Attachment Security and the Problem-Solving Behaviors of Mothers and Children

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Attachment security may predict the development of competence by influencing how preschoolers solicit and receive help from their mothers during shared problem solving. Based on attachment and help-seeking literatures, we expected that preschoolers with lower security would request help more quickly and in unnecessary circumstances and express frustration and inability attributions more often than children with more secure attachments. Their mothers were expected to provide direct solutions rather than indirect assistance (e.g., hints). Thirty-six preschoolers (mean age 58 months; 17 boys, 19 girls) and their mothers were observed in manageable and difficult problem-solving tasks. As expected, children with lower security scores made more unnecessary help-seeking bids and inability statements, were more frustrated, and asked for help more quickly; differences were observed on easy and difficult tasks. Maternal behavior, however, did not differ.

The association between attachment security and the development of competence in children is well established. A number of studies have documented how securely attached children, compared with insecurely attached children, develop more competent exploratory initiatives, more successful close relationships with caregivers and peers, and more positive representations of self, relationships, and other people (see reviews by Belsky & Cassidy, 1994; Sroufe, 1996; Thompson, 1998). But what specific processes within the mother-child relationship contribute to these adaptive advantages of securely attached children? How does the sensitivity of parental response combine with the child's attachment-related characteristics to influence the growth of competence? These

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questions are especially pertinent to children in the preschool years, when the development of problem-solving skills, self-understanding, and social competence are advancing rapidly. The goal of this study was to examine the association between the security of attachment and maternal and child behavior during shared problem solving, which is an important context for the growth of child competence during the preschool years.

In infancy, as Bowlby (1969/1982) believed, the caregiver's sensitivity provides the baby with a "secure base" of psychological assurance that enables the infant to explore freely and with confidence in the caregiver's assistance if unexpected difficulty or danger ensues (Ainsworth, Blehar, Waters, & Wall, 1978). As subsequent attachment researchers have shown, exploratory confidence not only contributes to the development of behavioral competence but also instills greater self-efficacy in children as they develop internal representations (or "working models") of themselves as competent and capable, in contrast with the self-representations of less secure children as incapable (Bretherton, 1993; Waters, Kondo-Ikemura, Posada, & Richters, 1991). As a consequence, children with greater security approach problem-solving challenges with greater self-confidence and a sense of efficacy compared with children with a history of attachment insecurity. Crucial to the continued development of behavioral competence is the interaction of the young child's initiatives with the quality of assistance and support offered by the caregiver in the problem-solving challenges they share.

Current views of the growth of intellectual competence in early childhood emphasize, consistent with Vygotskian theory (Vygotsky, 1962, 1978), the importance of shared activity between young children and mature partners (see Maccoby, 1992; Rogoff, 1990; Wertsch, 1985). In this "apprenticeship in thinking" (Rogoff, 1990), young children appropriate from their partners greater understanding and skills through their interaction together. The adult's structuring, or "scaffolding" (Bruner, 1982; Wood, Bruner, & Ross, 1976), of their shared activity in a manner that promotes the development of emergent skills is an important reflection of the partner's sensitivity to the child's readiness for new accomplishment. The adult's support is important also in the context of the child's efforts to solicit assistance when help is truly required and will foster the child's acquisition of new skills after the child's independent problem-solving efforts have proven futile.

Research focused on parent-child problem-solving interactions offers a portrayal of children's help seeking and parents' help giving that suggests that the behavior of each partner is important to the

growth of child competence (see Nelson-Le Gall, 1981; Shell & Eisenberg, 1992). Researchers have shown that children contribute to the growth of independent competence through their solicitation of adult assistance. Children who request only *necessary* help enhance their problem-solving competence by limiting their help seeking only to those instances in which they are unable to independently resolve the problem at hand. This enhances opportunities for learning and skill development (Nelson-Le Gall, 1981, 1987; Newman, 1990). By contrast, children who have high amounts of *unnecessary* help seeking undermine the growth of competence by requesting assistance when challenges remain within their own capabilities. Sometimes this occurs when children request assistance too soon, withdraw from the task, or express self-denigrating inability statements (e.g., "This is too hard for me!") that reflect attributions of incompetence. These solicitations can, in turn, cause adults to provide assistance too soon or to offer aid in which they solve the problem directly for the child rather than offering hints or clues to facilitate the child's own problem solving. This reduces the likelihood that children will be challenged to develop new skills (Shell & Eisenberg, 1992).

Parents also contribute to the child's independent competence through the forms of help they provide. Adults who offer *indirect* assistance provide hints, clues, suggestions, and other collaborative initiatives that encourage the child to remain actively engaged and continue problem-solving efforts. This heightens the probability that the child will continue to try and, in so doing, learn new problem-solving strategies and acquire enhanced feelings of self-efficacy as a consequence. By contrast, when adults provide *direct* assistance, they take responsibility for solving the problem by carrying out the solution or showing the child how to do so. This reduces opportunities for the child to acquire new skills or understanding, and because direct forms of help giving are more intrusive, they can undermine perceptions of self-efficacy and engender feelings of incompetence in help recipients (Shell & Eisenberg, 1992, 1996).

