10 Maternal stress and children's development: prediction of school outcomes and identification of protective factors

Robert C. Pianta, Byron Egeland, and L. Alan Sroufe

The extent to which contextual stress in families affects children's development is a research topic that has been given considerable emphasis within the emergent field of developmental psychopathology (Garmezy, 1983, 1984; Garmezy, Masten, & Tellegen, 1984). This chapter presents research findings relating maternal stress and children's school outcomes, conducted as part of the Mother–Child Interaction Research Project at the University of Minnesota. The Mother–Child Project has accumulated data on the role of maternal stress in predicting child maltreatment (Egeland, Breitenbucher, & Rosenberg, 1980; Pianta, Egeland, & Erickson, 1989) and as a factor related to the quality of attachment relationships (Erickson, Sroufe, & Egeland, 1985; Egeland & Farber, 1984). These studies have suggested that maternal stress played a major role in determining certain parenting and child outcomes in this sample. Specifically, in this chapter we present data on the effects of maternal and family psychosocial stress on children's development in the early school years and the factors related to competence in a high-stress subsample. These introductory sections address issues germane to the study of contextual stress and its effects on children.

Risk research and the study of stressful life events

By and large, studies that have examined the role of contextual stress in child development have chosen one of two possible strategies for measuring contextual stress, both of which have certain advantages and disadvantages. The first uses life events scales as measures of general environmental stress, and the second involves identification of subjects on the basis of exposure to a particular stressor, such as divorce (Wallerstein, 1983) or parental mental

This research was supported by a grant from the Maternal and Child Health Service of the U.S. Department of Health, Education, and Welfare (MC-R-270416-01-0). This research is currently supported by a grant from the Office of Special Education, Department of Education (G00830029), and by the William T. Grant Foundation.

illness (see chapters 11 and 12 in this volume). These measurement strategies have been applied within prospective risk research designs and concurrent or retrospective designs. From a methodological standpoint, the prospective designs have provided a more powerful data base from which to make inferences regarding the causal nature of stress and other risk factors (Garmezy, 1977). However, issues related to the advantages and disadvantages of the measurement strategy chosen to study contextual stress (life events scale or single stressor) may have implications for theory building that are as important as the nature of the research design.

Life events scales as measures of contextual stress

Life events scales and their use as predictors have come under a great deal of justified criticism. Investigators have cited the need for these scales to contain items representative of subjects' experiences, to control for retrospective collection of data, and to collect and score responses so as to gain some assessment of the relative stressfulness of a particular event for a subject (Brown & Harris, 1978; Cochrane & Robertson, 1973; Derogatis, 1982; Dohrenwend & Dohrenwend, 1974). Other weaknesses of this approach have to do with the assumption that subjects' endorsements or reports of wide-ranging experiences lie along a common dimension of nonspecific stress and can therefore be composited to form a single score that can then be used as a predictor variable. This assumption has proved tenuous in light of research on the multidimensionality of these scales (Skinner & Lei, 1980). The life events literature has also lacked studies of a prospective, multivariate nature and thereby has confused cause and consequence (Rabkin & Streuning, 1976).

Despite these shortcomings, the life events methodology has proved amenable to a number of adaptations that have been quite useful in improving it as a strategy for measuring contextual stress. The advantages of using life events scales as measures of contextual stress lie predominantly in the fact that they survey a wide range of stressors and are adaptable to use within a semi-structured interview format whereby subjects' subjective interpretations of events can be analyzed. If gathered frequently across time, the information from these scales can be applied prospectively (Brown & Harris, 1978; Derogatis, 1982; Dohrenwend, Krasnoff, Askensky, & Dohrenwend, 1982; Perkins, 1982). Egeland et al. (1980) applied a scoring technique in which ratings were assigned to the disruptiveness of life events items on mothers' functioning (Egeland & Deinard, 1975), and they found the scores from this rating technique to be predictive of maltreatment, whereas simple event occurrence was not. Skinner and Lei (1980) have investigated the multidimensional nature of these scales, as have Pianta (1986) and Herzog (1985), and it is clear that there is potential for development of subscales that will measure specific stressors. Issues that remain to be addressed include continued work on the

multidimensionality of life events scales and the nature of relations among subscales measuring specific stressors, as well as the relations of these measures to outcomes.

Research on single stressors

There have been several research programs that have focused attention on the developmental sequelae of exposure to a single major stressor. Research on the effects of parental divorce is one example of this approach (Hetherington, Cox, & Cox, 1979; Wallerstein, 1983), as is research on the effects of family violence (Straus, 1983) or parental mental disorder (Watt, Anthony, Wynne, & Rolf, 1984). This approach to research on stress is attractive in that some believe that it may encompass a somewhat more circumscribed field of influences than does research that relies on life events scales, and it has led to the development of data bases for generating theoretical statements regarding particular stressors (Rutter, 1983). Unfortunately, there is the strong possibility that many of the subjects chosen for inclusion in this type of investigation, by virtue of their exposure to the stressor of interest, will have been exposed to a number of other stressors as well, so that there will be considerable overlap among subjects within and between investigations in the extent to which they represent multiple stressful experiences. This can result in difficulty in making statements about the effects of a particular kind of stress, such as divorce, when in fact there may be a number of families in a sample chosen for divorce that have also been exposed to other stressors, such as violent behavior or changes in income or employment status.

The possibility of exposure to multiple stressors in families chosen as "at risk" because of a single stressor suggests a need to assess contextual stress, even in research on single stressors, in such a way as to be able to capture and analyze the relations among and effects of a variety of stressors. From this perspective, the life events literature and the research on single stressors converge on the need to develop measurements of contextual stress that are wide-ranging enough to have adequate face and content validity and that also acknowledge the multidimensional nature of contextual stress. The use of life events scales as a basis for forming subscales representative of specific stressors may be useful in this regard, because this approach allows the researcher to sample many different types of contextual stress and also examine the many ways in which events may be classified and related to one another and to criterion variables (Herzog, 1985).

