partial success rather than no response.

3. Self-Solution

The initiator achieves the goal by his/herself within 10 seconds after the request has been made (e.g., [target shuts door himself after requesting target to close it]).
4. Rejection
Target actively refuses to comply within 10 seconds.

5. No response
Target does not respond to initiator's request within 10 seconds.

6. Unknown
The outcome of the SPS attempt cannot be determined by the coder. This inability might be due to video or audio difficulties (e.g., [children are out of view of camera]) or as a result of the interference of a third child (e.g., [third child grabs toy from target immediately after initiator has requested it]). As well, the outcome is coded as 'unknown' if the attempt is either a nonrequest (i.e., Hostile or Affectionate initiations), or requires future compliance (i.e., beyond the time of the experimental session; see 'General Rules and Guidelines' section). Finally, if the SPS attempt is imbedded within a string of independent SPS attempts and the target child does not respond to the attempt, again, 'unknown' is coded for the outcome (see 'General Rules and Guidelines' section).

<table>
<thead>
<tr>
<th>Affect</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Positive</td>
</tr>
<tr>
<td>Initiator laughs, smiles, giggles and/or chuckles during SPS attempt. <strong>Do not use voice only.</strong></td>
</tr>
<tr>
<td>2. Negative (externalizing/internalizing)</td>
</tr>
<tr>
<td>Initiator frowns, whines, cries, pouts, knits eyebrows, furrows brow, yells or uses angry tones during SPS attempt. The nature of the negative affect should be specified as being either 'externalizing' (i.e., angry) or 'internalizing' (i.e., sad, anxious, frightened).</td>
</tr>
<tr>
<td>3. Neutral</td>
</tr>
<tr>
<td>Initiator does not display clear signs of either negative or positive affect as defined here.</td>
</tr>
<tr>
<td>4. Unknown</td>
</tr>
<tr>
<td>The affect of the initiator is unknown.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Proximity (To Target)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Touching</td>
</tr>
</tbody>
</table>

Initiator is in direct contact with target during the majority of the SPS attempt. If children are sitting close and it cannot be determined if they are touching then it is coded as “within arms reach”

2. Within Arms Reach
   Initiator is capable of touching the target with one or both hands during the majority of the SPS attempt.

3. Beyond Arms Reach
   Initiator is not able to touch the target with either hand during the majority of the SPS attempt.

4. Unknown
   The proximity of the initiator to the target is unknown during the SPS attempt.

<table>
<thead>
<tr>
<th>Orientation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Toy/Play Object</td>
</tr>
<tr>
<td>Initiator looks predominantly at toy or play object (of concern) during the SPS attempt.</td>
</tr>
<tr>
<td>2. Target Child</td>
</tr>
<tr>
<td>Initiator looks at target child during the SPS attempt.</td>
</tr>
<tr>
<td>Within an SPS attempt the initiator may look at the play object and the target child, for example. In situations where the initiator looks between the play object and the target child, code orientation as target child. So if the initiator turns towards, faces, makes an attempt to move toward the target child during the SPS attempt code as target child. In addition, if the initiator looks at the target child directly following the SPS attempt code orientation as target child.</td>
</tr>
<tr>
<td>3. Other Child</td>
</tr>
<tr>
<td>Initiator looks predominantly at another child during the SPS attempt; coder must specify identity of other child.</td>
</tr>
<tr>
<td>4. Elsewhere</td>
</tr>
<tr>
<td>Initiator looks predominantly elsewhere during SPS attempt.</td>
</tr>
<tr>
<td>5. Unknown</td>
</tr>
<tr>
<td>Orientation of the initiator is unknown during SPS attempt.</td>
</tr>
</tbody>
</table>
When transcribing children's SPS attempts, it is extremely important that everything that each child says is recorded *verbatim*. The coder should be as accurate as possible and record only what the child is actually heard to say. Often, when children mutter or several children are speaking simultaneously, it is very difficult to understand their vocalizations. As well, poor tape quality may result in inaudible speech. Therefore, it might be necessary to review the tape several times.

