

# The Fate of Early Experience Following Developmental Change: Longitudinal Approaches to Individual Adaptation in Childhood

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SROUFE, L. ALAN; EGELAND, BYRON; and KREUTZER, TERRI. *The Fate of Early Experience Following Developmental Change: Longitudinal Approaches to Individual Adaptation in Childhood*. CHILD DEVELOPMENT, 1990, 61, 1363-1373. 2 strategies were used to investigate the continued impact of early experience and adaptation given subsequent experience and/or developmental change in a poverty sample ( $N = 190$ ). Groups were defined whose adaptation was similar during the preschool years but consistently different earlier; then these 2 groups were compared in elementary school. In addition, a series of regression analyses was performed in which variance accounted for by near-in or contemporary predictors of adaptation in middle childhood was removed before adding earlier adaptation in subsequent steps. Children showing positive adaptation in the infant/toddler period showed greater rebound in the elementary school years, despite poor functioning in the preschool period. Regression analyses revealed some incremental power of early predictors with intermediate predictors removed. The results were interpreted as supporting Bowlby's thesis that adaptation is always a product of both developmental history and current circumstances. While this research cannot resolve such a complicated issue, it does point to the need for complex formulations to guide research on individual development.

A strategically assembled longitudinal data set offers unique opportunities to address certain theoretical issues (Mednick, Harway, & Finello, 1984). Some of these are well-known and widely discussed, including investigation of stability and change in individual behavior. Other critically important theoretical issues concern the degree to which an earlier pattern of adaptation may still be present even though it currently is not being expressed, and the continuing influence of early experience beyond that of current circumstances.

All prominent theories of development ascribe an important role to contemporaneous environment as an influence on, or support for, adaptation. That is, the extent to which children are negotiating successfully the salient issues of a given developmental phase (self-regulation in the preschool period, competence in the peer group in middle childhood, etc.) is viewed as responsive to current environmental circumstances. Likewise, change in quality of adaptation from one period to the next is seen as influenced by environmental context.

Theories differ notably, however, with regard to assumptions made about the fate of prior experience and adaptation given changes in environmental context. One theorist has used a tape-recording analogy (Kagan, 1980). Prior adaptation, and experiences that contributed to it, are no longer influential once circumstances change. The tape was made and erased, and a new recording is now in existence. Others argue that any continuity in adaptation over time is itself due only to stability in the environment (Lamb, 1984). Indeed, important aspects of the social environment (e.g., quality of care) have been shown to be stable (Pianta, Sroufe, & Egeland, 1989), and adaptation change has been linked to changes in the caretaking environment (Egeland & Kreutzer, in press; Erickson, Sroufe, & Egeland, 1985; Vaughn, Egeland, Waters, & Sroufe, 1979). However, positions emphasizing only current environment assume a transmuting influence (and independence) of contemporary environment that has not been adequately evaluated.

In contrast to views emphasizing contemporary environment, Bowlby (1973, 1980) ar-

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## 1364 Child Development

gues that development is always a product of both current circumstances *and* developmental history (which includes genes, experience, and the succession of adaptations forged by the individual). Also, the developing child in part constructs his own environment (see Sroufe, 1979; Sroufe & Fleeson, 1988). Finally, while change is always possible, prior experience is not lost but is incorporated into the new pattern of adaptation (Werner & Kaplan, 1964). Earlier patterns may again become manifest in certain contexts, in the face of further environmental change, or in the face of certain critical developmental issues. While perhaps latent, and perhaps never even to become manifest again in some cases, the earlier pattern is not gone.<sup>1</sup>

As one specific example, a child who in early life experienced largely unavailable care, or a succession of losses or other disruptions of care, may in time come to function fully adequately given a consistently supportive environment. This would be expected, and with a protracted period of such support, this child's adaptation would essentially be indistinguishable from children knowing consistent and responsive care from the beginning. Still, it may be that such a child would remain more vulnerable to subsequent life stress, especially a significant loss; that is, the early formed belief that one may be abandoned by attachment figures might be reactivated by a loss in later life (Bowlby, 1980).

In the work to be presented, two strategies are used to examine Bowlby's proposition that early experiences and the adaptations to which they give rise remain as influences on later development, even given change and even beyond the influence of current circumstances or very recent adaptation.