This portrayal of parental and child contributions to problem-solving competence is in accord with prior findings from attachment research. Consistent with Slade's (1987) conclusion that "secure dyads 'work' better" together, researchers have consistently shown that dyads with a secure attachment (as assessed in the Strange Situation) collaborate more effectively and with less discord than dyads with an insecure attachment history (e.g., Frankel & Bates, 1990; Matas, Arend, & Sroufe, 1978). More secure preschoolers (assessed via the Attachment Q-sort, or AQS) also exhibit greater reciprocity and more cognitively

sophisticated modes of information exchange during problem-solving tasks than do less secure dyads. When interacting with their mothers in a joint problem-solving task, more secure children also show more task-relevant behavior and are more likely to use metacognitive strategies than are less secure children (Moss, Gosselin, Parent, Rousseau, & Dumont, 1997; Moss, Parent, Gosselin, & Dumont, 1993).

A well-known study by Matas et al. (1978) provides more detail about the interactive contributions of mother and child in secure and insecure attachments. Mothers of children previously identified as secure in the Strange Situation were found to be more attentive to their children's needs and to provide higher quality assistance in problem-solving interactions than were the mothers of insecurely attached children. Similar findings were obtained in a replication study by Fagot, Gauvain, and Kavanagh (1996). High ratings on the "quality of assistance" measure included maternal behaviors such as explaining the relationship between problem-solving steps, providing clear hints and clues, and giving other indications of indirect help giving. However, low ratings on this measure may have included maternal disengagement from the task (i.e., little assistance) as well as direct, intrusive help giving, making it difficult to determine if mothers of insecurely attached children were more direct in their helping or merely less involved in their children's problem-solving efforts (see also Fagot et al.).

In the Matas et al. (1978) study, securely attached children were more enthusiastic, cooperative, and persistent than were children with insecure attachments, although it was unclear whether their solicitations for adult assistance could be characterized as necessary or unnecessary. Because mothers were permitted to provide any assistance to their children that they thought was necessary, it is not clear whether secure children were more discriminating in their help-seeking behavior than were insecure children. Further attachment research has shown that, compared with insecurely attached children, children with secure attachments in the Strange Situation are less likely to solicit help from adults in their preschool classrooms, suggesting that secure children are less prone to unnecessary help seeking (Sroufe, Fox, & Pancake, 1983; Turner, 1991). However, these conclusions are based either on teacher ratings or on a limited analysis of the nature of children's help-seeking bids, making it difficult to distinguish necessary from unnecessary solicitations. Thus, further study of children's behavior during problem-solving interactions is warranted.

Taken together, the research literatures on parent-child problem-solving interactions and parent-child attachment each contribute to the expectation that mothers and children should behave very differ-

ently in their shared problem-solving activity based on the security of their relationship, but further empirical study is needed. This investigation was designed to examine the relation between attachment security and maternal and child behavior in problem-solving tasks. We expected that mother-child dyads with less secure attachments would be characterized by the child's greater use of unnecessary forms of help seeking, a tendency to ask for help sooner, and greater expression of inability statements reflecting diminished attributions of competence compared with more secure children. We also anticipated that less secure children would display greater negative emotion and frustration in problem-solving tasks than would more secure children. Moreover, we expected that the mothers of less secure children would also provide greater amounts of direct, rather than indirect, assistance when responding to their children's requests.

Attachment theorists believe that the influence of attachment security is most apparent when children are under stress and are therefore most reliant on the support of the caregiver, and assessments of attachment security (including the Strange Situation and the Attachment Q-sort) take this into account (Ainsworth et al., 1978; Cassidy, 1994; Thompson, 1998). Consequently, our research design included observations of mother-child interaction during problem-solving tasks that were either manageable or difficult for the child. We anticipated that under challenging conditions, children with less secure attachments would be even more likely to ask for help unnecessarily, use inability attributions, express frustration, and give up quickly (and their mothers would offer more direct assistance), and thus differences between dyads with more or less secure attachments would be accentuated during the difficult task. This expectation was tentative, however, in light of the limited number of prior studies in this area, none of which has systematically varied task difficulty as we have.

Consistent with considerable attachment research, we assessed contemporaneous associations between attachment and problem-solving behavior in preschoolers rather than predicting later competence from infant Strange Situation classifications. This is because during the preschool years, many features of intellectual, social, and self-regulatory competence begin to flourish and because contemporaneous rather than predictive associations with attachment security tend to be strongest and clearest in prior research (Thompson, 1999, 2000). Consequently, our measure of attachment security was the Attachment Q-sort (Waters & Deane, 1985), a well-validated observational instrument assessing secure-base behavior that is appropriate for children from the ages of 2 to 5 (see review by Thompson, 1998).

