



1998

Adjustment of Hearing-Impaired Children: Risk and Resistance Factors

Karen L. Burk-Paull
Loyola University Chicago

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LOYOLA UNIVERSITY CHICAGO

ADJUSTMENT OF HEARING-IMPAIRED CHILDREN:
RISK AND RESISTANCE FACTORS

A DISSERTATION SUBMITTED TO
THE FACULTY OF THE GRADUATE SCHOOL
IN CANDIDACY FOR THE DEGREE OF
DOCTOR OF PHILOSOPHY
DEPARTMENT OF PSYCHOLOGY

BY

KAREN L. BURK-PAULL

CHICAGO, ILLINOIS

MAY 1998

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ACKNOWLEDGMENTS

First, I would like to thank my dissertation committee, whose expertise helped strengthen this project tremendously. Because they supported my desire to study a topic in which I am truly invested, it made the endeavor stimulating from start to finish. I thank Dr. Wills, in particular, for the endless hours she spent working with me over the past several years, for sharing her knowledge of the Deaf community, and for being such a wonderful mentor, in every sense of the word. I would also like to thank my primary research assistant, Sapna Patel, whose help with data collection and coding was greatly appreciated.

Next, I would like to thank my husband for his continued support and encouragement. I cannot thank him enough for his direct help with this project, which included “technical” support and assistance with data collection. His humor and love always keep me smiling.

Finally, I thank my parents, who instilled in me the values of education and perseverance at a young age. Their unconditional love and support provided me with the confidence I needed to pursue my goals.

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ABSTRACT

The purpose of the present project was to identify predictors of adjustment in children with hearing impairment, using an adapted version of Wallander and Varni's model (Wallander, et al., 1988) as a theoretical guide. Risk and resistance factors studied include severity of hearing loss, functional independence, psychosocial stress, psychosocial resources, and children's use of problem-focused coping strategies. Fifty families participated in the study. Children were between the ages of 5 and 12, and had unaided hearing losses in the moderate to profound range.

Overall externalizing behavior problems (the average of parent and teacher reports) were associated with lower functional independence, higher psychosocial stress, and decreased use of problem-focused coping strategies. Stress mediated the relationship between functional independence and children's overall externalizing and internalizing behavior problems; lower functional independence was related to higher stress, which, in turn, was related to increased behavior problems.

Factors that predicted teacher-reported externalizing behavior problems differed somewhat from those that predicted parent-reported externalizing behavior problems. Lower functional independence and decreased coping skill

were related to increased teacher-reported externalizing behavior problems, whereas higher psychosocial stress and decreased coping were related to parent-reported externalizing behavior. Psychosocial stress contributed additional variance to children's behavior problems, above and beyond individual variables (disability severity and functional independence). Coping skill then accounted for additional unique variance in children's behavior problems, above and beyond stress. Coping also attenuated the relationship between stress and overall internalizing behavior, teacher-reported internalizing behavior, and teacher-reported externalizing behavior.

Psychosocial resources and coping skill were positively related to parent-reported appropriate behavior. Psychosocial resources accounted for variance in children's appropriate behavior, above and beyond individual variables; coping ability contributed additional variance above and beyond resources. In addition, better sign language or speech skill was positively related to appropriate behavior.

Results suggest that intervention and prevention efforts for children with hearing impairment should focus on increasing their functional independence, problem-focused coping abilities, and psychosocial resources, while also decreasing psychosocial stress. Attention should be devoted to multiple predictors in order to have a clinically significant impact on the children's functioning.

CHAPTER I

INTRODUCTION AND REVIEW OF RELATED LITERATURE

Ten to 20% of children in the United States are chronically ill or disabled (Boyle, Decoufle, & Yeargin-Allsopp, 1994; Hobbs & Perrin, 1985; Pless & Roghmann, 1971). Care providers often are faced with parents' questions about the medical and psychological prognosis of their child with chronic illness. Both parents and physicians frequently turn to pediatric psychologists for predictions of psychological adjustment of children with chronic disorders. Gaining a better understanding of the relationships between different variables (e.g., family relationships, severity of a child's disability) and a child's adjustment should improve pediatric psychologists' abilities to predict adjustment in those children. In addition, psychologists must also determine the most effective ways to intervene therapeutically with families who have a child with chronic illness who has adjustment difficulties. Knowledge of the relationship between a child's adjustment and individual and family variables may improve therapeutic intervention by guiding the treatment focus. This in turn should lead to more focused, successful interventions to facilitate adjustment in a child with a disability.

The purpose of this project was to identify predictors of adjustment in

children with hearing impairment (HI). In addition, psychosocial stress was assessed to determine whether it mediates the relationship between children's functional independence and their adjustment. Coping strategies and social-ecological resources (e.g., family cohesion) were assessed to determine if they moderate the relationship between psychosocial stress and the adjustment of children with HI. Although only children with HI participated in this study, the literature pertaining to children with a wide variety of chronic disorders was reviewed, due to the limited research available on the adjustment of children with deafness.

This approach to the literature review is consistent with a "noncategorical approach" (Pless & Pinkerton, 1975; Stein & Jessop, 1982), which suggests that one's diagnosis does not directly affect adjustment, but that instead the dimensions of one's illness (e.g., severity) mediate adjustment. Advocates of the noncategorical approach emphasize the similarities across disorders and support efforts to study children with various chronic disorders as a group. Such studies highlight factors that may or may not impact the adjustment of children with HI in particular. Therefore, while the literature review will reflect a noncategorical perspective, the design of the present project utilized a diagnosis-specific model, due to evidence that deafness may differ from other disorders in its impact on families and on children's adjustment.

In a review of the literature on the adjustment to physical disorders, Lavigne and Faier-Routman (1992) note a trend suggesting that children with

sensory disorders (i.e., deafness, blindness) show the greatest risk for adjustment problems when compared to children with other diseases. Stein and Jessop (1982) report that deafness is perceived by professionals as one of the most burdensome conditions for families to manage. Hearing impairment is a unique disability, because in addition to the added stress that disability generally places on a family, hearing impairment often poses a significant communication challenge for families (Cohen, 1980), a profound impact that is relevant to few other disabilities. These research findings, in conjunction with the author's professional experience with the impact hearing impairment may have on communication between a child with HI and normally-hearing family members, led to the selection of hearing impairment as the disability for study in this project.

The work of Lavigne and Faier-Routman (1992) and Cohen (1980) supports studying children with HI as a separate group, rather than in combination with children who have other chronic conditions. Nevertheless, some predictors of adjustment of children with other disabilities and chronic illnesses may be relevant to children with HI, and therefore remain worthy of review and consideration.

Adjustment of Children with Disability or Chronic Illness

There is a great deal of variability in the adjustment of youngsters with disabilities or chronic illness. Many researchers report that these children are

at an increased risk for adjustment problems compared to healthy children (Breslau, 1985; Freeman, Malkin, & Hastings, 1975; Harvey & Greenway, 1984; Henggeler, Watson, & Whelan, 1990; Levy-Shiff & Hoffman, 1985; Meadow & Schlesinger, 1971; Pless & Roghmann, 1971; Rutter, Tizard, & Whitmore, 1970). This risk is reported in studies exploring adjustment in children with a variety of disabilities and chronic illnesses, such as hearing impairment, cerebral palsy, spina bifida, chronic obesity, and asthma.

