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Preschool children's mental representations of attachment: antecedents in their secure base behaviors and maternal attachment scripts

Maria Wong^a, Kelly K. Bost^a, Nana Shin^b, Manuela Veríssimo^c, Joana Maia^c, Ligia Monteiro^c, Filipa Silva^c, Gabrielle Coppola^d, Alessandro Costantini^e and Brian E. Vaughn^{b*}

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This study examined the antecedents of preschool age children's mental representations of attachment, assessed using the Attachment Story Completion Task (ASCT). Antecedent predictors were maternal attachment scripts, assessed using the Attachment Script Assessment (ASA), and the child's secure base behaviors, assessed using the Attachment Q-Set (AQS). Participants were 121 mothers and their preschool children assessed in three samples (Portuguese sample, $n = 31$; US Midwestern sample, $n = 38$; US Southeastern sample, $n = 52$). AQS and ASA assessments were completed approximately 1.5 years before the ASCT data were collected. No cross-sample contrasts for the attachment variables were significant. Correlations and structural equation modeling (SEM) indicated that the three attachment measures were significantly associated and that both maternal secure base script knowledge and children's secure base behaviors (AQS) were uniquely and significantly associated with children's mental representations of attachment (ASCT). A test of the indirect effect between maternal scripts and child representations through children's secure base behaviors was not significant.

Keywords: attachment; mental representations; secure base behaviors; culture

Introduction

The Bowlby/Ainsworth theory of attachment (Ainsworth, Blehar, Waters, & Wall, 1978; Bowlby, 1969/1982, 1973) highlights influences of early, close relationships on children's social and emotional development. A central premise of attachment theory concerns the assembly of internal working models (IWMs) of attachment relationships (Bowlby, 1969/1982, 1973). These working models are mental representations that mirror the history of interactions between children and their caregivers and are hypothesized to influence children's self-perceptions as being worthy of care, love, and acceptance (see Bretherton & Munholland, 2008, for a review). Bowlby (1969/1982, 1973) argued that these representations make possible children's extended

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explorations of the larger world beyond the family and their endurance of relatively long separations from their caregivers (e.g., as entailed by attending a childcare center), which is a central developmental task for preschool-aged children (e.g., Sroufe, 1996). Although a few studies have explored the antecedent and concurrent correlates of children's attachment representations (e.g., Bretherton, Ridgeway, & Cassidy, 1990; Smeekens, Riksen-Walraven, & van Bakel, 2009), evidence concerning influences on children's assembly of these IWMs over time remains sparse. The present study addresses this issue by examining the unique and joint contributions of two potential inputs to young children's attachment-related mental representations: (1) their secure base behaviors and (2) their mothers' tacit understanding of secure base scripts. From a theoretical standpoint, it is important to test both the direct effects of maternal attachment and children's secure base behavior on child representations as well as the indirect association between maternal attachment and child representation through influences on children's secure base behavior. Theoretically, the co-constructed attachment relationship should continue to influence emerging relationship representations beyond infancy in a variety of developmental domains as language and affect-regulation skills become more consolidated (Bowlby, 1973). Thus, determining whether there is a specific pathway of transfer through secure-base behavior is useful.

The unique history of behavioral and emotional exchanges between caregivers and children during the early years serves as the basis for the co-construction(s) of attachment relationships (Bowlby, 1969/1982). Both theoretical and empirical reports have established that caregiver sensitivity to child communicative signals, cooperation with the child's ongoing action, availability, and acceptance ground the co-construction of a secure attachment (e.g., Ainsworth et al., 1978; De Wolff & van IJzendoorn, 1997; van IJzendoorn & De Wolff, 1997; see Belsky & Fearon, 2008, for a discussion of additional parent, infant, and family antecedents). However, prior to the child's mastery of language, his or her representations of attachment relationships are largely sensorimotor, such that secure and insecure attachments are differentiated in terms of the patterning of the child's interactive behaviors, especially with reference to use of the caregiver as a secure base for exploration and haven of safety when stressed. Securely attached children are characterized as using their caregivers as a base for exploring and are effective in seeking and maintaining proximity and contact from their caregivers when they are distressed (Ainsworth et al., 1978). Insecurely attached children, in contrast, tend to show distortions of the secure base phenomena. For example, infants classified as "avoidant" in the Strange Situation tend to show reduced desire for contact or interaction with the caregiver, even when distressed, and infants classified as "resistant" in the Strange Situation tend to show reduced exploration, even when not distressed, and tend to mix some angry, resisting behaviors in the context of proximity seeking and/or contact when distressed. Still other insecurely attached children may fail to use a coherent pattern of attachment behavior (i.e., disorganized) when they are distressed (Solomon & George, 2008).