Recent investigations have shown promise in beginning to establish a more solid empirical base for the roles that contextual stresses may play in child development by using a risk research design and measuring stress using life events scale total scores. Maternal and/or child stresses have been related to

changes in attachment classification (Egeland & Farber, 1984), child maltreatment (Pianta et al., 1989), and children's academic and behavioral outcomes in school (Garmezy et al., 1984; Lewis, Feiring, McGuffog, & Jaskir, 1984). These studies have not attempted to measure or analyze the effects of specific stressors. Data presented in a later section of this chapter address this issue by using measures of specific stressors derived from life events scales to predict developmental outcomes within a risk research design.

Risk research, life events, and protective factors

Accounting for deflections in development both away from and toward competence has been a major focus of risk research, although historically interest has been focused toward those factors accounting for deflections away from competence. Protective factors have, until recently, received less attention, despite their potential to facilitate efforts directed at primary prevention of nonoptimal outcomes (Garmezy, 1984; Rutter, 1979, 1983; Sroufe & Rutter, 1984). In a recent summary of the literature, Garmezy (1984) identified three factors that appear to differentiate between competent and incompetent children within highly stressful environments across a wide range of investigations: personal characteristics of the child, a relationship with a warm, empathic adult, and a social environment that reinforces and supports the child's coping efforts. This suggests that attempts to identify protective factors must take into account individual child characteristics, including previous developmental history, the characteristics of parents and parent–child relationships, and larger, system variables such as the support available for parents in the social network.

The Mother–Child Interaction Research Project has been specifically designed to address many of the issues involved in studying the effects of contextual risk, stress, and protective factors. By means of a risk research design, data have been collected periodically on approximately 200 families in the areas of child competence and development since birth, parental characteristics (including personality and intelligence), maternal and family life events, and characteristics of parent–child interaction and the social network. As such, the Mother–Child Project provides an oppportunity to examine a number of aspects of the relations among contextual stress, protective factors, and development. Our purpose in the following sections of this chapter is to present project data to address three questions related to issues identified in these introductory sections:

1. Within a sample selected for economic disadvantage, are there significant relations among specific types of stressful maternal experiences?
2. To what extent do specific types of stressful maternal experiences predict children's school outcomes?
3. Among children of mothers experiencing high levels of stress, are there factors that differentiate developmental paths toward and away from competence?

Method

Subjects

Our subjects were 133 mothers and their firstborn children selected from primiparous women seen for prenatal care at the Minneapolis Public Health Clinic and considered to be at risk for caretaking problems by virtue of their disadvantaged economic status. In addition to low socioeconomic status, the risk factors included low educational level (41% had not completed high school), age (X = 20.5 range = 12–34), lack of support (62% single at the time of the baby's birth), generally unstable living conditions, and what appeared to be exposure to a variety of environmental stressors. Eighty-six percent of the pregnancies were unplanned. The racial and ethnic composition of the sample was 80% white, 13% black, and 7% Hispanic or Native American. Fifteen percent of the children were of mixed racial background. By the time the children had reached the second grade, approximately 40% had been identified for some form of special education or mental health services.

Measures and procedures

Measurement of and relations among specific stressors. Maternal stress was assessed using a scale adapted from Cochrane and Robertson (1973) for use with this specific population (Egeland & Deinard, 1975). The adaptation process involved addition of items and rewriting of items to capture stressors specific to a low-income population. This scale was used to assess life stress at 54 and 64 months and in the summer following the first grade. The data in this chapter are based on maternal stress assessed at 54 and 64 months and in the summer following the first grade. These data were composited by summing item scores across these three time periods to form a measure of maternal stress in the 2 years prior to the child's year in the first grade.

The procedure for collecting the maternal stress data involved a semistructured interview with each mother covering the 39 items on the scale. The interviewer asked if a particular event or condition had occurred since the previous assessment or was ongoing at the time. The interviewer then elicited the mother's feelings about the experience and the extent to which it had had an effect on family functioning. This allowed the mother to elaborate on each item and enabled us to make certain judgments about her subjective experiences.

Each Life Events Scale (LES) item was scored on a 3-point scale reflecting the extent to which the experience was disruptive to family functioning (Egeland et al., 1980). The rating of disruptiveness was based on both the frequency of occurrence of the item since the previous assessment and the extent to which it involved a person with whom the mother shared a close relationship. A close relationship was defined as one that the mother shared

with an immediate family member (e.g., a child, husband, boyfriend) or someone on whom the mother was financially or emotionally dependent (e.g., a close friend, parents, siblings). Interviewers were instructed to use probing and follow-up questions to gather the information necessary to make the rating of disruptiveness. The reliability of this scoring technique was established by determining interrater agreement across several raters for the ratings done at each assessment period. Raters must have achieved a minimum interrater agreement of .85 during training, and the average interrater agreement obtained after the scales were scored was .86.

Two types of procedures (empirical and rational) were used to derive subscales from the 39-item scale. Using a factor analysis of the composited 39-item scale (Pianta, 1986), 27 items were chosen with loadings of greater than .30 on the large first factor. These items represented a less diverse range of experiences than the entire 39-item scale, but were still somewhat heterogeneous in content. Because these items appeared to assess stressful experiences in the mothers' interpersonal relationships, the subscale formed from summing the scores of these items was named the Personal Stress subscale. The items forming the Personal Stress subscale were further subdivided on a rational/theoretical basis to assess more specific or content-homogeneous stressors. These subscales included Family Relationship Transitions, Family Violence, and Chemical Dependency. These rationally derived subscales were nonoverlapping with each other.

The Family Relationship Transitions subscale was a 12-item subscale representative of a range of family entrance and exit events: gain of a new family member, period of homelessness, miscarriage, abortion, pregnancy, marriage, boyfriend/husband moving in or out, other people moving in or out, marital separation, divorce, reconciliation, and separation of mother and child. This subscale provided a measure of family stability and structure. Family violence experienced by the mother was measured by the 2-item Family Violence subscale indicating the mothers' involvement in physical fights and receiving threats. Chemical Dependence was a 2-item subscale that measured alcohol and drug abuse in the mother's extended family and immediate family. Scores for these subscales were obtained by summing a subject's scores on the items composing a particular subscale.

Correlations were computed among these subscales in an effort to address the first research question regarding the need to assess the relations among diverse stressors within a high-risk population.

