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**RESILIENCY IN CHILDREN AT RISK: A MULTIVARIATE
PROFILE ANALYSIS OF PROTECTIVE FACTORS
FOR CHILDREN OF ADOLESCENT MOTHERS**

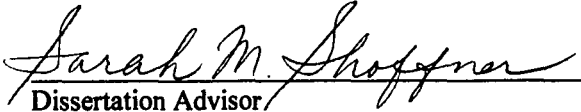
by

Dorothy Tennant Allison

**A Dissertation Submitted to
the Faculty of the Graduate School at
The University of North Carolina at Greensboro
in Partial Fulfillment
of the Requirements for the Degree
Doctor of Philosophy**

**Greensboro
1995**

Approved by


Dissertation Advisor

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ALLISON, DOROTHY TENNANT, Ph.D. *Resiliency in Children At Risk: A Multivariate Profile Analysis of Protective Factors for Children of Adolescent Mothers.* (1995). Directed by Dr. Sarah M. Shoffner. 133 pp.

The purpose of this longitudinal exploratory study was to investigate the protective processes that promote psychosocial competence in children who are at risk for maladaptive development. A resiliency model was developed and tested on a sample of 171 Anglo-American children (80 male and 91 female) of adolescent mothers living in two-parent families. Secondary data analysis was conducted on variables measured in Waves 1 and 2 of the National Survey of Children. In Phase One of the analysis, regression models that used multiple risk factors in the prediction of competency were applied to determine residual values for each individual. Phase Two used these residual values to categorize individuals into resilient and vulnerable groups for each competency criterion. Phase Three involved a multivariate profile analysis to test the moderating associations of eight protective factors for the resilient and vulnerable groups. All three phases of the analysis were conducted separately for external (action-oriented) competency and internal (thought-oriented) competency.

Outcomes for external competency. Difficult temperament in childhood emerged as a strong risk predictor of external competency in adolescence. Results of the equal group effects test indicated support for overall group differences with higher resilient group means across the eight protective factors. However, multivariate analysis of the resilient and vulnerable groups also indicated a group by protective factor interaction. Univariate tests detected group differences for the following factors: (a) gender, (b) the child's aspirations for post-secondary education, (c) mother-child relations, and (d) academic progress.

Outcomes for internal competency. Developmental health hazards, difficult temperament, and amount of parental arguments in childhood emerged as strong risk predictors of

internal competency in adolescence. Multivariate profile analysis indicated that the resilient and vulnerable group profiles were parallel across the eight protective factors. Results of the equal group effects test indicated support for overall group differences with individuals in the resilient group having higher scores. The greatest differences between the resilient and vulnerable groups were found for the following protective factors: (a) gender, (b) family atmosphere, (c) mother-child relations, and (d) academic progress.

APPROVAL PAGE

This dissertation has been approved by the following committee of the
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Date of Acceptance by Committee

November 2, 1995
Date of Final Oral Examination

ACKNOWLEDGEMENTS

I am grateful for my friend and committee chair, Dr. Sarah Shoffner, whose constant encouragement enabled me to complete this dissertation. Appreciation goes to Dr. Jackie Gray who provided me with the initial direction in my study of resiliency. I wish to thank Dr. Kay Pasley for motivating me to develop a conceptual model of resiliency. I am indebted to Dr. David Ludwig for his leadership in the statistical testing of the model and thank him for providing my study with so many revision hours.

I especially thank my daughter, Meaghan Clark, for her encouragement, love, and support; and for her many sacrifices throughout the 23 years of my post-secondary educational career. This study of resiliency is dedicated to her as a daughter of an adolescent mother, and to the grandchildren she has given me. An acknowledgement would not be complete without expressing my gratitude to Connie Ingalls, who knows how much mutual support we have provided each other during our years of study at UNC-Greensboro.

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CHAPTER I

INTRODUCTION

Many children born into disadvantaged situations overcome their adverse circumstances. Despite environmental conditions that threaten their well-being, these children develop a certain resiliency to deprivation and neglect. How do they escape the expected course that leads to developmental dysfunction? What distinguishes children who successfully overcome prolonged exposure to stressors from those who do not? Developmental researchers, who study children at risk for maladaptation, search for explanations of these individual differences.

Significance of the Problem

Knowledge in any area of social science research is promoted by testing models that conceptualize theoretical relationships between the variables that attempt to measure the phenomenon of interest. Clear articulation of the hypothesized associations among variables is an important first step in the research process. The next step involves a preliminary analysis of the data with the purpose to check if directional associations of the data support the research hypotheses. Only after the first two steps are completed can decisions be made by the researcher regarding the selection of an appropriate statistical design to test the hypothesized relationships.

Fundamental questions raised by scholars interested in the study of developmental risk are: (a) What factors place children at risk for maladaptive functioning, and (b) how is a risk population selected? A risk factor is any factor associated with the increased likelihood of maladaptive functioning. Depending on their context, risk factors are categorized as either a biological or social risk. Studies that focus on biological risk further categorize individuals

according to temporal factors associated with the risk. Where individuals who have been exposed to one or more organismic stresses during the prenatal, perinatal, or postnatal periods are categorized “at risk”, those who have a diagnosed handicapped or clinical condition are considered “established risk” (Koop & Krakow, 1983).

Individuals are typically considered at social risk by virtue of (a) living in a family characterized by deviation from a “psychosocially normal” two biological-parent system or (b) belonging to historical cohorts (i.e. those individuals born within the same decade) exposed to chronic environmental stressors. Developmental researchers have studied samples of at-risk children living in families with parents who have various mental disorders (Garmezy & Phipps-Yonas, 1984; Rutter, 1985; Sameroff & Seifer, 1983), parents who divorce (Robson, 1991; Wallerstein, 1983), “surrogate parents” in institutional homes (Rutter & Quinton, 1984, 1990), adolescent mothers (Brooks-Gunn & Furstenburg, 1986; Barratt, 1991; Christ, Lahey, Frick, Russo, McBurnett, Loeber, Stouthamer, & Green, 1990; East & Felice, 1990; Furstenburg, Hughes, & Brooks-Gunn, 1992; Kinard & Reinherz, 1987; Luster and Dunbow, 1990; Moore & Snyder, 1991), and children affected by separation from or loss of a parent (Garmezy, 1986). Historical risk cohorts include children living in environmental areas of poverty (Garmezy, 1992; Long & Vaillant, 1984; Luthar, 1991; Werner & Smith, 1982, 1992) and children experiencing war-related stressors (Langmeier & Matejcek, 1975).

During the past 20 years, many advancements have been made in the development of theory that guides the scientific research of high risk populations. Michael Rutter (1990) noted a historical progression in the focus of risk research from the simple identification of risk variables found in association with psychopathology to the explanation of the role of protective processes and mechanisms associated with the concepts of competence and resilience. A resilient individual is one

who is exposed to the hazards of risk but, through the advantages afforded by protective processes, is able to achieve and maintain adaptive functioning. In the design of risk studies investigating resiliency, it is recommended that investigators select risk and protective factors from individual, family, and community contexts. Individual factors are either biologically and/or psychologically determined, and are categorized by the intrapersonal context within the individual. Familial factors are found within the context of the nuclear family system, whereas community factors are categorized by those contexts outside the nuclear family (Garmezy, Masten, & Tellegen, 1984).

Although resiliency research to date has functioned as a guide toward a fuller understanding of the elements of risk, protection, and resiliency, theoretical information provided in the literature review of Chapter II was not fully utilized in the designs of these studies. Because recent theoretical and the accompanying statistical knowledge were lacking when the processes driving the associations between risk and resiliency were investigated, the results reported from these reviewed studies cannot fully explain the protective mechanisms at work in the risk-competency relationship. An understanding of the process by which protective factors work is key to discovering how resiliency is acquired by children who are at risk for developmental dysfunction. A conceptual model that illustrates these processes is needed to study the mechanisms that work to develop resiliency in at-risk children. Because the present study will develop a conceptual model that is based on current resiliency theory and test it using a compatible statistical design, the emerging results will yield more dependable information about the theoretical relationships between risk, protection, and psychosocial competency than previous resiliency studies.

Theoretical Framework

Conceptual Models

There are two basic types of conceptual models in developmental research: (a) the deficit or pathology model and (b) the competence model. In contrast to deficit models, models of competence attempt to explain the nature and causes of adaptive psychosocial functioning. Evaluations of behavior as either deviant or competent requires a definition of what is acceptable or normal behavior, and these definitions are shaped by cultural, social and historical contexts (Richters & Weintraub, 1990; Sameroff & Seifer, 1990).

For the past 20 years, the social science community has been involved in a transition from the exclusive use of the deficit model to the inclusion of a competency model. During this time, many developmental researchers have expressed strong displeasure in the use of the deficit model. Horowitz and Paden (1973) believe that a social scientist's promotion of a deficit model has serious implications for destruction of their subject's cultural identity. Albee (1980) stated that meaningful plans for primary prevention efforts cannot result from the use of the deficit model because they focus on the identification and prevention of the causes of dysfunction. Only through the use of resiliency models, which seek to discover the protective processes and mechanisms of competency in at-risk children, can research knowledge be applied to prevention efforts that are based on the more realistic goals of the reduction of stress and the promotion of developmental competency.

Consistent findings in developmental research show that many high risk children achieve adaptive outcomes. These findings led to a theoretical shift in focus from using conceptual models that test deviancy outcomes to using models that test competency outcomes. Due to the publications of a number of developmental theoreticians (Garmezy, 1985, 1988; Masten &

Garmezy, 1985; Ritchers & Weintraub, 1990; Rutter, 1985, 1990), it is now well established that prospective longitudinal designs using competency models are superior in the investigation of risk populations. The application of competence models in the study of high risk populations enables investigators to investigate protective factors. Protective factors operate in the lives of at-risk children by supplying the necessary support mechanisms to prevail over developmental insults derived from individual, familial, and community stressors.

Many children who are exposed to multiple risk factors surmount adversity and develop into competent young adults. Protective mechanisms, which are responsible for resiliency, enable the development of competent behaviors in children who are at risk for psychosocial maladaptation. The interaction of risk and protective factors decrease the risk potential for the development or maintenance of maladaptive behaviors and enable these children to develop a certain invulnerability to stress (Rutter, 1990). Garmezy (1983) stated that resiliency and maladaptation are two sides of the same coin. Exposure to multiple stressors without the buffering effects of sufficient protective factors leads to maladaptive development and dysfunction. On the other hand, when the necessary protective factors are in place, individuals are able to acquire and incorporate coping skills into their behavior repertoire, thereby allowing for adaptive functioning (Ebata, Peterson, & Conger, 1990; Garmezy, 1983 Masten, Morrison, Pelligrini, & Tellegen, 1991; Rutter, 1979; Stevenson & Rhodes, 1991). In developmental risk studies that focus on resiliency, attention is directed toward identifying the processes, and mechanisms of protective factors that ameliorate the effects of risk and promote competence.

Social-Cognitive-Behavioral Model

The theoretical framework that best guides conceptual thinking in the area of risk and resiliency is the social-cognitive-behavioral model of family interaction. This model was proposed

by Crosbie-Burnett and Lewis (1993) and is based on Albert Bandura's (1986) social-cognitive theory, which emphasizes the mutual interaction of cognitive, social, and behavioral factors in the development of behavior. The notion of reciprocal determinism is a key principal in understanding this theory. Bandura explained the principal of reciprocal determinism as the process whereby an individual is capable of influencing and changing the environment as much as the environment is capable of influencing and changing the individual.

Although Bandura (1986) addressed the reciprocal influences at the individual, community, and sociocultural levels, he omitted the direct influence of the family environment. The social-cognitive-behavioral model of development uses the same processes and principles contained in Bandura's social-cognitive theory to explain behavior, and expands its parameters to include the influence of the family as part of the social and physical environment. This model connects individual family members through the immediate social and physical environments, as well as through the larger cultural environment they share. These are the basic assumptions of the social-cognitive-behavioral model: (a) behavior is learned, and within the limits of genetic inheritance and physical and physiological characteristics, behavior is malleable; (b) in order to attempt to meet their basic needs, individuals actively seek, select, and utilize information; (c) cognitive activity can be consciously accessed, monitored, and altered; (d) individuals attempt to maximize rewards and minimize costs in all of their actions and avoid events, people, places, objects, and sensations that they experience as more punishing or unpleasant than rewarding; and (e) overt manipulations of human behavior is an ethical endeavor (Crosbie-Burnett & Lewis, 1993). Practical application of research efforts is justifiable and promoted under the social-cognitive-behavioral framework.

The social-cognitive-behavioral model is relatively value free. In this model, the constitution of the family is not limited to the traditional one, where offspring live with both

biological parents; instead, all household compositions that offer care-giving environments for children are considered families. The model neither states nor implies how families should interact, rather it focuses on how they interact and the consequences of these interactions. However, the values and beliefs that each family member holds concerning the family's goals and functions are considered useful in the explanation of the interactions among the family members (Crosbie-Burnett & Lewis, 1993).

Any theoretical model that informs resiliency research must deal with an outcome of competence. Within the social-cognitive perspective, personal development is addressed in terms of five basic capabilities: (a) symbolizing capability, (b) forethought capability, (c) vicarious capability, (d) self-regulatory capability, and (e) self-reflective capability (Bandura, 1986). The capacity to use imagined, written, or verbal symbols allows individuals to transcend time and space. When humans develop the ability to transform and cognitively process information, former experiences can be recorded through the use of symbolism. As children mature, their capacity to transform newly acquired impressions and perceptions into cognitive symbols increases, as well as their ability to bring the remembrance of their past experiences into conscious control (Bandura, 1977). The capability of forethought allows an individual to solve problems without the need to personally experience alternative solutions on a trial-and-error basis. This intentional, goal-directed behavior is possible through the use of symbolism.

Vicarious learning is the acquisition of new information and skills or the extinction of old behaviors through the observation of another person's behavior (Lerner, 1986; Miller, 1989; Salkind, 1985). Indirect reinforcement can motivate or discourage an individual to behave in a certain way. Self-regulatory capacities enable an individual to engage in foresightful behavior. When an individual is aware of and remembers that a past behavior has produced a certain

consequence, they develop expectations that future actions will bring either benefits, no appreciable effects, or negative outcomes. Depending on the expected outcome, an individual will be motivated to act or refrain from acting accordingly. Reflection about one's thinking fits into this category. Different perceptions of self-efficacy that control an individual's judgment of their ability to act effectively in certain circumstances affect motivation and competent behavior. Ideas and thoughts of self-doubt create low motivational forces which lead to lower performance, whereas those of self-belief create high motivational forces leading to improved competent behavior.

The protective processes and mechanisms that moderate the effects of risk on competency are important components to consider in resiliency research. The ability of the social-cognitive theory to inform resiliency research is superior to other theoretical frameworks. Individual, familial, and community risk factors and their interaction with individual, familial and community protective factors are considered through the model's emphasis on the family's shared physical, social and cultural environments in shaping the individual's course of behavior. In addition, the tenets of personal capabilities within the social-cognitive frame-work consider the processes of competent human functioning.

A Population At Risk: Children of Adolescent Mothers

Children born to adolescent mothers constitute a population predisposed to the influence of multiple risks throughout childhood. Every year, close to half a million young women under 20 years of age give birth (National Center for Health Statistics, 1991). Giving birth to a child before reaching adulthood forever changes the life course of an adolescent woman. More importantly, the social, physical, and emotional conditions of the adolescent mother before and after birth directly affect the developmental outcomes of the children she rears. Results of a prospective longitudinal study revealed that concurrent maternal life situations are highly associated with school

performance and behavior during preschool and high school years for children born to adolescent mothers (Furstenburg, Brooks-Gunn, & Chase-Lansdale, 1989). The effects of early parenthood alter many present choices and continue to alter future life choices of the mother and the children who depend on her.

Adverse family conditions interfere with optimal child-rearing. The contextual circumstances influencing the caregiving environment in families of adolescent parents are of particular consequence to long-term development (Sameroff, 1975; O'Dougherty & Wright, 1991). Disadvantaged circumstances associated with adolescent parenthood include unplanned pregnancy, large family size, single parenthood, family disruption, low maternal educational attainment, prolonged economic hardship, maternal depression, and punitive attitudes toward child rearing (Adams, Adams-Taylor, & Pittman, 1989; Card & Wise, 1981; DeBolt, Pasley, Kruetzer, 1990; East & Felice, 1990; Furstenburg, Brooks-Gunn, & Morgan, 1987; Hofferth & Moore, 1979; Kellam, Adams, Brown, & Ensminger, 1982; Kissman, 1989; Moore & Wertheimer, 1984; Mott & Marsiglio, 1985; Reis & Herz, 1987; Zuravin & DiBlasio, 1992). These factors place children born to adolescent mothers at high risk for failure to develop competence skills necessary to realize their potential.

Children of adolescent mothers frequently show signs of academic, cognitive, and psychosocial dysfunction (Baldwin & Cain, 1980; Barratt, 1991; Brooks-Gunn & Furstenburg, 1986; Chase-Lansdale, Brooks-Gunn, & Paikoff, 1991; East & Felice, 1990; Hayes, 1987; Hofferth, 1987; Ketterlinus, Henderson, & Lamb, 1991; Moore & Snyder, 1991; Wadsworth, Taylor, Osborn, & Butler, 1984). They are more likely than children of adult parents to engage in problem behaviors during adolescence, including early sexual activity resulting in pregnancy and early parenthood (Hofferth, 1987). Although past comparative research suggests that children

born to teenage mothers are at high risk for maladaptive functioning, there is great within-group variability. For example, observations of cognitive deficiencies are more prevalent in male children born to adolescent mothers than female children born to adolescent mothers (Baldwin & Cain, 1980; Furstenburg, 1988).

The qualifying characteristics that define the offspring of adolescent mothers differ among research studies of this at-risk population. Whereas one definition restricts the offspring of adolescent mothers to only those children born to women who are under 20 years of age, another study may include all subsequent children born to the adolescent mother (Baldwin & Cain, 1980; Kinard & Reinherz, 1987; Zuravin & DiBlasio, 1992). In studies where the latter definition is used, the age of the proband child's mother at birth is considered an additional risk factor in a group of multiple risks to which associations with developmental outcomes of children born to adolescent mothers are investigated. Not only are there immediate short-term effects on the developmental course of the mother and the child born to the woman who becomes a mother before the age of 20, but the lifecourses of all future family members are affected by the birth events that make women adolescent mothers. Because the adverse effects of premature parenthood are experienced by subsequent children born into families that have mothers who gave birth to their first child before the age of 20, this study will adopt the definition that includes them.

There are few developmental studies using children of adolescent parents as the risk population (Furstenburg et al., 1987; Chase-Lansdale et al., 1991). Most of the research comparing developmental outcomes of children born to adolescent and adult mothers prior to 1980 was conducted on predominately Black, urban, and disadvantaged women who were enrolled in specialized intervention programs. Concern with the methodological problems of these studies led Ketterlinus and colleagues (1991) to design a study in which the effects of familial factors among a

sociodemographically heterogeneous sample of children of adolescent and adult mothers could be controlled.

Data from a nationally representative sample ($N = 4,971$) of children whose mothers were between the ages of 17 and 25 at their birth was used by Ketterlinus and associates to test the hypothesis that maternal age is a less important predictor of children's cognitive development than the quality of the home environment, maternal intelligence, and sociodemographic variables such as ethnicity, marital status, maternal education, and family income. Results reported from multiple regression analysis suggest that risk factors other than maternal age at birth were indeed important predictors of cognitive functioning. Support was indicated through negligible beta coefficient values while testing the unique association of maternal age with criterion responses in both math and reading scores. Gender and home environment were notable predictors for Peabody Individual Achievement Test (PIAT) Reading scores, whereas, family income, marital status, maternal cognitive status, maternal education, and ethnicity were predictors of PIAT Math scores.

The retrospective research conducted in the 1970s was not effective in isolating the effects of poverty and diminished maternal education from that of maternal age. In part, the inability to isolate the unique effects of these factors is due to the bi-directional association between poverty and adolescent pregnancy. Poverty in a young adolescent woman's life is linked to increased pregnancy and adolescent pregnancy is linked to increased poverty.

More recent research results have suggested that infant and childhood developmental concerns are mainly related to family structure and poverty instead of maternal age. In addition, when family socioeconomic status, maternal education and household composition are held constant, little difference is explained by maternal age in intellectual development in early childhood (Baldwin & Cain, 1980). Later in life, however, children of adolescent mothers are at-

risk for school failure. Compared with adolescent children of adult parents, adolescent children born to adolescent mothers have lower standardized test scores, poorer academic achievement, higher rates for grade retention, and lower teacher evaluations--even when other sociodemographic variables are held constant (Brooks-Gunn & Furstenburg, 1986; Hofferth, 1987).

Family structure is thought to be an important factor that can place children of adolescent mothers at greater risk for maladaptive functioning. Results of past studies suggest that the long-term health, cognitive, social, and emotional development of children born to adolescent mothers is improved if the child is reared in a household with more than one adult present (Baldwin & Cain, Dunbow, 1980 & Luster, 1990). However, family structure is not stable and the study of family patterns is extremely complex. Kellam, Ensminger, and Turner (1977) analyzed the compositions of adult members living in the households of first-grade children. They found 86 different household classifications when the relationship bonds between individuals who were at least 18-years-old were considered. Control of the confounding effects of family structure in the study of children of adolescent mothers is available through the application of sampling techniques when choosing the study sample. Since the results of past studies are based on samples of predominately African-American, single-parent families enrolled in intervention programs (Ketterlinus, Henderson, & Lamb, 1991), and because the generalizations of those results cannot be extended beyond these specialized samples, the present study will examine a sample of children born to adolescent mothers living in Anglo-American, two-parent families at the time of risk analysis.