With increasing age, advances in cognitive and linguistic capacities enable the transition from sensorimotor secure base behaviors to symbolic (mental) representations, which allows children to reflect on and discuss aspects of behavior relevant to their attachment relationships. Taking advantage of these cognitive/linguistic advances, researchers have designed semi-projective methods such as story-stem completion tasks to assess children's attachment representations (e.g., Bretherton et al., 1990). This involves presenting children with an attachment-related conflict or

problem using doll props and asking them to complete the stories. Bretherton and associates created several different scales for scoring these stories, but most of these scales show significant associations with two summary scales (i.e., coherence of story, overall security of story). Much of the published research using this task focuses only on the security scale (e.g., Verschueren & Marcoen, 1999).

Research using this task suggests that children's sensorimotor representations of attachment (assessed by AQS and/or Strange Situation) and the quality (i.e., security and coherence) of their representations scored from their story completion narratives are significantly related (Bretherton et al., 1990; Smeekens et al., 2009). Oppenheim (1997) reported similar patterns of association between scores derived from a somewhat different story completion task and children's attachment behaviors during separations and reunions in a preschool setting. We therefore anticipated that children's use of the caregiver as a secure base and haven of safety (from AQS assessed earlier) would predict the security and coherence of their attachment representations using the ASCT.

In addition to their own sensorimotor representation of the attachment relationship, children's symbolic mental representations of attachment are likely to be influenced by social transactions with caregivers, who themselves have representations of secure base (attachment) relationships. There is abundant evidence documenting the positive association between a woman's current mental state regarding attachment and her child's sensorimotor representation of attachment (e.g., Main, Kaplan, & Cassidy, 1985; Posada, Waters, Crowell, & Lay, 1995; Steele, Steele, & Fonagy, 1996; van IJzendoorn, 1995) and it is generally presumed that the mother's state of mind regarding attachment is antecedent to (and influences) her co-construction of an attachment relationship with her child (as reflected in the child's use of the mother as a secure base for exploration and haven of safety). We anticipated that maternal representations of attachment would also influence the child's mental representation of attachment.

For this study, we selected the Attachment Script Assessment (ASA; Waters & Rodrigues-Doolabh, 2004) to measure mothers' attachment representations. The ASA presumes that the core of secure attachment representations for adults is constituted by a cognitive script that organizes knowledge of secure base use and secure base provision (Waters & Waters, 2006). Scripts summarize past experiences in a sequence of abstracted, general representations (e.g., Nelson, 1986; Nelson & Hudson, 1988). Waters and Waters (2006) argued that a secure base script includes the temporally ordered elements: some constructive interactions involving the dyad members; an obstacle or interruption is encountered and one dyad member signals distress; the partner detects the signal and offers help; help is accepted by the distressed member; the assistance (including emotional support) is effective in overcoming the obstacle or interruption; and the dyad resumes or begins new constructive interactions. A story based on the secure base script would include most of these elements in this sequence.

The ASA yields reliable and valid scores for secure base knowledge in adults. Maternal attachment "scriptedness" scores are positive, significant correlates of their "coherence" scores from the Adult Attachment Interview (AAI; Hesse, 2008; Main & Goldwyn, 1998) (e.g., Coppola, Vaughn, Cassibba, & Costantini, 2006; Dykas, Woodhouse, Cassidy, & Waters, 2006; Waters & Rodrigues-Doolabh, 2001), which are central to the coding AAI attachment security. Similarly, maternal attachment script scores are also significant correlates of children's attachment security, using attachment classifications in the Strange Situation (Tini, Corcoran,

Rodrigues-Doolabh, & Waters, 2003) and Q-Sort attachment security scores (Monteiro, Verissimo, Vaughn, Santos, & Bost, 2008; Vaughn et al., 2007; Verissimo & Salvaterra, 2006). Given these established relations between maternal attachment representations using the ASA and child sensorimotor representations of attachment and our expectation that ASA script scores would be significantly predictive of child mental representations of attachment, it seems plausible to test whether mothers' attachment scripts would exert an indirect effect on children's mental representations via children's sensorimotor representations of the secure base relationship reflected in their behavioral use of the mother as a secure base and haven of safety from the AQS. Thus, mothers' attachment scripts might have both direct and indirect effects on the child's mental representations of attachment.