Disability and chronic illness are associated with more internalizing and externalizing problems (Drotar, et al., 1981; Meadow & Schlesinger, 1971; Thompson & Gustafson, 1996; Wallander, Varni, Babani, Banis, & Wilcox, 1988), as well as difficulties in social competence (Wallander, et al., 1988). The Isle of Wight study, an epidemiological investigation in which the entire population living on the Isle of Wight participated, revealed that the rate of psychiatric disturbance was higher in children with physical disorders than in nondisabled children. Groups of children with a variety of chronic disorders (that do not involve the brain), such as asthma, diabetes, and congenital heart defects, had prevalence rates of psychiatric problems that were up to two times higher than that found in healthy children (Rutter, et al., 1970). Similarly, in a study of children with cystic fibrosis and other respiratory conditions (e.g., asthma, pulmonary disease), parent and teacher ratings of children's behavior also revealed significantly more behavior problems in medically involved children than in a healthy comparison group (Drotar et al., 1981).

An increased incidence in adjustment problems also was reported in children with chronic conditions (e.g., juvenile diabetes, spina bifida, hemophilia) compared to a normative sample (Wallander, et al., 1988). Maternal completion of the Achenbach Child Behavior Checklist (Achenbach & Edelbrock, 1983) revealed significant differences in the externalizing behavior problems, internalizing symptoms, and problems in social competence of children with chronic illness when compared to the standardization sample.

Researchers also have reported deflated self-concept in children with physical disorders, irrespective of their school environment (Harvey & Greenway, 1984). Participants included children with congenital physical disabilities (e.g., cerebral palsy, spina bifida, limb deficiency) who attended a special school for children with congenital physical disabilities, children with congenital physical disabilities who attended a regular school, and a nondisabled comparison group. Participants' completion of the Piers-Harris Self-Concept Scale for Children (Piers, 1984) revealed that children who are physically challenged have poorer self-concepts than their nondisabled peers. School placement appeared to have no effect on children's self-concepts.

Several studies investigating the adjustment of children with deafness reveal that these children exhibit more behavior problems than normally-hearing children (Henggeler, Watson, & Whelan, 1990; Hindley, Hill, McGuigan, & Kitson, 1994; Meadow & Schlesinger, 1971; Mitchell & Quittner, 1996), with the prevalence of maladjustment reaching 30% in Meadow & Schlesinger's

study (1971), compared to only 10% in normally-hearing children. However, all but the study completed by Henggeler and colleagues investigated the adjustment of children attending residential schools. Thus, the generalizability of findings to children in other educational settings (e.g., mainstreamed) remains questionable.

Henggeler, Watson, and Whelan (1990) studied the peer relationships of adolescents with HI who were enrolled in a special education program. Children's parents completed the Revised Behavior Problem Checklist (Quay & Peterson, 1987), the Social Competence Scale of the Achenbach Child Behavior Checklist (Achenbach & Edelbrock, 1983), and the Missouri Peer Relations Inventory (MPRI; Borduin, Blaske, Treloar, Mann, & Hazelrigg, 1989). Those adolescents with HI who had advanced language skills (n=29) completed the MPRI with the aid of a research assistant. Results indicated that compared to normally-hearing controls, the peer relations of adolescents with HI may be at risk for significant problems. Parents of adolescents with HI rated their children's peer relations as higher in aggression than parents of hearing controls. However, the adolescents with HI rated their relationships as less aggressive than did the hearing adolescents. The discrepancy between reports of adolescents with HI and that of their hearing parents may reflect a cultural difference, as behavior which is considered aggressive by hearing persons (e.g., firmly tapping someone's arm for attention) may be considered typical and acceptable behavior by people who are deaf (i.e., syntonic with Deaf culture).

This issue could not be addressed in Henggeler, Watson, and Whelan's study because all of the participants' parents possessed normal hearing.

In contrast to the above research, several authors have reported no difference in the adjustment risk of children with chronic illness or disability compared to healthy children (Arnold & Atkins, 1991; Cates, 1991; Graetz & Shute, 1995; MacLean, 1983; MacLean & Becker, 1979; Nassau & Drotar, 1995; Raymond & Matson, 1989). Children with diabetes or asthma have been reported to display social competence that is comparable to that of healthy controls matched on socioeconomic status, gender, age, and race (Nassau & Drotar, 1995). This study involved multiple informants, including teachers, parents, and children. Similarly, Graetz and Shute (1995) conducted a study involving sociometric ratings of children with asthma and healthy controls, revealing comparable peer relationships between the two groups.

Although two studies report that children with HI appear well adjusted (Cates, 1991; MacLean & Becker, 1979), methodological concerns necessitate caution when considering the studies' results. MacLean and Becker (1979) studied the psychosocial adjustment of 20 adolescents with severe or profound HI and who attended an oral school for students with HI. Students were rated by a psychologist and their school teachers in a variety of areas, with scores collapsed into the following domains of adjustment: total, personal, educational, and social. The psychologist and teachers first rated students independently and then worked collaboratively to assign one score for each

aspect of a child's functioning. A child psychiatrist then interviewed all but three families, and rated the families' psychosocial adjustment. "Developmental adjustment" of families was defined by family size, socioeconomic status, and language used at home. Results indicated that all of the participants displayed average or above average adjustment. Families reportedly were well adjusted in all areas except developmental and social adjustment.

MacLean and Becker suggested that the families' poor social adjustment was due to isolation experienced secondary to their reportedly recent immigration to the country in which the study was conducted (Canada). However, the authors did not consider that families of children with HI often feel isolated from family and friends regardless of immigrant status (Adams, 1988; Dyson, 1989). Moreover, also of concern are the subjective ratings employed in this study. It is likely that the psychologist and teachers who were responsible for rating the adjustment of families and children were invested highly in the success of their hearing-impaired program. The design of the study could have been improved by including ratings completed by individuals who were less likely to be biased. Furthermore, as Quarrington (1980) pointed out, it appears that no attempt was undertaken to determine inter-rater agreement prior to discussion among raters to obtain consensus scores.

While a study conducted by Cates (1991) that investigated the self-esteem of children with deafness used a design superior to that employed by MacLean and Becker (1979), there is some evidence that the results of studies

using self-report measures of self-esteem with people who are deaf vary with the measure used (Bat-Chava, 1993). Thus, the results of Cates's study must be viewed with caution. Cates (1991) studied 68 children with deafness attending a residential school for the deaf and 68 hearing controls. Participants completed the Piers-Harris Self-Concept Scale for Children (Piers, 1984) and teachers completed the Behavioral Academic Self-Esteem Questionnaire (Coopersmith & Gilberts, 1982). Results indicated no significant difference between the groups on overall measures of self-esteem. However, as noted above, in a meta-analytic review of the literature on self-esteem of people with deafness, Bat-Chava (1993) reported that study results vary with the self-esteem measure utilized. For example, studies using the Tennessee Self-Concept Scale (Fitts, 1964) reveal lower self-esteem in people with HI than in hearing people, whereas studies using the Piers-Harris Self-Concept Scale for Children (Piers, 1984) report either no relationship between hearing status and self-esteem or that people who are deaf have higher self-esteem than hearing people. Although Cates's study was not included in the meta-analytic review, presumably because insufficient information was provided to calculate an effect size, Bat-Chava's conclusions are consistent with the results of his study (which used the Piers-Harris).