Method

Participants

Thirty-six children and their mothers were recruited from local day care centers and asked to participate in a study of children's problem-solving behavior. Children ranged in age from 49 to 65 months, with a mean age of 57.7 months (SD = 4.7). Seventeen of the children were male, and 95% were White. The latter is consistent with the demographic characteristics of the recruitment area. Mothers ranged in age from 26 to 50 years, with an average age of 33.5 years (SD = 4.5). The majority of mothers were married (76%), White (97%), and employed outside the home (93%).

Materials

In order to capture children's interest and create a task representative of common problem-solving situations, we used four board-style jigsaw puzzles as the problem-solving tasks. Two of the puzzles were chosen to fall within the children's general skill level and were used exclusively in the manageable task condition. The other two puzzles were selected to be far beyond the children's abilities and comprised the difficult task condition. In each condition, children chose one of two possible puzzles to complete.

Manageable tasks. In the first condition both puzzles were colorfully painted, wooden block puzzles with large, easy-to-handle pieces. To ensure that the puzzles were solvable, the outline of each piece was clearly drawn on the base of each puzzle board, pieces were uniquely shaped, and the same color was used to denote pieces of the same figure (e.g., all dinosaur pieces were red). Pilot testing with 4- to 5-year-old children indicated that children within this age range were capable of completing both puzzle options with minimal difficulty. Although pilot children occasionally hesitated with piece placement, given time, they were able to resolve their difficulties independently through the use of trial and error.

Difficult tasks. Two 35-piece "see inside" board puzzles were used in the difficult task condition. These puzzles required the child to create an image that was different from the picture shown on the puzzle base. For example, one puzzle choice depicted an image of an airplane parked at the airport terminal when completed, but the puzzle base showed what the inside of the plane and terminal looked liked. Both puzzles were designed for use with children over the age of 8; none of the children in the pilot or test groups was able to complete the chosen puzzle within the 6 minutes set aside for the task.

Procedure

Assessment of problem-solving behavior. Following procedures similar to those designed by Matas and colleagues (1978), mother-child pairs were invited into the lab and observed during both the manageable and difficult problem-solving tasks. All children were presented with the manageable task first. With the exception of puzzle difficulty and session length, procedures were identical across task conditions.

At the beginning of each laboratory session, mothers were told that the researcher was interested in learning about the strategies children use to solve problems. The researcher explained that the children would be asked to work on two jigsaw puzzles for approximately 6 minutes each while the researcher observed their problem-solving behavior from another room. In order to assess how and when children decide to seek help, mothers were instructed to let their children work independently. However, if a request for assistance was made, mothers were given permission to provide their children with whatever assistance they felt was necessary. To keep mothers from spontaneously offering assistance, mothers were seated a few feet away from the children's table and given a clipboard of papers to complete. Instructions were repeated at the beginning of each task.

Once mothers were seated, the children were asked to choose between the two puzzle options available for that task and were subsequently presented with the appropriate puzzle in its unsolved form. The researcher then informed the children that she would be leaving the room for a few minutes and asked the children to try to put the puzzle together during her absence. Before leaving the room, the researcher advised the children of two things they could do if they got stuck or had a hard time putting the puzzle back together. These options included (a) using a picture of the completed puzzle that the researcher hung on a nearby wall, or (b) asking the mother for help. To control for possible order effects, the relative position of these options within the instructions was counterbalanced across both children and tasks. The researcher then exited the room and did not return until the children had completed the manageable task ($M = 277.7$ seconds, $SD = 102.9$, range 67 to 479) or 6 minutes had passed (for the difficult task).

In order to ensure that all children left the lab feeling positive about themselves and the experiment, the researcher praised each child for doing excellent work, regardless of actual performance, immediately after each task session. In addition, at the end of the difficult task, the researcher informed both the mothers and children that the selected puzzle was intended for much older children and that the children had done exceedingly well for someone their age.

Assessment of attachment. Two to 4 weeks after the dyads were seen in the laboratory, the principal investigator visited each of the mothers at home and assisted them in completing the 90-item version of the Attachment Q-sort (Waters & Deane, 1985). Teti and McGourty (1996) have shown that mothers produce sorts similar to those of trained observers when mothers are given the AQS items in advance, are provided with clear instructions, and are supervised during the sorting process. In accordance with these guidelines, mothers were given a written copy of all 90 AQS items prior to leaving the laboratory and were instructed to review the list carefully during the weeks preceding the home visit. During the home visit, the investigator guided each mother through the sorting process and recorded her responses. Once completed, mothers' sorts were correlated with the criterion sort for security provided by Waters and Deane (1985) in order to determine each child's security score. Possible scores ranged from −1 to 1, with higher scores indicating greater security.