It is helpful to use contextual cues prior to, during and after the vocalization to determine what each child is saying. If, by this point, the transcriber still cannot determine what has been said, 'INAUD' (i.e., inaudible) should be written in the transcription section of the coding sheet.

It is easier to follow the flow of a conversation if all sounds and pertinent actions made by each child are recorded. Laughter, dramatic noises, coughs, etc. should be transcribed along with the actual speech. Actions and annotations are also to be recorded briefly within square brackets (e.g., [ ]) if they are important to the understanding of the vocalization.

The transcriber should also mark if the child is engaged in private speech by recording an 'S' for 'Self-Speech' beside the vocalization.

Example 1 illustrates the proper way to transcribe a speech sequence:

A: I'll bring mine [a chair] over here. [S].
B: [laughs] This is your pile of markers [hands A some markers].
A: What should I....
B: You have to INAUD.
A: A Tree?
B: [nods head]. Blah!
A: OK. [laughs].
1. Multiple goals and/or multiple strategies
   
   A. Strings of identical goals with identical strategies
      
      If the initiator issues a string of identical requests (i.e., the same request more than once within 10 seconds), without allowing the target child to respond (e.g., "Give me the car; hand it over!"), these requests are considered to be a single SPS attempt.

   B. Strings of identical goals with dissimilar strategies
      
      If the string of requests utilize different strategies (e.g., "Can I have the yo-yo? Give it to me!" [a question followed by a command]), all strategies are recorded and the strategy of the highest power (i.e., target allowed the least freedom to refuse) is marked with an asterisk. The hierarchy for the strongest to weakest strategies has been arbitrarily set as follows:

      1. Physical aggression
      2. Verbal aggression
      3. Invasive non-verbal requests
      4. Commands
      5. Incentives (positive/negative)
      6. Indirect requests / questions
      7. Non-invasive non-verbal requests

   C. Strings of dissimilar goals
      
      Often the initiator will issue a string of separate requests (i.e., a series of distinct requests for different goals) without allowing the target child to respond to each request separately. These multiple requests are to be coded as independent SPS attempts (e.g., "Can I have your green marker? Is it better than mine?" [object acquisition followed by request for information]). However, the target might only respond to one or some of the requests made of him/her (e.g., I:"Do you like my dolly? -- Guess what her name is.", T:"Is her name Sarah?"). In this case, the appropriate outcome is coded for whichever request was responded to and the outcome is coded as 'unknown' for the remaining requests.

      With multiple SPS attempts, the coder must be sure the string of requests are independent. Sometimes, an initiator will use what appears to be two or more separate requests when, in fact, the requests are merely components of a more global request or
goal (e.g., "Come here and catch me! [two 'elicit actions' making up a single goal of 'play joint']"; "You should put the doll there [initiator points at table] and change it." [this is a single elicit action comprised of 'attention' (pointing), and two component 'elicit actions' (putting the doll on the table and pretending to change it.)].

2. Initiations to group versus individuals

In making an SPS attempt, a child might initiate to a single child in particular, several specific children at once, or to the entire group as a general request. These types of initiations are to be differentiated. If the initiation is towards one or more specific children (e.g., "Sue, hand me that book."); "Hey, Billy and Pete, come help me lift this table!"). the ID numbers of all the target children involved are to be recorded. If the request is of a general nature (e.g., "Who wants to play with me?"; "Somebody help me with the window.") the term 'all' is to be recorded on the 'target child(ren)' comment line.

With initiations to more than one target, proximity is coded with respect to the nearest target child and orientation is coded as usual, however, 'target child' is to be specified as being whichever target the initiator is oriented towards.

3. Non-codable requests

A. Clarity of initiation

To record an SPS attempt, the coder must be reasonably confident that the target child is aware that a request has been directed at him/ herself; otherwise, the attempt is again not to be coded (e.g., [the initiator mumbles the request under his/her breath and the target probably does not hear the attempt being made]; [the child states that she wishes she had an orange crayon, but is engaging in private speech]). For group initiations, at least one of the target children must be aware of the SPS attempt for the initiation to be coded.

