Disorganized Infant Attachment Classification and Maternal Psychosocial Problems as Predictors of Hostile-Aggressive Behavior in the Preschool Classroom

Karlen Lyons-Ruth, Lisbeth Alpern, and Betty Repacholi

Harvard Medical School

LYONS-RUTH, KARLEN; ALPERN, LISBETH; and REPACHOLI, BETTY. Disorganized Infant Attachment Classification and Maternal Psychosocial Problems as Predictors of Hostile-Aggressive Behavior in the Preschool Classroom. CHILD DEVELOPMENT, 1993, **64**, 572–585. This study of 62 lowincome families examined the relation between maternal and infant measures assessed at 18 months infant age and child behavior problems at age 5 as rated by preschool teachers. The infancy assessments included measures of mother-infant interaction, maternal psychosocial problems, infant cognitive development, and infant attachment security, including the disorganized/ disoriented classification. The strongest single predictor of deviant levels of hostile behavior toward peers in the classroom was earlier disorganized/disoriented attachment status, with 71% of hostile preschoolers classified as disorganized in their attachment relationships in infancy. Maternal psychosocial problems independently prediction Results are discussed in relation to the asymmetry of forward and backward prediction that characterized the findings and in relation to the potential significance of disorganized attachment behavior as a precursor to later maladaptation.

Mapping the developmental pathways of infants at risk for social maladaptation is an important priority in the field of developmental psychopathology. In previous studies of low-risk samples, security of attachment emerged as one important, broad-band organizational construct in theories of early social development. A number of longitudinal studies dealing with not-at-risk populations have found that early attachment patterns have significant potential for predicting later social behaviors up to age 6 and beyond, both in relation to parents (Londerville & Main, 1981; Main, Kaplan, & Cassidy, 1985; Matas, Arend, & Sroufe, 1987) and in relation to peers (Arend, Gove, & Sroufe, 1979; Oppenheim, Sagi, & Lamb, 1988; Waters, Wippman, & Sroufe, 1979). However, in regard to the prediction of seriously maladaptive social behavior, the results of previous studies have been less consistent. Only a few studies have examined the relation between infant attachment security and behavior problems during the preschool years, and these studies have varied considerably in both methodology and results (Bates, Maslin, & Frankel, 1985; Erickson, Sroufe, & Egeland, 1985; Goldberg, Corter, Lojkasek, & Minde, 1990; Lewis, Feiring, McGuffog, & Jaskir, 1984). Only in the poverty sample of Erickson et al. (1985) was a significant relationship reported between attachment security and later behavior problems that was consistent for both sexes.

Most of these studies examining longitudinal continuity coded only the three originally described attachment patterns, which were developed to describe variations in infant behavior among adequately functioning families. During the past decade, a number of investigators have published evidence that the three original attachment classifications do not capture the distinct organizational features of infant attachment behavior

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among socially-at-risk subpopulations (Crittenden, 1985; Lyons-Ruth, Connell, Zoll, & Stahl, 1987; Main & Weston, 1981; Radke-Yarrow, Cummings, Kuczynski, & Chapman, 1985; Spieker & Booth, 1988). These reports led Main and Solomon (1990) to develop classification criteria for a new disorganized/ disoriented, or D, attachment category, including in the coding scales most of the atypical behaviors observed in earlier studies.

In Main and Solomon's (1990) view, disorganized/disoriented attachment behavior does not represent a fourth organized strategy for maintaining access to the attachment figure under stress, as do the three original attachment patterns. Instead, in their view, conflicting behavioral tendencies are activated in the infant and compete for expression, resulting in incomplete or contradictory actions or the display of combinations of behaviors from two or more usually distinct organized strategies. Disorganization can occur in the context of an otherwise secure infant attachment strategy or in the context of insecure strategies characterized by the restriction (avoidant pattern) or augmentation (resistant pattern) of attachment-related behavior and affect. Therefore, Main and Solomon also recommended that a best-fitting alternate classification be assigned to all infants, indicating the predominant underlying attachment strategy.

The disorganized form of infant attachment behavior appears infrequently among infants from middle-class samples, constituting only 13% of 268 attachment classifications in the Berkeley sample of Main and Solomon (1990). Disorganized attachment patterns increase in frequency as the severity of social risk factors increases, characterizing 28% of infants from multiproblem families receiving supportive services (Spieker & Booth, 1988), 54% of infants of lowincome mothers with serious depressive symptoms and no services (Lyons-Ruth, Connell, Grunebaum, & Botein, 1990), and 82% of infants from maltreating families (Carlson, Cicchetti, Barnett, & Braunwald, 1989).

The patterning of the disorganized behavior itself also appears to differ from lowto high-risk settings. A majority of disorganized infants in low-risk settings display underlying secure strategies, with particularly few disorganized-avoidant patterns. In high-risk settings, a majority of disorganized infants are assigned insecure alternate classifications, particularly insecure-avoidant alternate classifications (Ainsworth & Eichberg, 1991; Carlson et al., 1989; Lyons-Ruth et al., 1990; Main & Solomon, 1990; O'Connor, Sigman, & Brill, 1987; Spieker & Booth, 1988; see Lyons-Ruth, Repacholi, McLeod, & Silva, 1991, for review).