CHAPTER II

REVIEW OF RELATED LITERATURE

Literature pertinent to this study involves several areas of review. First, the evolution of theory in risk research is presented as a means of seeing past and present ways that risk is conceptualized and measured. The methodological and statistical practices in three contemporary resiliency studies will be examined next. Then, psychosocial competency as an outcome measure is presented. Finally, the operational representations and statistical analyses of risk factors in recent research, followed by descriptions of potential protective factors from studies focusing on competency outcomes are reviewed.

Theoretical Models of Risk

A developmental risk factor is a biological or social environmental agent that is especially likely to increase the probability of the occurrence of a negative outcome (Rutter, 1987; Werner & Smith, 1982, 1992). During the past 25 years, risk research has carved a strong foothold in the field of human development. At its inception in the 1950s, risk research began as a quest for an explanation of individual differences in developmental outcomes. The first conceptual model used to inform research in this field was based on the biomedical model of risk, which posited a reductionist framework. In the biomedical model, all behavioral disturbances are seen as symptoms of deeper somatic disturbances (Sameroff & Seifer, 1983). Methodologies used to determine risk factors in these early risk studies were retrospective in nature and often gave the impression that clear relationships were present between prenatal and perinatal complications and later maladaptive

outcomes. However, most conclusions based on the results of these early comparative studies are no longer supported through contemporary prospective studies.

Conducted in 1951-66, the early work of Lilienfeld and colleagues (cited in O'Dougherty & Wright, 1991) identified anoxia, prematurity, obstetrical complication, malnutrition, and low socioeconomic status in infancy as risk factors. These factors were believed to negatively influence the child's current development processes, as well as increase the risk of later disorder. Their work resulted in the establishment of a "continuum of reproductive casualty", which encompassed lethal, sublethal, subtle, and minor manifestations of disability thought to result from early central nervous system trauma. However, subsequent prospective research involving the study of single perinatal or postnatal risk did not confirm the earlier inferences of direct causation. After noting in a risk review article that family and environmental factors--especially socioeconomic status--played a key role in determining maladaptive outcomes, Sameroff and Chandler (1975) proposed that the "continuum of care-taking casualty" replace the continuum of reproductive casualty. They also advocated the use of the transactional model for research investigating developmental outcomes.

The transactional model of psychosocial development (Sameroff & Chandler, 1975) stresses the malleable character of both the individual and the environment. Behavioral outcomes are seen as functions of the quality of the organism-environment transactions across time, which are continually engaged in mutual adaptation. To the extent individuals elicit or are provided with a nurturing environment, positive outcomes are found. Conversely, to the extent individuals elicit negative responses from the environment or are not provided with a nurturing environment, they are found to be at-risk for later deviant development. Replacing the biomedical model in risk research, the transactional model considered the mediational relationship between individual and environmental risk factors in developmental outcomes. However, it is important to note that the transactional model

focused on dysfunctional development through the investigation of maladaptive or deviant outcomes of risk.

Based on the cumulative results from 20 years of analyzing the data collected in the Rochester Longitudinal Study, Sameroff and Seifer (1990) realized a need to replace the transactional model that previously guided their risk research. In a literature review of the factors contributing to early developmental risk status, Sameroff and Seifer presented the *vulnerability model*, a conceptual model that delineates a relationship between risk and competency outcomes. Through the study of competency outcomes, the vulnerability model allows researchers to investigate factors that explain resiliency in children. After analyzing the Rochester data using the new vulnerability model, Sameroff and Seifer reported a strong influence of the parent-child dyad in the resiliency process. These new observations led them to suggest a modification of the vulnerability model, the *systems model*, where an emphasis is placed on examining transactions between the parent and child through the role of protective factors.

Much progress has been made over the past 25 years in the evolution of theory and statistical designs guiding research in high risk populations. Perhaps the greatest contributions in the field have come from the publications of Norman Garmezy and Michael Rutter. Collaborating in developing theory and methodology, Garmezy and Rutter have advanced the focus of developmental research from merely identifying risk factors to exploring the processes by which risk conditions are handled (Garmezy, 1974, 1983, 1985, 1988; Garmezy, Masten, & Tellegen, 1984; Garmezy & Phipps-Yonas, 1984; Masten & Garmezy, 1985; Rutter, 1970, 1974, 1979, 1983, 1985, 1987, 1990).

There is general agreement among developmental researchers regarding the importance of using prospective, longitudinal designs to study risk and protective processes (Ritchers & Weintraub, 1990). However, Garmezy (1988) pointed out that many risk studies that are longitudinal in method

are not, in fact, longitudinal in analysis, as the studies are “essentially unconcerned with the processes and mechanisms underlying behaviour change over time” (p. 32). Specifically, researchers who conduct resiliency studies need to be concerned with explaining how a predicted path of maladaptation turns into one of competency (protective process) and why that path is averted (protective mechanism).

Norman Garmezy has directed over twenty years of research at the University of Minnesota in the identification of factors found during early childhood that point toward risk status for developing psychopathology. An important part of this research was the identification of statistical models to test the theoretical relationships in high risk population studies. In a summary article based on the data analysis strategies used in research conducted over a period of ten years at Project Competence, Garmezy et al. (1984) linked multiple regression analysis models to three hypothesized relationships between risk and competency.

In the *compensatory model* (Garmezy et al., 1984), risk factors are negatively associated with competent functioning and contribute to low levels of adaptation while compensatory factors are positively associated with competent functioning and promote high levels of competency. Because risk and compensatory factors operate in a simple, direct fashion with competency, only main effects are considered in the accompanying compensatory regression model. In the *protective model*, variables serve as protective factors when they moderate the expected negative effects of risk by increasing the likelihood of adaptive outcomes. At the opposite pole, vulnerability factors moderate the negative impact of risk factors by decreasing the likelihood of adaptive outcomes. Garmezy and associates (1984) suggested that the moderating processes of protective and vulnerability factors be tested in regression analysis through an interactive term with risk factors in predicting competency outcomes. The *challenge model* supports the notion that exposure to risk

can enhance competence, given that the accumulation of unresolved stress is not more than the individual can successfully handle. A curvilinear statistical relationship between risk and competence is hypothesized through the challenge model, which is tested through a regression model containing second-order associations (i.e. squared risk term).

It is germane to the study of psychosocial resilience to understand that many risk factors do not have a direct effect. In cases where an isolated risk factor had no direct effect on the outcome, results indicated that associations became apparent when the factor occurred in concert with other risks (Rutter, 1990). Because the relationship between risk and resiliency is not a simple additive one, the statistical handling of the mediating processes of multiple risk factors presents a challenge to investigators studying the effects of multiple risk on adaptive psychosocial competence. However, before an investigator of psychosocial resilience attempts to deal with the mediational relationships between multiple risk factors, Rutter (1990) suggested that the moderating effects of protective factors be considered. Rutter (1987) has noted that the identification of protective processes is key to understanding the risk buffering effects involved in resiliency.

In a recent publication Rutter (1990) stated that prior understandings of protective processes and mechanisms are necessary in risk studies to avoid the danger of interpreting resilience as meaning “no more than that the person has not in fact experienced the crucial risk factor” (p. 184). The essential feature of a protective mechanism is its ameliorating impact on the effects of risk for a predicted maladaptive outcome. The effects of protective factors are indirect and dependent on their moderation of single or multiple risk indicators. Rutter warned investigators about assuming that the moderating process between risk and protection can be “confirmed or refuted by testing for a multiplicative statistical interaction effect” (p. 185). However, he did not recommend a statistical technique that could investigate protective processes. Garmezy (1992) asserted that identification of

resilient individuals is the critical first step in the effort to identify the processes whereby protection overcomes the negative effects of risk. He further stressed that a comparison of the successful adaptation group under the conditions of risk with the unsuccessful adaptation group under the conditions of risk is the “gateway to the critical step that must follow, namely, identification of biological, psychological and sociocultural mechanisms that control these differentiators of adaptive and maladaptive outcomes” (p. 59).

Recent Resiliency Research

A review of recent published literature concerning resiliency in at-risk individuals revealed that researchers failed to choose theoretical models that were compatible with the hypothesized associations between risk, protection, and competency prior to selecting statistical analyses to test these relationships. The following section will critique theoretical, design, and statistical issues for three resiliency studies. Special emphasis will be given to departures from the use of a conceptual model that complements the purpose of the research and adequate statistical testing of the conceptual relationships that were described in the study.

A criticism of the summary article by Garmezy and associates (1984) by this author pertains to a statement that suggests the relationship between risk and competency in the three statistical models “are not mutually exclusive; they may be combined” (p.103). Research can be misguided if readers interpret this statement to mean that statistical relationships found through the indiscriminate use of one, two, or all three of the regression analyses (as Garmezy and associates described) can produce tangible evidence for theoretical relationships between risk and competency. The investigation of relationships through the use of one or more statistical models because they “fit the data” is analogous to shooting an arrow in the dark. Instead, theoretical models that are compatible

to the purpose and goals of the investigator's study should be chosen prior to the determination of the statistical analysis.

Examining Resiliency in Inner-City Adolescents

Information based on previous risk studies with young children was used to select risk and protective factors for investigation of four competency criterions in a sample of under-privileged inner-city adolescents in a resiliency study by Sunya Luthar (1991). The major objective of the study was to investigate whether variables identified as protective factors in previous studies using samples of younger risk populations would also serve ameliorative functions in a sample of older at-risk adolescents. Acknowledging that competency measures have generally been measures of external observable behavior, a second objective was to compare internal competencies (through the absence of such symptoms as depression and anxiety) among the resilient and non-resilient children who were categorized as such through external competency measures.

Four composite measures of external competency were used as criterions in statistical analyses (Luthar, 1991). One competency composite, School Grades, was summed from grade points of four academic courses. In the creation of the remaining three competency composites, a number of factor analyses were applied to variables from two behavioral inventories. One inventory of both teacher and peer responses was designed to assess various domains of peer reputation in the classroom. The other inventory (consisting of 36-items) was given to the adolescent's English teacher and was designed to gauge six behavior and adjustment problems: (a) Acting Out, (b) Shy-Anxious, (c) Learning, (d) Frustration Tolerance, (e) Assertive Social Skills, and (f) Task Orientation.

The first step in determining the remaining three composites was a factor analysis of the items from the peer reputation inventory (Luthar, 1991). A four-factor solution was determined through examination of an eigen value plot, and the following composite variables were constructed:

(a) Aggressive-Disruptive, (b) Sensitive-Isolated, (c) Sociability, and (c) Leadership. Another factor analysis was applied to the six-subscale scores of the teacher behavior ratings along with the four composite variables from the previous factor analysis of the peer reputation inventory. Three composite variables (a) Assertive-Responsive, where high scores represented adaptive competency skills; (b) Disrupted-Disengaged, where high scores represented poor competency skills; and (c) Sociable, where high scores represented adaptive competency skills, which accounted for 77% of the total variance, were derived from this final factor analysis. Although positive and negative directions of the scoring operations were reported for the variables making up these composite scores, Luthar supplied no information about whether variable weights were used in the creation of these composites.

Luthar first used the compensatory regression model (Garmezy et al., 1984) to jointly test the relationships between six potential risk variables and the four composite competency criteria. Even though Luthar's (1991) statistical design considered five sociodemographic variables as possible risk factors, she rejected them because they did not "significantly and independently contribute to reduced competence scores" (p.605) when tested by regression analysis. The variables were reduced to dichotomous measures before testing their association with the competency composites. Cutoff points, indicating what Luthar determined sufficient risk, were: (a) presence of more than three children in the house for the variable, Family Size; (b) absence of a parent or surrogate parent for the variable, Household Composition; (c) membership in a minority group for the variable, Ethnicity; (d) head of household engaged in manual labor for the variable, Parent's Occupation; and (e) maternal education below high school for the variable, Parent's Education. Although regression analysis was used by Luthar to decide whether a variable would be included in further analyses, the type of regression model was not specified. In addition, frequencies for the five

dichotomous variables and their first-order correlations with the four composite competency criteria were not reported. In fact, no frequencies for any variables in the study were reported.

A self-report measure of the frequency of negative life events over the past year was the only measure of risk used to test for possible moderating associations between six protective factors. If Luthar (1991) subjected her data to a hierarchical regression analysis that first considered the continuous risk variable, Negative Life Events, in accounting for a sequential sum of squares for the variation in competency, little subsequent variation could be accounted for by the five dichotomous sociodemographic variables. No explanation was offered as to how what Luthar terms the “significant and independent” associations of the potential risk variables with the composite competency criteria were determined. Independent associations with the competency criteria can be evaluated through simple correlational analysis. The unique association of each independent variable with the criterion variable can be tested through the partial multiple correlational analysis (or the partial sum of squares in multiple regression analysis). Nevertheless, the protective mechanisms associated with resiliency would have been better tested if Luthar had first selected and communicated a conceptual model as a framework with which to guide her research, and then chosen appropriate statistical analyses to test the theorized relationships. Instead, Luthar used both the compensatory and protective statistical models (Garmezy et al., 1984) to test data when the challenge model would have better tested the conceptual relationship between risk and competency in her study.

All subsequent analysis was based on a composite variable that consisted of the summed negative life events score, which Luthar aptly named Stress. Hierarchical regression analysis was used to test the interactive effects of Stress with five variables that measured potential protective factors: (a) Internality, (b) Intelligence, (c) Social Skills, (d) Ego Development, and (e) Positive Events. Gender, age, and socioeconomic status were used as control factors in separate regression

analyses with the four competency criterions. Interactive effects are reported as “significant” through an indeterminate measure of R-Square value change. The interactive effects were interpreted as protective or vulnerable according to direction of their association with competency when the variable involved in the interaction were re-expressed as categorical variables. The variable was considered a protective factor if the effects of the variable were positively related to the criterion and a vulnerability factor if they were negatively related. For Assertive-Responsive as the competency criterion, Internality and Intelligence were considered protective. For the competency criterion, Disruptive-Disengaged, no factors were considered protective or vulnerable. For the Social competency criterion, Social Skills were considered protective. For the Grades competency criterion, Positive Events and Intelligence were considered vulnerability factors.

Luthar noted that current research in developmental psychology suggests that at higher levels of development, pathology tends to be expressed more often in internalizing (thought-oriented) behavior than externalizing (action-oriented) behavior. Because past research suggested that children who have been identified as resilient tend to be at higher developmental levels as reflected by their greater intellectual maturity, the second objective of Luthar’s (1991) study was to investigate internal competencies among resilient children. Using categories of the risk variable, Stress, and the four competency criterions that consisted of the behavioral measures from the first part of the study, individuals were placed into one of four categories: (a) high risk/low external competency, (b) high risk/ high external competency, (c) low risk/low external competency, and (d) low risk/high external competency. Status was determined as high risk if an individual was one standard deviation above, and low risk if one standard deviation below, the group mean on the Negative Life Events score. Competency status was determined as high if an individual was one standard deviation above, and low if one standard deviation below, the group mean on one or more of the four competency

composites measuring external behavior. Because only two individuals met the criteria for the low risk/low external competence category, they were excluded from further analyses.

A separate measurement was employed to determine internal competency scores for the study sample. Internal competency scores for the nine high risk/high external competence individuals (resilient) were compared to the internal competency scores of the individuals belonging to the high risk/low external competence ($n = 12$) and low risk/high external competence ($n = 11$) categories. Analyses of variance were used to examine whether the external competence resilient group differed from the external competence non-resilient group on four dependent measures of internal competency. The four internal competency measures--Depression, Anxiety, Dependency, and Self-Criticism--were composite variables constructed from continuous scales of established psychometric inventories. Results from a multivariate analysis of variance (MANOVA) indicated that there were differences in internal competencies among the three risk and external competence category groups. Analysis of variance tests for each internal competency criterion revealed main effects for the grouping variable that indicated the resilient and non-resilient status for following three competency measures: (a) Depression, (b) Anxiety, and (c) Self-Criticism. Neuman-Kuells comparisons revealed that resilient individuals had higher internal competency scores than low risk/high external competence individuals. However, in comparison to high risk/low external competence individuals, resilient individuals had comparable levels of internalizing competency.

Examining Resiliency in Adolescent School Children

A retrospective study concerning resiliency during adolescence was conducted by Grossman, Beinanshowitz, Anderson, Sakuari, Finnin, and Flaherty (1992). This exploratory study, conducted on a convenience sample of 179 ninth-graders, examined the role of risk and protective factors on four outcome measures of adaptation: (a) Mood, (b) Deviance, (c) Self-Esteem, and (d) Grades. An

unweighted composite score, which was derived from a 12-item dichotomous inventory with an internal reliability of .55, assessed Risk. Descriptions of sample items show a strong similarity to a typical negative life-events inventory such as the one used by Luthar (1991). Descriptive analyses indicated that 66% of the females and 78% of the males experienced two or more risk factors.

The following protective factors were investigated in the Grossman and associates (1992) study: (a) Family Cohesion, (b) Locus of Control, (c) Mother-Child Communication, (d) Father-Child Communication, and (e) Relationship with a Significant Non-Parent Adult. Family Cohesion was measured through a 30-item subscale of an inventory that had been used in a previous study with families receiving clinical treatment where alpha reliability had been established at .91 for that study. Locus of Control was measured through a 40-item dichotomous scale designed to measure generalized expectancies for external and internal locus of control, which placed greater internalized locus of control at the high end of the scale. Split-half reliability for Locus of Control was established as .81 with a sample of twelfth-graders from a previous study.

Separate composite variables of Mother-Child Communication and Father-Child Communication were created from measures of a 20-item self-report inventory. These parent-child composite measures originated from two subscales of the inventory that evaluated open-family communication, as well as problems in family communication. Questions in the parent-child communication subscales applied to the male and female whom the adolescent considered as their parents, which in many cases was a step-parent. Internal consistency was reported as .88 from a previous study. The protective factor composite, Relationship with a Significant Non-Parent Adult, was formed from answers to an interview that consisted of three questions. The adolescents' composite score was non-zero if they reported that an extrafamilial adult was important in their lives and, based on the intensity of the closeness to that adult, ranged from 1 to 5.

Five hierarchical regression analyses were performed in a three-step process separately for each of the four outcome measures with Risk, one protective factor, and a Risk by Protection interaction as the predictor variables in the models. In addition, these models were tested separately for males and females, resulting in a total of 40 regression models. For females, results of the first hierarchical step of the four outcome measures regressed on Risk produced modest R-Square values for Mood ($R^2 = .12$), Deviance ($R^2 = .18$), Self-Esteem ($R^2 = .09$), and Grades ($R^2 = .16$). For males however, Risk was a predictor only for Grades ($R^2 = .07$).

During the second hierarchical step, one protective factor was added to each simple regression model. These models, which tested the main effects of a particular protective factor as the second independent variable, are were used to calculate increases in the variance accountable to the protective factor after the variance in Risk had been taken into account (ΔR^2). Family Cohesion, as a protector for females, produced R-Square value increases for all four criterion variables ($\Delta R^2 = .09$ for Mood, $\Delta R^2 = .08$ for Deviance, $\Delta R^2 = .07$ for Self-Esteem, and $\Delta R^2 = .05$ for Grades). For males, Family Cohesion was responsible for R-Square value increases for two criterion variables ($\Delta R^2 = .08$ for Deviance and $\Delta R^2 = .08$ for Self-Esteem).

For females, adding Father-Child Communication as the protective factor in the second hierarchical step gave increases in the values of R-Square in three competency criterion ($\Delta R^2 = .13$ for Mood, $\Delta R^2 = .05$ for Deviance, and $\Delta R^2 = .10$ for Self-Esteem). However, in all four outcome models, the addition of this protective factor produced no substantial increases in R-Square values for males. For females, R-Square value increases were obtained with the addition of Mother-Child Communication in the regression models for all four criterion ($\Delta R^2 = .04$ for Mood and $\Delta R^2 = .06$ for Deviance, $\Delta R^2 = .04$ for Self-Esteem, and $\Delta R^2 = .03$ for Grades). For males, Mother-Child

Communication was responsible for increases in R-Square values with two competency criterions ($\Delta R^2 = .08$ for Deviance and $\Delta R^2 = .08$ for Self-Esteem).

The addition of Locus of Control as a protection factor in the second step of the regression analysis resulted in a R-Square value increase with three competency criterion for females ($\Delta R^2 = .13$ for Mood, $\Delta R^2 = .09$ for Self-Esteem, and $\Delta R^2 = .05$ for Grades). For males, the addition of Locus of Control resulted in a R-Square increases in two competency criterion ($\Delta R^2 = .10$ for Mood, $\Delta R^2 = .09$ for Deviance). The addition of Relationship with Significant Non-parent Adult as a protective factor resulted in a substantial increase in R-Square values only for the competency criterion of Mood for both genders ($\Delta R^2 = .03$ for Female and $\Delta R^2 = .07$ for Male). No increases were found in the models with the competency criterion of Deviance, Self-Esteem, or Grades for either gender.

Examining Resiliency in Children of Adolescent Mothers

In a prospective resiliency study that used secondary data from the National Longitudinal Survey of Youth, Dunbow and Luster (1990) investigated the impact of multiple risk factors on two measures of competency for 721 children born to adolescent mothers. Data for the eight risk variables were collected in 1986 when the children were 8- to 15-years-old (with the exception of mother self-esteem, which was collected 6 years earlier). Four risk factors were single continuous variables: (a) Number of Children in Home, (b) Mother's Age at Child's Birth, (c) Mother's Education, and (d) Mother Self-Esteem. Three risk factors were single dichotomies: (a) Mother has No Partner Living in Home, (b) Poverty Income Status, and (c) Urban Residence; with a value of zero indicating no risk and a value of one indicating the presence of risk.