In a meta-analytic review of studies assessing the self-esteem of people who are deaf, Bat-Chava (1993) also found that study results vary with the mode (e.g., written language, sign language) in which test instructions are provided to

participants who are deaf. Studies in which test instructions were provided in writing only or that provided some sign language interpretation in conjunction with written instructions resulted in lower self-esteem scores for participants who were deaf compared to hearing participants. In contrast, those studies in which the self-esteem measure was administered in sign language or that administered the measure using the modality most comfortable for the participant yielded no significant differences in self-esteem between participants with normal hearing and deafness. Bat-Chava (1993) also reported a test format (e.g., unmodified vs. modified written English for people who are deaf) effect. For example, those studies that used modified written English (i.e., simplified language, such as avoiding double negatives) reported no differences in the self-esteem of participants with normal hearing or deafness. Those studies using unmodified English suggested that the self-esteem of people with deafness is lower than that of people with normal hearing. Bat-Chava's findings again underscore the importance of considering what measures were used in a study and the procedural details of the study when attempting to interpret the study's results.

As this review demonstrates, there are contradictory findings in the literature exploring the adjustment of children with disability or chronic illness. In an effort to obtain a clearer understanding of this literature, Lavigne and Faier-Routman (1992) conducted a meta-analytic review of 87 studies. Their findings indicate that, indeed, children with physical disorders exhibit higher levels of adjustment difficulties than healthy controls. The authors report that

children with physical disorders are more likely to demonstrate internalizing rather than externalizing symptoms, but that they are at risk for developing both.

Furthermore, there is evidence suggesting that the adjustment of children with chronic illness is stable, which underscores the importance of gaining a better understanding of the factors that contribute to adjustment. Thompson, Gustafson, George, and Spock (1994) studied the stability of mother and child-reported adjustment in 41 children with cystic fibrosis. Participants completed measures of child adjustment two times, one year apart. Results indicated no significant change over time in overall group rates of adjustment problems reported by the children and their mothers. Although changes were noted in adjustment classifications, diagnoses, and specific behavior problems in individual children, 73% of the subjects (30 children) demonstrated stable adjustment (either "good" or "poor" adjustment) between time 1 and time 2. Of the 30 children exhibiting stable adjustment, 20 were characterized as poorly adjusted.

Why So Many Contradictory Findings?

The literature on the adjustment of children with disability is riddled with contradictory findings. While some of the variability appears due to legitimate (true) variance, the limitations of this literature must be considered also when attempting to reconcile the discrepant results.

When reviewing and integrating the findings in the literature on the adjustment of children with disability, comparisons are made among studies that have operationalized adjustment differently. Researchers study children's self-concept, externalizing behavior problems, internalizing behavior problems, and/or social competence as indices of adjustment. The outcome variable investigated in a study may represent only one dimension of adjustment; therefore, the results should not be compared directly with another study that assessed a different facet of adjustment.

Many researchers gather information regarding children's adjustment from only one source. This technique precludes the assessment of children's behavior across settings and prevents the evaluation of the validity of the information provided by the informant. Furthermore, those studies that rely only on parents to report children's behavior run the risk of measuring adjustment based only on reports that are exaggerated due to the parents' own stress. Parents' reports may vary with their emotional state. For example, parents who are depressed often have a lower threshold for tolerating their children's behavior (Brody & Forehand, 1986). Parents' reports also may have poor validity, as they may not have a good sense of "average" child behavior. Relevant to the present study, parents may rate the behavior of their child with HI in comparison to their hearing children or hearing children in the community. This may result in reporting more behavior problems than if the parents were more familiar with typical behavior of children who are deaf (Mitchell & Quittner,

1996). Study designs may be improved by including multiple informants, such as parents, teachers, and peers, to obtain reports of children's adjustment.

Small sample size is another limitation of the literature on the adjustment of children with disability. While generally this is due to the relatively low incidence of disabilities being studied, it remains important to consider that lack of power may contribute to findings indicating no differences between groups studied.

Variation in sample compositions also appears responsible for contradictory findings across studies. Some samples are homogeneous, for example representing only families of low socio-economic status or children in specialized settings (e.g., residential schools), whereas other samples are more heterogeneous. Homogeneous samples limit the generalizability of study findings. Disability characteristics vary across samples as well, with some researchers adopting a disease-specific model and others employing a noncategorical approach (Stein & Jessop, 1982), in which data from children with a variety of diseases are combined for statistical analyses. It is unclear whether the difference in disabilities studied may be at least partially responsible for contradictory findings in the literature.

Finally, another limitation in the literature on the adjustment of children with disability is the use (or lack thereof) of comparison groups. While some researchers carefully recruit control groups and match participants on relevant variables (e.g., gender, socioeconomic status), others employ no matching

strategies. This may lead to disparate findings, such that those who match controls to target children are less likely to find spurious results that are due to a third variable. Other researchers do not include a control group, but instead compare the data they collect to measure norms, a technique that tends to exaggerate pathology in clinical samples (Lavigne & Faier-Routman, 1992). Moreover, it is also worthwhile to consider that even those differences between groups that are found to be statistically significant may not be clinically significant in the populations studied. That is, despite the fact that the difference between groups may be statistically significant, the average score of the children with disability may remain within normal limits.

In summary, methodological limitations must be considered when attempting to draw conclusions and understand the discrepant results across studies in the literature on the adjustment of children with disability. Improvements in this literature would include multidimensional assessment of adjustment, use of multiple informants, larger sample sizes, and inclusion of control groups matched to target children when making comparisons with healthy children.