B. Pseudo-managing

If the initiator requests that the target child engage in some activity that the target child is already engaged in, this is termed pseudo-managing and is not to be coded (e.g., [As the target child is closing the door] "Please close the door"; [as the target child hands a toy voluntarily to the initiator] "Let me play with that.").

C. After the fact initiations

If an SPS attempt is made that is in reference to a prior event (e.g., [target hits initiator] I:"Don't hit me!") it is not to be coded.
D. Plausibility

If a request is not within the capabilities of the target child and/or within the realm of 'acceptable' behaviour, the request is not to be coded (e.g., "Why don't you eat this Barbie doll?"; "I'll do a hand stand if you give me a million dollars.").

E. Requests for future events

Requests for future action (i.e., beyond the time of the free play session) are not to be coded because the outcome cannot be observed (e.g., "Wear a green shirt tomorrow"; "You can call me tonight if you like."). Even if the target child agrees to comply with the request, the attempt is not coded (e.g., I: "When the man comes, tell him we want a snack." T: "Ok, I will"; I: "Will you show me your mom's car after the playtime?", T: "I might."). If however, the request is for an action to take place within the time limit of the play session (but beyond the present moment), the SPS initiation is coded (e.g., "Give me the car when you're done."; [target steps on initiator's drawing] "Don't step there again."). In this case, the goal and the strategy are coded as usual, but the outcome is coded always as 'unknown'.

F. Requests in response to SPS initiations

If a nonfocal (NF) child directs an SPS attempt to the focal (F) child and the focal child responds using another SPS attempt, then the focal's initiation is not to be coded (e.g., NF: "Can I play with you?", F: "Leave me alone!" [F's 'play solitary' SPS attempt is not to be coded because it is a rejection of NF's 'play joint' initiation]; NF: "You're stupid!", F: "I think you're ugly!" [F's 'hostile' SPS attempt was in response to NF's 'hostile' initiation and is not coded]). These responses are not coded because the scheme, as intended, is meant only to measure the number and type of unsolicited SPS attempts by the focal child.

4. Fantasy Requests

Often, children will make SPS attempts while in dramatic play (e.g., [in a gruff voice] "I am King! Tell me where the gold is."); [in a play-mom's voice] "would baby like some dinner?"). These requests fall into the same goal and strategy categories as non-dramatic requests; however, it is important to note that the child is requesting from within the boundaries of the dramatic play by writing 'dramatic' beside the heading 'Goal' on the SPS coding sheet. Indicators that a child is within the dramatic play-frame include the use of a 'play voice' while requesting and/or the use of the target's 'play-name'.
Initiator: CHILD/MOTHER
Coder: 
(circle one)

Tape #: 

Focal Child ID: 
Session: 
Time of Attempt: 

<table>
<thead>
<tr>
<th>Goal</th>
<th>Strategy</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elicit Action/Self</td>
<td>Agg – Physical/Verbal</td>
<td>Success</td>
</tr>
<tr>
<td>Object acquisition/access</td>
<td>Incentives – Pos/Neg</td>
<td>Partial Success</td>
</tr>
<tr>
<td>Joint Action</td>
<td>Questions</td>
<td>Rejection</td>
</tr>
<tr>
<td>Play Solitary</td>
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<td>Self-Solution</td>
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<th>Orientation</th>
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<td>Play Object</td>
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<tr>
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<td>Within Arms Reach</td>
<td>Child/Mother</td>
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Transcript of Attempt (Verbatim):

Initiator: ____________________________________________

Response: ____________________________________________

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Appendix E

Joint Planning Coding Manual

General Instructions

The coding scheme that follows applies to the dyadic regulation of an origami task. Children are asked to choose one model and work on it with the help of the mother. The dyad could choose from a windmill, a jet plane and goldfish. If the first model is completed, the dyad may start a second model.