The eighth risk factor was an unweighted composite score, created by summing a value of one for each risk factor present. Presence of risk for the continuous variables was determined by the

following conditions: (a) four or more children living in the home, (b) mother 17 or younger at birth of child, (c) mother had less than 12 years of education, and (d) mother self-esteem below the 33rd percentile. Frequency distribution information for the composite risk score was reasonably normal for the individuals in the study sample with 4% having zero risk factors, 14% having one risk factor, 17% having two risk factors, 22% having three risk factors, 21% having four risk factors, 14% having five risk factors, 7% having six risk factors, and 1% having all seven risk factors.

Data for the protective factors and cognitive and behavioral competencies were collected in 1986 when the children were 6 to 11 years old. Behavioral adjustment data consisted of the mothers' responses to a behavioral problem index that was designed to measure the antisocial, hyperactivity, depression, and peer conflict behavior of their children. Forced choice categories for the questionnaire responses were (a) often true, (a) sometimes true, and (c) not true. The internal reliability coefficient for the Total Behavior Problems score, which contained 28 items, was .89. The internal reliability coefficient was .71 for the Antisocial Behavioral Scale score, which was a six-item subscale of the Total Behavioral Problems score. Three cognitive competency criterion were measured from the Math, Reading Recognition, and Reading Comprehension subscales of the Peabody Individual Achievement Test (PIAT).

Dunbow and Luster (1990) investigated four protective factors: (a) Intelligence, a continuous measure of the child's score on the Peabody Picture Vocabulary Test (PPVT); (b) Child's Self-Worth, an unweighted composite variable measured through a subscale of a child self-esteem inventory, (c) Emotional Support at Home, and (d) Cognitive Stimulation at Home. The latter two protective factors originated from an abbreviated version of the Home Observation for Measurement of the Environment (HOME) inventory. The unweighted composite sum of a 13-item subscale of the Emotional Support of the HOME inventory made the third protective factor (alpha reliability = .65).

The fourth protective factor was an unweighted composite score of the 14-item subscale, Cognitive Stimulation from the HOME inventory with an internal reliability coefficient of .61. The fifth protective factor consisted of the total number of the above protective factors present in the children's lives. Children were considered as having protection if they had scores above the median group score for Self-Worth, Emotional Support, and Cognitive Stimulation. Although the median PPVT was 87, a score of 100 was considered protective since this score is generally considered average intelligence.

Chi-square analyses were employed to assess the associations between seven individual risk factors and behavior problems across the five competency measures. Children were considered having behavior problems if their scores were above the 66th percentile in the Behavior Problems Total and the Antisocial Behavioral scale. Academic problems were determined by scores below the 33rd percentile for PIAT Math, PIAT Reading Recognition, and PIAT Reading Comprehension. Results of the analyses indicated that three risk factors were associated with an increased likelihood of adjustment problems in all five competency areas: (a) Poverty Income Status, (b) lower Mother Self-Esteem, and (c) lower Mother's Age at Birth of Child. Three risk factors were associated with increased likelihood of adjustment problems in four competency areas: (a) Mother Has No Partner Living in Home, (b) higher Number of Children in Home, and (c) lower Mother's Education. Urban residence was associated with increased likelihood of adjustment problems in three competency areas: (a) PIAT Math, (b) PIAT Reading Recognition, and (c) PIAT Reading Comprehension. Chi-square analyses were used to assess the associations between the four protective factors for adjustment problems and the five competency measures. Results indicated that, for all four protective factors, children having high protective scores were less likely to experience behavior and academic problems than children with low protective factors.

A hierarchical regression was performed for each of the five competency criterion by entering the seven risk factors (Number of Children in Home, Mother's Age at Child's Birth, Mother's Education, Mother Self-Esteem, Mother Has No Partner Living in Home, Poverty Income Status, and Urban Residence) in the first step, followed by the five protective factors (Intelligence, Child's Self-Worth, Emotional Support at Home, Cognitive Stimulation at Home, and Total Protective Factors). Dunbow and Luster (1990) considered their most important finding to be that of all the variables regressed on the measures of cognitive and behavioral outcomes, the risk composite score was the strongest predictor of adjustment (higher risk composite scores indicated poorer adjustment). However, knowledge of only the quantity of risk factors, without an accompanying knowledge of the degree to which specific risk factors contribute to the mechanisms involved in the resiliency of children at risk for psychosocial maladaptation, seriously limits a researcher's interpretation of the study results .

Dunbow and Luster (1990) did not use statistical techniques this writer considers appropriate to testing the conceptual relationship between risk and protective factors. Instead of analyzing interaction effects with the risk factors, direct associations between protective factors and cognitive and behavioral outcomes were tested. Beta coefficient tests were examined, which expressed the expected rate of change in the dependent variable of interest associated with the rate of change in the independent variable under investigation while holding the effects of the other independent variables constant. These methodological and statistical strategies test only simple associations between single independent variables and criterion measures of competency and are useful in identifying those factors that Garmezy and colleagues (1984) label "compensatory" factors.

Psychosocial Competence

In the early 1970s, furthering the understanding of individual differences in human development was thought possible through investigation of the factors that contributed to resiliency. Resiliency research was pioneered through the contributions of Norman Garmezy, who promoted a philosophical change from treating pathology as the proper outcome in developmental research to one of competence (Cicchetti, 1990). Focusing on competency as the outcome of development has enabled investigators to consider the mechanisms and processes involved in the development of resiliency in children at risk for maladaptive psychosocial development.

Definitions and Measurement of Competency

Human competence denotes continual adaptive functioning in transactions with the environment. Competent functioning is manifested through three abilities: (a) the ability to accept and effectively respond to the expectations of society and one's own culture, (b) the ability to accomplish individual goals, and (c) the ability to anticipate a future that holds value and fulfillment (Bandura & Schunk, 1981; Clausen, 1991; Ford, 1987; Garmezy, 1974; Laosa, 1979; Ogbu, 1981). In other words, competent children and adults successfully conform to sociocultural expectations in their educational, occupational, and interpersonal roles; they realize their need to positively influence and shape the course of their future; and they engage in personal goal planning that is accompanied by the motivation and action needed for goal achievement.

Ford (1987) provides an excellent review of the ways competence is conceptualized in the psychological literature. He listed the following categories: (a) competence motivation, (b) behavioral repertoire, (c) personal agency beliefs, (d) internal and external equilibrium of human functioning, and (e) effectiveness in obtaining goals. As an outcome measure in resiliency studies, competency has been operationalized in many different ways. In the past, researchers who studied risk and resiliency used

the absence of pathology to measure competent functioning. However, more recently, investigators of resiliency have tended to include healthy adaptive functioning in their measurements of competence. Garmezy (1985, 1988) encouraged researchers in developmental studies to search for protective moderators that influence adaptive biological, social, affective, and cognitive functionings.

Measures of cognitive functioning (aptitude, school grades, academic achievement, and intelligence quotient) and behavioral functioning (mother, teacher, and peer reports of a child's antisocial and adaptive social behavior) have been used in recent developmental studies to evaluate competency (Dunbow & Luster, 1990; Ketterlinus et al., 1991; Sameroff & Seifer, 1983). A unique approach to assessing measures of adolescent psychosocial competency was used by Luthar (1991) in combining both adaptive and maladaptive functioning (measured from positive and negative behavior ratings of peers and teachers) to derive three composite scores of behavioral competence. In current risk and resiliency research, the need to assess both external behavioral and internal affective competency has been acknowledged (Cohen, Brooks, Cohen, Velez, & Garcia, 1990; Luthar, 1991). In the present study this writer incorporated both of these new approaches in the selection of the competency criterions.

Examining Competency Throughout Adulthood

Emmy Werner and Ruth Smith (1982, 1992) used the transactional model of psychosocial development (Sameroff & Chandler, 1975) to inform their early research and the vulnerable model (Sameroff & Seifer, 1990) to inform their most recent research of children born on the island of Kauai, Hawaii. Goals of this resiliency study, which began in 1954 and documented all pregnancies and the outcomes of their offspring, were: (a) to provide a longitudinal perspective on children's capacity to cope with perinatal stress, poverty, and parental psychopathology, (b) to examine sex differences in vulnerability and resiliency in the first and second decades of life, and (c) to identify

protective factors within the child and the care-giving environment that differentiated high risk children who are resilient from those who developed serious learning problems (Werner & Smith, 1982). Competent functioning in the 1955-57 Kauai birth cohort was assessed at four separate time periods from infancy until adulthood.

Competency at two years of age was determined through (a) pediatrician's rating of physical health status as normal or above, (b) psychological rating of intellectual development as normal or above, and (c) Catell IQ score less than one standard deviation below normal. Competency at 10 years of age was measured through (a) the absence of the child's physical handicap, (b) Primary Mental Abilities test score less than one standard deviation below normal, and (c) non-placement in mentally handicapped classroom or institution. Competency at 18 years of age was measured through the absence of the adolescent's (a) physical handicap, (b) mental retardation, (c) serious mental health problem, (d) delinquency record, and (e) involvement in a teenage pregnancy (Werner & Smith, 1982). Assessment of adaptive competencies at 31 to 32 years of age were measured through (a) self-perceptions of success and satisfaction with work, family, and social life; (b) psychological well-being; and (c) absence of public records of lawful violations and mental health treatment (Werner & Smith, 1992).

Risk Factors

Adaptive developmental outcomes are negatively affected by biological and psychological disorder as well as familial and social dysfunction. Therefore, risk factors are typically selected from individual, familial, and community contexts (Garmezy, 1985). Individual risk characteristics encompass innate as well as acquired abilities and functionings. Family environments, especially transactions within the parent-child dyad, are extremely influential in the development of competency. Community circumstances exert an increasingly greater influence on

development as the child grows older and begins to create social ties outside the nuclear family.

Table 1 indicates childhood risk factors documented by researchers in developmental studies that affect later psychosocial and cognitive development. A brief account of the results from these risk studies is found in the following section.

Individual Risk Factors

Risk factors are considered in an individual context if they are intrapersonal and are not developed primarily from an interaction between the individual and another person. Individual risk factors categorized through the child's intrapersonal functioning include: (a) somatic history and (b) temperament.

Somatic history. Early somatic risk, in a sample of 423 children whose ages were one to ten, was one of the multiple risk factors Cohen and colleagues (1990) tested for associations with psychosocial maladjustment eight years later in adolescence. An unweighted composite measure of incidence of (a) pre- and perinatal problems, and (b) illnesses, accidents, and hospitalizations in childhood was used in regression analyses with three criteria of psychosocial maladjustment. Three regression techniques were used to investigate the associations of sixteen risk factors with three criteria: (a) Substance Abuse, (b) Externalizing Behavioral Problems, and (c) Internalizing Emotional Problems. The first regression technique tested the independent association of each risk factor with the three criteria. The second techniques examined the partial regression coefficients discover the unique contributions of the risk factors in the prediction of the three criteria. A net regression technique was also performed, which compared the partial coefficients of each risk factor from two criteria to determine if the risk factor had an equivalent effect on those criteria.

All analyses (Cohen et al., 1990) controlled for the child's Age, Sex, and Age by Sex associations. Results of the regression analyses of independent associations indicated that increased

Table 1. Risk Factors of Psychosocial Competence with Reference Sources

Risk Factors	References
<i>Individual</i>	
Somatic history	Cohen, Brooks, Cohen, Velez, & Garcia, 1990; Wadsworth, Taylor, Osborn, & Butler, 1984; Werner, 1986
Temperament	Caspi, Elder, & Herberner, 1990
<i>Familial</i>	
Educational aspirations for child	Brooks-Gunn, Guo, & Furstenbuerg, 1993; Furstenburg & Hughes, 1995
Family planning	Barocas, Seifer, & Sameroff, 1985; Werner & Smith, 1992
Maternal education	Kinard & Reinherz, 1987
Parental conflict/discord	Werner & Smith, 1992
Parental mental health	Cohen et al., 1990; Christ, Lahey, Frick, Russo, McBurnett, Loeber, Stouthamer, & Green, 1990
Parenting style/parent-child interactions	Barocas et al., 1985; Cohen et al., 1990; Simons, Whitbeck, Conger, & Conger, 1991
Parental sociopathology	Cohen et al., 1990
<i>Community</i>	
Neighborhood crime	Cohen et al., 1990
Social isolation	Cohen et al., 1990
Socioeconomic status	Christ et al., 1990; Cohen et al., 1990; Wadsworth et al., 1984

Somatic Risk was related to a higher number of Externalizing Behavioral Problems. Results of the regression analyses for unique associations indicated that increased Somatic Risk was associated with a higher number of Internalizing Emotional Problems. Net regression analyses indicated that Somatic Risk did not have a greater effect for one criterion over the others.

Wadsworth and colleagues (1984) conducted a risk study with a sample of 13,135 children from the 1970 British Birth Survey cohort. Somatic risk, measured through birth weight of less than 2,500 grams, was tested as a covariate in ANCOVA analysis where social, cognitive, and biological outcomes were compared for children of adolescent mothers and older mothers. Study results revealed that birthweight was responsible for a reduction in the error variance in statistical models where younger age of the mother was associated with lower vocabulary assessments and higher behavioral deviance scores.

Werner (1986) investigated somatic risk through the degree of pre- and perinatal stress associated with: (a) health problems of mother during pregnancy, (b) abnormal womb environment, (c) abnormal labor, (d) delayed breathing, (e) birth injury, and (f) prematurity or low birth weight in a sample of 1,963 children in the 1955-57 birth cohort of the Hawaiian island of Kauai. For individuals categorized as suffering severe Somatic Risk, the rate of mental health problems at age 18 requiring in- or out-patient treatment was five times greater than the rate of the entire cohort. For individuals suffering moderate Somatic Risk, the rate of behavioral disorder was three times greater than the rate of the entire cohort.

Temperament. Temperamental or personality differences affect the ways in which young children learn to meet such developmental demands as delay of gratification, control of impulses, and modulation of emotional expression (Chess & Thomas, 1990). As a trait, temperament is reflected by behaviors such as activity level and positive responses to others (Garmezy, 1992).

To study temperamental continuities and their effects on an individual's life-course, Caspi, Elder, and Herbener (1990) investigated associations between various childhood interaction styles and later adult outcome measures of (a) Personality Adjustment, (b) Educational Attainment, (c) Occupational Status, and (d) Parenting Pattern. Childhood Temperament was measured through (a) severity and frequency of temper tantrums, (b) shyness, and (c) dependency. Study results based on path analysis, Q-sort correlates, and ANOVAs by middle and working class social factors suggested that boys who reacted with temper tantrums and frustration to adult authority exhibited less competence in the life tasks of adulthood. However, because study results were based on a sample of 87 predominately middle-class, white, Protestant males selected from the Berkeley Guidance Study of 1928, findings cannot be generalized to persons of other cultural or historical contexts.

Familial Risk Factors

Risk factors are categorized as familial if they are interpersonal and found within the boundaries of the nuclear family system. Familial risk factors found in recent developmental literature include: (a) educational aspirations for child, (b) emotional discord, (c) family planning, (d) maternal education, (e) parental mental health, (f) parenting style, and (g) parental sociopathology.

Educational aspirations for child. Educational attainment is considered an important predictor of psychosocial outcomes in adulthood. In a longitudinal study of 254 first-born children of adolescent mothers living in Baltimore (Brooks-Gunn, Guo, & Furstenburg, 1993), the mother's educational aspirations for her child were tested with other risk factors for associations with educational attainment of the child at the 20-year follow-up investigation. Three groups were formed from the 230 individuals who were not still attending high school. Nearly half of the young adult children of adolescent mothers had completed high school (46%), with the next highest percentage

associated with those who dropped out of high school (37%). The lowest percentage was associated with individuals who continued their education beyond high school (17%). Results of a continuation ratio logistic model indicated that the mother's educational aspiration of her child acquiring less than a post secondary level (measured before the birth of her child) was related to non-completion of high school and high school graduation.

Furstenburg and Hughes (1995) explored educational outcomes of young adults in the Baltimore Study at the 23-year follow-up investigation. Results of logistic regression analysis indicated that the young adult children of adolescent mothers who held low educational aspirations for their child were: (a) 1.5 times less likely to graduate from high school, (b) 2.2 times less likely to be enrolled in college, and (c) 1.8 times less likely to have a stable economic status than the young adult children of adolescent mothers who held high educational aspirations for their child. In addition, the children of the adolescent mothers who held high educational aspirations for their child were 1.4 times more likely to avoid a live birth before reaching young adulthood.

Emotional discord. Werner and Smith (1992) investigated emotional discord (measured through chronic conflict between parents) as risk factors in the Kauai Longitudinal Study. When the individuals were 31 to 32 years old, adult competence data were collected concerning adaptive functioning in five areas: (a) School and/or Work, (b) Relationship with Spouse or Mate, (c) Relationships with Children, (d) Relationships with Parents and Siblings, and (e) Relationships with Peers. Adult Adaptation was categorized as successful (serious coping problems in one or none of the five adaptive functioning areas) and unsuccessful (serious coping problems in at least two of the adaptive functioning areas) and served as the dichotomous outcome measure in separate logistic regression models for males and females. Study results indicated that when the child was 2 to 10 years of age, the presence of Emotional Discord between parents was related to unsuccessful

Adaptation for females only. Whereas, when the child was 11 to 18 years of age, the presence of Emotional Discord between parents was related to unsuccessful Adaptation for males.

Family planning. Data from the Kauai Longitudinal Study was tested for the effect of family planning on adaptation in adulthood (Werner & Smith, 1992). Results of a separate logistic regression analysis by gender indicated that lack of Family Planning (measured by birth of a younger sibling before age the proband child reached age three) was related to unsuccessful Adult Adaptation (two or more serious coping problems) for males only.

Family planning was investigated as a risk factor for psychosocial maladjustment by Barocas, Seifer, and Samerof (1985). Regression analysis was performed on data from a sample of 197 children and their mothers in the Rochester Longitudinal Study. The criterion, Global Social Adaptation, was measured when the child was 4 years old using the Rochester Adaptive Behavior Interview (Seifer, Sameroff & Jones, 1981). Results of a preliminary correlational analysis indicated that a family size of more than three children was associated with lower social functioning scores. However, when Socioeconomic Status and Race were partialled out, a considerable decrease in the relationship between social adjustment and family size was actualized.

Maternal education. Support for maternal education as a psychosocial risk factor was found through covariate association in a longitudinal study by Kinard and Reinherz (1987). Fifteen cognitive and academic competency criteria were investigated in a sample of 432 kindergarten children from predominately white, lower-middle working-class families. Analysis of covariance models were used to test the main and interactive effects of Maternal Age with each of the following: (a) Gender, (b) Birth Order, and (c) Family Structure. Maternal Educational Attainment was tested as a covariate in each model.

Study results (Kinard & Reinherz, 1987) indicated that for the models with Maternal Age and Gender, lower Maternal Educational Attainment levels were related to lower Preschool Verbal Reasoning scores and parents' lower ratings of their child's School Productivity in the third grade. For the models with Maternal Age and Birth Order, lower Maternal Educational Attainment levels were related to lower Language Performance, as well as lower Reading, Math and Total Achievement scores in the fourth grade. For the models with Maternal Age and Family Structure, lower Maternal Educational Attainment levels were related to the parent's rating of the child's Overall Productivity in third grade and Reading, Math, Language, and Total Achievement scores in the fourth grade. However, since no provisions were made for multiple comparisons of the 45 models that tested fifteen outcome measures, caution should be given in the interpretation of the study results.

Parental mental health. Parental mental health was found to be related to higher frequency of conduct disorders in a study by Christ, Lahey, Frick, Russo, McBurnett, Loeber, Stouthamer, and Green (1990). Behavioral outcomes were compared for children of adolescent and older mothers using a sample of 253 boys (ages 6-13 years) who had received treatment in a psychiatric clinic. Results of path analysis indicated that both Maternal and Paternal Antisocial Behavior (measured through absence or presence of antisocial personality disorder) were directly associated to the total number of DSM-III (Diagnostic and Statistical Manual, Version 3) behavioral symptoms. Indirect associations of parental mental health with total number of DSM-III symptoms were also found through the mediating association of adolescent motherhood status at age of first birth. However, since the majority of responses concerning the parent's antisocial status were based on the mother's report, conclusions drawn from these findings should be carefully considered.

Parental mental health (measured during the subject's childhood through the maternal reporting of the mother's or father's mental health treatment history) also was investigated in the risk study by Cohen and associates (1990). Results of the multiple regression analyses, assessing the independent association of the risk factors with the criterion, indicated that occurrence of Parental Mental Health Treatment was related to a greater number of Externalizing Behavioral Problems as well as a greater number of Internalizing Emotional Problems in adolescence. Multiple regression analyses that tested the unique association of each risk factor also indicated somewhat lower positive associations with the risk factors for both Externalizing Behavioral Problems and Internalizing Emotional Problems. Results of the net regression indicated that parental mental health treatment had a greater effect for: (a) Substance Abuse than Externalizing Behavioral Problems, and (b) Substance Abuse than Internalizing Emotional Problems.

Parenting style. An examination of ability of the joint relationship of a multiple risk index with parenting style to predict psychosocial adjustment was investigated by Barocas and associates (1985). The predictor composite variable, Risk Index, was measured by the summation of the instances where the individual had a higher than average numbers of the following negative life events: (a) illness or injury to the child, (b) parental divorce or separation, (c) death in the family, (d) parental injury or loss, (e) parental job loss or layoff, (f) parental jail term, and (g) parental minor violation of the law. Parenting Style was measured by above average scores on an unweighted composite score of rigid maternal parenting style (conforming values, concrete orientation and authoritarian attitudes). Step-wise regression analysis was performed and the effects of Socioeconomic Status and Race were controlled by entering these factors into the regression analysis in the first step. In the second step, the Risk Index and Parenting Style were entered together. The final step added the Risk Index by Parenting Style interaction term. Consideration of the incremental

R-Square values indicated that an additional 5.3% of the variance in Social Adjustment was accounted for by the interaction term, with higher Risk Index scores and rigid Parenting Styles associated with lower Social Adjustment scores.