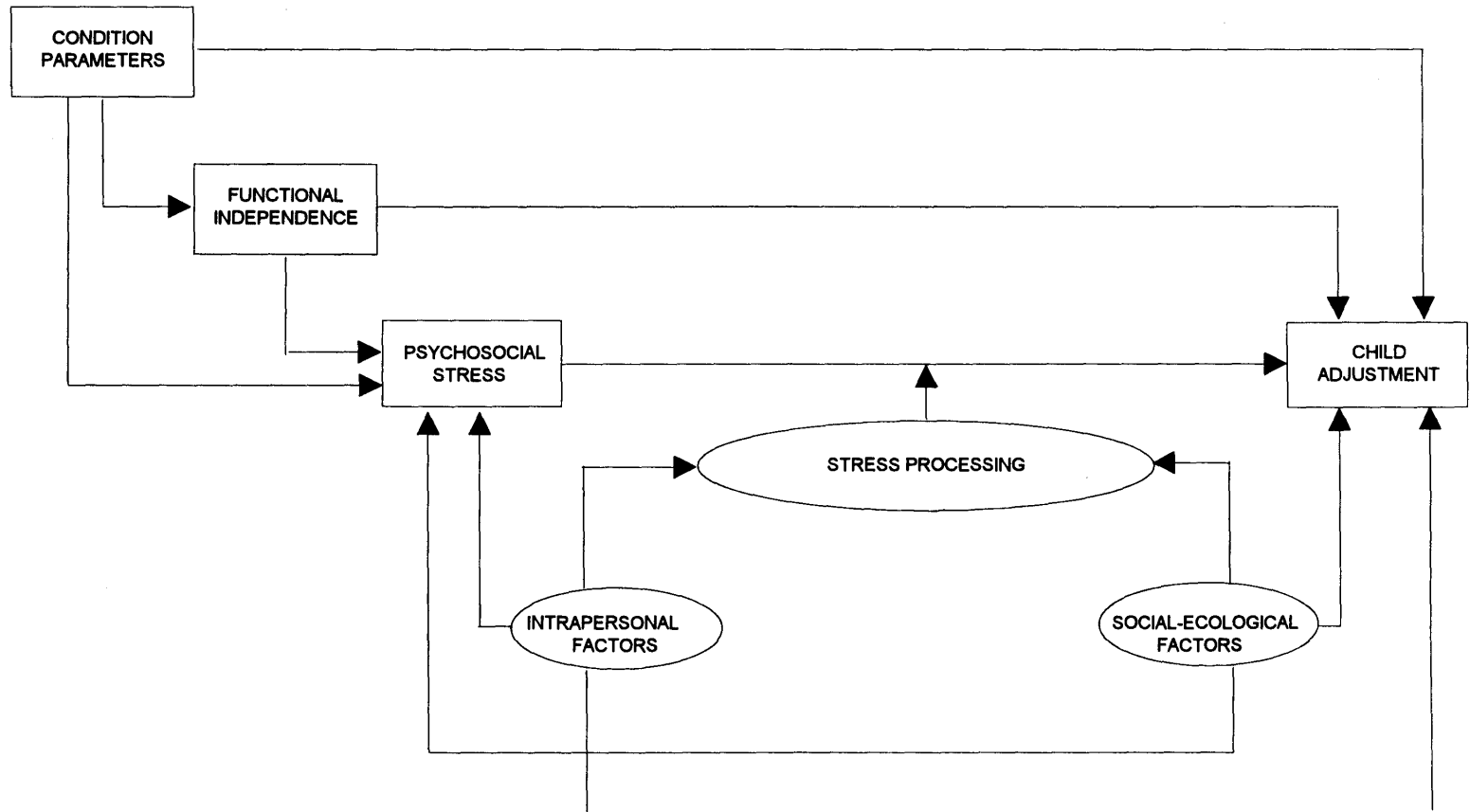
In the present study, several of these limitations were addressed. In an effort to study adjustment multidimensionally, three aspects of children's adjustment were studied, including internalizing symptoms, externalizing symptoms, and appropriate social behaviors. Both parent and teacher reports were used to assess adjustment, so that children's behaviors could be

assessed across settings (i.e., school, home, community) and to minimize the effects of rater bias. Participants were recruited from a range of settings (e.g., religious, educational, community) in an effort to increase generalizability of the study. Finally, to increase the likelihood of obtaining a large sample that would provide adequate power for the study, participants were recruited from two metropolitan areas.

Model for Adaptation in Children with Chronic Conditions

Due to the variability of adjustment in children with chronic illness or disability, Wallander, Varni, and colleagues developed a model that identifies factors associated with adjustment (Wallander, Varni, Babani, Banis, & Wilcox, 1989; Wallander & Thompson, 1995). These researchers developed this model in an effort to assist explanation and prediction of differential adjustment among individuals with disability (Figure 1). Their model includes risk and resistance factors that interact with the direct effects of a disability either to facilitate or impede an individual's adjustment. Among the risk factors they include are disease or disability parameters, functional independence of the child, and psychosocial stressors. "Disease or disability parameters" includes dimensions such as disability severity, its noticeability, and extent of brain involvement. "Psychosocial stressors" refers to circumstances such as major life events and daily nuisances. Resistance factors proposed in this model to moderate the effects of risk variables are intrapersonal factors (e.g., temperament), social-

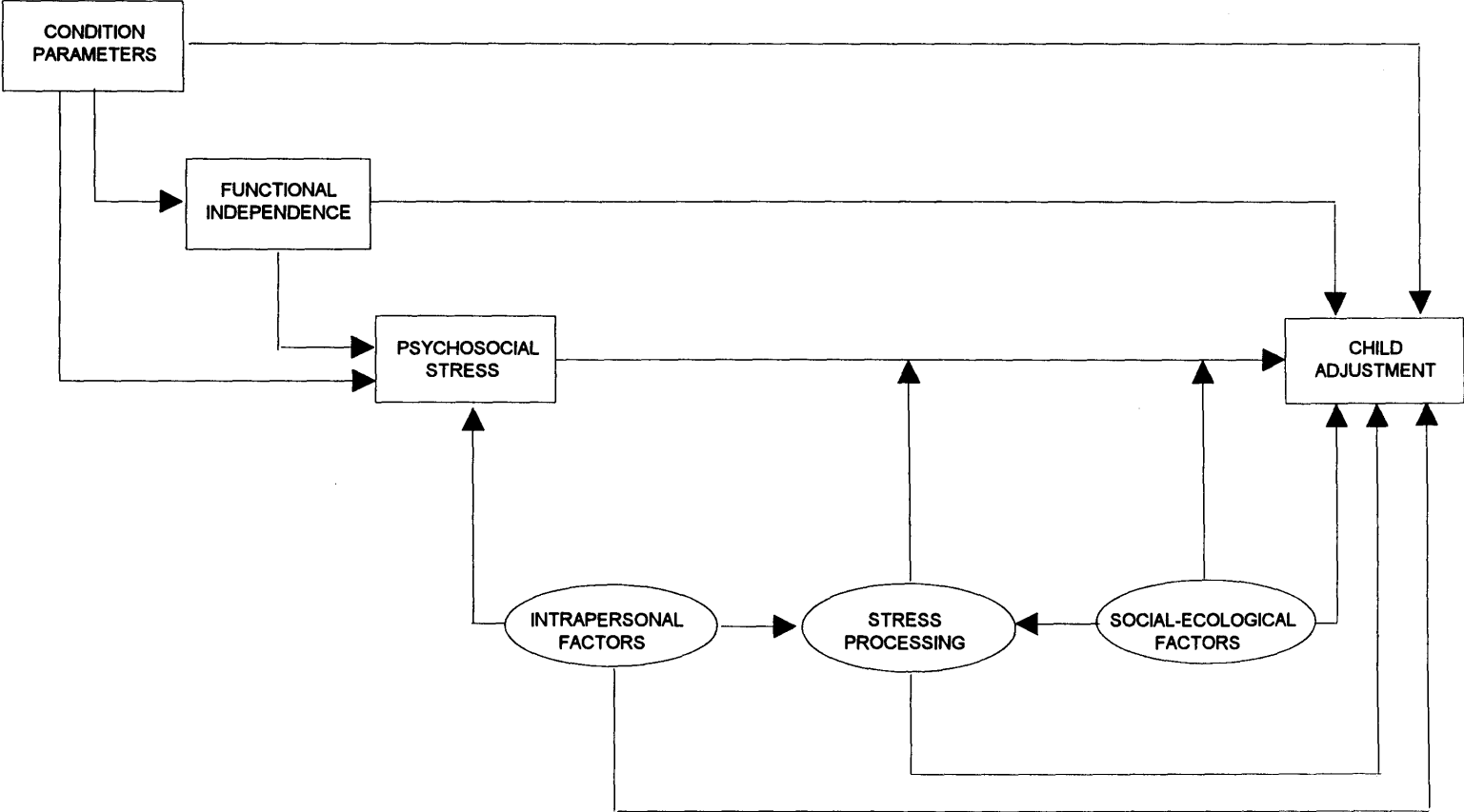
Figure 1. Wallander and Varni model: Predicting adjustment of children with disability.