Using the first strategy, we examined the differential resiliency of two groups of children showing comparably poor adaptation with respect to the salient issues of the preschool period (flexible problem solving, self-management, curiosity) but who had shown strikingly different adaptation earlier. Although both groups were functioning poorly during the preschool years, one group had shown positive adaptation earlier (secure attachment in infancy and movement toward harmonious autonomy in the toddler period,

patterns associated with supportive care). How would these two groups subsequently compare in the early elementary years?

The second strategy involved removing variation in an outcome accounted for by contemporaneous environmental measures and/or just preceding measures of adaptation, and then assessing the additional predictive power of earlier assessments. That is, does knowledge of earlier adaptation or environmental variation increase the strength of prediction to an outcome beyond more contemporary measures?

The data to be reported are based on observed quality of the environment, patterns of adaptation with respect to the salient issues of the early years, and outcome evaluations we have collected on a large sample of subjects ( $N = 190$ ) at risk for developmental problems (Erickson et al., 1985; Renkin, Egeland, Marvinney, Sroufe, & Mangelsdorf, 1989). The assessments have been densely packed and comprehensive, allowing assessment of adaptation from infancy through middle childhood.

### Method

#### SUBJECTS

The subjects in this research were part of a prospective longitudinal study of 267 families from lower socioeconomic backgrounds (Egeland & Sroufe, 1981). The sample of primiparous women in their third trimester of pregnancy was recruited from prenatal clinics sponsored by the Maternal and Infant Care project of the Bureau of Maternal and Child Health, Minneapolis Health Department. In general, it is a population considered at high risk for later caregiving problems. At the time of delivery, the mothers ranged in age from 12 to 37 years ( $M = 20.52$ ,  $SD = 3.65$ ), and 62% of the mothers were single. Forty percent had not completed high school and 86% of the pregnancies were unplanned; 80% of the mothers were white, 14% were black, and the remaining 6% were Native American or Hispanic.

Different subsets of the 190 subjects remaining in the sample are included in the analyses to be presented below. The numbers vary because when analyses involve numer-

<sup>1</sup> Thelen (1989), studying human infants, has shown that certain behaviors that seemingly have disappeared from the repertoire may be shown to have potential for reactivation. For example, alternating stepping movements that may be easily elicited in newborns apparently are not available after several weeks. However, if such movements are supported by placing the now heavier infant on a moving treadmill, the movements may be activated again.

ous developmental periods subjects are sometimes lost. As often as possible we retained subjects by using the data that were available; that is, when composites were made across developmental periods, these were based on partial data when all assessments were not available (see Data Reduction, below). Two analyses involved particular subsets of subjects, with numbers varying accordingly. Samples sizes will be indicated for each analysis.

## PROCEDURE

### *Rationale for Selection of Measures*

The present article utilizes broad-band assessments of adaptation keyed to each developmental phase (rather than the more specific measures of functioning we have also assessed). Thus, we are focused at the level of the organization of behavior (Sroufe, 1979, in press), with particular patterns of adaptation evaluated with regard to how well they promote development (i.e., successful negotiation of subsequent issues; Waters & Sroufe, 1983). The measures used are based on global ratings, molar indices of competence derived from factor analyses of more specific measures, or examination of the patterning of behavior in the assessment situation (e.g., attachment classification). In each case, the measures are aimed at the salient issues of the particular developmental period (attachment, autonomy, self-regulation, peer competence). Moreover, based on earlier research, we assume that these broad-band indices reflect the cumulative personal and environmental influences operating to that point in time.

We also used the most global measure of environment we had available (the HOME Scale), rather than more specific measures that we have also assessed. The influence of these other variables (life stress, caregiver relationship status) has been addressed in other papers (e.g., Egeland & Kreutzer, in press). An advantage of the HOME variable is that it is completely independent of our child adaptation assessments, carried out in the laboratory. A disadvantage is that it cannot really stand in place of detailed assessments of parent-child interaction.

### *Assessments*

In each case, outcome or predictor variables were reduced to a single index by combining measures. Independent coders made each of the sets of ratings to be described (usually several sets of coders even within an age period), and never had knowledge of other data on the child.

*Attachment (12, 18 months).*—Standard Strange Situation assessments were used with classifications done according to Ainsworth's guidelines (Ainsworth, Blehar, Waters, & Wall, 1978). Conferenced ratings of two coders, at least one of whom had demonstrated reliability with Ainsworth's group, were used at each age. For the analyses to be reported, A and C (the two anxious patterns of attachment) were collapsed.