The ASA has been used with respondents from diverse ethnic and cultural groups, including the US, Peru, Switzerland, Turkey, United Arab Emirates, Zimbabwe, Columbia, and Portugal (Rodrigues-Doolabh, Zevallos, Turan, & Green, 2003; Vaughn et al., 2007). In these studies, mothers' attachment scripts had acceptable levels of reliability (Cronbach's $\alpha > .70$) and associations between constructs were similar across cultures. In the present study, mother-child dyads from two countries (Portugal and the US) were included. We explored mean level differences on all attachment constructs and whether the pattern of correlations among maternal and children's attachment representation scores were similar between the two cultures. Based on previous research findings, however, we did not anticipate finding cultural differences.

In summary, this study provides new information on how children's secure base behavior and mothers' attachment scripts uniquely and jointly predict the quality of children's mental representations of attachment assessed from ASCT narratives. The indirect effect of maternal attachment scripts on children's mental representations through children's secure base behaviors was also examined. Because the data presented were collected in two countries (Portugal and the US), sample differences (both mean level and pattern of correlations) were also explored.

Method

Participants

Participants were 121 mothers and their preschool children (63 boys and 58 girls). Families were recruited when their children were between the ages of 2.0–3.0 years ($M = 2.66$, $SD = .48$). The Portuguese sample ($n = 31$) was recruited from childcare centers in a suburb of Lisbon (14 boys and 17 girls). Thirty-eight families (21 boys and 17 girls) were recruited through a university affiliated child development lab school in the Midwest of the US. Fifty-two families (28 boys and 24 girls) were recruited from two university-affiliated child-care centers in the Southeastern region of the US. These three samples were recruited to represent middle-class populations by the standards of their respective sociocultural communities. The US samples were collected as components of a collaborative project and the Portuguese sample was collected independently, in consultation with the US investigators so as to have a common attachment protocol. The age range for mothers in the Portuguese sample was 27 to 44 years ($M = 35.57$, $SD = 4.07$), whereas mothers in the Midwestern and Southeastern samples ranged in ages from 22 to 43 ($M = 33.51$, $SD = 4.16$) and 28 to 46 ($M = 35.46$, $SD = 4.38$), respectively. The majority of mothers in each sample had completed a university degree or certification and income levels for most families were above the median incomes for their communities.

Procedures

Informed consent was obtained from all the participating families. Mothers were initially contacted when children were between 2.0–2.5 years of age. After agreeing to participate, a two-hour home visit was scheduled when children were between 2.5 to 3.0 years of age. Observations were conducted with mothers and their children to observe the organization of children's secure base behavior with their mothers in the home using the Attachment Q-Set (AQS; Waters, 1995). For the Portuguese sample, mothers completed the Attachment Script Assessment (ASA; Waters & Rodrigues-Doolabh, 2004) at the end of the home visit (i.e., after observations of the child were complete). The mother accompanied one of the observers to another room to complete the task while the other observer played with the child. For the US Midwestern and Southeastern samples, mothers completed the ASA in the course of a laboratory assessment. In all three samples, audio recordings of the mothers' narrated stories were made and transcribed for later scoring in their own language. Most mothers completed the ASA task in 15–20 minutes. Between 12 and 18 months after the home visit, children completed the story-completion task with an interviewer using an adapted version of the Attachment Story Completion Task at their child care facility (ASCT; Bretherton & Ridgeway, 1990).

Measures

Children's secure base behavior

The Attachment Q-Set (AQS; Waters, 1995) was used to assess children's secure-base behaviors and attachment security to mothers. In all samples, mothers and children were asked to freely interact with each other in a typical fashion during the home visit. The AQS contains 90 statements about how a child uses the caregiver as a secure base for exploration and safe haven as needed. For the Portuguese and Midwestern US samples, two trained observers went on all home visits. In the Southeastern US sample, two visitors completed approximately 40% of the visits, with the remaining visits being completed by a single observer. After finishing the observations, each observer sorted the items along a continuum ranging from 1 (*least descriptive*) to 9 (*most descriptive*) of the child's behaviors with the mother, according to a nine-category fixed rectangular distribution (i.e., 10 items in each of 9 categories), with the "score" for a particular item being the category (i.e., 1 to 9) in which it was placed. The AQS security score was calculated by correlating the child's Q-sort description with the hypothetical "very securely attached" child (see Waters, 1995). Rater agreement for the AQS scores was assessed by Q-correlations and ranged from .61 to .89 for the Portuguese sample and .70 to .80 for the US Midwestern and Southeastern samples.