Measures of problem-solving behavior. Videotapes of each laboratory session were later coded by individuals blind to the dyad's attachment status for each of the following categories of behavior: child affect, help seeking, inability statements, and maternal help giving. Separate scores were calculated for each measure in both tasks.

Child affect. Positive and negative affect scores were separately calculated for each task by dividing the total number of times the child verbally or physically expressed positive or negative emotion by the total number of minutes elapsed during that task session. These ratios were used in subsequent analyses. Examples of behaviors coded as positive affect include smiling, laughing, and statements of pleasure (e.g., "this is fun"); examples of behaviors coded as negative affect include frowning, frustration, whining, complaining, and stomping.

Help seeking. In order to assess differences in the overall quantity, quality, and timing of children's help-seeking behavior, three separate measures of children's help seeking were derived from the videotapes for each task condition. *Total help seeking* was determined for all children by dividing the total number of direct, verbal requests for maternal assistance (e.g., "Mommy, can you help me?", "Where does this piece go?") by the total number of minutes elapsed during the task session. This ratio was used in subsequent analyses. The percentage of *unnecessary help-seeking* requests was assessed by dividing the total number of help-seeking bids classified as unnecessary by the total number of help-seeking bids made during each session. In order to be classified as an unnecessary bid, a help-seeking request either had to be made before the child had attempted to place a piece on his or her own or it had to be immediately followed by a successful, independent reso-

lution. In other words, if a child asked for help and then managed to figure out the proper solution prior to maternal assistance, the help-seeking bid was classified as unnecessary. To discriminate children who chose not to seek assistance during a particular task from children who solicited assistance but did so only when necessary (both of whom would receive an unnecessary-help-seeking score of 0), unnecessary-help-seeking scores were calculated only for those children who made at least one help-seeking request during a given task session ($n = 25$ for the manageable task, $n = 26$ for the difficult task). Children who did not make any help-seeking bids were assigned a missing values code for that task. Finally, *help-seeking latency* (i.e., the number of seconds that elapsed before the child's first help-seeking request) was recorded for all help-seeking children during each task. Scores on this variable ranged from 8 to 274 seconds in the manageable task and 5 to 336 seconds in the difficult task. Children who did not seek assistance during a given task were assigned a missing values code.

Inability statements. Verbalizations in which children indicated that they were unable or unwilling to continue with the assigned task based on their negative self-evaluations but did not specifically request maternal assistance were coded as *inability statements.* Examples of verbalizations classified as inability statements include "I don't know how to do this," "This is too hard for me," and "I am never gonna get this by myself." These were corrected for session duration, and the resulting ratios were included in the analyses.

Help giving. Differences in the overall quantity and quality of mothers' help-giving behavior were assessed through the creation of two help-giving variables. First, *total help giving* was measured for all mothers by computing the total number of both indirect and direct provisions of maternal assistance. Helping offers categorized as indirect forms of assistance included (a) offering hints or strategies (e.g., suggesting children match pieces by color and/or shape), (b) referring children to the picture and explaining its use, and (c) explaining the concept of the "see inside" puzzle in the difficult task. Direct forms of assistance were defined as incidents in which mothers verbally or physically carried out a portion of the solution. Examples of direct assistance included (a) physically placing a piece in its proper location, (b) pointing to where a specific piece went, and (c) verbally linking a particular piece with a particular place (e.g., "That piece with the round edge goes in that corner over there."). In turn, the overall quality of mothers' help-giving efforts was captured by computing the percentage of mothers' helping responses coded as *direct help.* To create the direct-help measure, the total number of direct-help-giving bids was divided by the total number of help-giving bids in each task, and this

ratio was used in subsequent analyses. To avoid confounding mothers who did not provide assistance with mothers who provided only indirect forms of assistance (both of whom would receive a direct-help score of 0), this variable was only computed for those mothers who provided some form of assistance ($n = 22$ for the manageable task, $n = 29$ for the difficult task); all other mothers were assigned a missing values code.

Interrater reliability. To assess interrater reliability, 15 of the 36 videotapes were independently coded by two members of the research team, and the frequency counts (or time durations) of coded events were compared in relation to the totals observed by both raters. With respect to the latency measure, raters were deemed to be in agreement when their independent judgments of time duration were within 2 seconds. Overall percentage of agreement was adequate, with scores ranging from a low of 79% for mother direct help in the difficult task to a high of 97% for inability statements in the manageable task. Disagreements were resolved through discussion.