ecological factors (e.g., social support, family environment), and stress processing or coping strategies used by an individual. These stressors and resources are also demonstrated to predict adjustment in nondisabled children (e.g., Abidin, Jenkins, & McGaughey, 1992; Bloom, 1996; Daniels, Moos, Billings, & Miller, 1987; Dubow, Edwards, & Ippolito, 1997; Hetherington & Blechman, 1996).

For the present study, Wallander and Varni's model was adapted to represent the author's hypotheses regarding the mediating and moderating relationships between the aforementioned variables and adjustment of children with HI. First, while Wallander and Varni consider "family environment" in general to be a resistance factor (specifically, a social-ecological factor), this author purports that family conflict may be a risk to a child's adjustment, and therefore should fall within "psychosocial stress," a risk factor. Thus, whereas Wallander and colleagues consider only life events and daily hassles as "psychosocial stressors," family conflict was also included in this variable for the present project. Adaptation of the model also included removing the direct relationship between social-ecological factors and psychosocial stress. Another adaptation of Wallander and Varni's model included adding the moderating effect of the social-ecological factor to the relationship between psychosocial stress and children's adjustment, and the direct relationship between stress processing and adjustment (Figure 2). The relationship between intrapersonal factors and children's adjustment was not adapted,

Figure 2. Modification of Wallander and Varni model.



remaining mediated by stress processing. As Holmbeck (1997) discusses, Wallander and Varni's diagram of their model does not parallel their written descriptions. Whereas Wallander and Varni describe resistance factors as moderators of adjustment in their text (Wallander & Varni, 1992), their visual model represents stress processing as a mediator of the other resistance factors. Thus, the present adaptation of their model seems to be more consistent with their written descriptions (e.g., Wallander & Varni, 1992).

Wallander and Varni have conducted several studies to investigate the relationship between the risk and resistance factors identified in their model and the adjustment of children with disability or chronic illness. They have adopted a noncategorical approach, proposing that their model should be relevant for all youngsters with disability or chronic illness, regardless of their diagnosis. As noted above, this approach has been advocated by several researchers who purport that one's diagnosis does not directly affect adjustment, but instead that the dimensions of one's illness (e.g., severity, age of onset), which are universal across disorders, mediate adjustment (Pless & Pinkerton, 1975; Stein & Jessop, 1982). Thus, Wallander and Varni have applied their conceptual model to study the adjustment of children with a wide range of diagnoses. Their studies, as well as those conducted by other researchers investigating the relationships between the adjustment of children with disability and risk and resistance variables, are reviewed below.

Disability Parameters and Adjustment

Wallander and Varni report that they have found no relationship between disability parameters and a child's behavioral adjustment (Varni, Rubinfeld, Talbot, & Setoguchi, 1989a, 1989b, 1989c; Wallander, et al., 1988; Wallander, Feldman, & Varni, 1989; Wallander, Varni, Babani, Banis, & Wilcox, 1989). These researchers have investigated the behavioral adjustment of children with spina bifida, cerebral palsy, limb loss, juvenile rheumatoid arthritis, juvenile diabetes, and hemophilia. Across studies, Wallander, Varni, and colleagues have found that dimensions of children's disabilities (e.g., type, severity, number of surgeries) are not related to children's externalizing or internalizing behaviors, as reported by their parents on the Achenbach Child Behavior Checklist (Wallander, et al., 1988; Wallander, Feldman, & Varni, 1989; Wallander, et al., 1989). In addition, Varni, Rubinfeld, Talbot, and Setoguchi (1989c) report no relationship between a child's disability severity and self-reported depressive symptomatology.

Other researchers also report no relationship between children's disability severity and their behavioral adjustment. Rodda (1984) discusses a study in which he and colleagues found similar prevalence rates of behavior problems in children with profound deafness and in those whom they termed "partially hearing". Musselman, Lindsay, and Wilson (1988) similarly reported no relationship between severity of hearing loss and social development in children between the ages of 3 and 5. In a study of psychological functioning of

children with cystic fibrosis, cerebral palsy, myelodysplasia, and multiple physical handicaps, Breslau (1985) also reported no relationship between disability severity and outcome on the Psychiatric Screening Inventory (Langner, Gersten, McCarthy, & Eisenberg, 1976), a parent-report measure of several behaviors considered predictive of psychiatric disorder.

Stein and Jessop (1984) also found no significant relationship between disability parameters and children's adjustment. They studied the psychological adjustment of children with chronic illness. Chronic illness was defined in their study as having a condition that persisted for more than three months or that required more than one month of hospitalization. Findings suggested no significant relationship between the number of days children were hospitalized or days they spent in bed and their adjustment, which was assessed with the Personal Adjustment and Role Skills Scale (PARS) II (Ellsworth & Ellsworth, 1982).

It is noteworthy that Wallander and Varni (1992) emphasize that although disability parameters have not predicted children's behavioral adjustment in their research, they have found a relationship between disability parameters and children's social adjustment (Wallander, Varni, Babani, Banis, et al., 1989). However, they assessed social adjustment with the social competence scale of the Achenbach Child Behavior Checklist (Achenbach & Edelbrock, 1983), a scale which has been criticized for its narrow focus (Drotar, Stein, & Perrin, 1995). Drotar and colleagues note that the Achenbach Social

Competence scale assesses only activities, school performance, and overall social competence (e.g., number of close friends). Specific social skills (e.g., initiating conversation) are not assessed. Furthermore, children with disability or chronic illness may have limited opportunity to become involved in extracurricular activities due to family SES or time dedicated to various therapies (e.g., physical therapy, speech therapy) or doctor visits. In addition, the school performance of children with chronic illness may be negatively affected by increased school absence associated with the children's illnesses (e.g., children hospitalized for asthma).

In contrast to those researchers reporting no relationship between disability severity and adjustment, others have found that the more severe a child's disorder, the greater his/her adjustment difficulties (e.g., Billings, Moos, Miller, & Gottlieb, 1987; Levy-Schiff & Hoffman, 1985; MacLean, Perrin, Gortmaker & Pierre, 1992). In a study of 93 children with arthritis or rheumatic disease and matched healthy controls, target children were divided into two categories based on their disease status: "severe/active" or "mild/inactive". The Health and Daily Living Form (Moos, Cronkite, Billings, & Finney, 1984) was completed by parents and children (10-years-old and older) to assess the children's adjustment. Results revealed that children in the "severe/active" disease group demonstrated significantly more psychological problems (i.e., anxiety, depression) than children in the "mild/inactive" group. There was no difference between groups in reported behavior problems. Children in the

"mild/inactive" group did not differ in adjustment from the control group.