Prediction of school outcomes from specific maternal stressors. Children's first-grade outcomes were assessed in the academic/cognitive and socioemotional/behavioral domains. Socioemotional and behavioral functioning was assessed by the Internalizing, Externalizing, and Total scores from the Child Behavior Checklist – Teacher report form (CBC-T) (Achenbach & Edelbrock, 1980). Teachers were also asked to fill out Teachers' Ratings of Cognitive Competence

(TRCC), which is the teacher report analogue to the Perceived Competence Scale for Children (Harter, 1982). The Total score from the Peabody Individual Achievement Test (PIAT) (Dunn & Markwardt, 1971) was used as an independent, standardized measure of the child's academic and cognitive competence.

The second research question noted earlier involves the extent to which first-grade outcomes were predicted by the more heterogeneous Personal Stress subscale and the set of three rationally derived content-homogeneous subscales. Multiple regression procedures were used to investigate this question. There were two sets of multiple regression analyses for each sex. In each set of analyses, mother IQ and child IQ, as assessed by the Wechsler Adult Intelligence Scale (WAIS) and Wechsler Preschool and Primary Scale of Intelligence (WPPSI), were entered into the equation first in order to control for individual differences in outcomes that might be due to intelligence. The next regression step corresponded to the content homogeneity of the subscale. In the first set of analyses, the Personal Stress subscale was entered in the second step in order to determine the predictive validity of an empirically derived, more heterogeneous measure of stress. In the second set of analyses, the three content subscales were entered stepwise, after mother IQ and child IQ, in order to examine the possibility that rationally derived measures of specific content-homogeneous stressors would account for unique variance in outcomes.

Comparisons of competent and incompetent children of highly stressed mothers. The third research question noted earlier involves the identification of factors that lead to competent development under conditions of significant risk. The analyses designed to address this question were somewhat dependent on the results of the first two phases of this investigation and therefore will be described in detail following presentation of the relevant preliminary results.

Results

Relations among separate stressors in a high-risk sample

Correlations were calculated separately for boys and girls for the relations among the maternal stress subscales. For mothers of boys, there was a strong correlation between Family Violence and Chemical Dependence ($r = .57$, $p < .05$) and a moderate relations between Family Violence and Family Relationship Transitions ($r = .27$, $p < .05$). There was not a significant relations between Chemical Dependence and Family Relationship Transitions for mothers of boys ($r = .15$). All three specific subscales shared items with the Personal Stress subscale; so, not surprisingly, all three were significantly correlated with it for mothers of both boys and girls. For mothers of girls, among the rationally derived subscales, Family Relationship Transitions was significantly correlated with both Family Violence ($r = .41$, $p < .05$) and

Table 10.1. *Summary of regressions of Grade 1 outcomes on maternal stress subscales and mother and child IQs for boys (N = 57)*

	Internalizing[a]		Externalizing		Total		PIAT		TRCC	
Scale	β	ΔR^2	β	ΔR^2	β	ΔR^2	β	ΔR^2	β	ΔR^2
Set 1										
WAIS	.30		.26		.31		.07		−.25	
WPPSI	−.40	.18**	−.44	.19**	−.45	.20**	.67	.47**	.58	.31**
Set 2										
Personal Stress	.13	ns	.33	.11*	.30	.09*	−.07	ns	−.17	ns
Family Violence	—[b]	—[b]	.28	.08*	.24	.06*	—[b]	—[b]	−.27	.07*
Chemical Dependence	—	—	−.01	ns	−.03	ns	—	—	.02	ns
Family Relationship Transitions	—	—	.11	ns	.07	ns	—	—	−.08	ns

*p < .05; **p < .01.
[a]Figures reported are β and change in R^2.
[b]No variables entered.

Chemical Dependence ($r = .31, p < .05$), and Family Violence and Chemical Dependence were also correlated ($r = .43, p < .05$). These results suggest that in this low-income sample there were relations of only moderate degrees among different stressors. This finding supports a point made earlier regarding the possibility of multiple stress experiences in families chosen as "at risk," and it suggests a need for further research to identify linkages and possible potentiating relations (Rutter, 1979) among stressful experiences in these families.

Predicting school outcomes from maternal life events scales

As noted earlier, the second question addressed by this research involves the extent to which measures of different stressors derived from life events scales can be used to predict children's school outcomes. Table 10.1 summarizes the results of the regression of outcomes on the different subscales derived from the maternal life events scale. The data presented above as Set 1 in Table 10.1 are the results of regressing the outcomes on maternal IQ and child IQ. Set 2 (Personal Stress) is a summary of the results of adding the Personal Stress subscale to the equation after accounting for maternal IQ and child IQ. The remainder of Set 2 is a summary of stepwise entry of the three rationally derived, content-specific subscales after maternal IQ and child IQ were accounted for. The results are presented in the same format for girls in Table 10.2.

Table 10.2. *Summary of regressions of Grade 1 outcomes on maternal stress subscales and mother and child IQs for girls (N = 70)*

Scale	Internalizing[a]		Externalizing		Total		PIAT		TRCC	
	β	ΔR^2	β	ΔR^2	β	ΔR^2	β	ΔR^2	β	ΔR^2
Set 1										
WAIS	−.01		−.06		.00		.02		.12	
WPPSI	−.16	.03	−.11	.02	−.14	.02	.65	.43**	.45	.27**
Set 2										
Personal Stress	.24	.05*	.28	.08*	.20	ns	−.10	ns	−.30	.08**
Family Violence	−.04	ns	—[b]	—[b]	—[b]	—[b]	—[b]	—[b]	−.05	ns
Chemical Dependence	.07	ns	—	—	—	—	—	—	−.01	ns
Family Relationship Transitions	.30	.09**	—	—	—	—	—	—	−.30	.08**

*p < .05; **p < .01.
[a]Figures reported are β and change in R^2.
[b]No variables entered.

As indicated in Table 10.1, Personal Stress was predictive of outcomes in the socioemotional/behavioral domain for boys, even after accounting for maternal IQ and child IQ. Mothers' Personal Stress accounted for 11% of the variance in boys' Externalizing scores and 9% of their CBC Total scores. Within the set of rationally derived, content-specific subscales, Family Violence was the only significant predictor of boys' first-grade outcomes. Using stepwise entry, Family Violence was the first subscale entered into the equation after maternal IQ and child IQ were entered on a previous step and accounted for 8% of the variance in the boy's Externalizing scores, 6% in their CBC Total scores, and 7% in the TRCC.