In a study of 61 seventh grade adolescents and their parents conducted by Simons, Whitbeck, Conger, and Conger (1991), the causative relationship of parenting style with three negative behavioral outcome measures (Problems at School, Deviant Peer Group, and Delinquent Behavior) was investigated. Parenting style was measured through a composite of the summation of both parent's scores on four observational indexes. The indexes focused on the extent to which the parents were (a) Authoritarian, (b) Authoritative, (c) Coercive, or (d) Nattering when interacting with their child. The Authoritative parenting index was reverse coded, thereby giving the parenting style composite higher values for non-authoritative parenting. Results of a path analysis indicated that non-authoritative parenting style (Authoritarian, Coercive, or Nattering) was directly associated with involvement in a deviant peer group. Non-authoritative parenting style was also reported as indirectly related to academic and behavior problems at school and delinquent behavior in the community through the mediation of the child's coercive interpersonal style at home.

Parenting style was also investigated in the longitudinal risk study by Cohen and colleagues (1990). Two separate measures of parenting style were investigated as risk factors: (a) Power Assertive Punishment Techniques such as screaming at, threatening, hitting, isolation of, and taking away privileges from the child, and (b) Lax/Inconsistent Rules. Results of the regression analyses of independent associations indicated that parent's use of Power Assertive Punishment Techniques was related to a greater number of Externalizing Behavior Problems. Results of the regression analyses for unique associations indicated that a parent's use of Power Assertive Punishment Techniques was

associated with a greater number of Externalizing Behavior Problems; whereas, a parent's use of Lax/Inconsistent Rules was related to a greater number of Internalizing Emotional Problems. Net regression analyses indicated that a parent's use of Power Assertive Punishment techniques had a greater effect for (a) Internalizing Emotional Problems than for Externalizing Behavior Problems and (b) Substance Abuse than for Externalizing Behavior Problems.

Parental sociopathy. Parental sociopathy, measured by maternal-reported problems of the mother or father with alcohol, drugs, or the police, was also investigated by Cohen and colleagues (1990) as a risk factor. Results of the regression analyses for independent associations indicated that presence of Parental Sociopathy was associated with a greater number of Externalizing Behavior Problems. Results of the regression analyses for unique associations indicated that presence of Parental Sociopathy was associated with a greater number of Externalizing Behavior Problems, which was reduced in comparison to the independent association. Net regression analyses indicated that presence of Parental Sociopathy had a greater effect for Substance Abuse than for Externalizing Maladjustment scores.

Community Risk Factors

Risk factors are considered in a community context if they are not intrapersonal and are found outside the family context. Interpersonal risk factors occurring outside the family context include: (a) neighborhood crime, (b) social isolation, and (c) socioeconomic status.

Neighborhood crime. Cohen and colleagues (1990) tested the presence of neighborhood crime as a risk factor. Results of the regression analyses for independent associations indicated that presence of Neighborhood Crime was associated with (a) higher Substance Abuse and (b) a greater number of Externalizing Behavior Problems. Results of the regression analyses for unique associations indicated that presence of Neighborhood Crime was associated with a higher incidence

of Substance Abuse, which was not reduced in comparison to the independent association. Net regression analyses indicated that presence of Neighborhood Crime had a greater effect for Substance Abuse than for Externalizing Behavior Problems.

Social isolation. Cohen and colleagues (1990) also investigated social isolation (measured by a scale reflecting frequency of contacts with non-sibling children) as a risk factor. Results of the regression analyses for independent associations indicated that higher Social Isolation scores were associated with a greater number of Internalizing Emotional Problems. Regression analyses for unique associations indicated that higher Social Isolation scores were associated with higher incidences of Substance Abuse, which was slightly reduced in comparison to the independent association. Results of the net regression analyses indicated that Social Isolation had a greater effect for Substance Abuse than for Internalizing Emotional Problems.

Socioeconomic status. Socioeconomic Status, based on a five-level scale determined by the education level and occupation of the primary wage earner, was found by Christ and colleagues (1990) to have a direct association with frequency of conduct disorder in boys who had received treatment in a psychiatric clinic. In addition, Adolescent Motherhood Status was a mediating factor in child Conduct Disorder, with Socioeconomic Status accounting for the largest portion of the variance in the correlation between Adolescent Motherhood Status and Conduct Disorder problems.

Wadsworth and colleagues (1984) tested socioeconomic status as a covariate in an ANCOVA statistical model where social, cognitive, and biological competency outcomes were compared for children of adolescent mothers and older mothers. Socioeconomic status was measured by the Social Index, which was comprised of four factors: (a) domestic crowding, (b) parental education, (c) status of neighborhood, and (d) paternal occupation, and categorized into advantaged, average, and disadvantaged social groups. Study results revealed that

Socioeconomic Status was a covariate in the ANCOVA models where younger Mother's Age was associated with outcomes of lower Vocabulary Assessment and higher Behavioral Deviance scores.

Protective Factors

Individual outcomes for at-risk children can be classified on a continuum ranging from dysfunction to competence. Resiliency is defined as the capacity to successfully adapt and cultivate competencies despite exposure to biological and psychosocial risk (Werner & Smith, 1982, 1992). The presence of protective factors in the lives of resilient individuals enables them to attain competence despite exposure to various risk factors. The main purpose of resiliency studies is to test the moderating effects of protective factors in the risk-competency relationship. Recent evolution of resiliency theory has emphasized the need to make conceptual distinctions between different ameliorative factors based on the mechanisms through which they influence human adaptation (Rutter, 1987, 1990).

There are few published resiliency studies to date that have investigated protective mechanisms through statistically testing how protective factors moderate the risk-competency relationship in the resiliency process. However, factors have been reported in recent developmental studies that have correlational associations with competency outcomes, which suggests a potential moderating role. Listed in Table 2 are protective factors investigated in resiliency studies, as well as other potential moderating factors of risk implied by their association with adaptive functioning in developmental studies. The potential protective factors are organized according to individual, family or community categories as suggested by Masten and Garmezy (1985). Discussions of study findings and the statistical techniques by which the associations between competency and potential protective factors were tested are found in the following sections.

Table 2. Protective Factors for Psychosocial Competence with Reference Sources

Protective Factors	References
Individual Protection	
Educational aspirations	Brooks-Gunn, Guo, & Furstenburg, 1993
Gender	Grossman, Beinanshowitz, Anderson, Sakuari, Finnin, & Flaherty 1992; Ketterlinus, Henderson, & Lamb, 1991;
Self-efficacy	Grossman et al., 1992; Werner & Smith, 1992
Familial Protection	
Emotional atmosphere	Dunbow & Luster, 1990
Cohesion	Grossman et al, 1992
Parent-child relations	Furstenburg & Harris, 1993; Rutter, 1978; Werner & Smith, 1982
Community Protection	
Academic achievement	Morison & Masten, 1991
Participation in planned activities	Morison & Masten, 1991
Peer relations	Hightower, 1990; Morison & Masten, 1991
Relations with extrafamilial adult(s)	Hightower, 1990; Werner & Smith, 1992

Individual Protective Factors

Protective factors are considered in an individual context if they are intrapersonal and are not primarily involved with interactions between the individual and another person. Individual protective factors thought to be associated with competency are: (a) educational aspirations, (b) gender, and (c) self-efficacy.

Educational aspirations. Although educational aspiration of the child has not been formally tested as a potential moderator variable in published resiliency studies, an association between educational aspirations and competency was found in a study involving children of adolescent mothers (Brooks-Gunn et al., 1993). The sample consisted of 254 first born children of adolescent mothers of the Baltimore Study who were primarily of African-American ethnicity. In this study, educational aspiration was tested as a predictor of educational attainment, measured as a dummy variable, and coded as aspiring to post secondary education. Logistic regression analysis was performed on a three-category criterion variable: (a) high school completion, (b) continuing beyond high school, or (c) post-secondary education. Results indicated that young adolescent children of adolescent mothers who had educational aspirations of post-secondary education were 1.68 times more likely to complete high school and 1.33 times more likely to continue their education beyond high school than individuals with educational aspirations of the other measured categories.

Gender. Although the protective mechanisms of gender are not fully understood, it is hypothesized that certain gender-related biological functions, as well as socially learned behaviors, serve as protective factors. Because males have been shown to be more vulnerable to physical hazards, it is believed that they also may have a biologically determined susceptibility to psychosocial hazards (Rutter, 1979, 1990). Most researchers conducting developmental studies

either include gender as a control variable or separate their samples by gender before performing statistical analyses, thus allowing for gender comparisons.

For example, when Ketterlinus and colleagues (1991) compared reading achievement for children born to adolescent and older mothers, Gender was entered first into a multiple regression equation to control for its effect on the criterion of Reading Achievement scores in the model. Results of the study indicated that only Gender and Home Environment were significant predictors of Reading Achievement scores, with females scoring higher than males. Other factors included in the model that did not predict Reading Achievement scores were Maternal Age, Race, Marital Status, Maternal Education, Family Income, and Maternal Aptitude.

In the resiliency study by Grossman and colleagues (1992), analyses were performed separately for males and females. The investigators compared the study results according to Gender and formulated two conclusions: (a) Protective factors are highly context specific, and (b) there are significant differences in the effects of protective factor among the genders. In fact, protective factors were responsible for increases in R-Square values in more than twice as many regression models for females than for males. The above observation lends additional support for examining the female gender as a source of protection in the present study.

Self-efficacy. Perceptions of self-efficacy, which control an individual's judgment of their ability to act effectively, affect motivation and competent behavior. Ideas and thoughts of self-doubt create low motivational forces which lead to lower performance; whereas, those of self-belief create high motivational forces leading to improved competent behavior (Bandura, 1986). Seligman (1975) has tied the concept of self-efficacy to the term, "learned helplessness", or a feeling of powerlessness. Attribution theorists (DeCharms, 1968; Kelley, 1972; Rotter, 1966) identify internal and external loci of control with the concept of self-efficacy.

Self-efficacy, measured by the generalized expectancies for external and internal loci of control, was used in the exploratory resiliency study by Grossman and associates (1992) to test for a moderating effect on risk with four outcome measures of adaptive functioning. A step-wise regression analysis--where risk was entered on the first, one protective factor on the second, and a risk by protective factor interaction on the last step--was performed separately for males and females. Results indicated that entering Risk by Self-Efficacy interaction term in the third step of the regression analysis did not produce a notable R-Square value change for any of the four outcome measures of adaptation. However, entering Self-Efficacy in the second step of the regression analysis accounted for an increase in R-Square values for criteria of Mood (male and female), Deviance (male only), Self-Esteem (female only), and Grades (female only).

Adolescent self-efficacy, measured through locus of control, was tested as a discriminator of later adult adaptation through logistic regression analysis for the resilient individuals of the Kauai Longitudinal Study (Werner & Smith, 1992). For resilient females, results indicated that high Self-Efficacy was associated with successful (a) Overall Adult Adaptation, (b) Work Experiences, and (c) Self-Evaluations. For resilient males, high Self-Efficacy was associated with successful (a) Work Experience, (b) Interpersonal Relationships, and (c) Self-Evaluations. In addition, results of a previous analysis of the Kauai Longitudinal Study (Werner, 1985) indicated that out of the subsample of individuals who were exposed to four or more childhood risks, those who displayed competent behavior in late adolescence (resilient) had higher self-efficacy scores than those individuals who developed serious learning and/or behavior problems (vulnerable).

Familial Protective Factors

Protective factors are considered from a familial context if they are interpersonal and found within the boundaries of the nuclear family system. Factors associated with competency that

will be investigated for inclusion in the present study as possible familial protective factors are:

(a) emotional atmosphere, (b) cohesion, and (c) parent-child relations.

Emotional atmosphere. In a resiliency study of children of adolescent mothers, Dunbow and Luster (1990) reported that the emotional atmosphere surrounding the family was associated with measures of external and cognitive competency. Study results showed that an Emotionally Supportive Home Environment, measured through a subscale of the Home Observation for Measurement of the Environment (HOME), was related to a lower incidence of Behavior Problems and high Scholastic Aptitude scores.

Cohesion. Family cohesion, measured through a subscale of a 30-item self-report inventory, was examined as a protective factor in the resiliency study by Grossman and colleagues (1992). Correlational associations between Cohesion and Risk were negative, indicating lower Risk associated with higher Family Cohesion. Although results of hierarchical regression models that included the Risk by Family Cohesion interaction term did not produce substantial increases in R-Square values for the four competency criteria, there were direct independent associations. Correlational associations indicated that high Family Cohesion was related to: (a) high Mood scores for females, (b) low Deviance scores for females and males, (c) high Self-Esteem scores for females and males, and (d) high Grades for females.

Parent-child relations. Using the 20-year follow-up data from the Baltimore study of children of adolescent mothers, Furstenburg and Harris (1993) investigated the relationship between children's close association with their fathers and four outcomes measures: (a) Socioeconomic Achievement, (b) Teenage Birth, (c) Imprisonment, and (d) Depression. Paternal relationships were grouped into three categories: (a) Close Inside-Father, which included both father-figures and biological fathers who were residential; (b) Close Outside-Father, where the biological father was

non-residential; and (c) Close Other-Father, where a father-figure other than the biological father was non-residential. Results of logistic regression indicated that children with a Close Inside-Father were: (a) 2.15 times more likely to be Graduated from High School and/or be Employed, (b) .25 times less likely to have become a Parent Before the Age of 18, (c) .21 times less likely to have Spent Time in Jail, and (d) .37 times less likely to be diagnosed as Depressed than children with either a Close Other-Father or a Close Outside-Father.

Regardless of the type of father or father-figure, young adult males in the Baltimore Study (Furstenburg & Harris, 1993) consistently reported closer relationships than female young adults. Children with a Close Outside-Father were three times more likely to become a Parent Before the Age of 19 than those in the other two categories. Data analysis revealed a Gender by Close Outside-Father interaction, where males who had close contact with their non-residential father were more likely to report a teen birth than males and females in other categories; whereas, no associations were reported for the Close Other-Father category. In addition, results of the data analysis showed that poor relationships with all fathers and father-figures were associated with poorer outcomes than no paternal relationships at all.

In a resiliency study of children having at least one parent under psychiatric care, Rutter (1979) reported that a good parent-child relationship had a moderating effect on conduct disorders for children living in discordant homes. Data were collected on a sample of 10-year-old children living in the Isle of Wright and inner London. Results of a two-factor ANOVA indicated that children living in discordant homes who had a good relationship with at least one parent were more likely to be free from conduct disorders than children who did not have good relationships with either parent and were living in either discordant or non-discordant homes.

Werner and Smith (1982) examined the association between mother-child interactions when the child was 20-months-old and later adaptive behavior when the child was 10 years old. Results of chi-square analysis indicated that resilient female children were more likely than vulnerable female children to have had a higher percentage of positive mother-daughter interactions when they were toddlers. However, similar associations were not found for male children.

Community Protective Factors

Protective factors are considered in a community context if they are not intrapersonal and are found outside the family context. Factors associated with competency that will be investigated for inclusion in the present study as possible community protective factors are: (a) academic achievement, (b) employment, (c) participation in extrafamilial activities, (d) peer relations, and (e) relations with extra-familial adults.

Academic achievement. High intercorrelations were found between academic achievement and seven other criterion measures in the study by Morison and Masten (1991). Academic achievement was measured through a composite score with an internal reliability of .91, which was derived through principal components analysis with varimax rotation. The weighed composite was summed from the following five variables: (a) two indicators of school performance judged by the investigator, (b) one parent rating indicator of academic competence, (c) one self-report indicator of academic competence, and (d) one self-report indicator of grade-point average. Correlations for the academic achievement composite with the other criterion measures were as follows: (a) $r = .44$ for Job Competence, (b) $r = .41$ for Sports/Activities, (c) $r = -.50$ for Externalizing Maladjustment, (d) $r = -.28$ for Internalizing Maladjustment, (e) $r = .41$ for Self Worth, Parent View, (f) $r = .39$ for Perceived Self-Worth, and (g) $r = .71$ for Global Adaptation.

Participation in extrafamilial activities. Participation in sports and activities was also considered as a competency criterion by Morison and Masten (1991). Sports/Activities was measured through a composite score with an internal reliability of .84, which was derived from a principal components analysis with varimax rotation. The weighed composite was summed from the following six variables: (a) two measures of activity involvement judged by the investigator, (b) a parent rating of athletic competence, (c) a self-report of athletic competence, and (d) a self-report of sports involvement, and (e) a self-report of involvement in organizations. Correlations for the Sports and Activities composite with the other criterion measures were: (a) $r = .48$ for Social Competence, (b) $r = .41$ for Academic Achievement, (c) $r = .24$ for Job Competence, (d) $r = -.31$ for Externalizing Maladjustment, (e) $r = -.35$ for Internalizing Maladjustment, (f) $r = .29$ for Self Worth, Parent View, (g) $r = .40$ for Perceived Self-Worth, and (h) $r = .68$ for Global Adaptation.

Peer relations. In the longitudinal study by Morison and Masten (1991), the relationship between peer reputation in middle childhood and eight outcome measures of later adolescent competence were investigated. Peer reputation was measured when the children were 9 to 12 years old through the 30-item Revised Class Play, an inventory designed to assess dimensions of peer sociability. Factor analysis of data resulted in three composite variables: (a) Sociable, (b) Disruptive, and (c) Isolated. Seven years later (ages 16-19), the competency data were collected for 183 individuals. A number of principal component analyses were performed on a total of 34 subscales from five inventories resulting in 8 outcome composite scores: (a) Social Competence, (b) Academic Achievement, (c) Job Competence, (d) Sports/Activities Competence, (e) Externalizing Maladjustment, (f) Internalizing Maladjustment, (g) Self-Worth/Parent View, and (h) Perceived Self-Worth.

A hierarchical regression procedure (Morison & Masten, 1991) was performed for each of the eight outcome measures as the criterion. The control variables--Sex, Grade, and IQ--were

entered on the first step followed by the three dimensions of peer reputation in the second step.

Interactions for Sex with each dimension of peer reputation--Sex by Sociable, Sex by Disruptive, and Sex by Isolated--were entered in the third step.

Results of adding the variables representing the three dimensions of peer reputation in the second step of the hierarchical regression analysis indicated that the prediction of Peer Reputation varied depending on the outcome criterion. Substantial increases in R-Square values were found for seven of the eight competency criterion ($\Delta R^2 = .09$ for Social Competence, $\Delta R^2 = .09$ for Academic Achievement, $\Delta R^2 = .15$ for Job Competence, $\Delta R^2 = .07$ for Sports/Activities, $\Delta R^2 = .16$ for Externalizing Maladjustment, $\Delta R^2 = .05$ for Internalizing Maladjustment, and $\Delta R^2 = .07$ for Self-Worth/Parent's View. No substantial increases in R-Square values were reported for the competency criterion, Perceived Self-Worth. Although three dimensions of peer reputation were entered in the second step of the regression analysis, they were not all unique contributors to the increase in R-Square values. The peer reputation dimension, Social, was a unique predictor variable for all of the above seven competency criterions. The peer reputation dimension, Isolated, was a unique predictor only for the competency criterion of Social Competence; whereas, the peer reputation, Disrupted, was a unique predictor variable for all the criterions except Social Competence.

The third step in the hierarchical regression involved adding the three interaction terms. Sex by Peer Reputation interaction terms were responsible for an increase in R-Square values for three criterion measures. These criterion were: (a) Sports/Activities, $\Delta R^2 = .06$, with only Sex by Isolated producing a unique contribution; (b) Externalizing Maladjustment, $\Delta R^2 = .05$; with Sex by Sociable and Sex by Isolated producing unique contributions; and (c) Perceived Self-Worth, $\Delta R^2 = .06$; with Sex by Sociable and Sex by Isolated producing unique contributions. The next three hierarchical

steps, explored the possibility of Peer Reputation interactions with Grade, IQ, and a second order Peer Reputation term, which yielded no substantial increases in R-Square values.

A positive peer relationship, characterized by a harmonious and socially adept interpersonal style at age 13, was associated with healthy psychological adult functioning at age 50 in a Q-sort methodological study of 141 male and female subjects from the Guidance Study and Oakland Growth Study by Hightower (1990). However, when the sample was split by Gender, only Positive Peer Relations for females were related to Q-sort measures of Positive Mental Health.

Relations with extrafamilial adults. In the study by Hightower (1990), Q-sort measures of healthy psychological adult functioning were investigated for correlational relationships with maintaining a close relationship with adults other than parents at age 13. Results indicated that close Relations with Extrafamilial Adults was associated with Positive Mental Health for the total sample, as well as for the female subsample, and the male subsample.

Relations with extrafamilial adults (measured as the number of caring adults outside the family with whom the child liked to associate) was investigated as a protective factor in the longitudinal Kauai Study (Werner & Smith, 1992). Males and females were investigated separately in a discriminant function analysis where a number of protective factors were entered in sequential order according to occurrence at birth, age 1, age 2, age 10, age 18, and age 30. Results indicated that a greater number of Relations with Extrafamilial adults at age 10 was related to successful Overall Adaptation and Work-Related ratings for high risk males.

Purpose, Assumptions, and Goals of the Study

The purpose of the present study was to investigate protective processes that moderate the negative relationship between risk and psychosocial competency for children of adolescent mothers. The study was based on the following assumptions: (a) children born to adolescent mothers are a

unique risk population; (b) although this population is at increased risk for maladaptive functioning, there are within-group differences; and (c) discovery of protective mechanisms that operate in the lives of children of adolescent mothers will contribute to the explanation of individual differences in the development of psychosocial competency within this population.