Given that rates of disorganized infant attachment behavior are elevated in highrisk social environments that are similar to those that produce elevated rates of childhood psychopathology (Rutter et al., 1975), disorganization of attachment strategies, rather than insecurity per se, is likely to represent an early precursor of behavior problems. However, the relation between disorganized attachment behavior in infancy and later behavior problems has not yet been evaluated. Assessing this relation in sociallyat-risk samples is particularly important since rates of disorganized behavior rise sharply among infants in high-risk environments. One goal of the current study was to evaluate the contribution of the disorganized attachment category to the prediction of teacher-rated behavior problems in preschool and kindergarten among a sample of infants at social risk. While reliance on a single outcome measure limits the scope of the study, teacher ratings of child behavior problems in the classroom provide an assessment of adaptive functioning in an ecologically valid context of great importance to the child's subsequent development. Teacherrated behavior problems at age 5 have also been shown to predict receipt of guidance services in third grade, in a large-scale longitudinal study of working-class children (Reinherz, Gordon, Morris, & Anastas, 1983).

A second goal of the study was to evaluate the longitudinal prediction available from three maternal risk indicators in infancy: maternal lack of involvement with the infant, maternal hostile intrusiveness, and the presence of serious maternal psychosocial problems. Psychosocial problems included depressive symptoms, child maltreatment, or a history of psychiatric hospitalization. All maternal measures were predicted to relate to later behavior problems, given their concurrent association with childhood psychopathology in crosssectional studies (Aber, Allen, Carlson, & Cicchetti, 1989; Hammen, Burge, & Stansbury, 1990; Richman, Stevenson, & Graham, 1982). We also wished to examine whether the maternal variables would account equally well for variance related to attachment status and whether attachment status might inter-

act with maternal risk factors to protect against or potentiate later problems (see Masten, 1989; Morisset, Barnard, Greenberg, Booth, & Spieker, 1990; Rutter, 1985). The contribution of infant mental development scores to the later prediction of behavior problems was also investigated, given recent reports from high-risk samples relating insecure or disorganized attachment relationships to slowed cognitive development (Lyons-Ruth et al., 1991; Morisset et al., 1990) and relating cognitive development at 24 and 42 months to behavior problems at age 5 (Erickson et al., 1985).

Given the diversity of previous findings, no prediction was made concerning the *type* of later problem behavior likely to be associated with disorganized/disoriented attachment behavior, lowered mental development scores, or the maternal risk factors. Teacher ratings of child behavior in the classroom were analyzed both for the overall behavior problem score and for aggressive, anxious, and hyperactive behavior problems.

Method

Subjects

The subjects for the study were 62 preschool children from low-income families, ranging in age from 49 to 71 months, mean age 59 months. Twenty-two males and 12 females were between 48 and 59 months of age, and 15 males and 13 females were between 60 and 71 months of age.

The subjects were recruited from among 78 low-income families who had participated in a previous study of the impact of family risk factors on infant development (Lyons-Ruth et al., 1990). Two percent of the original sample could not be reinterviewed because they had moved too far away, 11% could not be relocated, and 5% refused to participate. Two additional families had agreed to participate, but their children were not enrolled in preschool.

Families were characterized by the following social risk factors: 18% of the mothers had experienced psychiatric hospitalization; 16% of families had a documented history of child maltreatment; 83% of families were female-headed households; 45% of families were supported by AFDC; 23% of families included a minority parent; and 46% of mothers were not high school graduates.

During the infant study, home-visiting services were provided to 23 families until infants were 18 months old. All infant assessments were gathered at 18 months after the home visiting services had ended and represent maternal and infant status postintervention.

An additional group of 182 children (mean age 60 months) attending the same classrooms as the study children were also assessed by their teachers. These children were selected by matching all study children with the three same-sex classmates nearest in birthdate. Four controls were omitted through teacher error. Classmate scores were included to control for potential differences among teachers in their use of the rating scales based either on variations in child age or on idiosyncratic baseline differences among teachers.

Assessment Procedures—Infancy

Maternal and infant functioning was assessed when the child was 18 months old. The observational measures had also been collected at 12 months.

Demographic data.—A measure of cumulative demographic risk was created by summing the presence of the following six factors coded from maternal interviews: mother's minority race, mother not a high school graduate, mother under 20 at the birth of her first child, mother a single parent, family supported by government assistance, and three or more children under age 6.

Maternal psychosocial problems.-Maternal psychosocial problems were coded as present if the mother had a documented history of child maltreatment, a history of inpatient psychiatric hospitalization, or reported depressive symptoms on the CES-Depression Scale over the validated cutoff point for possible clinical disorder. All other mothers received a score of 0. The CES-Depression Scale was administered verbally to mothers when infants were 18 months old. The CES-D is a 20-item questionnaire concerning depressive symptoms during the past week (Radloff, 1977). It has been well validated in large-scale epidemiologic studies (Myers & Weissman, 1980; Weissman, Sholomskas, Pottenger, Prusoff, & Locke, 1977). Further differentiation among the three types of problems was not attempted due to the degree of overlap among problem types. Among mothers with psychiatric histories, 55% were also depressed and 46% also had maltreatment histories. Among maltreating mothers, 80% were also either depressed or had psychiatric histories.