Children's mental representations of attachment

The Attachment Story Completion Task (Bretherton & Ridgeway, 1990) was used to assess children's symbolic attachment representations. A number of story-stems were presented to the child to elicit narratives regarding attachment behaviors toward caregivers. Stories were presented using dolls and household props, including a mother, father, child, sibling, a pet dog, kitchen equipment, living room and bedroom furniture, etc. The child doll was the same gender and ethnicity as the target child. Before administering the story stems, the interviewer invited the child to

play the story completion game together, such that the interviewer would begin stories and the child would finish them. The child was first presented with a story about a birthday party with a pleasant but non-attachment related theme. This is a warm-up story and is not scored. The child was then presented with the six primary story-stems and asked “show me and tell me what happens next.” Non-directive questions such as “Does anything else happen in the story?” or “What are they doing?” are used to facilitate the child’s narrative production. The story ended when the child indicated that he/she was finished. Given our focus, the eight point continuous scales of *Coherence* (how unified the story was) and *Security* (how effectively the child addressed the major issues in the story and used the caregivers as secure base) were coded for each story. Together, these scale scores capture the central aspects of what it means to be a “securely attached” child. The correlations across stories were high for Coherence (mean $r = .63$, $\alpha = .93$) and Security (mean $r = .60$, $\alpha = .92$). Previous research has shown that the security ratings from the ASCT are significantly correlated with AQS attachment security (Bretherton et al., 1990; Smeekens et al., 2009). Two raters coded the Portuguese ASCT transcripts and an independent team of two raters coded all US transcripts. Interrater agreement for Coherence and Security was satisfactory across both sets of raters (Pearson $r_s > .64$, intraclass correlations range from .54–.85 for both Security and Coherence).

Mothers’ attachment scripts

Mothers completed the ASA (Waters & Rodrigues-Doolabh, 2004) using word prompts that form the outline of a story. Each outline included three columns of four words and was presented one at a time. Mothers were asked to read down from each column from left to right to produce a story. They were told that the stories would be recorded using an audio-recorder, and that they could start the story over if they desired. Of the six word-prompt outlines presented, four were attachment-related: two parent–child oriented lists (i.e., Baby’s Morning and Doctor’s Office) and adult–couple oriented lists (i.e., Jane and Bob’s Camping Trip and Sue’s Accident). The other two were filler stories (Trip to the Park, Going Shopping) and these were not scored for this report. The order of the stories was counter-balanced (six different list-orders used, with three parent–child lists and three adult–adult lists presented as two separate clusters). The attachment-relevant stories were transcribed and then coded using the seven point secure base script scale (Waters & Rodrigues-Doolabh, 2004). Higher scores indicated both the presence and the richness in quality of the secure base script in a given story, whereas lower scores indicated the absence of a secure base scripts. Scores for the four attachment stories were averaged for subsequent analyses. Coders were trained by H. Waters and achieved satisfactory levels of agreement (90% agreement within one scale-point placement on 25 transcripts) on test transcripts. Intraclass correlation coefficients ranged from .82 to .93 for each sample.

Results

The results are presented in four sections. First, missing values were estimated using multiple imputation methods. Second, preliminary analyses tested for possible relations among demographic variables, child sex, sample and the three attachment-related variables. Third, correlations among the attachment variables were computed. Finally, a structural equation model (SEM) examined the unique and

joint effects of children's secure base behaviors and maternal attachment script on children's mental representations of attachment. The model also tested whether mothers' attachment scripts might exert indirect effects on children's mental representations through their secure base behaviors. The SEM method is preferred over other methods because it simultaneously estimates all the parameters for the hypothesized model by specifying the direct and indirect paths (see Loehlin, 1998).