*Tool problem assessment (24 months).*—Procedures described by Matas, Arend, and Sroufe (1978) were utilized. A dyadic situation was devised in which the child worked to solve a series of problems of graded difficulty, with mother available for help. A variety of ratings were made, typically on 7-point Likert-type scales. These ratings were subsequently factor-analyzed and a competence factor derived. These variables, their factor loadings, and brief definitions are found in Table 1. (Complete descriptions of all scales are available from the authors.)

*Teaching tasks and barrier box (42 months).*—These situations have been described by Erickson et al. (1985). In the four teaching tasks, mother directs the child to: (1) build block towers of specific proportions, (2) name things with wheels, (3) match colors and shapes on a form board, and (4) trace a preset pattern through an etch-a-sketch maze. The barrier box presents the child with an essentially unsolvable problem (to open a Plexiglas box filled with toys). Mother is not present during this task. Again, a variety of 7-point child ratings were made in both of these tasks and then factor analyzed. The factors derived, along with factor loadings and definitions of the variables, are found in Table 1.

*Curiosity box (54 months).*—A number of ratings were made in Banta's (1970) curiosity box situation. The curiosity box is a large wooden box with numerous attractive features (doors to open; things to twist, pull, and turn; a long-springed Slinky, etc.). The child's readiness to explore, affect, enthusiasm, and systematicity of play are evaluated. The ratings were again factor analyzed (see Table 1).

*Teacher rankings and behavior problem checklists (kindergarten, first, second, and third grade).*—Available for the present analyses were rankings made by teachers of peer competence and emotional health. The emotional health ranking may be thought of as an assessment of overall adjustment, while the peer competence ranking is a measure of social competence, perhaps the most salient

TABLE 1

VARIABLES (Ratings) UNDERLYING COMPOSITES FOR THE 24-54-MONTH PREDICTORS

| Variable                    | Factor Loading | Definition  |
|-----------------------------|----------------|---|
| 24 months (tool problems):  |                |   |
| *Persistence .....          | .84559         | Degree to which the child remains goal oriented and involved with the problem |
| *Dependency .....           | -.82786        | Degree of nurturance, attention, help seeking                                 |
| *Coping .....               | .72818         | Degree of frustration, stress child tolerates                                 |
| Enthusiasm .....            | .45937         | Enthusiasm, enjoyment, involvement shown                                      |
| Noncompliance .....         | -.33645        | Resistance, refusal to comply, negativism                                     |
| Negative affect .....       | -.30956        | Amount of crying, whining, tantrums, anger                                    |
| 42 months (teaching tasks): |                |   |
| *Experience .....           | .93865         | Child's experience of success and competence                                  |
| *Persistence .....          | .92226         | Degree to which the child stayed problem oriented                             |
| *Compliance .....           | .92029         | Degree of compliance with mother's directives                                 |
| Enthusiasm .....            | .86567         | Child's eagerness, vigor, and confidence                                      |
| Negativity .....            | -.83065        | Anger, resistance, demandingness toward mother                                |
| 42 months (barrier box):    |                |   |
| *Agency .....               | .91059         | Confidence, vigor and force of efforts  |
| *Flexibility .....          | .90258         | Range of tactics, regrouping, trying alternatives                             |
| *Persistence .....          | .87773         | Degree of continued efforts to open the box                                   |
| Apathy .....                | -.56538        | Noninvolvement or withdrawal from the situation                               |
| Self-esteem .....           | .51994         | Interest, curiosity, enthusiasm, self-management and confidence               |
| 54 months (curiosity box):  |                |   |
| *Self-esteem .....          | .89881         | Enthusiasm, confidence in exploration   |
| *Involvement .....          | .84908         | Degree of sustained exploration of the box                                    |
| *Agency .....               | .84850         | Thoroughness, purposefulness, vigor of exploration                            |
| Level of play .....         | .78042         | Imaginativeness and quality of play   |
| Positive affect .....       | .53646         | Amount of animation and enjoyment in exploration                              |
| Negative affect .....       | -.52813        | Amount of frustration, anger, or distress                                     |
| Dependency .....            | -.40402        | Amount of attention or involvement sought from experimenter                   |

NOTE.—Variables selected for composites are marked with an asterisk.