The goals of this study were twofold: (1) the development of a resiliency model that explains the protective mechanisms involved in the risk-competency relationship, and (2) the use of appropriate statistical analyses to test the model. The research hypothesis to be tested using the resiliency model is: Resilient individuals tend to have higher scores on protective factors than vulnerable individuals. The present study investigated the risk factors listed in Table 1, and protective factors listed in Table 2, depending on the availability of adequate measurements from data collected in Waves 1 and 2 of the National Survey of Children (Zill, Peterson, Moore, & Furstenburg, 1992).

CHAPTER III

METHODOLOGY

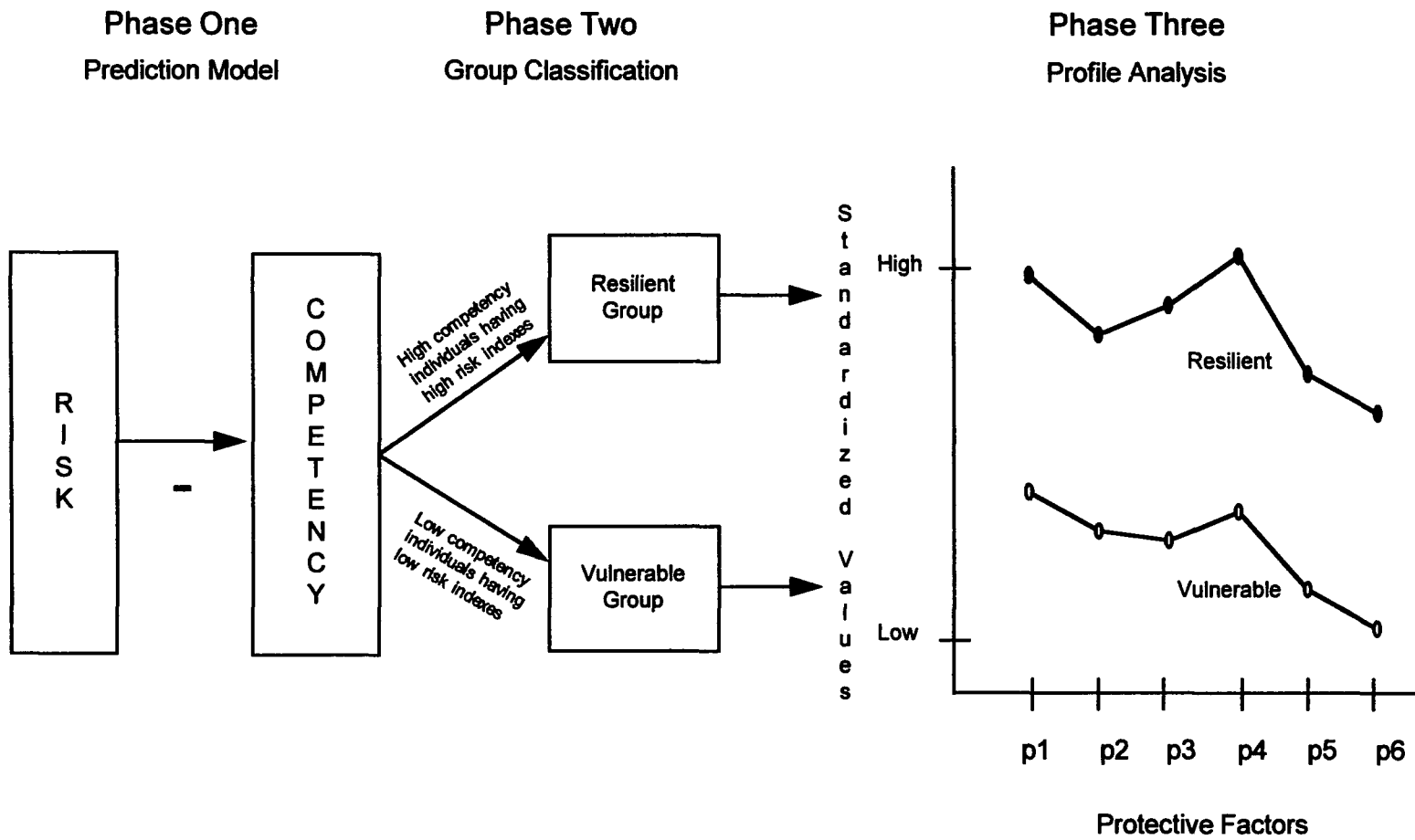
The present study investigated eight protective factors as moderators of the relationship between risk and competency. Resiliency was determined through external behavioral and internal affective competencies. The research hypothesis, resilient individuals tend to have higher scores on protective factors than vulnerable individuals, was tested using the resiliency model depicted in Figure 1. Even though the utility of this model could extend to other at-risk populations, the present study examined protective mechanisms operating in the lives of children of adolescent mothers.

The Resiliency Model

The statistical definition of risk denotes a negative correlational association with competency. Generally, it is difficult to predict competency from the consideration of risk factors alone. In these cases, identification of third variable moderators will improve the prediction of competency. The resiliency model in Figure 1 illustrates a three stage process designed to identify sources of protection that moderate the negative relationship between risk and competency. In Phase One of the analysis, multiple risk factors, which were operating during infancy and childhood, were considered in the prediction of competency.

Because composite measures of related variables are more reliable than any single variable measure, every effort was made to use multiple indicators of risk, protection, and competency in the present study. Past research has shown that in cases where a single risk variable was not associated with psychosocial maladaptation, an association was found if a risk factor composite, which simultaneously considered the effects of more than one related variable, was examined (Rutter, 1990).

Figure 1. The Resiliency Model



According to resiliency theory, Garmezy (1992) recommended that the moderator role of protective factors in the risk-competency relationship could be examined after individuals were classified into resilient and vulnerable groups. Following the Garmezy procedure, Phase Two of the analysis involved determination of the resilient and vulnerable groups. Classification into the two groups was based on residual values, which measured the discrepancy between the predicted and observed competency scores for each individual. High competency individuals who had low risk indexes were placed into the resilient group. Conversely, low competency individuals having low risk indexes were placed into the vulnerable group. In Phase Three, the resilient and vulnerable groups underwent multivariate profile analysis. High protection means were expected to be associated with the resilient group; whereas, low protection means were expected to be associated with the vulnerable group.

Population and Sampling Technique

The sample was drawn from the National Survey of Children (Zill et al., 1992), a three-wave, longitudinal study conducted from 1976 through 1987. The original sample, a multi-staged stratified probability sample of households in the continental United States containing at least one child, produced a population pool of 2,193 households. For the present study, secondary data analyses were performed on data collected from Wave 1 and Wave 2. During Wave 1 (1976), interviews with 2,301 children aged 7 to 12, and the most knowledgeable parent were conducted. In the spring of 1977, follow-up data were obtained from the schools attended by the children. Data for 2,301 children were obtained in 1,747 households (a completion rate of 80%). In families with two eligible children, both were interviewed; if there were three or more eligible children, two were selected at random. To ensure independence of variable observations in families where two children were interviewed, the older child was selected for the present study sample.

Conducted in 1981, the focus of Wave 2 was on the effects of marital conflict and disruption on children. Re-interviews were sought with all children who were found in Wave 1 to be living in a high conflict or disrupted family, and only a randomly selected group of those living in low-conflict families was followed up. Eighty-two percent of those children selected for follow-up ($N = 1,423$) completed the second interview. Telephone interviews were conducted with the child and the more knowledgeable parent, and a questionnaire was completed by a teacher. Data collected from a subset of interviews that were conducted in person revealed no important differences when compared with the data collected from the phone interviews. To reduce biases introduced for selective attrition, the Wave 1 data were re-weighted using factors that were found to be important predictors of attrition--ethnicity, age, sex, city size, family income, and the number of years the family lived at the current address. As a result, the weighted data in the National Survey of Children are representative of the United States population of children born between September 1964 and December 1969 and living in the United States in 1976.

The risk sample for the present study was selected from the Wave 1 random sample of 1,423 children. Sampling techniques were employed to create a more homogeneous sample and reduce confounding effects. The primary selection criterion, mother's age of 19 years or younger at time of first birth, yielded a subsample of 550 children. From this subsample, children were excluded if they were: (a) of a minority ethnicity, (b) lived in a one-parent family, and (c) were younger than 8, or older than 11, years of age at Wave 1 data collection. Thus, the present study sample constituted 171 Anglo-American children (80 male and 91 female), ages 8 to 11 at initial data collection, who were born to adolescent mothers and living in two-parent families (139 two-biological parent and 32 stepparent). Descriptive demographics show that the average at-risk child in the study sample came from families where the mother was 24-years-old at time of the proband

child's birth, had completed the 11th grade of high school, and had a total family income of \$15,000 to 19,000 before taxes in 1977.

Variable Definitions

This study analyzed variables from three categories: (a) risk factors, (b) protective factors, and (c) competency criteria. Tables are included in the following sections, which contain values, frequencies, and reliability coefficients for these variables. Measurements of the original variables from which composite variables were constructed also are included in the tables.

Risk Factors

Seven risk factors were derived from measurements collected at Wave 1 of the National Survey of Children when the children were 8 to 11 years old: (a) Somatic, the occurrence of infant and childhood somatic hazards; (b) Temperament, the parental perception of the child's temperament; (c) Aspire Parent, the parental educational aspirations for the child; (d) MomAge, the maternal age at proband child's birth; (e) MomEd, the maternal educational attainment at Wave 1 data collection; (f) Discord, the degree of parental arguments; and (g) Income, the amount of family income. The values of the risk factors were calculated from the unweighted sums of the corresponding measurements indicated in Tables 3a-3g, and ascend by degree of risk experienced by the child. All risk factors were continuous variables with the exception of Somatic and Aspire Parent. Somatic was a dichotomous composite variable and Aspire Parent was a single dichotomous variable.

Protective Factors

Eight protective factors were compiled from measurements collected during Wave 2 data collection when the children were 13 to 16 years old: (a) Gender, the sex of the proband child; (b) Aspire Child, the post-secondary educational aspirations the child has for self; (c) Peer, the self-

Table 3a. Composition and Frequency of Risk Factors: Somatic

Factor	Values	Frequency	Percent	Composition
Somatic				Composite dichotomy of:
(Development affected by child's health)	no risk = 0	122	71.3	(Reported by parent)
	one or more risks = 1	49	28.7	
Range = 0 to 1	Total	171		(1) weight at birth
Mean = .29				0 = greater than or equal to 87 ounces
				1 = less than 87 ounces
StdDev = .45				(2) birthdate
				0 = born less than 3 weeks early
Alpha reliability = .67				1 = born 3 or more weeks early
				(3) health defect
				0 = no defect was present at birth
				1 = one or more
				(4) health history during childhood
				0 = no serious health problems
				1 = one or more health problems

Table 3b. Composition and Frequency of Risk Factors: Temperament

Factor	Values	Frequency	Percent	Composition
Temperament (Child's temperament)				Continuous composite of:
	low risk = 0	8	4.7	(Reported by parent)
Range = 0 to 6	1	26	15.2	
	2	33	19.3	(1) child tense or relaxed
Mean = 2.94	3	47	27.5	0 = very calm, relaxed
	4	25	14.6	1 = moderately relaxed
StdDev = 1.56	5	22	12.9	2 = moderately tense
	high risk = 6	10	5.8	3 = high-strung, nervous
Alpha reliability = .60	Total	171		(2) child's temper
				0 = rarely loses temper
				1 = occasionally loses temper
				2 = occasionally strong temper
				3 = loses temper easily

Table 3c. Composition and Frequencies of Risk Factors: Aspire Parent

Factor	Values	Frequency	Percent	Composition
Aspire Parent				Single dichotomous variable:
(How far primary parent wants child to go in school)	low risk = 0	59	35.1	0 = college graduate or above
	high risk = 1	109	64.9	1 = non-college graduate
	Total	168		
Range = 0 to 1				
Mean = .65				
Stderr = .48				
Fair reliability (estimated) ^a				

^a This single variable has no internal reliability, but its reliability has been estimated as fair.

Table 3d. Composition and Frequency of Risk Factors: MomAge

Factor	Values	Frequency	Percent	Composition
MomAge				Single continuous variable:
(Age of mother at birth				(Reported by parent)
of proband child)	low risk = 1	2	1.2	1 = 42 years old
	2	1	0.6	2 = 41 years old
Range = 1 to 26	3	2	1.2	3 = 38 years old
	4	4	2.4	4 = 37 years old
Mean = 17.51	5	4	2.4	5 = 36 years old
	6	1	0.6	6 = 35 years old
Stderr = .5.96	7	3	1.8	7 = 34 years old
	8	2	1.2	8 = 33 years old
Good reliability	9	4	2.4	9 = 32 years old
(estimated) ^a	10	2	1.2	10 = 31 years old
	11	3	1.8	11 = 30 years old
	12	4	2.4	12 = 29 years old
	13	5	2.9	13 = 28 years old
	14	4	2.4	14 = 27 years old
	15	7	4.1	15 = 26 years old
	16	8	4.7	16 = 25 years old
	17	11	6.5	17 = 24 years old
	18	6	3.5	18 = 23 years old
	19	8	4.7	19 = 22 years old
	20	22	12.9	20 = 21 years old
	21	16	9.4	21 = 20 years old
	22	16	9.4	22 = 19 years old
	23	23	13.5	23 = 18 years old
	24	9	5.3	24 = 17 years old
	25	2	1.2	25 = 16 years old
	high risk = 26	1	0.6	26 = 15 years old
	Total	170		

^a This single variable has no internal reliability, but has its reliability has been estimated as fair.

Table 3e. Composition and Frequencies of Risk Factors: MomEd

Factor	Values	Frequency	Percent	Composition
MomEd				Single continuous variable:
(Highest grade mother				
completed at Time 1	low risk = 1	5	2.9	1 = two years post high school
data collection)	2	5	2.9	2 = one year post high school
	3	77	45.0	3 = grade 12
Range = 1 to 10	4	22	12.9	4 = grade 11
	5	25	14.6	5 = grade 10
Mean = 4.15	6	18	10.5	6 = grade 9
	7	13	7.6	7 = grade 8
StdDev = 1.69	8	3	1.8	8 = grade 7
	9	2	1.2	9 = grade 6
Good reliability	high risk = 10	1	0.6	10 = grade 1
(estimated) ^a	Total	171		

^a This single variable has no internal reliability, but its reliability has been estimated as fair.

Table 3f. Composition and Frequency of Risk Factors: Discord

Factor	Values	Frequency	Percent	Composition
Discord				Continuous composite of:
(Sources of spousal arguments)	zero sources = 0	37	21.6	Do you argue about...
	one source = 1	40	23.4	(1) chores or responsibilities
Range = 0 to 5	two sources = 2	37	21.6	0 = no
	three sources = 3	26	15.2	1 = yes
Mean = 1.91	four sources = 4	20	11.7	(2) children
	five sources = 5	11	6.4	0 = no
StdDev = 1.52	Total	171		1 = yes
				(3) money
				0 = no
				1 = yes
Alpha reliability = .55				(4) sex
				0 = no
				1 = yes
				(5) drinking
				0 = no
				1 = yes
				(6) in-laws
				0 = no
				1 = yes

Table 3g. Composition and Frequencies of Risk Factors: Income

Factor	Values	Frequency	Percent	Composition
Income				Single continuous variable:
(Family Income)				1) total family income before taxes
Range = 1 to 12	low risk = 1	4	2.5	1 = 35,000
	2	4	2.5	2 = 30,000 to 34,000
Mean = 5.09	3	22	13.7	3 = 25,000 to 29,000
	4	42	26.1	4 = 20,000 to 24,999
StdDev = 2.04	5	35	21.7	5 = 15,000 to 19,999
	6	20	12.4	6 = 12,000 to 14,999
Good reliability	7	17	10.6	7 = 10,000 to 11,999
(estimated) ^a	8	6	3.7	8 = 8,000 to 9,999
	9	4	2.5	9 = 6,000 to 7,999
	10	3	1.9	10 = 5,000 to 5,999
	11	3	1.9	11 = 4,000 to 4,999
	high risk = 12	1	0.6	12 = 3,000 to 3,999
	Total	157		

^a This single variable has no internal reliability, but its reliability has been estimated as fair.

Perception of relationship with peers; (d) Atmosphere, the family atmosphere reported by child; (e) Relations, the mother-child relations reported by child; (g) Activities, the amount the child participated in extrafamilial activities, and (h) Academic, the parent and child's report of the child's academic progress. Each protective factor ascends by degree of protection experienced by the child. With the exception of Gender, Aspire Child, and Academic, the protective factor values were continuous composite variables calculated from the unweighted sums of the corresponding measurements indicated in Tables 4a-4h. Gender was a categorical variable, with female gender as the higher value. Aspire Child was a single continuous variable, where the response of quitting school was given a higher weight than the other options. Academic was a composite continuous variable, where three variables were unweighted and the fourth variable (*repeated a grade*) was given a higher weight.

Competency Criteria

Two composite variables were used to measure external and internal psychosocial competency. External competency was measured through home- and school-related social or task-oriented behaviors. The value of the external competency composite was calculated through summing the corresponding variables values indicated in Table 5. All variable values were unweighted, with the exception of suspended or expelled from school, which was weighted higher than the other responses. The affective dimension of psychosocial functioning was used to determine a measure of internal competency. The value of the internal competency composite was calculated from the unweighted sum of the corresponding variable values indicated in Table 6.

Statistical Analyses

In resiliency models, protective factors act as third variable moderators and are selected to investigate whether they are involved with changes in the negative risk-competency correlational

Table 4a. Composition and Frequencies of Protective Factors: Gender

Factor	Values	Frequency	Percent	Composition
Gender (Child's gender)				Single dichotomous variable:
	low protection = 1	80	46.8	1 = male
Range = 1 to 2	high protection = 2	91	53.2	2 = female
	Total	171		
High reliability (estimated) ^a				

^a This single variable has no internal reliability, but its reliability has been estimated as fair.

Table 4b. Composition and Frequencies of Protective Factors: Aspire Child

Factor	Values	Frequency	Percent	Composition
Aspire Child				Single continuous variable:
(Child's aspirations for education)	low protection = -1	3	1.8	My educational plans are:
	1	49	29.3	-1 = quit school ^a
Range = -1 to 4	2	44	26.3	1 = finish high school
	3	49	29.3	2 = get some college
Mean = 2.21	high protection = 4	22	13.2	3 = finish college
	Total	167		4 = graduate school
StdDev = 1.11				
Low reliability (estimated) ^a				

^a This single variable has no internal reliability, but its reliability has been estimated as fair.