Maternal behavior at home.—Naturalistic mother-infant interaction was videotaped at home for 40 min when the infants were awake and alert. Maternal behavior was coded in 10 4-min intervals on 12 five-point rating scales and one timed variable, including sensitivity, warmth, verbal communication, quality and quantity of comforting touching (physical contact in the service of communicating affection, "touching base," or reducing distress), quality and quantity of caretaking touching, interfering manipulation, covert hostility, anger, disengagement, flatness of affect, and time out of room, rounded to the nearest half minute. Coders were blind to all other data on the families. Interobserver reliabilities, computed on a randomly selected 20% of the 40-min videotapes, yielded percentages of agreement, calculated within one point, above 90% for all scales, with a mean of 91%. Cohen's kappa coefficients ranged from .45 to .81, all p < .001. Additional information on coding procedures is available in Lyons-Ruth et al. (1987). Principal components analyses of the scales, conducted during the previous infant portion of the study, had yielded two main factors. Factor 1, labeled maternal involvement, accounted for 38% of the variance and included negative loadings (<.50) for maternal disengagement and positive loadings for maternal sensitivity, warmth, verbal communication, and quantity of comforting touch. Factor 2, labeled hostile-intrusiveness, accounted for 26% of the variance and included negative loadings for quality of comforting touch and quality of caretaking touch and positive loadings for covert hostility, interfering manipulation, and anger. For five mothers who were missing 18-months home data, identical 12-months home data were substituted.

Infant development.—The Bayley Scales of Infant Development, Mental and Motor Scales, were administered to each infant in a laboratory visit before assessment in the Ainsworth Strange Situation. For two infants who were missing the 18-months Bayley assessment, the 12-months scores were substituted.

Infant attachment security.—Within 2 weeks of the home videotaping, mothers and infants were videotaped in the Ainsworth Strange Situation (Ainsworth, Blehar, Waters, & Wall, 1978). In this procedure the infant is observed in a playroom during a series of eight 3-min episodes in which the mother leaves and rejoins the infant twice. Videotapes were coded for attachmentrelated behaviors and for the three attachment classifications as described by Ainsworth et al. (1978) and for disorganized/ disoriented behaviors as described by Main and Solomon (1990). The three original attachment classifications (secure, avoidant, ambivalent) were assigned by both a computerized multivariate classification procedure developed on the original Ainsworth data (Connell, 1976; see also reference in Richters, Waters, & Vaughn, 1988) and a coder trained by M. Main. Agreement between the two sets of classifications on the full 18months N of 72 was 86%. Seventy-five percent of the disagreed-upon tapes were later found to meet criteria for the disorganized/ disoriented category. Agreement on the disorganized/disoriented classification between M. Main and the third author for 32 randomly selected tapes was 83%. Classification data can be seen in Table 3.

For regression analyses, security of attachment was ordered from 1 to 3, with secure = 3, avoidant = 2, and disorganized/ disoriented = 1. In keeping with other investigations (Morisset et al., 1990; Vondra & Shaw, 1991), disorganized attachment strategies were given the least secure ranking based on their differentially high frequencies among the most impaired parent-infant relationships, particularly those in which maltreatment has been independently documented. For five infants missing the 18months attachment data, 12-months attachment data were substituted.

Assessment Procedures—Age 5

Teacher ratings of child behavior problems.—The Preschool Behavior Questionnaire (PBQ) (Behar & Stringfield, 1974a) was completed by teachers for the 62 children in the study and the three same-sex classmates nearest in age to the study child. A single, mean classmate control score was computed for each study child. Fifty-one teachers rated the children. Half the children were in classrooms located in public schools, 18 attended Head Start, 10 went to private or parochial preschools, and 3 were in public daycare.

The PBQ represents a modified version of Rutter's (1967) Children's Behavior Questionnaire, developed for children in the 3–6year-old age range. Total score ranges from 0 to 60. Test-retest values, interrater reliabilities, and standardization sample characteristics are all acceptable (see Behar & Stringfield, 1974b). Factor analytic studies extracted three factors: hostile, anxious, and hyperactive (Behar, 1977; Behar & Stringfield, 1974b). Cutoff scores which maximally discriminated normal and disturbed groups

were 17 for the total score, 8 for hostile behavior, 5 for anxious behavior, and 5 for hyperactive behavior (Behar & Stringfield, 1974b). Cutoff values indicated the upper 10% of scores among the normal validation group. Scores over the cutoff point cannot be considered comparable to a clinical disorder but merely denote deviance from normative behavior.

Results

Control Analyses

Age.—There were no age effects (4 years vs. 5 years) on the four problem scales for either subjects, F(1, 60) = .27-2.58, all p = N.S., or classmates, F(1, 60) = .02-1.89, all p = N.S. Age effects over this range were not observed in the original PBQ validation study (Behar & Stringfield, 1974b).