developmental issue for middle childhood (Elicker & Sroufe, in press). (Definitions provided to the teachers are found in the Appendix.) The rankings were made by the child's primary teacher and have several advantages over the numerous ratings that were also made. First, they are at the molar level preferred for the present analyses. Second, since the children in our study are in 140 separate classrooms, rankings provide a way of calibrating individual teachers who may tend to rate children high or low in general. Finally, especially in the early school years, it was sometimes possible to have the teacher rank the whole class by initials, being blind to the child being assessed (which counters a tendency to rate all children being studied by university researchers as troubled). To adjust for the fact that class sizes varied, rankings were converted to proportions by dividing the child's rank by the class size and subtracting this result from 1. Teachers also completed the Child Behavior Problem Checklist of Achenbach and Edelbrock (1986), which was

used to validate the teacher rankings in this study.

*HOME Scale (30 months; 6 years).*—At age 30 months and in first grade, the HOME scale (Caldwell & Bradley, 1984) was completed by trained observers. The HOME is a semistructured interview and observation instrument designed to measure the quality of the child's home environment. At the time of our 30-month visit to the child's home, we completed the HOME Inventory for Infants and Toddlers. This 45-item inventory is broken down into six subscales: Emotional and Verbal Responsivity of the Parent, Acceptance of Child's Behavior, Organization of Physical and Temporal Environment, Provision of Appropriate Play Material, Parent Involvement with Child, and Opportunities for Variety in Daily Stimulation. A total score based on a composite of the six subscales was used for the statistical analyses.

At the time of the first-grade visit to the child's home, we completed the elementary

version of the HOME. This version consists of 59 items that are scored on nine different subscales: Organization of a Stable Environment, Developmental Stimulation, Quality of Language Environment, Responsiveness and Avoidance of Restriction, Fostering Maturity and Independence, Emotional Climate, Breadth of Experience, Aspects of Physical Environment, and Play Material. A total score based on the subscales was used in the analyses.

*Counselor ratings (age 10).*—For a subsample of children ( $N = 47$ ), ratings and rankings were available based on functioning at 4-week summer camps (Elicker & Sroufe, in press). For comparability to school outcome data, a rating of peer competence and a ranking of self-confidence were utilized. Each child was independently assessed by four counselors.

#### *Data Reduction Strategy and Procedures*

Given a very large number of variables, it was essential to reduce the potential data set in an unbiased and systematic way. In this study we relied primarily on factor analysis and compositing of variables.

#### *Outcome Variables*

The major outcome variable in the analyses below was a composite of the rankings of emotional health and peer competence made by the three principal teachers across grades 1–3. To reduce variance due to idiosyncratic ranking, only the two teachers most closely agreeing on the particular ranking were utilized. These ranks were then averaged and, finally, emotional health and peer competence rankings were added together. This composite ranking measure was chosen over the Behavior Problem Checklist data because the rankings are keyed to the salient developmental issues of middle childhood and because they are bipolar. The CBCL does not capture variance at the positive end of adaptation. In addition, the rankings and the CBCL total problem score do correlate quite strongly ( $r = .6333$ ,  $df = 171$ ,  $p < .001$ ), attesting to the validity of the ranking measure.

In one analysis, a “preschool age” variable is used as the outcome. This is a composite of the factor-derived measures from the 42- and 54-month assessments (see predictors below). In another analysis, the composite judgments of the four camp counselors were utilized.

#### *Predictor Variables*

*Attachment.*—Attachment data were reduced by assigning each child a score across

the 12–18-month period, according to the number of times he or she was securely attached (0, 1, 2). Not only does this permit summarizing across two periods, but it allows us to retain subjects whose attachments were unstable (38% in this poverty sample). Further, it is based on the plausible assumption that those assessed as secure twice are more likely secure than those assessed as secure just once (either because of assessment error or actual change), who, in turn, are more likely to be secure than those never judged secure.

*24–54-month assessments.*—The predictors for these age periods were based on the factor analyses of the various rating scales (see Table 1). From the derived competence factors, the three variables with the highest loadings were composited to form a predictor. In most analyses, the 42- and 54-month composites were also combined to form what is called the “preschool age” predictor (or, in analysis 2, the criterion).