Table 4c. Composition and Frequencies of Protective Factors: Peer

Factor	Values	Frequency	Percent	Composition
Peer				Continuous composite of:
(Child's perception of peer relations)	low protection = 0	1		(1) worry friends not like you
	1	5	0.6	0 = yes
Range = 0 to 6	2	22	3.0	1 = no
	3	34	13.1	(2) satisfaction with friends
Mean = 2.21	4	43	20.2	0 = not too satisfied
	5	57	25.6	1 = somewhat satisfied
StdDev = .1.24	high protection = 6	6	33.9	2 = very satisfied
	Total	168	3.6	(3) wish you had more friends
Alpha reliability = .46				0 = often
				1 = sometimes
				2 = hardly ever
				3 = never

Table 4d. Composition and Frequencies of Protective Factors: Atmosphere

Factor	Values	Frequency	Percent	Composition
Atmosphere				Continuous composite of:
(Child's perceptions of home atmosphere)	low protection = 0	6	3.6	Family life is....
	1	8	4.8	(1) relaxed and/or easy going
Range = 0 to 6	2	9	5.4	0 = no
	3	13	7.7	1 = yes
Mean = 4.58	4	21	12.5	(2) well-organized
	5	45	26.8	0 = no
StdDev = 1.68	high protection = 6	66	39.3	1 = yes
	Total	168		(3) complicated
Alpha reliability = .74				0 = yes
				1 = no
				(4) tense and/or stressful
				0 = yes
				1 = no
				(5) close and/or intimate
				0 = no
				1 = yes
				(6) sharing and/or cooperative
				0 = no
				1 = yes

Table 4e. Composition and Frequencies of Protective Factors: Relate

Factor	Values	Frequency	Percent	Composition
Relate				Continuous composite of:
(Child's perception of the relationship with mother)	low protection = 1	1	0.6	Do you:
	2	1	0.6	(1) spend enough time with mother
	3	4	2.4	1 = wish for more
Range = 0 to 13	4	2	1.2	2 = enough
	5	2	1.2	(2) argue with mother
Mean = 9.10	6	6	3.6	0 = often
	7	6	3.6	1 = sometimes
StdDev = 2.48	8	10	6.0	2 = hardly ever
	9	13	7.8	(3) amount of affection from mother
Alpha reliability = .73	10	35	21.1	0 = don't want affection
	11	32	19.3	or much less than I want
	12	34	20.5	1 = less than I want
	high protection = 13	20	12.0	2 = all I want
	Total	166		(4) enjoy doing things with mother
				0 = hardly ever
				1 = sometimes
				2 = often
				(5) closeness to mother
				0 = not very close
				1 = fairly close
				2 = quite close
				3 = extremely close
				(6) mother loves me and interested in me
				0 = not at all like
				1 = somewhat like
				2 = very much like

Table 4f. Composition and Frequencies of Protective Factors: Cohesion

Factor	Values	Frequency	Percent	Composition
Cohesion				Continuous composite of:
(Child's perception of family togetherness at work and play)	low protection = 1	2	1.2	In the last month have you... (1) gone to dinner with parents 0 = no 1 = yes
	2	7	4.3	(2) gone shopping with parents 0 = no 1 = yes
Range = 0 to 12	3	18	11.0	(3) taken trips with parents 0 = no 1 = yes
Mean = 5.03	4	34	20.9	(4) done things with parents 0 = no 1 = yes
	5	35	21.5	(5) played games with parents 0 = no 1 = yes
StdDev = 1.56	6	39	23.9	(6) help straighten room 0 = no 1 = yes
	7	19	11.7	(7) help keep house clean 0 = no 1 = yes
	high protection = 8	9	5.5	(8) help do dishes 0 = no 1 = yes
Alpha reliability = .41	Total	168		(9) help cook 0 = no 1 = yes
				(10) I eat dinner with family 1 = 1 or 2 times a week 2 = 3 or 4 times a week 3 = 5 or 6 or 7 times a week

Table 4g. Composition and Frequencies of Protective Factors: Activities

Factor	Values	Frequency	Percent	Composition
Activities				Continuous composite of:
(Child's participation				
in extrafamilial	low protection = 0	62	36.9	Do you participate in or belong to
activities)	1	40	23.8	(1) club or team
	2	56	33.3	0 = no
Range = 0 to 3	high protection = 3	10	6.0	1 = yes
	Total	168		(2) extracurricular school activity
Mean = 1.08				0 = no
				1 = yes
StdDev = .97				(3) special lessons outside school
				0 = no
Alpha reliability = .52				1 = yes

Table 4h. Composition and Frequencies of Protective Factors: Academic

Factor	Values	Frequency	Percent	Composition
Academic				Continuous composite of:
(Child's academic progress)	low protection = -1	2	1.2	(Reported by parent)
	0	3	1.8	(1) child's academic status
Range = -1 to 10	1	6	3.6	0 = near bottom
	2	11	6.5	1 = below middle
Mean = 5.22	3	16	9.5	2 = in the middle
	4	32	19.0	3 = above middle
StdDev = 2.47	5	27	16.1	4 = one of best
	6	17	10.1	(2) child's progress in school
Alpha reliability = .68	7	17	10.1	0 = can do better
	8	19	12.5	1 = doing well as possible
	9	9	5.4	2 = doing really well
	high protection = 10	7	4.2	(Reported by child)
	Total	168		(3) academic status
				0 = near bottom
				1 = below middle
				2 = in the middle
				3 = above middle
				4 = one of best
				(4) repeated a grade
				-1 = yes ^a
				0 = no

^a Special weighted case

Table 5. Composition and Frequencies of External Competency

Factor	Values	Frequency	Percent	Composition
External				Continuous composite of:
(External action-oriented competency)	low competency = 0	2	1.2	(Reported by parent)
	4	3	1.2	Compared with others in....
Range = -2 to 21	5	3	1.8	(1) doing homework
	6	3	1.8	0 = worse
Mean = 12.89	7	12	7.3	1 = about the same
	8	12	7.6	2 = better
StdDev = 4.38	9	8	4.8	3 = much better
	10	12	7.3	(2) doing household chores
Alpha reliability = .79	11	6	3.6	0 = worse
	12	10	6.1	1 = about the same
	13	11	6.7	2 = better
	14	13	7.9	3 = much better
	15	18	10.9	Has child ever...
	16	16	9.7	(3) done laundry alone
	17	12	7.3	0 = no
	18	9	5.5	1 = yes
	19	10	6.1	(4) babysat outside home alone
	20	5	3.0	0 = no
	21	1	0.6	1 = yes
	Total	165		Does child help out with...
				(6) doing dishes
				0 = no
				1 = yes
				(7) cooking
				0 = no
				1 = yes
				(8) keeping house clean
				0 = no
				1 = yes

Table 5. Composition and Frequency of External Competency (continued)

Variable	Composition
External	(9) Child argues too much
	0 = true
	1 = sometimes true
	2 = not true
	(10) Talked to principal about behavior
	0 = yes
	1 = no
	(11) Suspended or expelled from school
	-1 = yes ^a
	1 = no
	(Reported by child)
	Do you....
	(12) help keep house clean
	0 = no
	1 = yes
	(13) help do dishes
	0 = no
	1 = yes
	(14) help cook
	0 = no
	1 = yes
	(15) get into trouble with teacher or principal for fighting
	0 = yes
	1 = no
	Number of times last year...
	(16) physically hurt person
	-1 = more than one or twice
	0 = once
	1 = never

^a special weighted case

Table 6. Composition and Frequency of Internal Competency

Competency Values	Frequency	Percent	Composition
Internal			Continuous composite of:
(Internal thought-oriented competency)	low competency = 4	1	0.6 (Reported by primary parent)
	5	1	0.6 My child:
Range = 0 to 26	6	1	0.6 (1) is high strung, tense
	7	1	0.6 0 = often true
Mean = 20.09	8	1	0.6 1 = sometimes true
	9	2	1.2 2 = not true
StdDev = 4.54	10	1	0.6 (2) is easily confused
	12	2	1.2 0 = often true
Alpha reliability = .85	13	5	3.0 1 = sometimes true
	14	3	1.8 2 = not true
	15	7	4.2 (3) is withdrawn
	16	2	1.2 0 = often true
	17	13	7.8 1 = sometimes true
	18	7	4.2 2 = not true
	19	17	8.4 (4) is stubborn, irritable
	20	16	9.6 0 = often true
	21	13	7.8 1 = sometimes true
	22	16	9.6 2 = not true
	23	15	9.0 (5) is unhappy, depressed
	24	16	9.6 0 = often true
	25	17	10.2 1 = sometimes true
	high competency = 26	10	6.0 2 = not true
	Total	167	(6) has sudden changes of mood
			0 = often true
			1 = sometimes true
			2 = not true

Table 6. Composition and Frequency of Internal Competency (continued)

Variable	Composition
Internal	(7) has difficulty concentrating
	0 = often true
	1 = sometimes true
	2 = not true
	(8) has obsessions
	0 = often true
	1 = sometimes true
	2 = not true
	(9) worries too much
	0 = often true
	1 = sometimes true
	2 = not true
	(10) is too fearful, anxious
	0 = often true
	1 = sometimes true
	2 = not true
	(11) feels no one loves him
	0 = often true
	1 = sometimes true
	2 = not true
	(12) feels inferior
	0 = often true
	1 = sometimes true
	2 = not true
	(Reported by child)
	How often are you
	(13) nervous and or tense
	0 = very often <i>or</i> fairly often
	1 = occasionally
	2 = hardly ever

relationship. A variable is considered a moderator if (a) the direction of the association between a predictor variable and the criterion variable changes when the effects of the predictor variable are considered in conjunction with the effects of the moderator variable, or (b) the strength of the association between the predictor variable and criterion variable appreciably changes according to the level of the moderator variable (Baron & Kenny, 1986). Variables that show a negative correlation with competency are considered risk factors. Therefore, protective factors in resiliency studies are considered moderator variables if, when taken into account with risk, they (a) change the previous negative correlational association with competency into a positive association, or (b) appreciably reduce the strength of the correlational association between risk and competency.

There is no common method or procedure used to identify moderator effects, and the most suitable statistical technique depends on the purpose of the study (Brown & Scott, 1967; Ghiselli, 1963; Tuckman, 1972). A multivariate method of analysis is advised if the model contains a large number of independent predictor or moderator variables. Multiple univariate tests can only analyze variation in the response variable from a single random variable at a time. Unlike univariate approaches, multivariate analysis considers the common variance from several related predictor variables simultaneously (Manly, 1986). Statistical relations between criterion variables, predictor variables, and third variable moderators can be analyzed through a number of multivariate techniques, depending on the ways in which they are measured (Baron & Kenny, 1986).

Predictive error associated in regression analysis is both random and systematic. Prediction can be improved through the elimination of systematic differences between predictable and unpredictable individuals (Brown & Scott, 1967). Identification of these systematic differences can be accomplished through the identification of third variable moderators (Ghiselli, 1963). In regression analysis, residual values convey important information through revealing the amount of variation in the

criterion variable that cannot be explained by the joint contribution of the predictor variables.

Systematic differences can be discovered between those individuals whose observed scores are higher than predicted and those individuals whose observed scores are lower than their predicted scores (Brown & Scott, 1967; Ghiselli, 1963). By first classifying individuals based on their residual value from consideration of predictor variables alone, and then examining the profiles of their status across potential moderator variables, it can be assumed that differences in group means are associated with the strength of moderator variable.

This research project was an exploratory observational study measuring the relationship between seven risk factors, eight protective factors, and two criterion measures of competency. Both criterion measures--external and internal competency--were continuous composite variables. The risk factors were single and composite dichotomies or single and composite continuous variables. One protective factors was a single dichotomy, while the remaining seven factors were single or composite continuous variables. In previous resiliency studies that investigated variables of this nature, the prevailing statistical technique to test the moderating effects of protective factors was to analyze the data using a multiple regression model with risk, protective, and risk by protective interaction terms (Luthar, 1990, Grossman et al., 1992). This approach in testing the moderator function of protective factors was recommended by Garmezy and colleagues in an empirical article published in 1986. However, more recently, Rutter (1990) and Garmezy (1992) have proposed the use of other methods to investigate protective processes.

Because there tends to be a great amount of error associated with the measurement of construct variables in social science research, interactive associations are extremely difficult to observe in correlational analyses. Michael Rutter (1990) informs developmental risk researchers that the moderating processes between risk and protection cannot be "confirmed or refuted"

through an *F*-test for an interactive term in a regression model because the number of individuals for whom the protective and risk factors co-occur may apply to a small proportion of the sample (p. 185). Norman Garmezy (1992) now promotes the classification of individuals into resilient and vulnerable groups, followed by a comparison of the groups, as a key step in the process to discovering the protective mechanisms responsible for resiliency in children who are at risk for maladaptive psychosocial development.

Phase One: Prediction Models

Heeding the advice of Garmezy (1992) and Rutter (1990), the present study was based on a methodology different from that used in past resiliency studies. The method was based on a three-phase statistical process proposed by Ludwig and Dolphin (1982). In the first phase of Resiliency Model, three regression techniques were used to determine which individuals had competency scores that were not well-predicted by risk. Residual values from each of the three regression techniques were calculated for each individual. In the execution of these techniques, regression models were built separately for external competency and internal competency as the criterions. For each of the three techniques, one regression model was built with external competency as the criterion. A second regression model using each technique was built with internal competency as the criterion, for a total of six regression models. The first technique implemented a full regression model approach. Predictor variables for full regression models were restricted to the risk factors in Tables 4a-4g that were negatively correlated with the corresponding criterion variable.

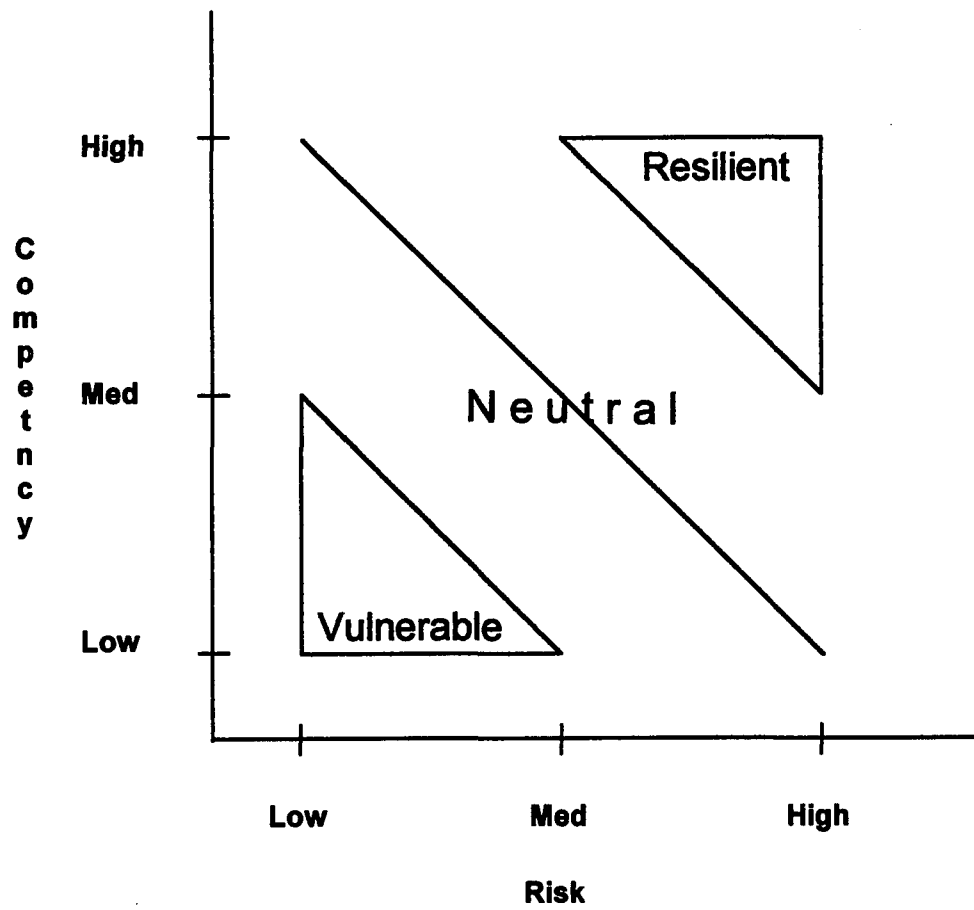
In the second regression technique, residual values were calculated through a reduced regression model. To determine the predictor variables for the reduced model, each individual risk factor in the full regression model was examined for a unique contribution to the prediction of

competency through its corresponding partial sums of squares. Those risk factors not contributing additional variance after a partialling of the variance from all other predictors in the model were removed. The third regression technique involved determining a composite measure of overall risk that was calculated from the first factor solution of a principal component analysis of the predictor variables from the full regression model. The composite risk factor was then used in a simple regression model to determine residual values separately for both external and internal competency.

Phase Two: Categorization of Individuals into Resilient and Vulnerable Groups

Each individual was classified as either resilient (higher competency than predicted), neutral (competency as predicted), or vulnerable (lower competency than predicted) according to their residual values (see Figure 2). In order to ensure valid resilient and vulnerable groups, agreement in classifications of residual values from all three techniques was required for the individual to be retained for the profile analysis. Initially, residuals were standardized according to the mean square error of the respective six regression models. Individuals whose residual values were at least one standard deviation higher than zero were classified as resilient. Individuals whose residual values were within one standard deviation of zero were classified as neutral. A vulnerable classification was given to individuals whose residual values were least one standard deviation lower than zero. Next, a comparison of classification status was made for each individual across the three techniques. Individuals were placed into the resilient group if their classification was resilient using all three regression techniques, and into the vulnerable group if their classification was vulnerable using all three techniques. Individuals not placed into the resilient or vulnerable group were eliminated from further analysis.

Figure 2. Graphical Representation of Vulnerable, Neutral, and Resilient Groups Based on Residual Values



Phase Three: Profile Analysis with Resilient and Vulnerable Groups

The third phase of the study analyses involved investigating the role of protective factors in moderating the risk-competency relationship through multivariate profile analysis. All profile analyses were performed using the GLM procedure with the REPEATED MEASURES option in the SAS (1990) statistical program. Two preliminary steps were completed before beginning the actual profile analysis. First, protective factors were standardized to a mean of 50 and a standard deviation of 10. Then, protective factor means between the two groups were examined for correspondence in the expected direction. Low means for protective factors were expected to be associated with the vulnerable group, whereas high means for protective factors were expected to be associated with the resilient group.

Profile analysis for two groups began with a test for profile parallelism to determine if there was a protective factor response by group interaction (Morrison, 1990). The Hotelling T^2 for two independent groups was the test statistic used to determine parallel profiles by indicating whether the population slope segments were equal for the resilient and vulnerable groups. When the system was found to be parallel, resilient and vulnerable height differences were examined using the usual two-sample t -test across the unweighted standardized sum of the eight protective factors.

Group by protective factor interaction is indicated in multivariate profile analysis if the group profiles are found to be non-parallel. If the system is non-parallel, an interaction is indicated. If the interaction is disordinal, the multivariate test for response effects among the two groups has no meaning and separate univariate t -tests are employed to detect differences among the resilient and vulnerable group means for each protective factor. If the interaction is ordinal, a multivariate test for response effects among the two groups can be applied to the data to determine if there are overall height differences. The presence of a protective mechanism moderating the risk-competency

relationship is indicated where the protective factor mean is meaningfully larger for the resilient group compared to the vulnerable group. In these cases, a high value of the protective factor can be attributed to its moderator role in the risk-competency relationship.

CHAPTER IV

RESULTS

The results of the statistical analyses used to test the resiliency model in Figure 1 are presented in this chapter. Data from a sample of children of adolescent mothers from the National Survey of Children (Zill et al., 1992) were used to examine the moderating role of eight protective factors in the risk-competency relationship. Moderation of the negative association between risk and competency for external and internal criterion measures was investigated through a comparison of resilient and vulnerable groups. It was expected that the resilient group would have higher protective factor scores than would the vulnerable group.

Testing the Resiliency Model

The results are presented according to the three phases of analyses, which correspond to the phases of the resiliency model in Figure 1 (see Chapter 3). The first phase of analyses involved the use of three regression modeling techniques to determine residual values in the prediction of external and internal competency. The second phase of the analyses used the residual values to categorize the study sample members into resilient and vulnerable groups for each competency criterion. The third phase of the analyses involved the use of a multivariate profile analysis to test the moderating association of eight protective factors for the resilient and vulnerable groups. All analyses were performed separately for external and internal competency as the criterion measures using the SAS (1990) statistical program.

Phase One: Prediction Models

Before the full prediction models were determined, the correlational associations between the risk and competency factors were examined (see Table 7). Two risk factors, Temperament and Somatic, shared a negative correlation with external competency. Low external competency scores were associated with high strung, nervous individuals who lose their temper easily ($r_{\text{Temperament, External}} = -.21$, $df = 164$) and had one or more developmental health risks ($r_{\text{Somatic, External}} = -.12$, $df = 164$). Five risk factor shared a moderate negative correlation with internal competency. Low internal competency scores were related to high temperamental risk ($r_{\text{Temperament, Internal}} = -.30$, $df = 166$), high sources of parental arguements ($r_{\text{Discord, Internal}} = -.19$, $df = 164$); low family income ($r_{\text{Income, Internal}} = -.18$, $df = 156$); young ages of the mother at first birth ($r_{\text{MomAge, Internal}} = -.13$, $df = 166$); and individuals who had one or more developmental health risks ($r_{\text{Somatic, Internal}} = -.19$, $df = 164$).

Intercorrelations among the risk factors also were examined (see Table 8). Seven intercorrelations among the risk factors were noteworthy, four of which were related to Income. Low levels of family income were related to high temperamental risk ($r_{\text{Temperament, Income}} = .16$, $df = 160$), low paternal educational aspiration for their child, ($r_{\text{Aspire Parent, Income}} = .17$, $df = 157$), greater sources of parental arguements ($r_{\text{Discord, Income}} = .14$, $df = 160$), and low maternal educational attainment levels ($r_{\text{MomEd, Income}} = .30$, $df = 160$). In addition, high temperamental risk was related to low mother's age at first birth ($r_{\text{Temperament, MomAge}} = .19$, $df = 169$) which in turn was associated with a greater amount of sources for parental arguements ($r_{\text{MomAge, Discord}} = .17$, $df = 169$). Low maternal educational attainment also was related to low parental educational aspirations for the child ($r_{\text{MomEd and Aspire Parent}} = .22$, $df = 167$). Together, six risk factors--Income, Temperament, Aspire Parent,

Table 7. Pearson Correlation Coefficients for Risk Factors with External and Internal Competency

Risk Factor	External Competency	Internal Competency
Somatic	-.1194 (.1267) 165	-.1906 (.0136) 167
Temperament	-.2099 (.0068) 165	-.3052 (.0001) 167
Aspire Parent	-.0399 (.6132) 163	-.0287 (.7144) 165
MomAge	-.0906 (.2485) 164	-.1257 (.1055) 167
MomEd	-.0770 (.3254) 165	.0397 (.6103) 167
Discord	-.0831 (.2887) 165	-.1944 (.0118) 165
Income	-.0523 (.5183) 155	-.1854 (.0201) 157

Note. Values enclosed in parentheses represent *p*-values. Values underneath parentheses represent the number of observations.

Table 8. Pearson Correlation Coefficients for Intercorrelations Among Risk Factors

Risk factor	1	2	3	4	5	6	7
1. Somatic	1.000 (.0000) 171						
2. Temperament	.0406 (.5983) 171	1.000 (.000) 171					
3. Aspire Parent	.1442 (.0623) 168	.0656 (.3984) 168	1.000 (.0000) 168				
4. Discord	.1222 (.1114) 171	.0999 (.1934) 171	.0061 (.9376) 168	1.000 (.0000) 171			
5. MomAge	-.0017 (.9822) 170	.1894 (.0134) 170	-.0331 (.6715) 167	.1672 (.0293) 170	1.000 (.0000) 161		
6. MomEd	.0656 (.3940) 171	.0392 (.6109) 171	.2146 (.0052) 168	-.0154 (.8415) 171	-.0382 (.6211) 170	1.000 (.0000) 171	
7. Income	.0666 (.4016) 161	.1603 (.0423) 161	.1687 (.0341) 158	.1403 (.0758) 161	.0584 (.4628) 160	.2959 (.0001) 161	1.000 (.0000) 161

Note. Values enclosed in parentheses represent *p*-values. Values underneath parentheses represent the number of observations.

Discord, MomEd, and MomAge--shared associations, while Somatic did not. This observation suggested that there were two underlying constructs measured by the seven risk factors. One risk construct was mainly influenced by family income, while the other construct was influenced by the individual's health risk.