Results

Security scores ranged from a low of .10 to a high of .70 with a mean score of .43 ($SD = 0.15$). Sample size, means, standard deviations, and ranges for each of the dependent variables can be found in Table 1. Although unnecessary help seeking tended to decrease from the manageable to the difficult task as task demands increased, a cross-task comparison using paired t test indicated that the change did not reach statistical significance, $t(24) = 0.64$, $p > .05$. Help-seeking latency did vary significantly across tasks, with children seeking help sooner in the difficult task condition, $t(24) = 5.49$, $p < .01$. Mothers also significantly increased the rate of their helping behavior between the two tasks, $t(35) = -3.4$, $p < .002$; however, the proportion of direct assistance they provided did not change significantly between tasks, $t(21) = -0.69$, $p > .05$. Regardless of task difficulty, mothers offered more indirect than direct forms of assistance; on average, 20% or less of mothers' helping behavior was classified as direct. The mean correlation between comparable child and maternal measures across the two tasks was .34, with a range of .72 (inability statements) to .15 (help-seeking latency).

Bivariate Correlations

Tables 2 and 3 display the intercorrelations between key variables for the manageable task and the difficult task, respectively. Examination of the associations between demographic variables reveals two significant associations: girls received higher security scores than boys,

Table 1. Sample Size, Means, Standard Deviations, and Ranges for Dependent Variables

Variable	*Mean*	*Standard deviation*	*Range*
Positive affect			
Manageable task (36)	0.92	0.63	0–2.43
Difficult task (36)	0.79	0.55	0–2.17
Negative affect			
Manageable task (36)	0.46	0.69	0–3.40
Difficult task (36)	0.56	0.75	0–3.00
Total help seeking			
Manageable task (36)	0.50	0.53	0–1.84
Difficult task (36)	0.56	0.65	0–3.00
Unnecessary help seeking (%)			
Manageable task (25)	71.34	30.29	0–100
Difficult task (26)	63.96	31.94	0–100
Help seeking latency			
Manageable task (25)	101.68	84.45	8–274
Difficult task (26)	72.96	86.89	5–336
Inability statements			
Manageable task (36)	0.47	0.66	0–3.02
Difficult task (36)	0.53	0.66	0–3.00
Total help giving			
Manageable task (36)	6.00	8.18	0–32
Difficult task (36)	11.08	10.61	0–32
Direct help (%)			
Manageable task (22)	15.45	15.22	0–50
Difficult task (29)	18.67	21.18	0–80

*Note: N*s for each task are presented in parentheses following each variable.

and older mothers had older children. In terms of associations with the dependent variables, child age was negatively correlated with total help giving and was positively correlated with unnecessary help seeking in the manageable task. Child gender was unrelated to the dependent variables in both tasks, and mother age was negatively associated with direct help giving in the difficult task.

In both tasks, child negative affect and inability statements were positively correlated, and unnecessary help seeking and the latency to seek help were negatively correlated. Children who were emotionally negative were more likely to make comments about their inability, and

Table 2. Intercorrelations Between Variables for Manageable Task Condition

	2	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*
1. Child age	−.14	.39*	.23	−.32+	.19	−.09	.48*	−.22	−.26	−.34*	−.13
2. Child gender		.07	.39*	−.09	−.10	−.05	−.32	.10	−.08	.05	.07
3. Mother age			.29+	−.29+	−.05	−.28+	.05	.05	−.24	−.12	−.21
4. AQS				−.48**	.28+	−.17	−.37+	.46*	−.44**	−.17	−.16
5. Child negative affect					−.29+	.44**	−.09	−.02	.78**	.47**	.28
6. Child positive affect						.10	.32	−.47*	−.03	−.11	.34
7. Total help seeking							.13	−.46*	.46**	.55**	.43*
8. Unnecessary help seeking (%)[a]								−.77**	.30	.17	−.02
9. Help-seeking latency[a]									−.39+	−.08	.17
10. Inability statements										.07	.29
11. Total help giving											.50**
12. Direct help (%)[b]											

Note: Except as noted, $N = 36$.
$^{+}p < .10$. $^{*}p < .05$. $^{**}p < .01$.
[a] $n = 25$. [b] $n = 22$.