#### *Analyses*

Analyses will be described in detail in each section of the results. Two basic formats are used:  $t$  tests when groups showing particular patterns of development are compared with regard to outcome variables, and hierarchical multiple regressions for determining variance accounted for by earlier adaptation and environmental influence when later influences are removed statistically. The most relevant statistic in these analyses is the  $F$  change, which indicates the level of significance of a subsequent variable after variance accounted for by variables entered previously is removed.

## **Results**

### *Analysis 1: Developmental Rebound in Children with Different Early Histories*

In this analysis, we defined two groups of subjects who had followed well-defined but distinctive patterns of adaptation over time. The first group ( $N = 11$ ) showed consistent positive adaptation in the first three assessment periods (12–24 months), then showed poor adaptation (two of three assessments) across the 42- to 54-month assessments. The second group ( $N = 16$ ) showed poor adaptation both in the early and later periods. Thus, both groups are functioning consistently poorly during the preschool period. The consistency of their poor adaptation increases confidence that this performance is not error variance and that any rebound with respect to the elementary school outcome variable is not

## 1368 Child Development

simply regression to the mean. Ideally, we also would have compared children functioning well throughout with children functioning poorly in the early assessments and then doing well during the final assessments of the preschool period. Unfortunately, the latter group is represented with insufficient frequency in our poverty sample to allow such an analysis ( $N = 3$ ). Generally, we have downward drift in our sample. This works against differential rebound in the good, then poor group described above.

Nonetheless, when these groups were compared on adaptation in the early elementary school years, there was evidence for a return of differences in functioning. The combined score on the emotional health/peer competence ranking for group 1 was 110.27 ( $SD, 38.87$ ) and for group 2 the mean was 65.19 ( $SD, 50.62, t = -2.61, p < .015$ ). Those subjects with the early history of positive adaptation showed the greatest capacity for rebound, despite comparable adaptation in the period before school entry.

### *Analysis 2: Predicting Preschool Age Adaptation from Adaptation in Infancy with 30-Month Environmental Variation Removed*

In this first regression analysis, we used the preschool age composite variable as the outcome and first entered the 30-month HOME Scale score as the predictor. We next entered the 12- and 18-month attachment summary variable ( $N = 151$ ). The 30-month Home score predicted significantly the preschool criterion ( $R = .2196, p < .006$ ). In addition, the multiple  $R$  with attachment history added to the 30-month home predictor was .2698, and the  $F$  change was significant ( $p < .05$ ), supporting the incremental validity of the earlier attachment measure.

### *Analyses 3–5: Predicting Teacher Rankings in Grades 1–3 from Early Measures with More Contemporary Measures Removed*

In these regression analyses, the composite emotional health/peer competence ranking (grades 1–3) served as the outcome. We begin with the most comprehensive analysis, where predictors across this age range are entered in reversed developmental order. Then, selected follow-up analyses are presented to further clarify findings. Intercorrelations of all variables utilized are presented in Table 2.

*Analysis 3.*—In this analysis (see Table 3A), we first entered the 6-year HOME environment score, which significantly predicted the grade 1–3 criterion ( $R = .2478, F = 9.420, p < .003$ ). Next, we entered the kindergarten

teacher rankings of emotional health/peer competence. The multiple  $R$  increased substantially (.5452), with the  $F$  change highly significant ( $p < .001$ ). Still, child functioning in preschool ( $R = .5654$ ) and the 30-month HOME scale assessment ( $R = .5853$ ) each added significant predictive power, with both  $F$  changes being significant. The increment from adding infant attachment in the final step ( $R = .5907$ ) fell short of significance.

*Analysis 4.*—The power of the early HOME environment measure is further illustrated when the kindergarten ranking is left out of the predictive equation. Such an analysis is justified by the fact that the kindergarten ranking shares substantial method and context variance with the outcome. The results of this analysis are seen in Table 3B. Here, the increments yielded by both the preschool age variable and the 30-month HOME Scale are substantially larger than in Analysis 3, and both  $F$  change values are highly significant ( $p < .005, .002$ , respectively). Again, however, the increment yielded by the infant attachment assessment falls short of significance.

*Analysis 5.*—Table 3C shows that when the attachment variable is entered after removing the intermediate preschool variable, it does account for significant additional variance. A comparable degree of increment was found in analyses where only the 6-year HOME or the kindergarten ranking were entered before adding attachment.