Teacher baseline effects.—Significant correlations between teachers' ratings of classmates and ratings of subjects occurred for total problems, r = .28, p < .01, anxious behavior, r = .36, p < .002, and hyperactive behavior, r = .25, p < .05, suggesting potential teacher baseline differences in rating these problem behaviors. Only the scores for hostile behavior showed no significant association, r = .11, p < .20. To control for teacher baseline effects and any residual child age variance, mean classmate control scores were entered first as covariates in all analyses.¹

Demographic variables.—Within the restricted economic range represented in this sample, variation in cumulative demographic risk was not significantly related to the outcome variables and was not included in further analyses, partial correlations with classmate scores controlled: total problems, r = .12, hostile, r = .16, hyperactive, r = .08, anxious, r = .04, all N.S. There was a significant sex difference only on the hyperactive scale, F(1, 59) = 6.08, p < .02, with males scoring higher than females. Therefore, sex was included as a covariate in analyses of hyperactive scores.² Because some investigators have reported interaction effects between sex and attachment (LaFreniere & Sroufe, 1985; Lewis et al., 1984), sex × attachment AN-COVAs were also computed with classmate scores covaried. None were significant, total problems, F(2, 55) = .46, N.S., hostile, F(2, 55) = .10, N.S., anxious, F(2, 55) = .2.40, N.S., hyperactive, F(2, 55) = .33, N.S.

Prediction from Assessments in Infancy

Five summary measures of maternal and infant functioning at 18 months were analyzed in relation to later behavior problem scores: infant security of attachment (scored 1–3, with 3 as secure), maternal psychosocial problems (scored present or absent), maternal hostile-intrusive behavior toward the infant at home (continuous factor score), maternal involvement with the infant at home (continuous factor score), and infant mental development (continuous score).

These variables were first assessed for overall significance of prediction by entering the five infancy measures as a group into multiple regression analyses of each of the four preschool behavior problem scores (total problems, hostile behavior, anxious behavior, hyperactive behavior). Classmate control scores were entered first and, for hyperactive scores only, child sex was entered second. The five infant risk variables as a group accounted for a significant proportion of the variance in hostile behavior, $F \operatorname{chg}(5,$ (55) = 2.50, p < .04, variance explained =18%. The variance accounted for in total problems, 16%, failed to reach significance, F chg(5, 55) = 2.25, p < .06. The infant variables also failed to predict anxious behavior and hyperactive behavior. Table 1 displays the partial correlations between the infancy predictors and the four behavior problem scores, with classmate scores covaried and, for hyperactive scores only, sex covaried. In the case of the dichotomous psychosocial problems scores, ANCOVAs with classmate scores covaried were computed on the behavior problem scores. Strength of the asso-

¹ Teacher baseline effects proved to be largely independent of the effects related to the infant assessments. Risk-related subgroups in which subjects received the highest mean ratings were not the same subgroups in which classmates received high ratings, working against the alternate possibility that correlation in ratings primarily reflected true classroom differences. All significant results remained the same when the covariate control was omitted. However, without the inclusion of the covariate control, scattered and difficult-to-interpret significant results appeared on the anxious scale.

² Sex differences in hostile behavior are not consistently found in epidemiological samples of preschoolers (see Richman et al., 1982) but tend to emerge in these same samples by school age.

TABLE 1

	Preschool Behavior Questionnaire Scores $(n = 62)$					
Type of Assessment in Infancy	Total Problems	Hostile Behavior	Hyperactive Behavior	Anxious Behavior		
Continuous PBQ scores: ^a						
Sec attach	26*	29**	21	04		
Psych probs	.22	.26*	.07	.14		
Mat beh-hi	.21	.23*	.05	.11		
Mat beh-inv	10	.04	09	18		
Mental dev	34**	29**	24*	26*		
PBQ deviant classifications: ^b						
Sec attach	30*	36**	19	06		
Psych probs	.29*	.31*	.18	.13		
Mat beh-hi	.34**	.24*	.18	.02		
Mat beh-inv	.06	.06	.08	18		
Mental dev	21	15	22*	14		

STRENGTH OF ASSOCIATIONS BETWEEN ASSESSMENTS IN INFANCY AND PRESCHOOL BEHAVIOR PROBLEM SCORES

NOTE.—Sec attach = security of attachment (3 = secure, 2 = avoidant, 1 = disorganized); psych probs = maternal psychosocial problems (0 = absent, 1 = present); mat beh-hi = maternal home behavior—hostile intrusiveness; mat beh-inv = maternal home behavior—involvement.

^a For continuous PBQ scores, strength of association is indexed by partial r with classmate score (and sex for hyperactive scores) covaried.

^b For deviant classifications and continuous infancy variables, strength of association is indexed by beta with significance assessed by *F* test and mean classmate score covaried; for deviant classifications and dichotomous infancy variables, strength of association is indexed by phi, with significance assessed by chi square. Beta and phi are measures of the strength of association for effects tested by *F* or chi square statistics.

* p < .05.