Out of the 121 child–mother dyads participating in this study, 34 were missing one or another of the attachment assessments. AQS scores were available for all participating children. Due to audio-recording errors, nine mothers did not have complete sets of ASA stories and could not receive scores for the adult–child or the adult–adult stories. Thirty children did not complete the ASCT either because of recording malfunctions ($n = 3$) or because the families had left the childcare center and withdrawn from the study before the ASCT was administered ($n = 27$). Multiple imputation was employed to estimate missing data. This method has advantages over older methods of dealing with missing data such as case deletion, mean substitution, and single imputation. It makes use of the associations among all variables to impute missing data with high precision and solves the problem of uncertainty by producing different plausible versions of the complete data (see Schafer & Graham, 2002). NORM (Schafer, 2000), which uses an expectation-maximization (EM) algorithm to generate start values for the replacement of missing data, was used in the present study. To preserve relationships among the study variables, the imputation model includes the demographic variables (e.g., child gender and maternal age), predictor variables (e.g., children's AQS security scores, mothers' attachment script scores), and dependent variables (children's coherence and security of their mental representations of attachment). The percentage of missingness was computed for all the variables included in the imputation model. Although the percentages of missingness were 25% for children's coherence and security, percentages were low for the remaining variables, and the average percentage of missingness across all the variables was 10%. We followed Schafer and Graham's (2002) recommendations and present results based on the average across the 20 imputed data sets.

Preliminary analyses were conducted to examine the associations between demographic variables (such as child age, mothers' age, and family income) and children's mental representations of attachment (coherence and security). None of the associations were significant. Analyses of variance for sex of child and sample differences revealed that girls had higher scores than boys on both coherence, $F(1,119) = 9.91$, $p < .01$, and security, $F(1,119) = 10.78$, $p = .001$. There were no significant sample differences. Consequently, residual scores for ASCT coherence and security, controlling for the sex effect, were calculated for use in subsequent analyses. No other sex or sample differences for any attachment variable were found to be significant.

Descriptive statistics and intercorrelations among the study variables are presented in Tables 1 and 2, respectively. All correlations among the maternal and child attachment variables were significant. To examine whether the correlations were different across the three samples, we used Fisher's r -to- z transformation tests. Only one of 18 tests computed showed a significant between sample difference (i.e., the correlation between AQS security score and ASA Adult-Couple scripts was significantly different between the Portuguese ($r = .63$) and US Midwestern subsamples ($r = .10$) ($z = -2.40$, $p < .05$). Given the number of tests conducted, however, we conclude that the correlation matrices are equivalent.

Table 1. Descriptive statistics for all study measures.

	Children's secure base behavior (AQS)	Children's coherence (Doll play)	Children's security (Doll play)	Mothers' attachment scripts (Parent- child)	Mothers' attachment scripts (Adult- Couple)
Total: (<i>N</i> = 121)					
Mean	.38	5.22	5.10	3.96	3.64
SD	.23	1.10	1.18	1.14	1.03
Boys: (<i>n</i> = 63)					
Mean	.35	4.93	4.78	3.96	3.67
SD	.25	1.13	1.19	1.16	1.14
Girls: (<i>n</i> = 58)					
Mean	.40	5.53	5.45	3.96	3.60
SD	.20	.98	1.06	1.13	.91
Portuguese sample: (<i>n</i> = 31)					
Mean	.44	5.26	5.32	3.84	3.61
SD	.24	1.19	1.22	1.17	.81
US Midwestern sample: (<i>n</i> = 38)					
Mean	.34	5.15	4.95	3.95	3.57
SD	.23	1.04	1.14	1.11	1.03
US Southeastern sample: (<i>n</i> = 52)					
Mean	.36	5.25	5.08	4.03	3.70
SD	.22	1.09	1.17	1.17	1.16

Table 2. Intercorrelations and descriptive statistics for the study measures.

	Children's secure base behavior (AQS)	Children's coherence (Doll play)	Children's security (Doll play)	Mothers' attachment scripts (Parent- child)	Mothers' attachment scripts (Adult- Couple)
Children's secure base behavior (AQS)	–	.34***	.36***	.31***	.28**
Children's coherence (Doll play)		–	.96***	.37***	.34***
Children's security (Doll play)			–	.34***	.34***
Mothers' attachment scripts (Adult-child)				–	.71***
Mothers' attachment scripts (Adult-Couple)					–

Note: ***p* < .01; ****p* < .001. *N* = 121.