A negative association between risk and competency was required under the prediction model (see Figure 1 in Chapter 3). Any risk factor lacking a negative association with external competency was eliminated from the three regression analyses that determined residual values for the accompanying competency criterion models (see Table 7). All seven risk factors shared a negative correlation with external competency; therefore, they were retained for subsequent analyses with external competency as the criterion measure. For internal competency, all risk factors except MomEd had negative associations. Therefore, MomEd was excluded from further analyses with internal competency as the criterion measure, while the remaining six risk factors were retained.

Residual values for each individual in the study were determined through the prediction models. Three regression techniques were used: (a) full model regression, (b) reduced model, and (c) simple regression analysis with a single composite risk index calculated through principal components analysis. Results of the regression analysis for the first technique are given in Table 9. Standardized regression coefficients (β), indicating the direction and strength of the associated standard unit change predicted in the competency criterion for a one standard unit change in the risk factor (while holding the effects of the other risk factors constant), are included in the table. One regression coefficient for the external competency criterion was noteworthy. For internal competency, three regression coefficients were noteworthy. A decrease in internal competency was associated.

Table 9. Regression Analyses of Full Risk Model for External and Internal Competency

Risk factor	External					Internal				
	df	β	Type III MS ^a	F-value	p-value	df	β	Type III MS	F-value	p-value
Somatic	(1)	-.081	18.549	0.98	.3241	(1)	-.162	79.917	4.60	.0336
Temperament	(1)	-.219	127.866	6.75	.0104	(1)	-.298	252.010	14.50	.0002
Aspire Parent	(1)	.047	5.831	0.31	.5800	(1)	.034	3.512	0.20	.6537
Discord	(1)	.001	0.002	0.00	.9911	(1)	-.120	42.020	2.42	.1221
MomAge	(1)	-.038	4.003	0.21	.6465	(1)	-.012	0.436	0.03	.8744
MomEd	(1)	-.046	5.663	0.29	.5888			omitted		
Income	(1)	.007	0.130	0.01	.9340	(1)	-.097	26.688	1.54	.2172
<i>Model</i>	(7)		26.773	1.41	.2045	(6)		90.071	5.18	.0001
<i>Error</i>	(144)		18.950			(148)		17.377		
				$R^2 = .0642 \quad N = 152$					$R^2 = .1736 \quad N = 155$	

^a Type III MS are the partial sums of squares divided by the degrees of freedom

with higher Temperament ($\beta = -.298$) risk. Decreases in internal competency was associated with higher Temperament ($\beta = -.298$), Somatic ($\beta = -.162$), and Discord ($\beta = -.120$) risks.

In the second technique, predictor variables for the reduced regression models were chosen from those risk factors in the full regression model displaying unique contribution to the prediction of the criterion. For each competency criterion, unique correlational associations were determined through the investigation of the partial sums of squares for each risk factor. For the present study, a meaningful contribution to the regression model was considered through evidence of a risk factor explaining at least twice as much variance as the variance left unexplained by the regression model. Therefore, only those risk factors having an F -value greater than 2.00 in the full model regression were included in regression analysis for the reduced model approach. From a possible selection of seven risk factors, only Temperament ($F_{1,144} = 6.75$) had an F -value greater than 2.00. Therefore, the reduced regression model for external competency used Temperament as a single predictor variable.

Three predictor variables from a possible total of six were included in the reduced model for internal competency (see Table 10). The risk factors, Somatic ($F_{1,148} = 4.60$), Temperament ($F_{1,148} = 14.50$), and Discord ($F_{1,148} = 2.42$), all had F -values greater than 2.00. Results of the regression analyses for the reduced model technique with external and internal competency as the criteria are located in Table 10. A comparison in R-Square of the full versus reduced model for external competency indicates only a slight reduction in the amount of variance in the criterion explained by the reduced model ($R^2_{\text{full}} = .0642$, $R^2_{\text{reduced}} = .0525$). A slight reduction was also noted for the internal competency criterion ($R^2_{\text{full}} = .1736$, $R^2_{\text{reduced}} = .1646$).

The third statistical technique involved a two-step process. First the seven risk factors were reduced to an overall index of risk using principal components analysis. Principal

Table 10. Regression Analysis of Reduced Risk Model for External and Internal Competency

Risk factor	df	β	Type III MS ^a	F-value	p-value
External					
Temper	(1)	-.229	153.221	8.32	.0045
<i>Error</i>	(150)		18.420		
					R ² = .0525 N = 152
Internal					
Somatic	(1)	-1.633	83.261	4.84	.0294
Temperament	(1)	-.316	305.186	17.72	.0001
Discord	(1)	-.134	54.180	3.15	.0781
<i>Model</i>	(3)		170.767	9.92	.0001
<i>Error</i>	(151)		17.218		
					R ² = .1646 N = 155

^a Type III MS are the partial sums of squares divided by the degrees of freedom

components analysis partitions the total variance measured from a set of variables by finding a specified number of uncorrelated linear combinations of the variables. The first principal component, which accounts for the maximum amount of the variance, was used as a single predictor of competency in the third regression technique. A PRINCOMP option of the the FACTOR procedure (SAS, 1990) was used to determine the first principal component for the set of seven risk factors for external competency. A separate principal components analysis was employed for the set of six risk factors for internal competency.

The overall risk composite for the external competency criterion retained 23.92% of the total variance explained by the seven variables entered into principal components analysis. For the internal competency criterion, the principal component retained 25.39% of the total variance explained by the six variables entered into principal components analysis. The standardized coefficients, representing the standardized eigenvalue for each risk factor, were used as weights in a linear combination of variables to form the principal component, Overall Risk.

For external competency, the composite was calculated through the following equation for each individual: $\text{Overall Risk}_{\text{External}} = .2241 (\text{Somatic}) + .2968 (\text{Temperament}) + .2935 (\text{Aspire Parent}) + .2003 (\text{MomAge}) + .3325 (\text{MomEd}) + .2564 (\text{Discord}) + .3955 (\text{Income})$. Weights of the risk factors for the overall risk were approximately the same with the exception of MomEd and Income, which had higher weightings. Since MomEd was excluded from the prediction models for internal competency, a separate principal component analysis was required to determine the overall risk composite. For internal competency, the risk composite was calculated through the following equation for each individual: $\text{Overall Risk}_{\text{Internal}} = .2042 (\text{Somatic}) + .4176 (\text{Temperament}) + .2124 (\text{Aspire Parent}) + .3224 (\text{MomAge}) + .3482 (\text{Discord}) + .4125 (\text{Income})$. Weights for Somatic and Aspire Parent were comparably lower than the other factor weights. Slightly higher weights were

observed for MomAge and Discord. Income and Temperament had the highest weights in the computation of the Overall Risk composite.

The overall risk composites were then used in the third technique as single predictor variables in regression analysis. Results of the simple regression analysis for the overall risk composite for both the external and internal competency criterion are located in Table 11. Comparisons of R-Square between the overall risk and reduced regression models for external competency show a decrease ($R^2_{\text{reduced}} = .0525$, $R^2_{\text{overall}} = .0224$) in the amount of variance explained in the criterion. A reduction was also noted for the internal competency criterion ($R^2_{\text{reduced}} = .1746$, $R^2_{\text{full}} = .1291$).

Phase Two: Categorization of Individuals into Resilient and Vulnerable Groups

After each model was fit, the residual values were calculated and standardized. Those individuals having residuals of at least one standard deviation above the mean were classified as resilient (higher competency scores than predicted). Those classified as vulnerable individuals had residual values of at least one standard deviation below the mean (lower competency scores than predicted). Observed competency scores for the neutral individuals were close to their predicted scores as indicated by residual values within one standard deviation of the mean. Final categorization into the resiliency and vulnerable groups was based on an individual's classification into the same group for all three regression techniques. Only those individuals having the same classification for all three techniques were retained for further analysis.

For external competency, 19 individuals were eliminated during regression analysis due to missing data, and 16 individuals were eliminated after regression analysis due to failure to agree in categorization for all 3 techniques. Of the remaining 136 individuals, 20 were categorized into the

Table 11. Regression Analysis of the Overall Risk Model for External and Internal Competency

Risk factor	df	β	Type III MS ^a	F-value	p-value
External					
Risk	(1)	-.150	65.263	3.43	.0658
Error	(150)		18.420		
					$R^2 = .0224$ $N = 153$
Internal					
Risk	(1)	-.360	401.810	22.68	.0001
Error	(153)		17.715		
					$R^2 = .1291$ $N = 155$

^a Type III MS are the partial sums of squares divided by the degrees of freedom

resilient group (5 male and 15 female) and 27 were categorized into the vulnerable group (21 male and 6 female); 89 individuals fell into the neutral category. For internal competency, 16 individuals were eliminated during regression analysis due to missing data and 18 individuals were eliminated after regression analysis due to failure to agree in the classification procedure for all three regression techniques. Of the remaining 137 individuals, 17 were categorized into the resilient group (6 male and 11 female) and 17 were categorized into the vulnerable group (11 male and 6 female); 103 subjects comprised the neutral category. The majority of individuals in the study sample were classified as neutral for one competency criterion and either resilient or vulnerable for the other competency criterion. Frequencies of the risk factors for the resilient and vulnerable groups for external and internal competency are located in Table 5.

Phase Three: Profile Analysis with Resilient and Vulnerable Groups

Profile Analysis is a type of multivariate repeated measures analysis where subjects are nested within a sub-classification. This statistical technique compares outcome measures between two groups for a number of profile variables. In the present study, profile analysis was used to compare groups classified as resilient and vulnerable, and these groups were separately determined for external and internal competency. Profile plots across the eight protective factor scores for the resilient and vulnerable groups in external and internal competency are found in Figure 3.

The profile plot for external competency is found in Panel A of Figure 3. Even though all protective factor means were higher for the resilient group, the plots did not appear to be parallel (*Wilk's Lambda* = 0.732, $F_{7,36} = 1.88$, $p = .1017$). Therefore, it was concluded that there was a group by protective factor interaction. An interaction indicated that differences between the resilient and vulnerable group means depended on the protective factor. Univariate tests were examined for each protective factor to determine which resilient group means were different from the vulnerable group

Table 12. Resilient and Vulnerable Group Percentages for Risk Factors: External Competency and Internal Competency

Factor	Value	External		Internal	
		Resilient	Vulnerable	Resilient	Vulnerable
Somatic	no risk = 0	70.0	66.7	64.7	52.9
	one or more risks = 1	30.0	33.3	35.3	47.1
Temperament	low risk = 0	0.0	3.7	0.0	0.0
	1	20.0	11.1	0.0	5.9
	2	10.0	29.6	11.8	11.8
	3	40.0	25.9	47.1	23.5
	4	15.0	11.1	11.8	17.6
	5	10.0	7.4	17.6	29.4
	high risk = 6	5.0	11.1	11.8	11.8
Aspire Parent	low risk = 0	20.0	37.0	29.4	35.3
	high risk = 1	80.0	63.0	70.6	64.7
MomAge	low risk = 1	0.0	0.0	0.0	0.0
	2	0.0	0.0	0.0	0.0
	3	0.0	0.0	0.0	0.0
	4	0.0	3.7	0.0	0.0
	5	0.0	3.7	0.0	0.0
	6	0.0	0.0	0.0	0.0
	7	0.0	0.0	0.0	5.9
	8	0.0	0.0	0.0	0.0
	9	15.0	3.7	0.0	0.0
	10	0.0	7.4	0.0	0.0
	11	0.0	0.0	0.0	5.9
	12	5.0	0.0	0.0	0.0
	13	0.0	0.0	0.0	0.0
	14	5.0	0.0	11.8	0.0
	15	0.0	3.7	0.0	5.9

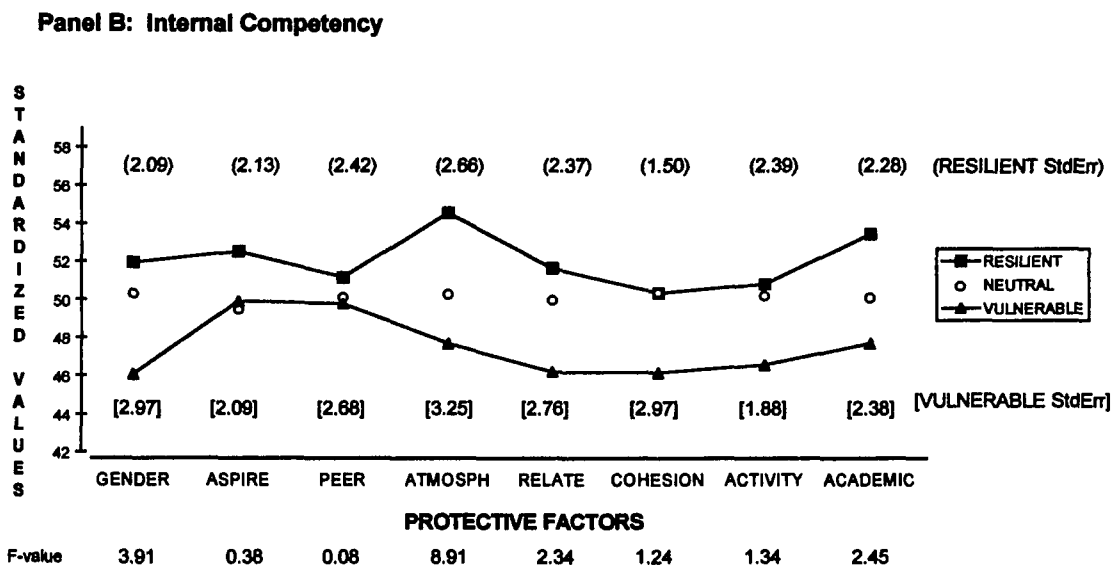
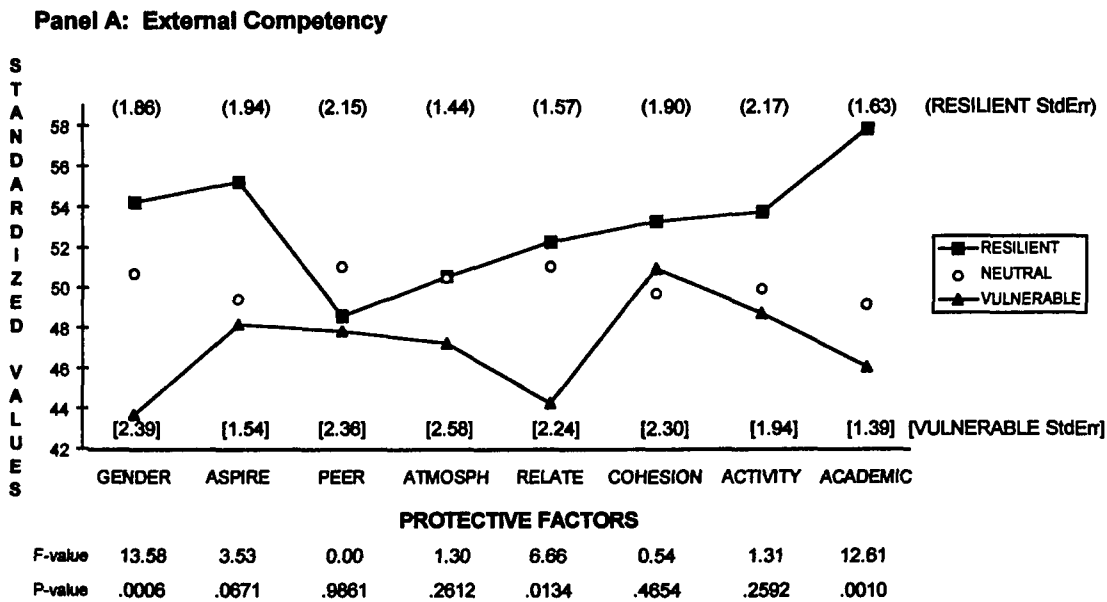
Table 12. Resilient and Vulnerable Group Percentages for Risk Factors: External Competency and Internal Competency (continued)

Factor	Value	External		Internal	
		Resilient	Vulnerable	Resilient	Vulnerable
MomAge (continued)	16	5.0	0.0	0.0	0.0
	17	15.0	11.1	5.9	17.6
	18	0.0	0.0	11.8	0.0
	19	5.0	3.7	5.9	0.0
	20	15.0	11.1	35.3	5.9
	21	0.0	14.8	0.0	17.6
	22	5.0	18.5	5.9	17.6
	23	20.0	7.4	11.8	23.5
	24	10.0	7.4	11.8	0.0
	25	0.0	0.0	0.0	0.0
	high risk = 26	0.0	3.7	0.0	0.0
MomEd	low risk = 1	0.0	0.0	0.0	0.0
	2	0.0	3.7	0.0	5.9
	3	55.0	40.7	35.3	52.9
	4	10.0	18.5	5.9	0.0
	5	15.0	22.2	23.5	17.6
	6	15.0	11.0	5.9	17.6
	7	5.0	3.7	29.4	5.9
	8	0.0	0.0	0.0	0.0
	9	0.0	0.0	0.0	0.0
	high risk = 10	0.0	0.0	0.0	0.0
Discord	zero sources = 0	20.0	14.8	11.8	17.6
	one source = 1	25.0	29.6	29.4	23.5
	two sources = 2	20.0	18.5	23.5	17.6
	three sources = 3	0.0	11.1	11.8	23.5
	four sources = 4	30.0	18.5	23.5	17.6
	five sources = 5	5.0	7.4	0.0	0.0

Table 12. Resilient and Vulnerable Group Percentages for Risk Factors: External Competency and Internal Competency (continued)

Factor	Value	External		Internal	
		Resilient	Vulnerable	Resilient	Vulnerable
Income	low risk = 1	5.0	0.0	0.0	5.9
	2	0.0	3.7	5.9	0.0
	3	15.0	29.6	0.0	23.5
	4	40.0	14.8	17.6	17.6
	5	20.0	25.9	25.5	17.6
	6	5.0	18.5	29.4	11.8
	7	15.0	0.0	11.8	5.9
	8	0.0	0.0	0.0	11.8
	9	0.0	3.7	5.9	5.9
	10	0.0	3.7	0.0	0.0
	11	0.0	0.0	5.9	0.0
	high risk = 12	0.0	0.0	0.0	0.0

Figure 3. Profile Plots of Resilient and Vulnerable Groups Across Eight Protective Factors for External and Internal Competency



means. Large F -values were found for Gender ($F_{1,42} = 13.58, p = .0006$), Aspire Child ($F_{1,42} = 3.53, p = .0671$), Relate ($F_{1,42} = 6.66, p = .0134$), and Academic ($F_{1,42} = 12.61, p = .0010$).

Because the interaction was ordinal, a univariate test for overall height difference between the resilient and vulnerable groups was performed and the F -value was examined. Results of the test for equal group effects ($F_{1,42} = 12.45, p = .0010$) indicated that there was an overall height difference across the eight protective factors.

The profile plot for internal competency, which is located in Panel B of Figure 3, appears to be parallel (*Wilk's Lambda* = 0.807, $F_{7,25} = .8503, p = .5575$). Results of the test for equal group effects ($F_{1,31} = 14.19, p = .0007$) indicated that there was an overall height difference across the eight protective factors. Even though univariate tests for group differences for the individual protective factors are not required when parallel profiles are determined, F -values from univariate tests were examined for differences in the resilient and vulnerable groups for internal competency. Unusually large F -values were found for Gender ($F_{1,31} = 3.91$); Atmosphere ($F_{1,31} = 8.91$); Relate ($F_{1,42} = 2.34$) and Academic ($F_{1,31} = 2.45$).

Even though the neutral group means were not investigated in the multivariate profile analysis, they were plotted. An examination of the location of neutral group mean in comparison to the resilient and vulnerable group means reveals whether the protective mechanisms at work in resiliency were associated with: (a) an abundance of protection for the resilient group, (b) a deficiency in protection for the vulnerable group, or (c) both. An abundance of protection was detected for Aspire Child for the external competency criterion alone. Both an abundance of protection for the resilient group and a deficiency of protection was found for Atmosphere for the internal competency criterion alone.

For Gender, comparison of the neutral group mean revealed a deficiency for the vulnerable group for the external competency criterion, while a deficiency in protection was found for the vulnerable group for the internal competency criterion. For Relate, a deficiency in protection was found for both the external and internal competency criteria. For Academic, an abundance of protection was found for the resilient group, while both an abundance and deficiency of protection was found for the internal competency criterion alone.

The cross product correlation coefficients for the protective factors were examined to detect the multivariate associations between the eight protective factors in the profile analysis. For external competency, Aspire Child and Academic ($r = .4323, p = .0038, df = 42$) measured an underlying construct in the profile analysis of the resilient and vulnerable groups through high child educational aspirations with high academic progress. Gender and Relate ($r = -.2902, p = .0584, df = 42$) also measured an underlying construct for the external competency groups through the male gender's association with higher levels of good maternal relations. For internal competency, Atmosphere and Relate ($r = .6034, p = .0003, df = 31$) measured an underlying construct in the profile analysis of the resilient and vulnerable groups through cooperative, easy-going family life associations with good maternal relations.

Limitations of the Present Study

The analyses in the present study was performed on pre-existing data of the National Survey of Children (Zill et al., 1992). Ideally, this study would have examined data from all three waves of the National Survey of Children (Zill et al., 1992). However, attrition of the individuals participating in the first two waves of the survey made it infeasible. Also, missing teacher data from the first two waves prevented the use of teacher measures of risk from the Wave 1 data, and teacher measures of protection and competency from the Wave 2 data in the study analyses.

Not all of the potential risk and protective factors that might have been related to external and internal competency were available variable measurements in the National Survey of Children study data. Appropriate measurements for many risk factors (family planning, parental mental health, parenting style, parental sociopathy, neighborhood crime, and social isolation) that were reviewed in Chapter II were not available in the data from the National Children's Survey. The addition of data for these risk factors as predictor variables in the regression models may have yielded different associations among the risk factors, as well as different associations between risk and the external and internal competency criteria. Likewise, appropriate measures for two protective factors (self-efficacy and relations with extra-familial adults) were not available; thus the potential results of the multivariate profile analyses were affected.