** p < .01.

ciation assessed by the F test is indexed in the table by beta coefficient.

Since the continuous behavior problem scores used in the regression analyses did not reveal whether the problems being reported were severe enough to fall within the range of risk for clinical disorder, children were also classified as deviant or nondeviant according to the PBQ cutoff scores. Hostile behavior scores in the deviant range were also significantly predicted by the five infancy variables, as assessed by multiple discriminant function analysis, with classmate scores controlled, F(5, 55) = 2.33, p < .04,Wilks's lambda = .80, variance explained = 20%. Table 1 also displays measures of the strength of association (beta or phi, see notes to Table 1) between the infancy variables and later deviant behavior classifications.

Given the significant prediction of hostile behavior, the relations between individual infancy variables and later hostile behavior were examined further. As seen in Table 1, predictors of the dichotomous deviance scores were similar to the predictors of the entire range of problem scores, with the exception of infant mental development. Mental development scores were related primarily to lower-level problem behaviors not severe enough to classify in the deviant range. Contrary to expectation, maternal involvement in infancy was unrelated to problem behavior.

Maternal involvement in infancy was significantly related to infant mental development scores at 18 months, r = .35, p < .002, so there may have been an indirect influence of maternal involvement on later problem behavior. This set of relations involved milder forms of problem behavior not falling in the deviant range, however.

As Table 1 also shows, security of attachment in infancy exhibited the strongest relation with hostile behavior in preschool. However, the scaled scores for attachment security used in the regression analysis do not reveal whether, compared to secure infants, avoidant infants and disorganized infants were at equally elevated risk for later hostile behavior. Therefore, avoidant and disorganized infants were compared separately to secure infants on both the continuous hostile behavior scores, using ANCOVA with planned orthogonal comparisons, and on the dichotomous hostile deviance scores, using chi square analyses. These analyses

revealed that hostile behavior scores of disorganized infants differed significantly from those of securely attached infants, deviance score, $\chi^2(1, N = 50) = 6.20, p < .01, \phi =$.40, continuous score orthogonal contrast, $F(1, 47) = 4.80, p < .03, \beta = .30$. Hostile behavior scores of avoidant infants did not differ significantly from those of secure infants, deviance score, $\chi^2(1, N = 35) = 1.71$, N.S., continuous score contrast, F(1, 32) =.10, N.S.³ The proportions of infants in each attachment classification who later exhibited deviant levels of hostile behavior are shown in the upper half of Table 2.

The marginal totals in Table 2 reveal that children were significantly more likely to be classified as disorganized in infancy (n = 27) than to be classified as hostile in preschool (n = 17), McNemar Q = 4.05, p < .05. Furthermore, at the level of prediction for a given individual, the predictive association between attachment classification and later hostile behavior problems was asymmetrical as assessed by the lambda statistic. Lambda indicates percent reduction in error of prediction of the subject's status on one categorical variable that is achieved by knowing the subject's status on a second categorical variable (Hays, 1963) and provides additional information about the form of the significant association between attachment status and hostile behavior.⁴ Looking forward from infancy to preschool, knowledge of infant attachment classification does not reduce the rate of error in prediction of preschool deviance status, lambda = 0%. Because a majority of the children in all attachment groups are nondeviant, the predicted outcome for a child in any attachment group is nondeviant behavior. However, looking backward from preschool status to infant attachment classification, knowledge of preschool deviance status results in 17% fewer errors in predicting prior attachment classification, lambda = 17%. As can be seen in the lower half of Table 2, for a child with deviant levels of hostility in preschool, the most likely earlier attachment classification was disorganized, while for a nondeviant preschooler the most likely earlier classification was secure. Seventy-one percent of children with deviant levels of hostile behavior at age 5 had been disorganized in their attachment behavior in infancy, compared to only 33.3% of nondeviant children. Preschoolers with highly hostile behavior were six times more likely to have been classified as disorganized than to have been classified as secure.

To further evaluate the utility of the disorganized attachment category, the rates of hostile behavior were also examined using only the three original attachment categories, including the alternate forced classifications for all D infants. As shown in Table 3, a majority of the children categorized as disorganized, 59.2% or 16 of 27, were avoidant in their alternate forced classifications. which is consistent with other studies of high-risk populations (Carlson et al., 1989; Spieker & Booth, 1988). Later hostile behavior was less specifically associated with the three original attachment strategies than with the disorganization of those strategies. as also shown in Table 3. Using the original three-category system (ambivalent group excluded because of small cell size), ANCO-VAs comparing secure and avoidant groups on the four continuous problem scores (total, hostile, anxious, and hyperactive) yielded Fvalues all <1.0, N.S., with classmate scores covaried; for the four deviant classification scores, secure versus avoidant chi-squares were all under 1.96, N.S.