The results for girls are presented in Table 10.2. The empirically derived measure of mothers' Personal Stress accounted for 5% of the variance in the girls' Internalizing scores, 8% in their Externalizing scores, and 8% in the TRCC. For the set of rationally derived, content-specific subscales entered stepwise, Family Relationship Transitions accounted for 9% of the variance in the girls' Internalizing scores and 8% in the cognitive competence rating. As for the boys, no additional rationally derived subscales were entered into the equation.

These results suggest that for boys and girls in this low-income sample, an empirically derived, somewhat heterogeneous measure of maternal stress in interpersonal relationships was a potentially important predictor of socioemotional/behavioral outcomes and was also predictive of ratings of girls' cognitive competence by their classroom teachers. The rationally derived measures of specific stressors did not appear to be independent enough of one

another to result in each accounting for unique variance in outcomes; so the subscale with the highest correlation with the outcomes was the first and only rationally derived scale to be entered for both boys and girls. Interestingly, the single rationally derived scale that was a significant predictor was different for boys and girls. These results may suggest a very tentative hypothesis that when measures of specific stressors are used, boys and girls may be differentially vulnerable to different types of maternal stresses. Otherwise, the broader, more heterogeneous measure of maternal stress appeared to be as useful for predicting boys' outcomes as it was for girls, with the interresting corollary finding that maternal stress did appear to affect teachers' perceptions of girls' classroom performances, but was not predictive of their scores on a standardized achievement test.

We then attempted to address the third research question noted earlier, namely, whether or not factors could be identified that would differentiate between competent and incompetent children from within a group of families in which the mothers were highly stressed.

Competence for children exposed to high stress: protective factors

Clearly, not all of the children exposed to high levels of maternal stress in the preschool period were functioning in an incompetent fashion in school; the range of outcomes appeared large. In the following section we present analyses used to determine why some children exposed to high levels of maternal stress were functioning competently. Specifically, we addressed the question of what child or parent characteristics, parent–child interaction patterns, or life circumstances "protected" children from the negative effects of stress. To answer this question, the children were divided at the median on their mothers' Personal Stress scores, because that measure appeared to be a useful predictor for both boys and girls but was also sufficiently general to encompass a wide range of experiences and outcomes. Children in the top half of the Personal Stress distribution were then divided into competent and incompetent groups based on CBC-T ratings obtained in kindergarten and the first and second grades.

Identification of competence groups. Competence groups were derived using hierarchical cluster analyses on the CBC-T factor profile scores for each sex at each grade level. These analyses resulted in patterns of scores that were common for different groups of boys and girls at each grade level, identifying groups of children labeled as clearly competent, average, or clearly incompetent on the basis of their patterns of factor scores determined by the clustering procedure. For each grade and sex, a three-, four-, or five-group cluster solution best fit the data. Each solution resulted in identification of one group that was clearly competent and another that was clearly incompetent. The remaining groups in each cluster solution were classified as average. For each

grade level, children were assigned competence scores depending on the cluster group in which they were classified. They received a score of 1 if they fell into the incompetent group, 2 if in the average group, and 3 if in the competent group. The scores were summed across the three grade levels for each child. Scores ranged from a high of 9 to a low of 3. Children who received a 7 or higher were placed in the competent group, those with scores below 7 were classified as less competent. There were 17 competent boys and 17 less competent boys and 18 competent girls and 13 less competent girls who had been exposed to high levels of maternal life stresses during the preschool years.

Measures used to compare competent and less competent groups. The competent and less competent groups were compared on the following variables:

1. Maternal characteristics: mother's age, education, and personality characteristics. The mother's IQ was assessed using the Comprehension, Block Design, and Similarities subtests of the WAIS, which was administered at the 48-month assessment. The mother's personality was assessed using the Form E of the 16PF (Cattell, Eber, & Tatsuoka, 1976). The items are forced-choice and are intended to assess pathological rather than normal aspects of a subject's personality.

2. Child characteristics: language skills, IQ, and ability to cope with frustration. At 42 months, the child was given the Zimmerman Preschool Language Scale (Zimmerman, Steiner, & Pond, 1979), which is an age scale yielding an auditory comprehension and verbal ability score. To assess intelligence, four subtests of the WPPSI were administered (Vocabulary, Comprehension, Block Design, and Animal House) to the child at 64 months. The measure of frustration tolerance and self-control consisted of observing the child in a barrier-box situation (Harrington, Block, & Block, 1978). This situation involved allowing a child to play with attractive toys, then removing the toys and telling the child that she or he could play with similar toys that were in a locked plexiglass box. The child was rated on 11 scales, including self-esteem, ego control, withdrawal, flexibility, dependence, and positive and negative affect.

3. Mother–child interaction: At 42 months the mother and child were observed in a series of teaching tasks. The four tasks included building copies of a block tower from a set of smaller blocks, the mother asking the child to name as many objects as possible that have wheels, a matrix sorting task requiring the child to sort chips according to size, color, and form, and the mother asking the child to trace a pattern drawn on the screen of an Etch-A-Sketch. The mothers were rated on six 7-point scales: supportive presence, respect for autonomy, structure and limit setting, hostility, quality of instruction, and confidence. The children were rated on persistence, enthusiasm, negativity expressed to mother, compliance, experience in the session, reliance on the mother, affection for the mother, and avoidance of the mother.

4. Mother's relationship status: At each assessment (12, 18, 24, 30, 42, 48, 54, and 64 months and first grade), the status of the mother's relationship with

husband or boyfriend was determined. For those mothers involved with a male, the relationship was judged as stable (consistent and ongoing) or unstable (separations and transient relationships) on the basis of interview questions. The mother also reported the degree of her satisfaction with the relationship and whether or not she was being abused by her husband/boyfriend.