To summarize analyses 3–5, assessments as early as 30 months could be shown to add to more contemporaneous predictors of elementary school competence. Additional variation accounted for by infant attachment assessments, however, was essentially absorbed by the combination of intermediate measures. In addition, the simple correlation between the attachment variable and this outcome was only a modest .1920 ( $p < .008$ ), with no other variance removed.

### *Analysis 6*

Despite compositing across teachers, the outcome measure in the preceding analysis contains considerable error, due in part to the lack of training of teachers in observation and ratings, and in part by limited opportunity to observe children in nonclassroom social settings. For a subset of subjects, representative of the total sample in terms of attachment history, we had a more powerful outcome variable. These subjects ( $N = 47$ ) had participated in one of a series of 4-week summer camps at age 10–11 years (Elicker & Sroufe, in press). Independent ratings were made by

TABLE 2  
 INTERCORRELATIONS (Pearson  $r$ ) OF MAJOR PREDICTOR AND OUTCOME VARIABLES ( $N$  in Parentheses)

| Camp Competence         | Grade 1-3 Competence | Kindergarten Competence | HOME Grade 1      | Preschool Competence | HOME 30 Months             | Attachment                  |
|-------------------------|----------------------|-------------------------|-------------------|----------------------|----------------------------|-----------------------------|
| Camp competence         | .3074*<br>(47)       | .2533*<br>(47)          | .0993<br>(44)     | .1385<br>(44)        | .2014 <sup>+</sup><br>(44) | .3595**<br>(44)             |
| Grade 1-3 competence    |                      | .5200***<br>(171)       | .2478***<br>(163) | .2728***<br>(164)    | .3617***<br>(164)          | .1920**<br>(158)            |
| Kindergarten competence |                      |                         | .1662*<br>(167)   | .1869**<br>(164)     | .2798***<br>(166)          | .1190 <sup>+</sup><br>(161) |
| HOME, grade 1           |                      |                         |                   | .2190**<br>(155)     | .5095***<br>(156)          | .1026 <sup>+</sup><br>(151) |
| Preschool competence    |                      |                         |                   |                      | .2269**<br>(162)           | .1801**<br>(158)            |
| HOME, 30 months         |                      |                         |                   |                      |                            | .1806**<br>(165)            |

<sup>+</sup>  $p < .10$ .

\*  $p < .05$ .

\*\*  $p < .01$ .

\*\*\*  $p < .001$ .

TABLE 3

PREDICTING GRADE 1-3 PEER COMPETENCE/EMOTIONAL HEALTH COMPOSITE FROM PREDICTORS ENTERED IN REVERSE DEVELOPMENTAL ORDER ( $N = 146$ )

| Step   | Multiple R | F Change  |
|--|------------|-----------|
| A. All predictors:                                   |            |           |
| 1. HOME Scale (6 years) .....                        | .2478      | ...       |
| 2. Kindergarten rank .....                           | .5452      | 47.981*** |
| 3. "Preschool" .....                                 | .5654      | 4.690*    |
| 4. HOME Scale (30 months) .....                      | .5853      | 4.920*    |
| 5. Attachment .....                                  | .5907      | 1.402     |
| B. Without kindergarten predictor:                   |            |           |
| 1. HOME Scale (6 years) .....                        | .2478      |           |
| 2. "Preschool" .....                                 | .3340      | 8.078**   |
| 3. HOME Scale (30 months) .....                      | .4144      | 10.305**  |
| 4. Attachment .....                                  | .4267      | 1.847     |
| C. Without HOME, preschool, and 30-month predictors: |            |           |
| 1. "Preschool" .....                                 | .2728      |           |
| 2. Attachment .....                                  | .3091      | 3.616*    |

\*  $p < .05$ .

\*\*  $p < .01$ .

\*\*\*  $p < .001$ .

four highly trained counselors who were blind to any prior information on the child but had extensive opportunity to observe the child in the social context of daycamp. The variables closest to the elementary school outcome variables used above were a rating of "social skills with peers" and a "self-confidence" ranking. These were composited together across the four counselors to form the outcome variable here.

The primary analysis with this smaller subsample involved just two steps. First, we entered the most contemporary predictor, the elementary school composite. The resulting correlation with the camp criterion was .3074 ( $p < .036$ ). Next we entered the 12-18-month attachment variable. The new  $R$  (.5112) and the  $F$  change (9.940,  $p < .003$ ) were highly significant. The  $F$  change for attachment was also significant when any other predictor was entered as a second, intermediate step.