The maternal psychosocial problems variable was also examined further. To evaluate whether maltreatment alone was responsible for the relation between maternal psychosocial problems and hostile child behavior, the relation between these variables was reanalyzed with the 10 maltreating mothers removed. The association remained significant, hostile continuous score, F $chg(1, 49) = 5.68, p < .02, \beta = .33, deviance$ status, $\chi^2(1, N = 52) = 5.15, p < .02, \phi =$.31. Among the 52 nonmaltreating mothers, serious depressive symptoms at 18 months infant age constituted the most prevalent maternal psychosocial problem. Nineteen of the 22 mothers with psychosocial problems other than maltreatment reported high levels of depressive symptoms when their infants were 18 months old, with three of these

³ Since the security of attachment rankings might have obscured a significant difference between secure and avoidant children in the regression analyses, secure vs. avoidant ANOVAs were also computed for total, anxious, and hyperactive scores. None approached significance, all F(1, 34) < .20, N.S. ⁴ The lambda statistic has no associated significance level beyond the significance of the

⁴ The lambda statistic has no associated significance level beyond the significance of the overall association represented in the 2 × 3 table, $\chi^2(2, N = 62) = 8.02$, p < .02.

TABLE 2

	HOSTILE BEHAVIOR		
	Not deviant $(\%)$ $(n = 45)$	Deviant (%) $(n = 17)$	
Looking forward: ^a			
Secure	91 (21)	9 (2)	
Avoidant	75 (9)	25 (3)	
Disorganized	56 (15)	44 (12)	
Looking backward: ^b	· · ·	\/	
Secure	47 (21)	12 (2)	
Avoidant	20 (9)	18 (3)	
Disorganized	33 (15)	71 (12)	

INFANT ATTACHMENT CLASSIFICATION AND PRESCHOOL HOSTILE BEHAVIOR: FORWARD AND BACKWARD PREDICTION

NOTE.—Cell n's in parenthesis.

^a Row percentages shown; lambda forward = 0%.

^b Column percentages shown; lambda backward = 17%.

also having past inpatient psychiatric hospitalization. Only three mothers coded as having psychosocial problems had inpatient psychiatric hospitalizations alone. Thus, except for these last three mothers, a mother classified as having psychosocial problems had problems that were active during her child's infancy, as manifested in continuous protective service involvement or in a high level of depressive symptoms. As previously reported, maternal depressive symptoms in this sample showed a high level of stability from 12 to 18 months infant age (Lyons-Ruth, Zoll, Connell, & Grunebaum, 1986).

As was the case for disorganized attachment behavior, the predictive association between maternal psychosocial problems and later hostile behavior was asymmetrical. Knowing the mother's problem status in infancy did not reduce error in predicting a child's later deviance status, lambda = 0%. However, looking backward, knowledge of whether the child's behavior was deviant did reduce error by 23% in predicting maternal psychosocial problems; 76.5%, or 13 of 17, mothers of highly hostile children had psychosocial problems while only 44.4%, or 19 of 45, mothers of nondeviant children had similar problems.

Asymmetry of prediction was not evaluated in relation to the continuous maternal hostile-intrusiveness scores due to the lack

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PERCENTAGES OF INFANTS IN EACH ATTACHMENT SUBGROUP WHO WERE DEVIANT OR NONDEVIANT IN PRESCHOOL: THREE- AND FOUR-CATEGORY ATTACHMENT CLASSIFICATIONS COMPARED

	HOSTILE BEHAVIOR		
	Not Deviant $(\%)$ $(n = 45)$	Deviant (%) $(n = 17)$	
Secure:	81 (25)	19 (6)	
Secure	91(21)	9 (2)	
Secure-D	50 (4)	50 (4)	
Avoidant:	61(17)	39 (11)	
Avoidant	75 (9)	25 (3)	
Avoidant-D	50 (8)	50 (8)	
Ambivalent:	100 (3)	00 (3)	
Ambivalent	(0)	(0)	
Ambivalent-D	100 (3)	00 (0)	

NOTE.-Cell n's in parenthesis.

of a validated basis for establishing a classification boundary for deviant maternal behavior.

Relations among maternal and infant variables.-- A multiple discriminant function analysis on the deviance scores for hostile behavior was conducted to evaluate whether the contributions of the three infant predictors were redundant, additive, or interactive. Redundancy between the two maternal variables, in particular, appeared likely because maternal hostile-intrusive behavior was strongly correlated with maternal psychosocial problems during the child's infancy, r = .48, p < .001 (see Lyons-Ruth et al., 1987, 1990). Classmate control scores were entered into the analysis first, followed stepwise in order of significance by attachment security, psychosocial problems, and hostile-intrusive behavior, followed by the three interaction terms (attachment \times problems, attachment \times behavior, problems \times behavior).