Table 3. Intercorrelations Between Variables for Difficult Task Condition

	5	*6*	*7*	*8*	*9*	*10*	*11*	*12*
1. Child age	−.15	.20	−.30^{+}	.25	−.13	−.27	−.31*	−.10
2. Child gender	−.20	.08	.07	.11	.09	−.11	.27	.25
3. Mother age	−.29^{+}	.10	−.25	−.05	.22	−.17	−.18	−.42*
4. AQS	−.53**	.20	.03	−.30	.14	−.39*	.00	−.10
5. Child neg affect		−.13	.15	.20	.04	.59**	−.09	.02
6. Child pos affect			.48**	.15	−.18	.13	.43**	−.01
7. Total help seeking				.04	−.27	.19	.64**	.43*
8. Unnecessary help seeking (%)[a]					−.50**	.15	−.02	.29
9. Help-seeking latency[a]						−.09	−.29	−.27
10. Inability statements							.07	−.25
11. Total help giving								.69**
12. Direct help (%)[b]								

Note: Except as noted, $N = 36$.
$^{+}p < .10$. $^{*}p < .05$. $^{**}p < .01$.
[a] $n = 26$. [b] $n = 29$.

children who asked for more unnecessary help tended to request aid sooner. There was also a positive association, in each task, between total maternal help giving and the proportion of direct help provided. That is, mothers who tended to give more assistance also provided more direct problem-solving solutions. Finally, there was a strong positive relation between total help seeking by children and total help giving and proportion of direct help by mothers in both tasks; however, no significant associations emerged between unnecessary help seeking and total help giving or direct help in either task.

Correlational associations with child affect across the two tasks were somewhat unexpected, however. In the manageable task, children who expressed more negative affect were more likely to engage in high rates of help seeking and to receive greater amounts of maternal help, while the rate of positive affective displays was not significantly related to total help seeking or help giving. In the difficult task, this pattern of relations was reversed. Children who expressed more positive affect were more likely to seek and receive maternal assistance, while the rate of negative affect was not significantly related to either total help seeking or help giving.

Multiple Regression Analyses

Hierarchical multiple regression analyses were used to assess the relationship between attachment security, affect, help seeking, inability statements, and help-giving behavior. In order to statistically control for possible main effects of age and gender on dyadic behavior, child age, child gender, and maternal age were entered in the first step of each of the analyses, followed by attachment security (AQS) on step 2. To control for possible child-driven differences in the quantity of mothers' help giving (in each task, mothers were instructed to provide assistance only when asked to do so by their child), children's total help seeking was also entered as a control variable for those analyses in which mothers' total help giving was the dependent variable.

Preliminary analyses indicated that neither child gender nor maternal age significantly contributed to any of the models tested for child behavior. These variables were therefore dropped from the analyses involving child affect, total help seeking, unnecessary help seeking, help-seeking latency, and inability statements for both tasks. These variables were retained, however, for the analyses of maternal behavior.

Finally, several of the dependent variables of interest had a positive skew greater than 1.0, violating one of the mathematical assumptions of multiple regression. Thus, before conducting the multiple regression analyses, we reduced the skew of these variables using a

square root transformation procedure. Transformed variables included negative affect, inability statements and total help giving in both tasks, and total help seeking, help-seeking latency, and direct help giving in the difficult task. Results of the significant multiple regressions reported in the following discussion can be found in Table 4.

Child affect. None of the regression models accounted for a significant proportion of the variance observed in positive affect for either task. The 2-step model in both tasks, however, significantly predicted negative affect. In the manageable task, a marginal main effect for child age was found in step 1. This effect was no longer significant in step 2, where only a main effect for attachment security was found. In the difficult task, only attachment security contributed to the final model. As expected, children with higher security scores were significantly less likely than other children to display negative affect in each task.

Total help seeking. Children's total help-seeking behavior was unrelated to both child age and attachment security for each task.

Unnecessary help seeking. In the manageable task, the child age–only model significantly predicted unnecessary help seeking. Inspection of the resulting beta weights indicated that older children were significantly more likely than younger children to have their explicit help-seeking bids classified as unnecessary. Adding attachment security to the model in step 2 significantly increased the amount of explained variance. As expected, children with lower security scores were more likely to have a greater percentage of their help-seeking bids classified as unnecessary.

In the difficult task condition, the age-only model did not account for a significant proportion of the variance observed in children's unnecessary help seeking. Adding attachment security to the model on step 2 did, however, produce a marginally significant two-predictor model. Consistent with our hypotheses, children with lower security scores were marginally more likely to have a greater percentage of their explicit help-seeking bids deemed unnecessary.

Help-seeking latency. As predicted, attachment security was significantly related to help-seeking latency in the manageable task. Although the inclusion of child age in step 1 of the analyses did not produce a significant model, the addition of attachment security on step 2 significantly increased the amount of explained variance in help-seeking latency. Consistent with our expectations, children with higher security scores waited for a longer period of time before explicitly seeking maternal assistance than did children with lower security scores. Neither of the models significantly predicted help-seeking latency in the difficult task condition, however.