There are two levels of planning: global and local. These events are distinct from one another and several global and local events can be found in one session. Global planning focuses on the overall task planning and local planning focuses on the planning of an intermediate step.

Within each level of planning, there are 4 target events. These events are to be identified during the mother-child interactions. A description of each target event will be discussed further. After a target event has been identified, the following dimensions must also be coded: responsibility sharing, affective climate, offers of and demands for help from mother and child, maternal emotional support of the child’s performance.

The coders’ task is locate these target events within the flow of the mother-child interactions and assign to each of them a code for each dimension previously mentioned. Begin coding once the experimenter has stopped talking. An event begins when a particular target event (e.g., subgoal definition) is identified. The end of that event is determined either by the actual execution of a particular step OR when a new event is located.

Definitions of Target Events
1. Global Planning

- refers to a group of operations that concern the regulation of activities for the whole task. One observes by the performance at the beginning or during the task. In fact, certain events are observed especially at the beginning of the task: definition of global goal; organization and global strategy choice; role definitions. The global evaluation is observed at the end of the task (evaluation of final goal) but this may also be observed during the unfolding of the task.

1.1 Definition of global goal – it is a verbal definition of the task to be carried out. It concerns WHAT to do in the task, which is the goal.

EX1 M: “Which one would you like to make?”
C: “Let’s make the goldfish.”

EX2 M: “You need to use one piece of paper for this one (goldfish).”

1.2 Organization and global strategy choices – this refers to making the decisions for strategies to use during the course of the activity. It concerns HOW to do the task.

NOTE: If there is only one step that is taken into account, code under local planning (the operations rely on one precise subgoal). For global strategy choices, the total organization or total choice of strategies is important. The task must be considered as a whole, or at least, a significant portion of this must be considered.

EX1: in Parent and Caron (2000):

M: “We are going to start by putting the numbers in order, we are going to put them on the boxes after.” This is a global strategy choice because the mother makes reference to the adopted strategies for carrying out the task, beginning to finish.

EX2: M: “We’ve only to 10 minutes to finish this.”

EX3: M: “Let’s do it step by step.”

1.3 Role Definitions (Division of responsibilities) – the role definition takes place at the BEGINNING of the activity. This includes all the physical and verbal performances that concern the way the responsibilities are divided between the mother and child during the activity.

NOTE: there must be a verbal or physical exchange between the mother and child. For example, the child cannot just grab the paper and start folding. This exchange is not explicit enough. However, if the child says that she will fold and then hands the mother the instructions, this is a role definition.
EX1: The mother places the origami paper in front of the child and then picks up the instructions and begins to read aloud.

EX2: C: “You do step 1 and I’ll do step 2.”

1.4 Global evaluation – this refers to all the physical behaviours and verbal exchanges for evaluating the execution of the task at the end of or during the task. For example, have all the steps been effective to complete the model? Also, the individual performances of the mother or child or both can also be evaluated.

EX1: M: “I think we made a mistake at the beginning.”
C: “Ok. At step one, we folded here and then at step two.....”

2. Local Planning – operations linked to subgoals

2.1 Definition of subgoal – it concerns defining the next specific step to be carried out. In origami, the dyad must figure out how to perform each step so that the corresponding folding is correct and they can move on and complete the model.

EX1: M: “Next, step 3, fold to the edge.”

EX2: The mother finds a moment to define the subgoal – M: “Watch me, it folds over the crease.”

EX3 M: “You have to go from step 8 to 9...what are you going to do?”

EX4: The mother is looking at the instructions with the child, “Do you know what it is telling you to do first?”

EX5: M: “Now what does this mean? (pointing to the instructions)
   C: The child looks at the instructions
   M: “Fold it backwards.”
   C: The child folds the origami.