5. Quality of organization and stimulation in the home environment: During the first-grade visit, observers completed the Home Observation for Measurement of the Environment (HOME) (Caldwell & Bradley, 1984). This inventory is designed to sample aspects of the quality and quantity of social, emotional, and cognitive support available to the child in the home. The nine scales include organization of a stable and predictable environment, developmental stimulation, quality of language support, responsiveness and avoidance of restrictions, fostering maturity and independence, emotional climate, breadth of experience, aspects of the physical environment, and provision of play material.

Comparisons between the competent and less competent children who were exposed to high levels of maternal stress resulted in significant differences on a number of variables. These results are presented in Table 10.3 for boys and Table 10.4 for girls.

Results of comparing competent and less competent groups. Competent boys of mothers who experienced high levels of stress had better auditory comprehension and overall language ability and were more intelligent than the less competent sons of highly stressed mothers. Differences were found on the Animal House and Block Design subtests and total score on the WPPSI. These high-stress boys classified as competent in school also had a history of competence as judged by their functioning on the barrier-box and teaching tasks at 42 months. These boys displayed more positive affect and were more creative in dealing with the frustration of the barrier-box task than their less competent peers. In the teaching situation, the less competent group lacked persistence, enthusiasm, and affection for their mothers, displayed more negative affect, and were avoidant of their mothers. The experience in the teaching tasks was basically a negative one for the less competent boys. The highly stressed mothers of the competent boys were more emotionally responsive and supportive than were mothers of less competent boys. Highly stressed mothers of less competent boys had a history of poor functioning with their sons, as evidenced by their lack of respect for autonomy, poorer quality of instruction, and lack of structure and limit setting.

There were no differences between the two groups of boys in terms of the percentage from intact families. However, the overall quality of the relationships reported by the highly stressed mothers was more satisfying for mothers of competent boys (59% satisfied) than for those from the less competent group (35% satisfied). The high-stress mothers of competent boys were also less likely to be in abusive relationships (18% abused) than were mothers of less competent boys (35% abused).

Table 10.3. *Protective factors: differences between competent and less competent boys of mothers experiencing high stress in preschool period*

Factor	Less competent (n = 17)	Competent (n = 17)	t	p
Child characteristics				
Zimmerman language, 42 months				
Auditory comprehension	96.19 (16.36)	115.40 (16.42)	−3.26	.003
Language ability	98.20 (19.70)	114.33 (17.72)	−2.36	.026
Barrier box, 42 months				
Creativity	1.94 (1.12)	2.81 (1.17)	−2.16	.039
Positive affect	2.50 (0.89)	3.25 (0.93)	−2.32	.027
Quality of the home environment				
HOME: Grade 1				
Total	58.71 (13.54)	69.29 (8.62)	−2.64	.011
Organization	2.76 (1.72)	4.24 (1.44)	−2.71	.011
Stimulation	6.12 (2.62)	7.88 (0.83)	−2.28	.030
Emotional climate	6.58 (1.81)	8.12 (1.50)	−2.69	.011
Physical environment	11.07 (3.38)	13.88 (1.50)	−2.64	.017
Content characteristics				
Emotional support of mother, 42 months	3.53 (1.13)	4.47 (1.42)	−2.14	.040
Characteristics of mother–child interaction				
Teaching task, 42 months, mother ratings				
Supportive presence	8.35 (3.32)	10.35 (1.94)	−2.15	.041
Structure & limits	8.18 (2.72)	10.00 (2.42)	−2.06	.047
Respect for autonomy	8.59 (2.85)	10.53 (1.42)	−2.51	.019
Quality of instruction	8.53 (3.11)	10.76 (1.20)	−2.77	.012
Teaching task: child ratings				
Persistence	7.24 (2.86)	9.12 (1.58)	−2.38	.026
Enthusiasm	6.59 (2.83)	8.76 (1.92)	−2.62	.013
Negativity	5.24 (3.70)	2.88 (1.22)	2.49	.022
Experience in session	7.18 (3.30)	9.29 (1.57)	−2.39	.026
Affection for mother	6.29 (3.10)	8.47 (2.65)	−2.20	.035
Avoidance of mother	5.18 (3.80)	3.00 (1.37)	2.22	.038
Maternal characteristics				
No significant differences				

Note: Groups compared on all variables described in the section on methods; only significant results reported.

Mothers of competent boys were also able to provide a structured, organized environment for their children. The homes of the competent boys were judged to be more stimulating, better organized, and emotionally "warmer" than the homes of the less competent boys. These groups also differed on the appropriateness of the physical environment and the total HOME score.

It appeared that despite experiencing high levels of interpersonal stress, there was a subset of mothers who were able to support their children both emotionally and through providing structure; it was these boys who were later

Table 10.4. *Protective factors: differences between competent and less competent girls of mothers experiencing high stress in the preschool period*

Factor	Less competent (n = 13)	Competent (n = 18)	t	p
Child characteristics				
Zimmerman language, 42 months				
Verbal ability	99.08 (19.09)	115.00 (20.54)	−2.11	.044
Barrier box, 42 months				
Ego control	2.31 (1.11)	3.83 (1.62)	−2.93	.007
Creativity	1.54 (0.87)	2.44 (1.38)	−2.08	.047
Help seeking	4.62 (1.33)	3.28 (1.45)	2.63	.014
Negative affect	3.15 (1.63)	1.72 (1.41)	2.62	.014
WPPSI, 64 months				
Vocabulary	8.85 (3.31)	11.11 (2.98)	−1.99	.056
Animal House	10.00 (2.55)	11.72 (2.22)	−2.00	.054
Quality of the home environment				
HOME: Grade 1				
Foster independence	11.08 (2.75)	12.87 (1.89)	−2.03	.053
Emotional climate	6.38 (2.18)	7.75 (1.13)	−2.18	.038
Content characteristics				
Emotional support of mother, 42 months	3.08 (1.19)	3.94 (1.16)	−2.03	.051
Characteristics of mother–child interaction				
No significant differences				
Maternal characteristics				
Education at child's birth	10.31 (.95)	12.11 (1.84)	−3.55	.001
WAIS 3-subtest total	26.62 (5.59)	32.94 (6.44)	−2.82	.009
16 PF				
Ego strength	4.54 (1.56)	5.94 (1.48)	−2.46	.021
Enthusiastic	5.38 (1.56)	6.63 (1.75)	−2.00	.056
Venturesome	4.62 (2.26)	6.63 (1.89)	−2.61	.015
Apprehensive	6.38 (1.50)	4.38 (2.36)	2.66	.013
Tense	7.92 (2.50)	6.00 (1.97)	2.32	.028
Group-dependent	6.08 (2.14)	4.00 (1.71)	2.91	.007

classified as competent in school. These mothers also tended to be involved in satisfying relationships with men. In turn, their sons developed competently; they had a history of competent functioning as early as 3.5 years that appeared to continue on into the first grade. These competent boys of highly stressed mothers were also relatively intelligent and had good communicative skills prior to school entry. Generally these boys appeared better suited for adaptive functioning prior to school entry, an impression borne out by their competence in school.