None of the three interaction effects approached significance, with the *F* change values ranging from 1.53 to .023, all N.S. Both security of attachment and maternal psychosocial problems made additive contributions to the prediction of hostile behavior, secattach F(1, 59) = 7.60, p < .01; psychprob, $F \operatorname{chg}(1, 58) = 4.99$, p < .03 (after security of attachment was entered). In a follow-up analysis, security of attachment was also significant when entered after maternal psychosocial problems, secattach, $F \operatorname{chg}(1, 58) = 6.35$, p < .02. Maternal hostile-intrusive

behavior was redundant with maternal psychosocial problems, accounting for no independent variance once the psychosocial problems variable was entered, $F \operatorname{chg}(1, 58)$ = .41, N.S. (after psychprob only). Attachment security and maternal problems together accounted for 18% of between-groups variance, R = .43, Wilks's lambda = .82, $\chi^2(2, N = 62) = 11.82, p < .003$, and correctly classified 76% of cases as to deviant levels of hostile behavior, $\chi^2(1, N = 124) =$ 8.85, p < .005. Regression analysis of continuous behavior problem scores yielded virtually identical results: secattach, $F \operatorname{chg}(1, 59)$ = 5.71, p < .02, psychprob, $F \operatorname{chg}(1, 58) =$ 4.03, p < .05, hostile, $F \operatorname{chg}(1, 57) = .22$, N.S.; no interaction effects approached significance.

To assess whether maternal psychosocial problems were related to child behavior primarily through the covariance between maternal problems and maternal hostileintrusive behavior, a follow-up discriminant analysis was performed entering maternal hostile-intrusive behavior before the other two variables. Maternal psychosocial problems failed to account for significant additional variance after hostile-intrusive behavior was entered, F chg(1, 58) = 2.98, p <.17, while attachment security continued to make a significant contribution after both maternal variables were entered, Fchg(1, 57)= 6.45, p < .01. Regression analysis of continuous scores yielded the same findings. Thus, maternal psychosocial problems accounted for variance in child behavior partly

TABLE	4
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Percentage of Infants Who Are Hostile and Not-Hostile in Preschool Cross-classified by Infant Attachment Status and Presence of Maternal Psychosocial Problems

	HOSTILE BEHAVIOR		
	Nondeviant $(\%)$ $(n = 45)$	Deviant (%) $(n = 17)$	
Maternal psychosocial problems absent:			
Secure	100 (14)	00 (0)	
Avoidant	80 (4)	20 (1)	
Disorganized	73 (8)	27 (3)	
Maternal psychosocial problems present:	. ,	. ,	
Secure	78 (7)	22 (2)	
Avoidant	71 (5)	29 (2)	
Disorganized	44 (7)	56 (9)	

NOTE.-Cell n's in parentheses.

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	N	PRESCHOOL BEHAVIOR QUESTIONNAIRE SCORES			
		Total Problems	Hostile Behavior	Anxious Behavior	Hyperactive Behavior
PBQ validation sample:					
Disturbed sample	102	21.3	6.2	6.7	4.8
Normal sample	476	8.1	2.7	2.0	2.2
Current study sample:					
Classmate controls	182	8.8	3.0	2.6	2.1
Subjects:					
Neither risk factor	19	7.8	1.5	2.8	2.4
Psychprob only	16	12.6	3.8	4.3	2.6
D attach only	11	12.2	3.7	3.8	2.9
Both risk factors	16	16.4	6.8	3.7	4.0

MEAN BEHAVIOR PROBLEM SCORES FOR CHILDREN WITH EARLY RISK FACTORS COMPARED TO CLASSMATE SCORES AND PBQ VALIDATION SAMPLE SCORES

NOTE.-Psychprob = maternal psychosocial problems; D attach = disorganized attachment classification.

because mothers with psychosocial problems were more hostile and intrusive in early interactions with their infants. The psychosocial problems variable was a stronger predictor of later hostile behavior, however, as was shown in Table 1, and in combination with attachment status resulted in more accurate classification of deviant behavior than did the combination of attachment security and maternal behavior, 76% compared to 69%.

The additive effect of maternal psychosocial problems and disorganized infant attachment behavior on the rate of deviant behavior in preschool is shown in Table 4. As can be seen, if the infant displayed disorganized attachment behavior *and* the mother had psychosocial problems, a majority of the children, 56%, exhibited deviant levels of hostile behavior in preschool.

Means for the continuous problem scores by the two infant risk factors are shown in Table 5, in comparison to classmate scores and PBQ norms. Despite the lower socioeconomic status of the subjects' school districts, classmates' mean scores on the four PBQ problem scales were similar to means for the normal PBQ validation sample, as shown. As can also be seen, scores for study subjects with neither risk factor were slightly lower than scores for low-income classmates and lower than scores for the normal PBQ validation group. In contrast, scores for study children with both early risk factors exceeded scores for their own lowincome classmates and approached, or in the case of hostile behavior exceeded, the scores for preschoolers in the disturbed PBQ validation group.

Discussion

Results from the study extend the findings of previous longitudinal work relating infant attachment security to later maladaptive social behavior with peers. The inclusion of the disorganized/disoriented attachment category in the classification system revealed that children with disorganized attachment histories accounted for 71% of the cases of serious hostile behavior in preschool. At the same time, this subgroup of highly aggressive children remained a minority of all children classified in infancy as disorganized in their attachment relationships.