Levy-Shiff and Hoffman (1985) report similar results in a study of the social competence of preschoolers with HI. Children were classified as profoundly hearing impaired (90 decibel loss or greater) or severely hearing impaired (70-90 decibel loss). A normally-hearing control group also participated in the study. Children's social behaviors were observed for four 15-minute periods, with a behavior checklist used to tally children's behaviors in 15-second time blocks. Findings suggested that the children with profound HI were less socially competent than children with severe HI, as they spent less time in contact with others. In turn, children with severe HI were less socially competent than the normally-hearing control group. Thus, a negative linear relationship emerged between hearing loss level and social competence.

Yet other researchers have found that children with a mild disorder display more adjustment problems than children with moderate or severe disorders (e.g., McAnarney, Pless, Satterwhite, & Friedman, 1974). Pless and Pinkerton (1975) discuss the concept of marginality to explain such research findings, claiming that children with a less disabling disorder, who experience marginal effects of the disorder, seem to face the greatest challenge. These individuals are not disabled severely enough to be removed from the mainstream, yet they are unable to compete on the same level as nondisabled people. Thus, people with mild disability often suffer emotionally from their inevitable failures. Pless and Pinkerton (1975) also note that people with mild

disabilities are from two cultures, that of people with disability and that of nondisabled people; however, they do not quite fit in with either culture and therefore may feel isolated.

In sum, there are three main groups of thought regarding the relationship between disability severity and adjustment. Some researchers purport that there is no relationship between disability severity and a child's behavioral adjustment; other researchers have found a positive relationship between disability severity and maladjustment; and a third group of researchers report findings supporting the concept of marginality, with children with mild chronic disorders demonstrating the greatest adjustment difficulties. Regarding deafness, one study suggests no relationship between incidence of behavior problems and level of hearing impairment, whereas another study reveals a significant negative relationship between hearing loss and social competence. The relationship between hearing loss and adjustment was explored further in the present study.

It appears that some of the discrepancies in results regarding the relationship between disability severity and adjustment may be accounted for by methodological differences. That is, those studies reporting a significant relationship between disability severity and children's adjustment tend to have larger samples (e.g., Billings, et al., 1987) than those finding no significant relationship between these variables (e.g., Varni, et al., 1989c). This suggests that insufficient power may have led to findings indicating no significant

relationships between the variables. In addition, differences in adjustment measures may be responsible for contradictory findings, as many of the studies finding no significant relationship between disability severity and adjustment used the Achenbach Child Behavior Checklist (Varni, et al., 1989b; Wallander, et al., 1989; Wallander, Feldman, & Varni, 1989), whereas many of those reporting a significant relationship used other measures, such as the Psychiatric Screening Inventory or the Health and Daily Living Form (Billings, et al., 1987; Breslau, 1985; Levy-Shiff & Hoffman, 1985; Timko, Stovel, Moos, & Miller, 1992).

Functional Independence and Adjustment

Functional independence has also been studied as a predictor of adjustment in children with disability and chronic illness. Historically, Wallander and Varni have operationalized functional independence as adaptive behavior (e.g., personal care) or characteristics reflective of the degree of a child's independence, such as ambulatory status and bladder control among children with spina bifida. They distinguish this construct from disability parameters, which would include severity of a child's illness (e.g., mild vs. severe asthma) and extent of brain involvement. The authors have found no relationship between functional independence and behavioral adjustment in their research (Wallander & Varni, 1992; Wallander, et al., 1989). In a study of 61 children with spina bifida, ambulatory status and bladder functioning were unrelated to

children's behavioral adjustment (Wallander, Feldman, & Varni, 1989).

Similarly, Wallander and Varni (1992) assessed the adaptive behavior of children with physical or sensory disabilities and found no relationship between the children's adaptive behavior and their behavioral adjustment. However, a significant relationship was found between the children's adaptive functioning and their social adjustment, although again their social adjustment was measured with the Child Behavior Checklist (Achenbach & Edelbrock, 1983), a measure that is limited in its assessment of social adjustment (Drotar, et al., 1995).

Wallander and colleagues (1989) obtained teacher reports of children's adaptive behavior (Adaptive Behavior Scale - School Edition; Lambert, Windmiller, Tharinger, & Cole, 1981) and studied their correlation with parent reports of the children's behavioral and social adjustment (Child Behavior Checklist; Achenbach & Edelbrock, 1983). Results supported Wallander and Varni's other findings, suggesting that adaptive behavior is not associated with behavioral adjustment, but does relate significantly to social adjustment.

In contrast, Stein and Jessop (1984) found a significant relationship between psychological adjustment and functional ability. Eighty-one children with chronic conditions participated in the study. Psychological adjustment was measured with parent report on the Personal Adjustment and Role Skills Scale (PARS II; Ellsworth & Ellsworth, 1982), and adaptive behavior was assessed with the Functional Status Measure, a measure developed for the study.

Multiple aspects of functioning across settings (i.e., home, school, an neighborhood) were assessed with the Functional Status Measure, such as communication, mobility, and toileting patterns.

The discrepant findings reported by Wallander and Varni (Wallander, et al., 1989; Wallander, Feldman, & Varni, 1989; Wallander & Varni, 1992) and Stein and Jessop (1984) may reflect their use of different adjustment measures (i.e., Child Behavior Checklist vs. PARS II). Examination of the subscales of each measure reveals the difference in the dimensions assessed by each questionnaire. That is, the PARS II is divided into the following factors: dependency, hostility, withdrawal, anxiety-depression, productivity, and peer relations (Stein & Jessop, 1984). Factor analysis of the Child Behavior Checklist items results in the following subscales: anxious, depressed, uncommunicative, obsessive-compulsive, somatic complaints, social withdrawal, hyperactivity, aggressive, and delinquent behavior (Achenbach, 1991a). It is not surprising that a measure of adaptive functioning would correlate with a measure of adjustment that includes subscales referred to as "dependency" and "productivity," since adaptive functioning refers to how well an individual completes tasks independently. This highlights that the operationalization of "adjustment" in studies is of central importance when attempting to understand the literature on the adjustment of children with chronic conditions.

As apparent in this review, researchers assess functional independence

by exploring domains of functioning that are typically affected by the child's disorder, such as ambulatory status and bladder control in children with spina bifida. For the present study, functional independence was defined by the child's communicative competence, since communication is the chief functional domain affected by hearing loss. Children's adaptive daily living skills were also assessed, as hearing impairment may delay children's acquisition of some adaptive skills due to communication difficulty (e.g., ordering own meal in a restaurant).

Psychosocial Stress and Adjustment

To date, Wallander and Varni's research has supported previous findings regarding the relationship between life stress and adjustment, indicating that there is a negative association between these variables (Greenberg, Siegel, & Leitch, 1983; Murch & Cohen, 1989; Varni, et al., 1989a; Varni, et al., 1989c).