The comparisons between the competent and less competent girls of mothers who experienced high levels of personal stress are presented in Table 10.4. The factors that were associated with school competence for girls were quite different from those associated with boys' competence.

The characteristics of mothers were important protective factors for girls. Compared with the mothers of the less competent group, highly stressed mothers of girls classified as competent in school were better educated, more intelligent, and differed on a number of personality variables. Comparisons on the 16PF scales indicated that highly stressed mothers of competent girls were emotionally more mature and stable, enthusiastic and cheerful, adventurous, self-confident, relaxed, and self-sufficient. In general, these mothers appeared to be characterized by positive affect, good social skills, and a sense of positive self-esteem, despite their stressful experiences, whereas the mothers of the less competent girls were characterized as anxious, restricted, depressed, and socially restrained.

Language and intelligence were also protective factors for girls of high-stress mothers. Competent girls obtained higher scores on the Verbal Ability scale of the Zimmerman and tended to score higher on the Vocabulary and Animal House subtests of the WPPSI. In response to the frustration of the barrier-box tasks, girls who were competent in the first grade displayed better self-control, more creativity, and less negative affect and help seeking than did the girls later identified as less competent. Surprisingly, there were no differences between the competent and less competent groups on any of the mother or child ratings during the teaching tasks.

Highly stressed mothers of competent girls also provided a higher quality of environment within their homes. Homes of competent daughters of highly stressed mothers were rated as fostering more independence and providing a better emotional climate than were the homes of girls classified as less competent in school.

There were no differences between the two competence groups of girls regarding factors related to the mothers' relationships with their husbands/boyfriends.

In contrast to the protective factors identified for the boys, those identified for the girls appeared to have more to do with the characteristics of their highly stressed mothers than with factors associated with parent–child interaction or the quality of the home environment, which were the important protective factors for boys. These points will be addressed in more detail in the following section.

Discussion

In this section we discuss the findings that address the three issues outlined earlier: the overlap among stressful experiences within an economically disadvantaged sample, the extent to which different measures of mater-

nal stress predict children's school outcomes, and the identification of factors distinguishing between competent and less competent children within a high-stress subsample.

Measuring contextual stress

As noted at the beginning of this chapter, measurement and methodological issues pervade research on contextual stress, especially the life events literature (Goldberger & Breznitz, 1982). Our research has addressed these issues by using a life events scale with items representative of the life experiences of the subjects, deriving content subscales as a means of examining relationships among, and prediction by, measures of specific stressors, and using a multivariate prospective research design.

The use of life events scales as a basis for measuring specific stressors breaks with the life events research paradigm, which considers stress to be a nonspecific entity subsuming any and all experiences requiring coping or adaptation, however broadly defined these may be (Dohrenwend & Dohrenwend, 1974). An important conceptual and methodological issue addressed by our research involves overlapping and shared variance among stressors in populations identified on the basis of some broad risk factor such as socioeconomic status (or even personal stress). We have presented data indicating that there are significant relations between specific stressors (e.g., family violence and chemical dependence) within our low-income sample. With regard to prediction, such overlap could lead to considerable empirical and theoretical confusion if not examined. Our research has addressed the collinearity issue through the use of stepwise regression. The findings from those analyses indicated that, at least empirically, measures of separate stressors did little to increase the amount of outcome variance accounted for, because it was perhaps the variance shared by the stress measures that was also the predicted outcome variance. These results could be used in support of an argument for the use of general, heterogeneous measures of stress (total scores); however, there is an alternative approach to conceptualizing and analyzing these relationships among specific stressors.

This alternative approach to conceptualizing and analyzing the issue of stressor overlap might involve assessing the extent to which some stressors (e.g., violence) "cause" or lead to other stressors (e.g., divorce or separation). For example, the results presented earlier suggest relationships among family violence, chemical dependence, and changes in family relations. Analysis of the causal hierarchy among stressors and the factors that serve to break causal chains among stressors (i.e., protective factors) may be highly useful in understanding and treating families with multiple stresses. This approach would emphasize specification of stressors, and relations among specific stressors would be viewed as a relevant and researchable domain, as opposed to a nuisance that must be controlled.

Measuring contextual stress by identifying specific stressors has led to results that suggest linkages between coherent subsets of maternal experiences and child outcomes. This is helpful from the perspective of generating testable hypotheses about cause and consequence; otherwise, the use of a total score makes it difficult to comprehend the meaning of significant relationships because the total score is so heterogeneous (Perkins, 1982; Rutter, 1983). For example, the finding that interpersonal stresses on mothers were predictive of children's school outcomes was a consequence of measuring a specific type of stress. Interestingly, when we measured stress at a level of even greater specificity using the rationally derived subscales, relations between types of stressors and outcomes were obtained that were gender-related.

The predictive validity of interpersonal stresses could be explained by the possibility that this class of events taxed mothers' emotional and psychological resources to the extent that they were less able to provide appropriate care for their children. Similar hypotheses have been suggested for divorce as a stressor (Bloom, Asher, & White, 1978; Hetherington, 1979). An alternative hypothesis for the interpersonal stress–outcome relation may be that some stressors that were part of the Personal Stress subscale (e.g., violence, separation) affected children's competences directly, whether through internal psychological processes such as anxiety or through a process of observational learning (Straus, 1983). In the case of either possible explanation, prior specification of stressors can assist in a clearer conceptualization of the processes underlying the predictive relation by identifying a class of events that could meaningfully fit into existing theories of development in a way that general, nonspecific notions of stress cannot.