The structural equation model with maximum likelihood estimates included one measured variable (i.e., AQS security score), and two latent variables (i.e., mothers' attachment script use and children's mental representations of attachment from the ASCT coherence and security scores). The child sex effect for ASCT coherence and

security was controlled by calculating residual scores prior to entering these variables into the SEM analysis. Paths were drawn from the mothers' attachment scripts (predictor) to children's secure base behaviors (intervening variable), and from children's secure base behaviors to children's mental representations (outcome). The direct pathway from mothers' attachment scripts to children's mental representations was also included. The direct and indirect paths were tested by using bootstrapping to estimate the standard errors as well as bias-corrected confidence intervals (90%) (see Preacher & Hayes, 2004; Williams & MacKinnon, 2008). Bootstrapping has advantages over other methods such as the Sobel test as it requires no assumption about the normality of distribution and can be applied to small samples.

The estimated structural equation model had a good fit to the observed data, $\chi^2(3) = 3.51$, $p = .32$, CFI = 1.00, RMSEA = .04 (see Hu & Bentler, 1999, for a discussion of model fit indices). We present all the standardized estimates in Figure 1. As expected, children's AQS security scores and mothers' ASA secure base script scores significantly predicted children's mental representations of attachment (ASCT scores), $R^2 = .19$. Results of bootstrapping suggested that the standardized direct effect for mothers' attachment scripts on children's mental representation was significant ($p < .01$). The standardized indirect effect from mothers' attachment scripts to children's mental representations through children's secure base behaviors, however, only approached significance ($p = .07$), indicating that, despite the overall good fit of the model, this indirect association was not significant.

Discussion

Our goal in this study was to identify potential antecedents of preschool children's mental representations of attachment. As expected, we found that both the organization of children's secure base behaviors (i.e., sensorimotor representations of attachment) and the quality of their mothers' attachment scripts significantly predicted children's mental representations of attachment (assessed over one year later). Further, we did not find support for an indirect pathway for maternal attachment through children's secure base behavior. Finally, across the three subsamples (Portuguese, US Midwestern, and US Southeastern), we did not find significant mean level differences or consistent differential patterns in correlation among study variables.

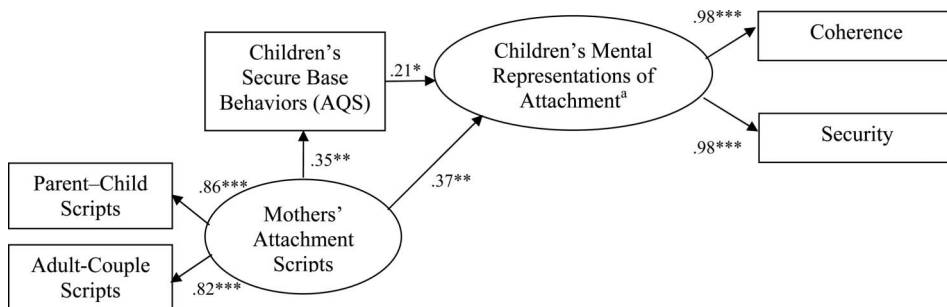


Figure 1. Factor loadings and structural path coefficients for the structural equation model.

^aAs assessed using the Attachment Story Completion Task.

During the preschool years, the maturation of cognitive and linguistic capacities allows children to talk about aspects of behavior that are relevant to their attachment relationships. Consequently, it becomes possible to access children's mental representations of attachment using semi-projective story-completion methods such as the ASCT. In this study, we found that the coherence and security of stories elicited in the ASCT were predicted by children's organization of their secure base behaviors assessed 12–18 months earlier. This finding is consistent with previous research (e.g., Bretherton et al., 1990; Smeekens et al., 2009) and contributes to the attachment literature by providing further evidence of the link between early organization of secure base behavior with an attachment figure and subsequent cognitive and affective representations of attachment relationships without the direct support of that attachment figure (i.e., hypothetical situation involving attachment-related themes while the child is away from the parent in out-of-home care).

Some researchers have not found significant associations between AQS attachment security and security and coherence from the ASCT (e.g., Laible, 2004; Oppenheim, 1997). These inconsistencies may be due procedural differences between studies. In both of these studies, mothers completed the AQS (with supervision from a research staff member in the Laible study) rather than having observers complete the AQS. van IJzendoorn et al. (2004) suggested that maternal AQS reports may be less valid indicators of attachment security than those of observers. Oppenheim (1997) also used the original version of the AQS that had been developed for children between 12 and 36 months of age. Children in Oppenheim's sample were somewhat older ($M = 44$ months) and this also might have affected item placements and derived security scores. The more recent 90-item AQS (Waters, 1995) that we employed has also been used successfully to characterize child secure base behavior in children up to 59 months of age (e.g., Posada et al., 1995) and this too might account for the differences between studies.