## Discussion

In each analysis, measures of the early home environment and/or measures of early adaptation were found to have explanatory power even after later assessments were taken into consideration. The 30-month HOME Scale proved to be particularly robust. In light of the challenges faced in such longitudinal research, we take these data as supporting Bowlby's general model of development, in which both the total developmental history and current circumstances are given important roles. Further, we would ar-

gue that behavioral change per se cannot be taken as evidence for the erasure of earlier experience. This same point was made by Hinde and Bateson (1984) when they argued that profound behavioral change, even total transformation, may not indicate discontinuity in the sense of a break from the past (e.g., moths laying eggs on vegetation that nourished them as caterpillars).

The issues involved in this research are complex and certainly cannot be resolved in a single study. The data here are open to a number of interpretations. Others may interpret these data as underscoring the influence of contemporary environment. This is supported by the power of more contemporary measures in our major analyses. Moreover, an assessment of parent-child interaction during the early elementary school years was not available in this study. Such a measure may have accounted for more variance in the outcome measures. A judgment on these interpretations must await further study with more powerful measures and different samples, including those having more stability and less downward drift than our poverty sample.

Dominant issues in the field, such as the roles of nature and nurture, continuity/discontinuity, and the impact of early versus later experience, are not going to yield to simplistic formulations (Sackett, Sameroff, Cairns, & Suomi, 1981). While in a researcher's mind, past experience and current environment may be independent sources of variance, whose relative power may be assessed

in a linear analysis (Lamb, 1984; Lewis, in press), in reality children play a large role in creating their own environments, in accord with past experience. In other research from this project, we have shown that preschool teachers show higher maturity demands, higher and more positive expectations, and less tendency to control children with secure attachment histories compared to children with histories of anxious attachment (Motti, 1986; Sroufe & Fleeson, 1988). Moreover, children with secure attachment histories more often have friends, more often select as partners other children with secure histories, and have deeper friendships when assessed at summer camp at age 10–11 years (Elicker & Sroufe, in press). Thus, children who elicit rebuff from teachers and peers and children who elicit support experience different contemporary environments. It follows that using regression analyses to partial out variance in an outcome variable accounted for by such contemporary environmental variables likely underestimates the enduring role of early experience in later adaptation.

No doubt the complexity goes beyond what we have shown in our research to date. Many questions remain about the unique impact of early patterns of adaptation. Research with monkeys does suggest that early deprivation may have more profound effects than later deprivation, and longer deprivation more than shorter deprivation (Sackett, 1970). Other monkey research suggests that the impact of early experience may remain potentially active despite change. Suomi (e.g., Novak, O'Neill, Beckley, & Suomi, in press), in accord with our reasoning, argues that the impact of early experience may remain dormant in certain contexts, only to be expressed later. After several years in naturalistic, ecologically sound environments, formerly deprived animals often are indistinguishable from those experiencing normal rearing. Exploratory behavior, social behavior, and sexual behavior appear normal. However, when these animals were once again placed in test cages, they showed maladaptive behaviors they had shown as juveniles, in contrast to normally reared monkeys. Remarkably, they exhibit "signature" stereotypies (i.e., replicas of quite idiosyncratic mannerisms they had shown as infants).

Bowlby (1973, 1980) argues that early experience may be of special importance for humans because early working models of caregiver and self are preverbal and ultimately may be shielded from environmental feedback by more sophisticated, overlaying

verbal models, often mandated by parental authority. Thus, while the rebound we found for the group with early positive adaptation may have been due simply to a return to a more supportive environment, it may also be that children with early internal models of available care and self-worth are more responsive to positive features of the environment and more resilient to stress, as we have reported elsewhere (Egeland & Kreutzer, in press).

Other questions also remain to be addressed by future research. Are there particular arenas where specific aspects of early adaptation will later be manifest? Is there a point where change becomes complete and earlier patterns do lose their force or become consciously controlled by the person? Is the force required for change greater the longer a pattern has been maintained? How does this interact with age of onset? Is change more readily accomplished when the adaptational history has been previously characterized by change? These and other questions guide our research as our subjects move into the period of early adolescence.