Competence in children of highly stressed mothers

Our findings comparing competent and less competent children of highly stressed mothers support Garmezy's identification (1984) of three types of protective factors. We identified protective factors having to do with child characteristics, such as intelligence, environmental support (as indicated by the HOME), positive relationships with adults (as measured by mother–child interaction), and personal characteristics of mothers. Boys' competence seemed to be especially related to characteristics of the home environment and mother–child interaction, whereas girls' competence was distinguished by characteristics of mothers. The roles of child characteristics, environmental support, and mother–child relationships as protective factors will be the focus of the following discussion.

Child characteristics and environmental support. One set of factors distinguishing the competent and less competent children included the characteristics of the children themselves. Both boys and girls classified as competent in school had a history of prior competence as early as 42 months. This suggests that the

child has a role as an active agent in the coping process. Also, the results of the comparisons between the competent and less competent children supported the view that environmental support was an important part of producing competence under stress. The relative contributions of endogenous and environmental influences on children's coping skills have implications for the goals and methods of early intervention and prevention efforts based on risk research in light of the fact that developmental history is itself a product of a dynamic relation between the child and the environment. Interestingly, our data suggested that the nature of protective environmental support was different for boys and girls.

For example, the quality of direct environmental support for learning coping skills appeared most salient for boys' competence, as evidenced in the findings that HOME measures and the ratings of mother–son interaction distinguished the competence groups. For girls, it appeared to be the case that maternal characteristics were the predominant features distinguishing competent development under stress. For boys, these environmental protective factors were related to actively facilitating competence and coping skills. "Protective" environments for boys were structured, organized, emotionally supportive, and distinguished by good teaching by mothers.

For girls, it appeared that it was not as important for them to be provided with such active environmental support in order to develop competently within a stressful household. This could have been due to resilience related to endogenous child characteristics, as noted earlier, or to cultural expectations that might have influenced whether or not coping skills were taught to girls. In any case, it appeared important for the mothers of girls to have a set of positive social and problem-solving characteristics that might be effective in buffering or shielding the girls from stress, in a manner that was not the same for boys, or that could be transmitted to the girls through some process of identification or observational learning and thereby become a part of the girls' repertoire of coping skills. Aspects of the relationship between the child and the caregiver that might mediate or produce protective influences will be discussed in the following section.

Child–caregiver relationships and protective factors. Our data indicate that among a group of mothers who experienced large amounts of personal stress, there were differences in competence among their children that were related to both the sex of the child and factors that had to do with the quality of the mother–child relationship and maternal characteristics. The consistent variable across these sets of measures was the mother. Therefore, it may be useful to look for explanations of these findings by examining the nature of the relationships between these mothers and their daughters and sons.

We identified the group of high-stress mothers for the competence group comparisons on the basis of their scores on the Personal Stress subscale.

Because that subscale contained a majority of items having to do with experiences with men (e.g., violence, separations, conflict), it is reasonable to assume that high scores on that index were reflective of dysfunctional relationships with males. For mothers of boys, relationships with males provided both a source of stress and a pattern for caregiving. From the perspective of an internal working model (Bowlby, 1980; Sroufe & Fleeson, 1986), it is plausible that mothers' beliefs and feelings about their relationships with men might be manifest in their interactions, as caregivers, with their sons (Pianta, Egeland, & Hyatt, 1986). This link between internal working models and caretaking behaviors may also be influenced by the complexity of the mother's understanding of the caretaking process (Newberger & Cook, 1983; Sameroff & Feil, 1985). Providing the types of environments that led to boys' competence, when the mothers were stressed by relationships with males, may have been influenced by the extent to which the mothers could differentiate their attitudes and feelings about their sons from their experiences in relationships with men.

From the perspective of an internal working model, it was not surprising to find that a girl's competent development was related to the personal characteristics of the mother and a home environment that was emotionally warm and fostered independence. Because there was no gender similarity between the source of stress and the object of caregiving, there may have been less of a tendency for mothers to interact with their daughters in a manner that validates internal models influenced by relationships with men. In this way, the gender difference between the source of stress and the object of caretaking facilitates a mother's efforts to keep attitudes and feelings about these relationships separate. Conversely, the girls' internal models would be strongly influenced by what they observed and experienced with their mothers. Therefore, in addition to being exposed to home environments that were emotionally warm and encouraged independence, the competent girls may also have internalized their mothers' positive personal characteristics.

Conclusion

Despite the progress made by risk research in the areas of schizophrenia and other biologically related conditions in identifying the relationships between risk factors and outcomes (Watt et al., 1984; chapters 19 and 20 in this volume), research in the domain of contextual stress continues to struggle with issues of conceptualization and measurement of contextual stress and generation of empirically based explanatory models. The questions we posed at the beginning of this chapter reflect our effort to deal with these issues in a systematic fashion. We believe the results presented here indicate support for greater specificity in conceptualization and measurement of stress, provide evidence for the importance of prior developmental history in a risk/protective factors

model, and suggest the extent to which factors related to competent development under stress are woven into the nature of child–environment and child–caregiver relationships.

References

Achenbach, T. M., & Edelbrock, C. S. (1980). *The Child Behavior Checklist: Teacher Report Form.* Burlington: University of Vermont Department of Psychiatry.

Bloom, B., Asher, S., & White, S. (1978). Marital disruption as a stressor. *Psychological Bulletin, 85,* 867–94.

Bowlby, J. (1980). *Loss.* New York: Basic Books.

Brown, G. W., & Harris, T. (1978). *Social origins of depression.* New York: Free Press.

Caldwell, E., & Bradley, R. (1984). *Home observation for measurement of the environment.* Little Rock: Center for Early Development and Education.

Cattell, R. B., Eber, H. W., & Tatsuoka, M. M. (1976). *Sixteen PF.* Champaign, IL: Institute for Personality and Ability Testing.

Cochrane, R., & Robertson, A. (1973). The life events inventory: A measure of the relative severity of psycho-social stressors. *Journal of Psychosomatic Research, 17,* 135–9.

Derogatis, L. (1982). Self report measure of stress. In L. Goldberger & S. Breznitz (Eds.), *Handbook of stress* (pp. 270–94). New York: Free Press.