Varni and colleagues (1989a) assessed the self-esteem of 41 children with congenital or acquired limb deficiencies. The authors utilized the Children's Hassles Scale (Kanner, Harrison, & Wertlieb, 1985), a self-report measure that assesses not only if a stressor has occurred, but the meaning of that stressor for the child as well. Thus, it is consistent with a cognitive appraisal theory of stress and coping (Folkman, 1984). Response choices on the Children's Hassles Scale (Kanner, et al., 1985) include: the event did not occur, the event occurred but did not bother the child, the event occurred and

bothered the child "sort of bad," and the event occurred and bothered the child "very bad". Self-esteem was measured with the Self-Perception Profile for Children (Harter, 1985). Results demonstrated that increased stressors were related to decreased self-esteem.

Murch and Cohen (1989) studied the psychological adjustment of 90 adolescents with spina bifida. As part of their investigation, they assessed the relationship between recent life stress and adjustment. Adjustment was measured multidimensionally with the Trait Anxiety Inventory for Children (Spielberger, 1973), the Child Depression Inventory (Kovacs, 1980/1981), and the Coopersmith Self-Esteem Inventory (Coopersmith, 1982). The Adolescent Life Experiences Survey, a self-report questionnaire that was adapted from the Junior High Life Experiences Survey (Swearingen & Cohen, 1985), provided an assessment of the participants' life stress. Results revealed that negative life events were associated with increased depression, increased anxiety, and decreased self-esteem. However, neither positive nor neutral life events were associated to psychological outcome.

Yet another study demonstrated that life stress is associated not only with the adjustment of a child with a disability, but also with that of a healthy sibling (Daniels, Moos, Billings, & Miller, 1987). Participants in the study included 93 children with juvenile rheumatic disease (e.g., systemic arthritis, polyarticular arthritis), 72 healthy siblings, and 93 controls. Family stressors investigated were negative life events, sibling adjustment, and burden of illness

on the family. Results indicated that family stressors are related significantly to the adjustment of children with chronic illness and their siblings. It is also noteworthy that risk and resistance factors were similar across all three groups, although correlations between these factors and outcome were weaker for control children. Risk factors studied were parental functioning (e.g., depression, physical symptoms) and family stressors. Resistance factors explored included family resources (i.e., family cohesion, family conflict, family expressiveness).

Thus, overall, research suggests a significant relationship between stress and adjustment. Negative life events seem to be associated with overall maladjustment, including depression, anxiety, and low self-esteem. The relationship between family life events and adjustment in children with HI was investigated in the present project.

Intrapersonal Factors and Adjustment

Wallander and Varni have devoted little attention to the study of intrapersonal factors, as their interest lies mostly in identifying variables related to children's adjustment that are modifiable through prevention or intervention (Wallander & Varni, 1992). They have, however, completed two studies investigating the relationship between temperament and adjustment in children with chronic disorders. A major problem in studying this issue is to define and measure "temperament" and "adjustment" as distinct constructs. For example,

items on some scales that purport to assess "temperament" are much the same as items on "behavior problems" scales.

Wallander, Hubert, and Varni (1988) studied the adjustment of children with spina bifida or cerebral palsy. These researchers assessed the temperaments of mothers and their children, using the Dimensions of Temperament Survey (Lerner, Palermo, Spiro, & Nesselroade, 1982). Mothers completed parallel forms of the measure, once regarding their own temperament, and once regarding their children's temperament. The Dimensions of Temperament Survey is a measure consisting of 34 true/false items regarding an individual's typical behavior. The measure yields five factor scores, including activity level, attention span/distractibility, adaptability/approach-withdrawal, rhythmicity, and reactivity. Children's adjustment was measured with the Child Behavior Checklist (Achenbach & Edelbrock, 1983). Results demonstrated a significant relationship between children's overall temperament (all five temperament subscales) and their behavioral adjustment. Among dimensions of children's temperament, child activity level added unique variance to the prediction of children's internalizing behavior problems. Child reactivity contributed unique variance to the prediction of children's externalizing behavior problems. Maternal rhythmicity (versus flexibility) improved the prediction of internalizing behavior problems, above and beyond children's activity levels.

Varni and colleagues (1989b) also found significant relationships

between children's temperaments and their adjustment. In a study of children with congenital or acquired limb deficiencies, the EAS (i.e., emotionality, activity, sociability/shyness) Temperament Survey (Buss & Plomin, 1984) and Child Behavior Checklist (Achenbach & Edelbrock, 1983) were administered to parents. Emotionality was related significantly to children's adjustment, accounting for 23% of the variance in internalizing behavior problems (positive relationship), 39% of the variance in externalizing behavior problems (positive relationship), and 28% of the variance in social competence (negative relationship). Garrison and Earls (1987) caution against using temperament measures that overlap with measures of psychopathology by utilizing more recently developed temperament questionnaires that assess global patterns of behavior rather than specific behavior problems. Varni and associates claim that the EAS is such a questionnaire, as it assesses the global patterns of emotionality, activity, and sociability. Therefore, they suggest that the significant relationships they found were not due to confounding of the temperament and adjustment measures.

Aside from Wallander and Varni's work, the relationship between temperament and adjustment in children with chronic illness or disability has been studied little. However, the work of Thomas and Chess (1977), who pioneered the concept of dimensions of temperament, is consistent with Wallander and Varni's findings (Varni, et al., 1989b; Wallander, Hubert, & Varni, 1988). That is, Thomas and Chess (1977) reported that behavioral problems

are more likely to occur in children with disability who have a "difficult" temperament than in those who have an "easy" temperament. Children were characterized as having an easy temperament if they exhibited high rhythmicity (i.e., regular eating and sleeping schedules), high adaptability, and were not overly active or moody. In contrast, children with difficult temperaments had irregular biological functions, demonstrated withdrawal responses to new stimuli, did not adapt easily to change, and exhibited intense, often negative, moods.

Thus, evidence suggests that there is a significant relationship between a child's temperament and behavioral adjustment. However, as Garrison and Earls (1987) emphasize, caution must be used when selecting a temperament measure in an effort to avoid confounding with the outcome variable.

Because the present project focused on identifying variables related to children's adjustment that are amenable to modification (for the purposes of intervention and prevention) and because temperament is thought to influence adjustment via coping differences (which were assessed in the present study), children's temperament was not assessed. Furthermore, temperament historically has been studied in infants and young children (Garrison & Earls, 1987), whereas the present project involved children who were 5 to 12 years old. Finally, there is much overlap between measures of temperament and adjustment; exclusion of temperament in this study avoided that methodological problem.