The obtained association between disorganized attachment behavior and later behavior problems may contribute to the previous mixed pattern of findings in longitudinal studies that did not include a disorganized attachment category. In low-social-risk samples such as those of Bates et al. (1985) and Goldberg et al. (1990), where no relation between infant attachment security and later problems were found, and that of Lewis et al. (1984), where predictive effects occurred only in boys, a low rate of disorganized infant behavior would be expected. In contrast, in the high-risk sample of Erickson et al. (1985), where a significant relationship between infant attachment security and later maladaptation was reported regardless of gender, a high rate of disorganized behavior would be predicted, particularly disor-

ganized-avoidant behavior (Carlson et al., 1989; Lyons-Ruth et al., 1990).

One subgroup of disorganized/disoriented infants who *did* develop behavior problems could be accounted for by the simultaneous presence of psychosocial problems affecting their mothers. The effects of attachment status and maternal psychosocial problems were independent and were additive rather than interactive, with no protective or potentiating relations between the two sources of risk. However, previous analyses of the infant data (Lyons-Ruth et al., 1990) had indicated that infants of mothers with psychosocial problems were less likely to develop secure attachments in the first place, suggesting both direct and indirect pathways for the influence of maternal problems on later child adaptation.

The finding that disorganized infant attachment behaviors and serious maternal psychosocial problems were part of the early family context of children who later displayed hostile behavior converges with and extends the larger literature on conduct problems. Maternal depressive symptoms and their correlate, maternal hostility, have been identified as frequent concurrent correlates of child conduct problems during the school years (Hammen et al., 1990; Richman et al., 1982; Stewart, deBlois, & Cummings, 1980; Webster-Stratton & Hammond, 1988; see Downey & Coyne, 1990, for review). The present data further suggest that maternal depressive symptoms and maternal hostility may have been present from early in the lives of children with conduct problems and that the conduct-disordered child's regulation of attachment-related affects in infancy may have been disorganized.

The observed asymmetry between forward and backward prediction sheds some light on the differing theoretical models held by clinicians and developmental researchers concerning the extent of continuity in early development. In the clinical area, a long-standing psychodynamic theoretical model has postulated significant continuity in maladaptive relationship patterns from infancy to early childhood, while among infant researchers prediction from infancy to later behavioral outcomes has appeared much more modest. The present data suggest that this difference in perspective may stem from a legitimate asymmetry in the backward and forward predictive association between behavioral difficulties in infancy and clinically significant behavioral problems in childhood, a common type of backward and forward asymmetry that exists in the prediction of other disorders such as the association between lung cancer and smoking. Clinicians may be able to predict at greater-than-chance levels that children presenting at age 5 with clinically significant hostile behavior are likely to have experienced both maternal psychosocial problems and disorganized attachment relationships in infancy. However, based on the same data, developmental observers in infancy cannot predict forward with the same degree of confidence. It remains to be seen whether more differentiated assessments of family environment or of subtypes of disorganized infant behavior might provide more precise forward prediction from the infancy period.

Bowlby (1988) has theorized that once a representational model of the attachment relationship is established in infancy, it will tend to maintain organization over time and exert an influence on later behavior independent of other environmental sources. One major contribution of previous attachment research has been the description of patterns of self-regulatory behaviors in infancy that were related to, but distinct from, patterns of caregiving. The finding that disorganized attachment status accounted for variation in later behavior independent of maternal variables is consistent with this view that self-regulatory processes need to be conceptualized as partially independent of the larger relational context. This tenet of Bowlby's theory also has important implications for the design of intervention efforts and deserves further evaluation in longitudinal studies (see also Renken, Egeland, Marvinney, Mangelsdorf, & Sroufe, 1989; Sroufe, Egeland, & Kreutzer, 1990, for related analyses).

As Sroufe (1989) has pointed out, one of the key premises of a developmental approach to psychopathology is that precursors to later maladaptation may be identified well before a true disorder develops. Disorganized attachment behavior deserves further study as one potential infant precursor of later maladaptation. A more process-oriented account is now needed of the particular aspects of high-risk environments that interfere with the infant's implementation of organized strategies for regulating attachmentrelated affects. While less optimal maternal behavior has been associated with disorganized infant attachment patterns, there are still few data available to evaluate why these negative interactive patterns result in disor-

ganized rather than organized insecure strategies (Hann, Castino, Jarosinski, & Britton, 1991; Lyons-Ruth et al., 1991; Main et al., 1985; Spieker & Booth, 1988; but see also Main & Hesse, 1990).

Equally important, evidence to date suggests that the behavioral patterns of children with disorganized attachment relationships may be particularly discontinuous over early development. Disorganized infant attachment strategies increase in frequency from 12 to 18 months of age among high-risk infants (Beckwith & Rodning, 1991; Lyons-Ruth et al., 1991), so that attachment assessments at 18 months rather than 12 months may be particularly important for prediction of later problems. This increase in disorganized strategies is apparently followed by a process of reorganization during the preschool years into one of two alternate forms of controlling behavior, controlling-caregiving or controlling-punitive (Main et al., 1985; Speltz, deKlyen, & Endriga, 1991). Children who display controlling-punitive behaviors with their parents may be those most likely to display hostile behavior toward peers in the classroom, though few data are yet available to evaluate this link. These gaps in current knowledge need to be addressed if the predictive associations found in the current data are to be more fully understood.

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