NOTE: Asking how to get to some point in a step can also be a subgoal definition
The mother and child are looking at the instructions and the mother asks, “There is a line there but how do you do that? How do you make it back into a square?” and the child replies, “Like this,” as he folds the origami. The mother and child are trying to figure out how to perform the step.

2.2 Strategy exchange – this refers to the modification of the adopted strategies at the beginning or during the activity. This can occur verbally or nonverbally. It must be clear that the dyad tried to use the original strategy for that particular step and once that failed, they use an alternative.
EX1: The mother and child have attempted to complete step 6 of the gold fish but their strategies for folding the origami are not working. The mother asks, “What if you folded him up this way instead?” The mother has suggested an alternative strategy to complete the step.

EX2: M: “Take that edge and flip it.”
C: “I can’t do it.”
M: “Ok, then lay it down the way they first had it.”
C: “Ok.” (lays the origami down)

NOTE: If the mother or child does not verbalize a change in strategy, then mark a 3 for “participation” for the partner that initiated the strategy change. On the other hand, if the partner verbalizes the strategy change, mark 4 for “dyadic regulation” in responsibility sharing because the partner initiated the strategy change verbally.

*Strategy exchange* can also consist of the mother correcting the child’s actions.

EX1: M: “No wait, that’s wrong. You have to fold it along the crease.” The mother is explaining how to complete that step using a different strategy than previously used.

EX2: M: “No, no, no. Do it the way you had it. No, no, no. Look, fold it, see this edge?” Again the mother is modifying the child’s strategy for completing the step.

2.3 **Role exchange** – the roles that were established at the beginning of the task have been reversed between the mother and child.

EX1: M: “Let me see it, you are going too slow.” The mother takes the paper from the child.

2.4 **Evaluation and monitoring of the performance** – evaluation of the accomplished progress or performance. In order to determine where the dyad is at for a particular step, the dyad must compare their origami to either the instructions or the completed model.

EX1: C: “Let’s go back to step 2 where we folded it over.”

EX2: The mother holds up the model and compares it to the origami in the child’s hands. The mother states, “You look like that now, right?”

EX3: The child is finishing the step 3 of the windmill and holds it up for the mother to evaluate, “Like this?” The mother replies, “Yes, like a house.”

EX4: The local evaluation may be equally initiated by the mother through feedback to the child, M: “Yes, that’s it, you are doing great.”
CODING SCHEME:

1 - Global goal definition
2 - Role Definition
3 - Organizing and global strategies
4 - Global evaluation
5 - Sub-goal definition
6 - Role exchange
7 - Strategy exchange
8 - Local evaluation

Dimensions

For every target event that is carried out, five dimensions must be coded.

A) Responsibility sharing

Participation of the child

0- The child does not participate. The mother may execute the operation alone, without attempting to implicate (or engage) the child. The mother may also try to engage the child but the child may refuse to participate and may or may not give an explanation.

EX1: The mother executes the operation without the child; without communicating why that is.

EX2: The mother takes control of the activity by removing the paper from the child and folding herself.

1- Attentive observation by the child. The child observes, listens and is attentive to the task, but is satisfied to look. He doesn’t participate actively in the execution of the task, neither physically nor verbally. One perceives, however, a lively interest in the task and an integrated attempt to the activity. This child isn’t passive, disinterested or distracted by another thing.

2- Feedback to the partner. By simple feedback, the child confirms his or her agreement or his or her approval of the decision or the work of the mother. It is not a question of elaborate verbalizations concerning the operations (i.e./ evaluations). Most of the time, it is only one word: OK or yes.

EX1: The mother introduces the subgoal, M: “We are going towards the 2 now.”
C: “OK”.

3- Participation in execution. The child actively participates in the execution of the task. The participation may be physical and/or verbal. The operation may be initiated by
the adult or child. The child doesn’t participate in the dyad regulation; he is happy to execute. The adult and the child may carry out the task through communication. The mother may provide information but the partners may also carry out the task in parallel ways while not communicating.

EX1: The child takes the paper and starts to fold while the mother is looking at the instructions.