## Appendix

### Definitions of Outcome Criterion Variables

#### *Definitions of Elementary School Ranking Variables*

*Emotional health/self-esteem.*—This refers, in part, to the degree to which the child is able to take advantage of what the class has to offer. He or she is not incapacitated by overdependency, lack of self-control, distractibility, inhibition, anxiety, or an asocial orientation. He is confident, curious, self-assured, and engaging; enjoys new experiences and new challenges; and becomes involved in whatever he does. This child typically enjoys social activities but can also become involved in more academic pursuits. He is also usually self-directed and self-motivated. He likes himself or herself and therefore brings a positive attitude to the classroom.

*Peer acceptance/popularity.*—A popular child is well liked by others and has clearly identifiable, mutual friends. Additionally, he is respected by others, and his/her ideas and actions are followed. Criteria for a child high on popularity would include the following: (a) sociability (i.e., fairly frequent social contact with peers), (b) wide acceptance among other children, (c) friendship (i.e., one or more special companions with whom there seems to be a well-meshed relationship), (d) social skills and leadership qualities, and (e) understanding another child's perspectives and desires, accepting the other child's ideas as a starting point for interaction, and using clear, comprehensible communications toward peers. Others want to be with this child and do what he is doing, and this child

## 1372 Child Development

knows how to lead them to interesting and fun activities.

### *Definitions (Scale) for Camp Criterion Variables*

*Self-confidence (ranking).*—The child's assuredness in approaching situations: the projected belief that he can do things. His expectancy for success. This is related to the sense of personal power and efficacy. This child takes on new situations believing they can be mastered. He asserts himself in group situations and tends to be in a leadership role.

*Social skills with peers (rating).*—This scale represents the degree to which the child is able to interact well with peers. Features of good social skills include: being responsive and enthusiastic toward peers, maintaining interactions with more elaborated play themes, modified play themes or initiations to play that interest other children, being accepted by other children as a playmate and a friend (as evidenced by how other children respond to the target child and whether they invite him to play with them). Some children may have only one friend with whom they play intensively, whereas other children have many social contacts and seem to be widely accepted in the group. Perhaps such interaction patterns may be associated with the age or sex composition of the group or with the history of children's attendance. Nonetheless, a child may get a high score on this scale with either pattern if he shows himself to be effective in social interactions and seems not to lack the required skills for more intensive or more extensive interactions.

Criteria for a high score on this scale would include elements from the following dimensions of social competence: (a) sociability (i.e., fairly frequent social contact with peers), (b) popularity (i.e., wide acceptance among other children), (c) friendship (i.e., one or more special companions with whom there seems to be a well-meshed relationship), and (d) social skills (i.e., techniques of social interactions that promote social relations, e.g., understanding another child's perspectives and desires, negotiating different play themes if a particular overture to play is not accepted, accepting the other child's ideas as a starting point for interaction, and using clear, comprehensible communications toward peers).

One special problem in rating social skills is how to rate a child who is very skillful but also is aggressive toward peers. Aggression seldom enhances popularity and generally precludes more skillful solutions to problems. Aggression should be considered in rating this scale exactly on that basis (i.e., how much damage that behavior does to the child's social functioning in that group). One child may appear very "bossy" and aggressive in a domineering way and yet be very popular and skillful. Another child may use aggression as a solution in ways that get him socially rejected. Judge the aggression on these principles (and use the Negative Emotions Scale to index the role of hostility in such behavior). (Three of the 7 scale points are presented below.)

1. *Very low.*—This child has real difficulty in-

teracting with peers. He probably has no real friends or regular playmates, tends to alienate other children through his lack of social responsiveness or arbitrary conduct in play, and usually is socially isolated or permitted to play only in limited ways by other children.

4. *Moderate.*—This child would be considered fairly well meshed into the peer group. He probably has some easily identifiable companions and easily gets involved in social interactions. He is not a leader of the group, however, nor does he demonstrate unusually astute skills in peer interactions. He simply seems to fit in well and to have no particular difficulties meshing with the group.

7. *Very high.*—This child is outstandingly good at social relations. Play is rich with incidents in which he modulates his behavior in ways that contribute to good social interactions (e.g., creative play themes, being able to include additional children into his play, re-engaging a child's interest in an ongoing or a new activity, etc.). This child seems to enjoy his skillful social relations with peers, to have trusted friends because of his skills, and to be able to apply those skills in a wide variety of new social settings with new children.

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