Table 4. Significant Hierarchical Multiple Regressions Predicting Affect, Help Seeking, Inability Statements, and Help-Giving Behaviors in Mother-Child Dyads

	Beta weights	
Predictors	*Model 1*	*Model 2*
Child negative affect MA (36)		
Step 1. child age	−.31^{+}	−.22
Step 2. AQS		−.43**
R^2	.10^{+}	.27**
Child negative affect DI (36)		
Step 1. child age	−.15	−.03
Step 2. AQS		−.51**
R^2	.02	.28**
Unnecessary help seeking MA (25)		
Step 1. child age	.48*	.51**
Step 2. AQS		−.41*
R^2	.23*	.40**
Unnecessary help seeking DI (26)		
Step 1. child age	.25	.32
Step 2. AQS		−.36^{+}
R^2	.06	.19^{+}
Help-seeking latency MA (25)		
Step 1. child age	−.22	−.26
Step 2. AQS		.48**
R^2	.05	.28*
Inability statements MA (36)		
Step 1. child age	−.26	−.17
Step 2. AQS		−.40*
R^2	.07	.22*
Inability statements DI (36)		
Step 1. child age	−.27	−.19
Step 2. AQS		−.35*
R^2	.07	.19*
Total help giving MA (36)		
Step 1. child age	−.25*	−.26*
child gender	−.01	−.01
maternal age	.30*	.29*
help seeking	.79***	.79***
Step 2. AQS		.01
R^2	.64***	.64***
Total help giving DI (36)		
Step 1. child age	−.13	−.11
child gender	.26^{+}	.30^{+}
maternal age	−.04	−.02
help seeking	.48**	.49**
Step 2. AQS		−.08
R^2	.36**	.37**

Note: MA refers to the manageable task; DI refers to the difficult task. Values in parentheses after the variable name are the *n* for each analysis.
$^{+}p < .10$. $^{*}p < .05$. $^{**}p < .01$. $^{***}p < .001$.

Inability statements. Children's tendency to make inability statements was significantly predicted by the two-predictor model of child age and attachment security in both tasks. As expected, children with lower security scores were more likely to make statements highlighting their inability to complete the task than were children with higher security scores. Child age did not contribute to either of the final models.

Total help giving. Child age, maternal age, and children's total help seeking were each significantly related to mothers' total help giving in the manageable task. Children who sought help more often and younger children were likely to receive greater amounts of maternal assistance. In addition, older mothers were more likely to provide help. Child gender did not contribute to either model, nor did entering attachment security in step 2 enhance the overall predictive utility of the final model. In the difficult task, neither child age nor maternal age accounted for a significant proportion of the variance in mothers' help giving. Child gender was marginally related to mothers' help-giving behavior, with girls somewhat more likely than boys to receive greater amounts of maternal assistance. Moreover, a significant positive relation was found between children's total help seeking and mothers' help giving in both steps. Attachment security did not contribute significantly to the final model.

Direct help giving. Contrary to expectations, neither of the models accounted for a significant proportion of the variance observed in mother's direct help giving for either task.

Discussion

Understanding how children and their mothers share problem-solving activity in the context of security in their attachment relationships can contribute substantially to appreciating how attachment influences the growth of behavioral competence in the preschool years. The findings of this study are consistent with prior research and with the predictions of attachment theory in documenting significant differences in the behaviors of mother-child dyads varying in attachment security. Consistent with Vygotskian theory and with the results of research into parent-child problem-solving interactions, we found that mothers and children with lower security scores acted in ways that were less likely to enhance the child's problem-solving competence compared with the behavior of dyads with higher security scores.

Consistent with previous research, results from this study indicate that children with lower security scores were significantly more likely

to display frustration, anger, and/or unhappiness during problem-solving interactions than were children with higher security scores. Attachment security was unrelated, however, to the frequency of children's positive affective expressions. The latter is somewhat surprising in light of prior research indicating that secure children tend to approach problem-solving situations with greater enthusiasm, and it is possible that our measure of positive affect was not sufficiently sensitive to this feature of children's task-related motivation and interest. Given that the difficult problem-solving tasks were specifically selected to frustrate the children's abilities, however, these findings suggest that children with higher security scores may also be better at managing the negative emotions created by such situations. This conclusion is consistent with prior research on attachment security and emotion regulation in young children (e.g., Cassidy, 1994; Thompson, 1994).

Also consistent with past research (e.g., Sroufe et al., 1983), there were no differences in children's total amount of help seeking by attachment security. However, when help-seeking *quality* rather than *quantity* was considered, there were differences according to attachment security in the type of requests that children made. Children with lower security scores tended to make more unnecessary requests for help, asked for help more quickly, and made more negative self-evaluative inability attributions when compared with children with higher security scores.

Attachment security was an important predictor of children's unnecessary help seeking in both tasks. In the manageable task, children with lower security scores had a higher percentage of their help-seeking bids classified as unnecessary. The same pattern was observed in the difficult task, albeit at a marginal level of significance. Thus consistent with our hypotheses, children with lower security scores were more likely to ask their mothers for help before attempting to resolve a problem on their own and were more likely to seek assistance when task demands were within their abilities. Children with higher security scores, on the other hand, tended to seek maternal assistance only when needed.