EX2: The mother instructs the child, “Fold to that edge.” The child says, “Ok,” and folds the origami. He executes the mother’s command.

4- **Participation in dyad regulation.** *Both mother and child work together and are involved in the decision making process (do more than simply execute).* The participation of the child in the dyad regulation includes the whole of its behaviours of self-supervision and self-correction. All of the child’s behaviours aim at the supervision and correction of the dyad’s activities.

EX1:

M: “Ok, we did step 1. What do you have to do next? (Both mother and child examine the instructions).

C: “I think I do it like this and fold it again.

M: “You flip these up.” (Mother flips up one side of the paper).

C: “Oh ok. I see how you do it.” (He folds over both sides).

**Participation of the mother**

0- **The mother does not participate.** The operation is carried out by the child without the help of the mother.

1- **Non-verbal supervision.** The operation is carried out by the child but the mom watches the child’s activities in non-verbal ways. Non-verbally, she communicates that she’s ready to help the child. She acts attentive to the child’s actions and monitors the child’s performance.

2- **Feedback to the child.** The mother communicates to the child with encouragements by repeating the decision the child is taking or work being carried out. For example, “That’s good”, “Let’s go!”

3- **Participation in the execution.** The mother participates actively in the execution of the task. The mother doesn’t supervise the child and doesn’t monitor the performance. She is happy to execute. She does not monitor the child’s performance but she will carry out a part of the task.

EX1: C: “Where are the scissors?” M: “Hold on, here they are.” (hands scissors to the child).
EX2: M: “Fold there.” The mother is simply issuing a command, there is no regulation of the task.

4- **Dyadic regulation.** Communication is essential. Both mother and child are involved in the decision-making process regarding the completion of the task. The mother communicates the supervision or monitoring of the child. All of the mother’s behaviours aim at the supervision and correction of the dyad’s activities. The mother who participates in the dyadic regulation does more than simply execute the task. At the request of the child or on her own terms, the mother takes part in the monitoring and coordination.

B) **Affective Climate**

The affective climate of the collaboration can be classified within one of five categories. The categories are mutually exclusive. For example, if the mother demonstrates positive affect during a target event, then she would be coded a 1. The mother cannot be coded under any other category for that particular target event.

1- **Positive affect** – explicit demonstrations of mutual pleasure. These demonstrations consist of joyous exclamations, physical contact (partners slap their hands, “High-five!” or give the “thumbs up” sign. This category also includes smiling, laughter, giggling, high-pitched voice and enthusiasm. Either mother or child or both can display positive affect when carrying out the task.

2- **Affectionate** - kissing; hugging; child places head on mother’s shoulder (Kochanska & Askan, 1995).

3- **Neutral affect** – the partners work together and the climate is agreeable but they do not show pleasure carrying out the task.

4- **Disagreement**
   a) Cognitive: the mother and child do not agree on the best way to accomplish the task
   b) Over collaboration: the mother and child do not agree on their respective roles in the task

5- **Negative affect** – the mother or child expresses negative affect either at one another or the task. For example, the child may express frustration towards the mother for intruding while he attempts to fold the origami.

C) **Demands of help (coded for both mother and child)**

0- Does not ask for help
1- Asks for help

C.1) **Offers for help (coded for both mother and child)**

0- Does not offer help
1- Sees partner having difficulty and offers help

D) Maternal Emotional Support

1- Encouragement provided: praise or motivational statements, positive reinforcement (e.g. “Good job”, “You are so smart”, “That’s great”, “Keep going”)

2- Rejection of child’s problem solving attempts: criticism, disapproval, dismissal of child’s efforts (e.g. mother ignores child’s attempt to take control of the task), negative reactions to the child (e.g. “You’re slow”, “That’s wrong”, “Don’t do it like that”)

3- No demonstrations of emotional support
Joint Planning Coding Sheet

Tape # _____  ID # _____  Time: ______

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<th>Participation</th>
<th>Affect</th>
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Task Effectiveness: _____