Dorhenwend, B. S., & Dohrenwend, B. P. (1974). *Stressful life events: Their nature and effects.* New York: Wiley..

Dohrenwend, B. S., Krasnoff, L., Askensky, A., & Dohrenwend, B. P. (1982). The psychiatric epidemiology research interview life events scale. In L. Golberger & S. Breznitz (Eds.), *Handbook of stress* (pp. 320–31). New York: Free Press.

Dunn, L., & Markwardt, F. (1971). *The Peabody Individual Achievement Test.* Circle Pines, MN: American Guidance.

Egeland, B., Breitenbucher, M., & Rosenberg, D. (1980). Prospective study of the etiology of child abuse. *Journal of Consulting and Clinical Psychology, 48,* 195–205.

Egeland, B., & Deinard, A. (1975). *Life stress scale and manual.* Minneapolis: University of Minnesota.

Egeland, B., & Farber, E. (1984). Infant–mother attachment: Factors related to its development and changes over time. *Child Development, 55,* 753–71.

Erickson, M. F., Sroufe, L. A., & Egeland, B. (1985). The relationship between quality of attachment and behavior problems in preschool in a high risk sample. In I. Bretherton & E. Waters (Eds.), *Growing points of attachment theory and research. Monographs of the Society for Research in Child Development, 50,* 147–66.

Garmezy, N. (1977). On some risks in risk research. *Psychological Medicine, 7,* 1–6.

Garmezy, N. (1983). Stressors of childhood. In N. Garmezy & M. Rutter (Eds.), *Stress, coping and development* (pp. 43–84). New York: McGraw-Hill.

Garmezy, N. (1984). Stress-resistant children: The search for protective factors. In J. E. Stevenson (Ed.), *Aspects of current child psychiatry research* (*Journal of Child Psychology and Psychiatry* book supplement No. 4). Oxford: Pergamon Press.

Garmezy, N., Masten, A., & Tellegen, A. (1984). The study of stress and competence in children: A building block for developmental psychopathology. *Child Development, 55,* 97–111.

Goldberger, L., & Breznitz, S. (1982). *Handbook of stress.* New York: Free Press.

Harrington, D., Block, J. H., & Block, J. (1978). Intolerance of ambiguity in preschool children: Psychometric considerations, behavioral manifestations and parental correlates. *Developmental Psychology, 14,* 242–56.

Harter, S. (1982). The perceived competence scale for children. *Child Development, 53,* 87–97.

Herzog, J. (1985). *Life events as indices of family stress: Relationships with children's current levels of competence.* Unpublished doctoral dissertation, University of Minnesota.

Hetherington, E. M. (1979). Divorce: A child's perspective. *American Psychologist, 34,* 851–8.

Hetherington, E. M., Cox, M., & Cox, R. (1979). Family interaction and the social, emotional and cognitive development of children following divorce. In V. Vaughn & T. B. Brazelton (Eds.), *The family: Setting priorities.* New York: Science and Medicine.

Lewis, M., Feiring, C., McGuffog, C., & Jaskir, J. (1984). Predicting pathology in six-year-olds from early social relations. *Child Development, 55,* 123–36.

Newberger, C. M., & Cook, E. H. (1983). Parental awareness and child abuse: A cognitive developmental analysis of urban and rural samples. *American Journal of Orthopsychiatry, 53,* 512–24.

Perkins, D. V. (1982). The assessment of stress using life events scales. In L. Goldberger & S. Breznitz (Eds.), *The handbook of stress* (pp. 320–31). New York: Free Press.

Pianta, R. (1986). *The longitudinal effects of maternal life stress on the developmental outcomes of first grade children in a high risk sample.* Unpublished doctoral dissertation, University of Minnesota.

Pianta, R., Egeland, B., & Erickson, M. (1989). The antecedents of child maltreatment: The results of the Mother–Child Interaction Research Project. In D. Cicchetti & V. Carlson (Eds.), *Child maltreatment: Research consequences and theoretical perspectives* (pp. 203–53). Cambridge University Press.

Pianta, R., Egeland, B., & Hyatt, A. (1986). Maternal relationship history as an indicator of developmental risk. *American Journal of Orthopsychiatry, 56,* 385–98.

Rabkin, J., & Streuning, E. (1976). Life events, stress and illness. *Science, 194,* 1013–20.

Rutter, M. (1979). Protective factors in children's responses to stress and disadvantage. In M. Kent & J. Rolf (Eds.), *Primary prevention of psychopathology: Social competence in children* (pp. 49–74). Hanover, NH: University Press of New England.

Rutter, M. (1983). Stress, coping and development: Some issues and some questions. In N. Garmezy & M. Rutter (Eds.), *Stress, coping and development* (pp. 1–42). New York: McGraw-Hill.

Sameroff, A., & Feil, L. (1985). Parental concepts of development. In I. Sigel (Ed.), *Parental belief systems: The consequences for children* (pp. 83–105). Hillsdale, NJ: Erlbaum.

Skinner, H., & Lei, H. (1980). Differential weights in life change research: Useful or irrelevant? *Psychosomatic Medicine, 12,* 367–70.

Sroufe, L. A., & Fleeson, J. (1986). Attachment and the construction of relationships. In W. W. Hartup & Z. Rubin (Eds.), *Relationships and development* (pp. 51–72). Cambridge University Press.

Sroufe, L. A., & Rutter, M. (1984). The domain of developmental psychopathology. *Child Development, 55,* 17–29.

Straus, M. (1983). Ordinary violence, child abuse and wife beating: What do they have in common? In D. Finkelhor, R. Gelles, G. Hotaling, & M. Straus (Eds.), *The dark side of families: Current family violence research.* Beverly Hills, CA: Sage.

Wallerstein, J. (1983). Children of divorce. In N. Garmezy & M. Rutter (Eds.), *Stress, coping and development* (pp. 265–302). New York: McGraw-Hill.

Watt, N. F., Anthony, E. J., Wynne, L. C., & Rolf, J. (1984). *Children at risk: A longitudinal perspective.* Cambridge University Press.

Zimmerman, I., Steiner, G., & Pond, R. (1979). *Preschool Language Scale.* Columbus, OH: Charles E. Merrill.