These results indicate that lower security scores are associated with less competent forms of help seeking, and are consistent with prior studies indicating that an insecure attachment may be a liability to the problem-solving interactions of young children. According to the helping literature (Nelson-Le Gall, 1981, 1987) unnecessary help seeking undermines the growth of competence by reducing opportunities for learning, skill development, and self-confidence. In choosing to disengage from the problem-solving process before exhausting their own resources, children limit their ability to practice and perfect previously acquired competencies. Moreover, as Shell and Eisenberg (1992) sug-

gest, children who are less engaged in the problem-solving process and who make little effort to resolve challenges on their own may be viewed by others as low in ability and may subsequently receive more direct forms of assistance. As a result, the higher rates of unnecessary help seeking observed in children with lower security scores may reflect one way that attachment insecurity undermines adaptive functioning.

The same is true of children's use of inability statements. Children with lower security scores were more likely to verbally disparage their own skills in the mother's presence than were children with higher security scores. To the extent that these statements convey dependency or low competence to potential helpers, these inability attributions heighten the probability that children with lower security scores will receive direct assistance from their mothers and other helpers, further undermining the growth of independent competence.

A third characteristic of their help seeking is that children with lower security scores asked for help more quickly than did secure children during the manageable task. This suggests their readiness to disengage more readily from problem-solving challenges, even those that they might be capable of mastering with additional effort, consistent with our expectations.

Although we had also anticipated that children who vary in attachment security would respond most differently during the difficult task because of how stress increments a young child's reliance on a caregiver, the results of this study did not confirm this expectation. Instead, children with lower security scores gave up more quickly in the manageable task, but not the difficult one, and attachment was a stronger predictor of most child behaviors for the manageable task. Although assessments of attachment security commonly rely on moderately stressful circumstances to accentuate behavioral differences between children, researchers have also recognized that stress is experienced in individual ways (Cassidy, 1994; Thompson, 1994, 1998). It is possible that because of their inability attributions, children with less secure attachments experienced even the manageable task as a stressful challenge, and thus gave up more easily compared with children with more secure attachment relationships. By contrast, both confident and nonconfident problem solvers were likely to recognize the difficulty of the second task and request maternal assistance. This suggests that future efforts to manipulate task difficulty must take into account how children who vary in attachment security differentially interpret problem-solving challenges, and it suggests that the manageable task condition was a more optimal one for studying differences between more secure and less secure children.

Finally, this study also expanded on previous research by exploring the relationship between attachment security and mothers' tendency to engage in direct forms of help giving. Contrary to expectations, however, the overall quality of maternal help giving did not vary with attachment security in either task. As a general rule, only a small percentage of mothers' helping offers was categorized as direct. On the whole, mothers were much more likely to provide indirect forms of assistance, regardless of the child's age, gender, or attachment status. The failure to find attachment-related differences may have occurred because of the constraints on maternal behavior: mothers were asked to allow the child to work independently and not to intervene unless requested, and they sought to complete several questionnaires while their child was working. Thus the differences in help giving that can emerge in everyday circumstances may have been more limited in this experimental context, and we urge further study of mother-child problem-solving interactions in less guided contexts to further elucidate maternal contributions to child competency.

These findings, while important, are limited in several ways. Experimental limitations on maternal behavior is one such constraint. The sample size was somewhat small and may have lacked power for detecting statistically small effect sizes. Furthermore, missing data on several crucial variables, arising from our effort to ensure that findings would be interpretively unconfounded, further reduced the power of these statistical tests. Therefore, we believe that these findings warrant follow-up investigation with larger, more representative sample sizes sufficient to detect moderately significant effects. Moreover, the range of security scores of this sample was somewhat limited, with no children obtaining negative scores. Although this is not uncommon for a nonclinical, middle-class sample, it is possible that the findings would have been stronger if the sample had included a broader range of security scores. Finally, the contemporaneous assessment of attachment security and problem-solving behaviors constrains strong causal interpretations of these research findings.

The results of this study suggest, however, that attachment security may be associated with the way that children approach intellectual challenges in the context of their shared activity with the mother. In particular, lower attachment security may limit the growth of independent competence in children by predisposing them to dependent modes of problem solving (e.g., unnecessary help seeking, inability statements, expressions of frustration) in their mothers' presence. Likewise, the shorter help-seeking latencies of children with lower security scores

under manageable task conditions suggest that insecure children prefer to turn to their mothers for assistance and may therefore have less opportunity to practice and expand previously acquired skills. Given the potential impact of these help-seeking tendencies on the development of children's competencies and the perceptions and actions of potential helpers, future research should also examine how attachment security influences the quality of children's helping interactions with other important adult figures (e.g., fathers, classroom teachers, child care providers) and in new contexts.

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