Error associated with the measurement of variables affects their statistical power by underestimating the true degree of the associations between the factors. A reliability coefficient indicates the proportion of the observed measurement variance that is the true measurement variance, and also denotes the proportion of the measure's variance that is available to correlate with other measures (Cohen & Cohen, 1984). The risk factors composed of single variables (Aspire Parent, MomAge, MomEd, and Income) were not strong predictors of either of the competency criteria. The internal reliability coefficients of the composite risk factors ($r_{\text{Somatic}} = .67$, $r_{\text{Temperament}} = .60$, and $r_{\text{Discord}} = .55$) were relatively moderate, and the internal reliability coefficients of the competency composites ($r_{\text{External}} = .79$ and $r_{\text{Internal}} = .85$) were high. It cannot be determined from this study whether the inability of the single variable risk factors to predict competency is due to measurement error or because they are not, in fact, predictors of psychosocial competency for children born to adolescent mothers. Measurements with greater reliability are needed to adequately investigate these risk factors.

The historical context of a resiliency study is an important area to consider. The adolescent mothers in this study first took on the role of motherhood before 1970. Since that time, many historical changes have occurred in the social context surrounding pregnancy resolution, especially the acceptability of single motherhood. Because the children in the study sample were from two-parent families, it is especially important to consider that the rate of married adolescent mothers during the data collection of Wave 1 in the National Children's Survey was different than it is now. It is more socially acceptable today to remain single and give birth to a child, and many more women are head of single-parent homes today than 25 years ago (Miller, 1993; Vivovskis, 1988). Many marriages that take place today as a result of adolescent pregnancy shortly end in divorce, leaving the adolescent mother a single head of the household (Adams, Pittman, & O'Brien, 1993; Furstenburg & Harris, 1993). Therefore, caution should be given to generalizations of the study results to historical cohorts other than the cohort to which those individuals born in the 1970s belong.

In data for this study, both competency composites were constructed mainly from the parent's perceptions of their child's competency. Under the social-cognitive-behavioral theoretical model (Crosbie-Burnett & Lewis, 1993), the ways in which a particular family member perceives the behaviors of another family member affect the behaviors of all family members as well as affecting each member's interpersonal domains and the social and physical environments that surround the family. Associations with individuals outside the family domain also influence the ways in which behaviors are perceived. Teachers and peers are strong sources of social influence for children and adolescents. Therefore, it is likely that the inclusion of measures from these sources of risk and protection and/or different dimensions of competency would have yielded different results in factor associations.

CHAPTER V

SUMMARY, DISCUSSION, CONCLUSIONS, AND RECOMMENDATIONS

Summary

This research focused on the examination of protective processes and mechanisms associated with resiliency in children who are at risk for psychosocial maladaptation. A conceptual resiliency model was developed and tested. A sample of 171 Anglo-American children (80 male and 91 female) of adolescent mothers living in two-parent families were chosen as the risk population in this investigation of protective processes and mechanisms involved in the development of resiliency through the risk-competency relationship. Multiple measures of risk were selected from variables that were shown in previous studies to have a negative relationship with competency. According to the predicted competency outcomes that were determined through these risk regressors, groups of individuals were categorized as resilient, neutral, or vulnerable. Using studies reported in the literature, protective factors were selected from variables that were found to act, or have the potential to act, as moderators of risk. The moderating role of protective factors in the risk-competency relationship was investigated through multivariate profile analysis, which compared protective factor means between the resilient and vulnerable groups. Higher protective factor scores were expected to be associated with the resilient group for both external and internal competency criterions.

Secondary data analysis was conducted on variables measured in the National Survey of Children. In Phase One of the analysis, regression models that used multiple risk factors in the prediction of competency were applied to determine residual values for each individual. Phase

Two used these residual values to categorize individuals into resilient and vulnerable groups for each competency criterion. Phase Three involved a multivariate profile analysis to test the moderating associations of eight protective factors for the resilient and vulnerable groups. All three phases of the analysis were conducted separately for external (action-oriented) competency and internal (thought-oriented) competency.

Difficult temperament in childhood emerged as a strong risk predictor of external competency in adolescence. Results of the equal group effects test indicated support for overall group differences with higher resilient group means across the eight protective factors. However, multivariate analysis of the resilient and vulnerable groups also indicated a group by protective factor interaction. Univariate tests detected group differences for the following factors: (a) gender, (b) the child's aspirations for post-secondary education, (c) mother-child relations, and (d) academic progress.

Developmental health hazards, difficult temperament, and amount of parental arguments in childhood emerged as strong risk predictors of internal competency in adolescence. Multivariate profile analysis indicated that the resilient and vulnerable group profiles were parallel across the eight protective factors. Results of the equal group effects test indicated support for overall group differences with individuals in the resilient group having higher scores. The greatest differences between the resilient and vulnerable groups were found for the following factors: (a) gender, (b) family atmosphere, (c) mother-child relations, and (d) academic progress.

Discussion

The methodology carried out in the present study tested the conceptual association between risk and protection as proposed by the current state of resiliency theory. The studies reported in the Review of Literature (Chapter II) did not utilize the most current advancements in resiliency theory

in the research design or statistical analysis when investigating the associations between risk, protection, and competency. Rutter (1990) stated that a statistical interaction between a risk factor and a protective factor cannot support or refute a moderating process, because the number of individuals for whom the risk and protective factors co-occur may only apply to a small proportion of the sample. This statistical problem was eliminated when the neutral group was extracted out of the study sample before multivariate profile analysis was performed across the eight protective factors. Thus, instead of testing an interactive association between protective factors and risk competency during the prediction model phase, the analyses presented in this study tested the moderating role of the protective factors through a group by protective factor interaction in multivariate profile analysis.

Fewer individuals in the study sample were included in the investigation of the mechanisms of protective factors than were excluded. Even though the majority of the initial sample members in the present study were not included in the resilient and vulnerable grouping for the statistical testing of the moderating role of the protective factors, their risk contribution to the explanation of protective processes are not required in the statistical analyses. Because the observed competency scores of the individuals in the neutral group were close to their predicted competency scores, protective factors would not have had moderating effect on their predicted competency scores. In addition, 10% of the individuals considered in the external prediction model and 12% of the individuals considered in the internal prediction models were eliminated during Phase Two of the analyses due to failure of a classification agreement for all three regression techniques. This procedure ensured valid resilient and vulnerable groupings.

Temperamental risk was a unique predictor of both external and internal competency (see Table 7, Chapter IV). Children who had high temperamental risk were characterized by their

parents as high-strung, nervous individuals who easily lost their temper. As the only unique risk predictor of external competency, Temperament was the most decisive factor in the placement of individuals into the resilient and vulnerable categories for this competency. Temperament also was the strongest predictor of internal competency. This finding supports the risk research of Caspi and associates (1990). Their study results of the 1928 Berkley Guidance Study sample of white middle class males indicated an association between the demonstration of temper tantrums and the exhibition of frustration to adult authority with poorer external and internal competencies in later adulthood. Because the present study used a 1970s birth cohort, this finding also suggests that the associations between childhood temperament and later competency crosses historical and social contexts.

Somatic and Discord were also found to be a unique predictor of internal competency. The association found in this study between the quantity of physical health risks from birth to childhood and internal competency in adolescence supports findings in three previous risk studies: (a) Cohen and et al. (1990) where competency was measured in adolescence, (b) Wadsworth et al. (1984) where competency was measured in childhood, and (c) Werner (1986) where competency was measured in late adolescence. Similarly, the association between the sources of parental arguments during childhood and internal competency supports the findings in the risk studies of Werner and Smith (1992). Thus, the association between the three risk factors, Temperament, Somatic, and Discord, and psychosocial competency merit investigation in future risk and resiliency studies.

The intercorrelational structure among the risk factors showed that six risk factors--Income, Temperament, Aspire Parent, Discord, MomEd, and MomAge--shared associations, while Somatic did not. This observation suggested that there were two underlying constructs measured by the seven

risk factors. One risk construct was mainly influenced by family income, while the other construct was influenced by the individual's health risk. The construct characterized by income indicated that low levels of family income were related to high temperamental risk, low paternal educational aspiration for the child, greater sources of parental arguments, and low maternal educational attainment. Because temperamental risk is included in the risk construct that was mainly influenced by family income, it is difficult to disentangle the relationship between temperament and competency from the influences of family income, parent's educational aspirations for their child, degree of marital conflict, and mother's education and age.

It is important to note that 63 individuals were included in at least one profile analysis that investigated the moderating role of the eight protective factors. Even though the intercorrelation between external and internal competency was .33, the majority of individuals were classified as either resilient or vulnerable for one competency criterion and neutral for the other competency criterion. Only three individuals were categorized as resilient in one competency and vulnerable in the other. Four individuals were categorized as resilient in both competencies, and five individuals were categorized as vulnerable in both categories. Thus, for children born to adolescent mothers, it can be concluded that the psychosocial development of resilient and vulnerable individuals, in response to varied exposures to risk, was different for external and internal competency. This conclusion is contrary to Luthar's (1991) findings concerning the comparison of internalizing symptoms associated with the individuals in her study who were classified as resilient. A probable reason for this disagreement is the difference in the categorization and analysis procedures of the resilient, neutral, and vulnerable groups in Luthar's as compared to the present study.

All the protective factor means were higher for the resilient group than the vulnerable group for both external and internal competency criteria. This finding provided support for the

research hypothesis that resilient individuals tend to have higher protective factor scores than vulnerable individuals. Results of the multivariate profile analysis were similar for three protective factors. Gender, mother-child relations, and academic progress were factors found to distinguish groups of resilient and vulnerable individuals. This finding provides support for social-cognitive-behavioral theory (Crosbie-Burnette & Lewis, 1992) and resiliency theory offered by Garmezy (1992) which state that factors in the individual, familial, and community contexts are important in explaining individual differences in human development. In addition, the resilient child's aspiration to continue education past high school was an individual protective factor specific to external competency; whereas, indications of a positive family atmosphere that may be characterized by a relaxed, easy-going, well-organized, uncomplicated, and sharing and cooperative family life was a familial protective factor specific to internal competency.

The inclusion of the neutral group in the graphs of the profile plots (see Figure 3, Chapter IV) served as an anchor for comparing the mechanisms that contributed to resiliency/vulnerability in the children born to adolescent mothers. For example, when comparing the distances of the resilient and vulnerable group means from the neutral group mean, it can be seen that the mechanisms in external competency were similar to those of internal competency for Gender and Relate. These distances were much greater for the vulnerable group than the resilient group in both external and internal competency. However, the mechanisms for academic progress were different in the external and internal competency resilient groups. The distance between the neutral group's mean for Academic was much greater for the resilient group than the vulnerable group in external competency. However, for internal competency, the distance between the neutral group's mean for Academic was approximately the same for the resilient and vulnerable groups.

Examination of the relative distance between the resilient and vulnerable groups' factor means from the neutral group's protective factor mean enables the investigation of protective mechanisms. In the search for the mechanisms involved in protective processes, Rutter (1990) emphasized that protection and vulnerability are the negative and positive poles of the same concepts. The labeling of a variable as a protective or a vulnerability factor does not depend on the how the researcher decides to measure the direction of the variable (i.e., successful school achievement is a protective factor; whereas, poor school achievement is a vulnerability factor), but it depends on the mechanism involved in the moderating process. Comparisons to the neutral protective means serves as one way to differentiate between variables that can be labeled as protective or vulnerability factors in the resiliency process. Those variables that contributed to resiliency through what was called "an abundance of protection" in the present study are in fact true protective factors; whereas, those variables contributing through "a deficiency in protection" are vulnerability factors.

The risk factors composed of single variables, *Aspire Parent*, *MomAge*, *MomEd*, and *Income*, were not strong predictors of either of the competency criteria (see Tables 3c, 3d, 3e, and 3g). Although the composite risk factors, *Somatic*, *Temperament*, and *Discord* possessed only moderate internal reliability coefficients, they were better predictors of competency than the single variable risk factors (see Tables 3a, 3b, and 3f). The fact that these composite factors were better predictors of competency than the single risk variables was in keeping with the findings of Rutter (1990). Likewise, those protective/vulnerability factors with higher internal reliability coefficients were stronger modifiers of risk than the protective/vulnerability factors with lower internal reliability coefficients. The internal reliability coefficients of the protective factor composites ranged from .41 to .74 (see Tables 4a-4h). Those protective factors having lower internal

reliability coefficients ($r_{\text{Cohesion}} = .41$, $r_{\text{Activities}} = .52$, and $r_{\text{Peer}} = .46$) were not found to be independent modifiers of risk for either external or internal competency. It appears that protective factors with error measurements that exceed or approximate the amount of true score variance were not true measures of protection/vulnerability. If tested for direct positive associations with external or internal competency, these factors may constitute compensatory factors (Garmezy et al., 1986). Again, it is emphasized that when measures of risk and protection factors have low reliability, one cannot determine whether the inability to find these factors as moderators of the risk-competency relationship is due to the large error associated with the measurement of the factors or if there is, in fact, no true association between the variables of interest.

In the past, researchers conducting risk and resiliency studies have not used the same operational definitions for similar concepts of risk, protection, and competency. The results of the statistical analyses in all resiliency studies are based primarily on the ways in which the competency criteria were measured. Therefore, consideration for the ways in which the competency criteria were measured in this study provide the framework for understanding the protective processes and mechanisms that work to achieve resiliency in children who are born to adolescent mothers. Additionally, the aspects of the outcomes from which these at-risk children escaped must be considered in order to understand these processes and mechanisms. Interpretations of the results in this study are constrained by the operational definitions of external and internal competency.

In the present study, over two-thirds of the variables that comprised the external competency composite originated from the parents' responses about their children's observable behavior when the proband child was 12- to 16-years old (see Table 5, Chapter III). Parent responses for the external competency composite were based on their perceptions of the child's: (a) academic and household work in comparison to other children, (b) independent and responsible

work behaviors, (c) cooperative household work, and (d) absence of negative interpersonal behavior at home and school. The remaining responses for the external competency composite originated from the proband child and were based on the child's perceptions of: (a) cooperative household work and (b) absence of involvement in physical violence.

Twelve out of the thirteen variables that comprised the internal competency composite in the present study originated from the parents' responses to the absence of psychological distress and emotional problems. Parent responses for the internal competency composite were based on their perceptions of the frequency of their child's: (a) inability to focus and concentrate, (b) emotional instability, (c) depressive symptoms, and (d) anxiety symptoms. Only one child response, which concerned the child's perception of the frequency of their anxiety symptoms, was included in the internal competency composite. Reader perceptions of the conclusions of this study must be framed in light of the above operational definitions of competency.

Conclusions

Because observational research is a type of inductive research, it is difficult to arrive at conclusions based on the statistical results of such studies. This statement is especially true of resiliency research. A decisive factor in the dependability of the results of a statistical analysis of all research resides in the inclusion of an explicit statement of theoretical relationships between the variables that attempt to measure the phenomena of interest. Much of the risk and resiliency research reviewed in Chapter II failed to apply and/or report theory guiding the research process. Another major concern involves the selection and use of appropriate statistical analyses that complements the theoretical orientation of the study. This study attempted to provide details of innovative statistical techniques that allow for the testing of the processes and mechanisms of protective factors in accordance with current resiliency theory. However, replication of the results

derived from this resiliency model study by social scientists who are scholars of risk and resiliency theory is needed before confidence can be placed in the conclusions and recommendations of this study.

At-risk children born to adolescent mothers who are of the male gender appear to be more vulnerable to the childhood risks that predict external and internal competency in adolescence. Past research has also found an association between the male gender and a vulnerability to physical hazards (Rutter, 1979, 1990). Whether these associations are determined through biological or social and cultural contextual factors is not known. It is general knowledge that many more males than females occupy the prison cells than females. At-risk males seem to be an important target population for intervention programs.

Poor mother-child relations during adolescence also constitute a vulnerability factor of adolescent external and internal competency for at-risk children born to adolescent mothers. However, since it was found that good mother-child relations were correlated with the male gender, the associations between poor mother-child relations and competency appears to be especially true for female at-risk children. Since no causal inferences can be made from this study, it cannot be determined if vulnerable female individuals are simply less able to develop and maintain good mother-child relations or if the parenting skills of the mother contribute to her child's vulnerability to maladaptation. The child's perception of daily family life as easy-going and relaxed functions as a protective factor of childhood risk for adolescent internal competency. An easy-going, relaxed family life may be linked to good mother-child relations, an identified protective factor.

Depending on the competency, academic progress can function as either a protective or a vulnerability factor. At-risk children born to adolescent mothers having good academic progress in adolescence are protected against the effects of risk on adolescent external competency. For

internal competency in adolescence, good academic progress serves as a protective factor against the effects of childhood risk while poor academic progress serves as a vulnerability factor. An at-risk child's aspirations to post secondary education protects against external maladaptive functioning in adolescence. Aspirations to post-secondary education may be linked with the protective factor, good academic progress, for both external and internal competent functioning in adolescence.

Recommendations

Many questions concerning resiliency not addressed in the present study remain unanswered. Because Rutter (1990) suggested that the moderating relationship between risk and protection be investigated before the mediating role of the multiple risk factors, the present study did not investigate the mediating associations between individual risk factors. Although high temperamental risk was the strongest predictor of lower levels of psychosocial competency, the associations it shares with low family income, low paternal educational aspiration for the child, greater sources of parental arguments, low maternal educational attainment, and younger ages of mother at time of the proband child's birth cannot be ignored. The mediational associations among these risk factors should be investigated in order to understand more fully the role of the risk-competency relationship in the development of resiliency in at-risk children. In addition, the mechanisms by which the mediating relationships between risk factors operate may not be the same for resilient, neutral, and vulnerable individuals.

Because the National Children's Survey (Zill et al., 1992) was a longitudinal study, a comparison of competency outcomes in childhood with competency outcomes in adolescence and/or adulthood could be investigated. An important area of investigation concerning the

protective processes of resiliency is to discover if the path of at-risk children changes from maladaptive functioning in childhood to adaptive functioning later in adolescence or adulthood.

The longitudinal nature of data in the National Children's Survey also allows for investigation of the resiliency model for a representative sample of control children who have not been selected because of their membership in a family having an adolescent mother. Comparison with different control groups, (i.e. homogeneous groups of African-American children, children living in poverty, or children of other nationalities) would enable a test of the mechanisms that operate between risk and protection in broader contexts. Research questions, which involve the comparison of a control group of children in the National Survey of Children (Zill et al., 1992) with the subsample of at-risk children of adolescent mothers in the survey, include:

1. Are the effects of the Temperament, Somatic, and Discord risk factors specific to children born to adolescent mothers or are they general risk factors for children born to mothers of all ages?
2. Are the Gender, Relate, Academic, Aspire, and Atmosphere protective factors specific moderators of risk to children born to adolescent mothers, or are they general moderators of risk for children born to mothers of all ages?
3. How do the results of this resiliency study compare to children of adolescent mothers of other ethnicities?

In the present study, variables that constituted the risk factors were measured at one time period when the individuals in the study sample were between 8 to 11 years of age. It is more likely that an individual's overall index of risk changes over time. The processes involved in risk factor associations over time and how changes in risk affect psychosocial development are areas of research that are still unexplored.

By using the knowledge derived from a better understanding of how mechanisms work in the development of resiliency in children born to adolescent mothers, applications of the results of this study can be used to help improve the quality of life for this at-risk population. The Dumka, Roosa, Michaels, and Suh (1995) five-stage model for the development of prevention programs was chosen as the framework through which recommendations from this study may be applied.

The identification of risk and protective factors is one of the first steps in Stage 1 (Problem Analysis) of Dumka and associates' (1995) intervention program development process. Stage 2 (Program Design) involves identifying the "modifiable mediators", which will later be examined for use as the focus of change objectives. This stage of the program development process involves consulting the target group so that the program content and processes can be adapted to the conditions and values of the local community. Soliciting participation from members of the target group is an important consideration in the development of any prevention program in which the involvement and cooperation of the parents are vital to the program's success.

After the change objectives have been agreed upon by the program developers, members of the community who will be affected by the implementation of the prevention program, and other interested members of the community (e.g., classroom teachers), the methods by which the change is to take place can be selected. An important part of the methodology in program design is the selection of participant outcome evaluation instruments (Dumka et al., 1995). The survey questions used in this study can serve as one evaluation instrument to establish measures of risk factors, protective/vulnerability factors and competency criterions.

Suggestions that are based on the outcomes of the present study would be appropriately applied at Stage 2 of the Dumka et al. (1995) intervention program developmental process. Collaboration with a group of adolescent mothers in the selection of change objectives may be the

most critical step in the determination of the success of a prevention program targeted at their children. In addition, since the risk model in the present study was tested on Anglo-American at-risk children of two-parent families in the late 1970s, the protective/vulnerability factors need to be re-examined to see if the factors still apply to at-risk children in the 1990s.

Based on the results of the present study, the topics of change objectives for intervention program development involving children born to adolescent mothers include parent involvement strategies that focus on instructing parents in ways that they can interact with their children to promote good parent-child relationships and an easy-going, relaxed family atmosphere. Teacher training would be a key element in developing implementation strategies. Early childhood education teachers can be trained to identify risk factors so that at-risk children and their families can begin their involvement in prevention programs as soon as formal education begins. Teachers of all developmental levels should be made aware of how they can contribute to the at-risk child's successful academic progress through creating a daily succession of academic accomplishments. Because findings of this study suggest that male children born to adolescent mothers are more susceptible to the effects of risk than their female counterparts, special components of an intervention program could be particularly targeted for parents and teachers of male children.

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