In addition to children's AQS security scores, maternal secure base script scores from the ASA also predicted children's mental representations of attachment. Previous studies have shown that the script scores are reliable, stable over time, and valid indicators of adult attachment representations (e.g., Coppola et al., 2006; Dykas et al., 2006; Vaughn et al., 2006; Waters & Rodrigues-Doolabh, 2001). Our data provide further evidence for the validity of the maternal script scores in that they also predict children's mental representations of attachment assessed using the ASCT. During infancy, the mother's secure base script can only be revealed to her child via the (more or less) continuous stream of their behavioral transactions and the affective experiences engendered by these transactions, traditionally summarized in terms of maternal sensitivity, cooperation, availability, and acceptance (Ainsworth et al., 1978). These transactions are reflected in the patterning of child attachment behavior (i.e., use of the caregiver as a secure base and haven of safety, see van IJzendoorn, 1995). During the preschool years, advances in cognitive and linguistic capacities make it possible for children to represent their attachment relationships symbolically as well as in behavior. Our findings suggest that mothers' secure base scripts and the mother–child transactions contingent on those scripts also influence the child's mental representations of attachment as the child matures, and this holds even after the earlier organization of the child's secure base behavior is statistically controlled.

The links between maternal secure base representations and their children's sensorimotor and mental representations of attachment suggest a mechanism that

may account for aspects of generational transfer of attachment. That is, maternal behavior guided by an understanding of secure base roles both promotes and reinforces the child's use of the mother as a secure base for exploration and haven of safety in the early months and years of life and may also promote the child's learning about secure base roles and behaviors in the course of informal tutorials as the child's cognitive and linguistic abilities mature. Several investigators have published results consistent with this speculation (e.g., Fivush, Haden, & Reese, 2006; Fivush & Sales, 2006; Oppenheim, Koren-Karie, & Sagi-Schwartz, 2007), demonstrating relations between attachment measures (using both antecedent and concurrent measures of attachment) and mother-child discussions of emotion. In addition, Bost et al. (2006) reported that these discussions of emotional events were associated with mothers' secure base script scores. These kinds of findings suggest that testing an indirect path from maternal scripts through mother-child emotion talk to child mental representations should be a focus for future research.

Finally, according to Bowlby (1969/1982), the behavioral and representational systems supporting the co-construction of attachment relationships in children are species-specific adaptations for human beings. Following Bowlby's argument, we did not expect nor did we find cultural differences in this study, either in terms of mean level differences for dimension scores or patterns of cross-dimension correlation.

Limitations and future directions

We acknowledge two limitations of this study. First, our samples were deliberately recruited from middle-class populations and this may limit the generalizability of our results. Sample recruitment was restricted to middle-class populations because this is the first study to examine the joint effects of early attachment representations on later child representations using the recently developed ASA measure and it seemed prudent to constrain sample parameters that might influence group means and confound the analyses. In the future, a wider range of SES and ethnic minority participants should be included to determine the broader generality of our results.

Second, child language ability was not assessed for all participating children. Because the assessment of mental representations relies on symbolic play and expressive language, we could have confounded Coherence and Security scores from the ACST with language ability. There are two reasons that we do not believe this to be the case. First, in the Portuguese sample, verbal ability assessments were available (Portuguese translation of the Wechsler Preschool and Primary Scales of Intelligence-R; Seabra-Santos et al., 2003) and the correlation between the verbal ability subscale and ASCT scores was low (i.e., $r < .10$) and not significant. In an independent sample of preschool children comparable to the Southeastern US sample (i.e., recruited from the same child-care center) the correlation between Peabody Picture Vocabulary Test (Dunn & Dunn, 2007) standard scores and the ASCT scores were also low ($r < .05$) and not significant. Second, in previous studies where children's language ability was controlled, the effects of children's mental representations remained robust (e.g., Verschueren & Marcoen, 1999). These results suggest that however much children's responses in the ASCT may depend on verbal abilities, this does not account for the relation between their attachment behavior and attachment representations.

Despite these limitations, our findings suggest that the assembly of children's mental representations of attachment is a co-construction process and that both

children and their attachment figures contribute to this task. Future research should probe the specific interaction processes and the affects, cognitions, and behaviors of each partner in this co-construction to determine how it is accomplished.

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