Social-Ecological Factors and Adjustment

Family functioning

There is widespread agreement regarding the contribution of family functioning to children's adjustment, with many researchers, including Wallander and Varni, reporting a significant positive relationship between family functioning and children's adjustment (Bodner-Johnson, 1986; Hamlett, Pellegrini, & Katz, 1992; Lewis & Khaw, 1982; Pless, Roghmann, & Haggerty, 1972; Stewart, Kennard, DeBolt, Petrik, Waller, & Andrews, 1993; Thompson, Kronenberger, Johnson, & Whiting, 1989; Wallander, et al., 1989; Watson, Henggeler, & Whelan, 1990; Wertlieb, Hauser, & Jacobson, 1986). Children with a wide variety of chronic conditions have been studied, such as children with asthma, diabetes, hearing impairment, cystic fibrosis, and spina bifida. Nevertheless, the results are generally consistent, indicating that specific dimensions of the family environment account for a significant portion of the variance in children's adjustment.

In one of the first studies exploring the relationship between family functioning and children's adjustment, Pless, Roghmann, and Haggerty (1972) found a significant association between quality of family functioning and children's adjustment. The sample consisted of 209 children with chronic illness or disability (e.g., asthma, congenital malformation, hearing impairment) and 100 healthy controls. Interviews were conducted to gather information

regarding a child's health condition and to assess the quality of family functioning. Questions regarding family functioning assessed family relationships by exploring a variety of dimensions such as marital satisfaction, frequency of disagreements between family members, and family happiness. Children's adjustment was measured by parents, teachers, and children's self-report. Overall results indicated a positive relationship between quality of family functioning and children's adjustment in both children with chronic illness and healthy controls, with the effects of poor health and poor family functioning increasing with age. The authors suggest that there is a cumulative effect of health and family problems on children's adjustment.

Wallander and colleagues (Wallander, et al., 1989) investigated the relationship between family functioning and resources and the adjustment of children with juvenile diabetes, spina bifida, juvenile rheumatoid arthritis, or cerebral palsy. Family functioning was assessed with the Family Environment Scale (i.e., the cohesion, expressiveness, conflict, organization, and control subscales; Moos & Moos, 1986). Family utilitarian resources were quantified as the family's income and maternal level of education. Children's behavioral and social adjustment were measured with the Child Behavior Checklist (Achenbach & Edelbrock, 1983). Results revealed that higher family cohesion and organization were associated with fewer internalizing and externalizing behavior problems in children. A positive relationship emerged between family conflict and children's behavior problems. Furthermore, the combination of

family psychological and utilitarian resources accounted for 18% of the variance in internalizing behavior problems and 16% of the variance in externalizing behavior problems. Forty-three percent (43%) of the variance in social competence was accounted for by family psychological and utilitarian resources. However, as noted throughout the present literature review, caution must be used when interpreting results from the social competence scale of the Child Behavior Checklist (Achenbach & Edelbrock, 1983), as it is a limited measure of social adjustment (Drotar, et al., 1995). Nevertheless, the results from this study are quite impressive in demonstrating the relationship between familial variables and children's adjustment.

In a study of the adjustment of 75 children with HI, Watson, Henggeler, and Whelan (1990) reported that after controlling for demographic variables (i.e., father absence, gender, race, age, social class) and characteristics of hearing impairment (i.e., severity, communication mode), family functioning contributed an additional 25% of the variance in children's adjustment. Family functioning, including parental symptomatology, was assessed with the Family Adaptability and Cohesion Evaluation Scales -II (FACES-II; Olson, Portner, & Bell, 1982), the Symptom Checklist-90-Revised (SCL-90-R; Derogatis, 1983), and the Questionnaire on Resources and Stress (Friedrich, Greenberg, & Crnic, 1983). The Revised Behavior Problem Checklist (Quay & Peterson, 1987) and the social competence scale of the Child Behavior Checklist (Achenbach & Edelbrock, 1983) were used to measure children's adjustment.

Thompson, Kronenberger, Johnson, and Whiting (1989) also found that family functioning accounted for children's adjustment after controlling for demographic variables. These researchers also controlled for children's neurologic functioning in statistical analyses. Fifty children with myelodysplasia participated in this study. Thompson and colleagues assessed family functioning with the Family Environment Scale (Moos & Moos, 1986). Child adjustment was measured with the Missouri Children's Behavior Checklist (Sines, Pauker, Sines, & Owen, 1969). Central nervous system (neurologic) functioning was quantified with IQ data, lesion level, and number of shunt operations. Results revealed that family cohesion, supportiveness, expressiveness, and independence were negatively associated with children's behavior problems, whereas family conflict was positively associated with children's behavior problems. Family functioning accounted for children's externalizing behavior problems above and beyond family demographic variables and children's neurologic functioning.

Not only has a relationship been demonstrated between children's family environments and their behavioral and social adjustment, but there is also evidence suggesting that the family environment affects school performance as well. Bodner-Johnson (1986) studied the school achievement of children with HI. She conducted interviews with 125 parents of children with HI to assess the children's family environments. A factor analysis of interview responses was conducted, resulting in eight factors. Four factors were used for the study,

including family involvement/interaction, guidance/knowledge, press for achievement, and adaptation to deafness. Those children in the study's sample who had the strongest reading skills came from homes in which families had adapted well to their child's deafness and who emphasized academic achievement. Similarly, those children who excelled (relative to the sample) in mathematic computation also had families who stressed the importance of academic achievement.

In a review of the literature on the adjustment of children with disability or chronic illness, Drotar (1997) examined results from 50 studies published between 1976 and 1995. He summarized that in all but four studies, at least one measure of family or parental functioning was related to the children's psychological adjustment. That is, supportive family relationships were related to decreased behavioral problems and increased positive psychological functioning (e.g., self-esteem). However, Drotar also noted that relationships between positive family functioning and children's behavior were not consistently found. In all but three of the studies reviewed, at least one nonsignificant relationship was found between specific measures of family functioning and children's outcome. Furthermore, he reported that typically only 10 to 15% of the variance in the adjustment of children with disability was accounted for by parental/family functioning (Drotar, 1997).

Marital relations

Research investigating the effect of the marital relationship on children's adjustment indicates that marital discord is negatively related to children's adjustment (Emery & O'Leary, 1982; Fincham, 1994; Oltmanns, Borderick, & O'Leary, 1977; Porter & O'Leary, 1980; Purcell & Kaslow, 1994; Rutter, 1971; Varni & Setoguchi, 1993; Whitehead, 1979). In fact, Grych and Fincham (1990) stress that marital conflict appears more closely related to children's behavioral adjustment than do measures of general marital satisfaction. While some authors purport that the relationship between marital conflict and adjustment is strongest for boys (Emery & O'Leary, 1982; Porter & O'Leary, 1980), Purcell and Kaslow (1994) conclude in a review of the literature on sex differences in children's responses to marital discord that this finding is an artifact of study designs. That is, Purcell and Kaslow claim that when clinic samples are used (especially when externalizing behavior problems are assessed), family members are the only informants, and interparental aggression is studied, findings generally support a stronger relationship between marital discord and adjustment in boys than in girls. However, when these study conditions are not met, there is evidence demonstrating a significant relationship between marital discord and girls' adjustment as well.

Whitehead (1979) studied the relationship between marital relations and children's adjustment in 2,775 first-born 7-year-old children. Although the adjustment of both boys and girls was affected by marital relations, findings

demonstrated differential results based on gender. In boys, a strong relationship emerged between domestic tension and the boys' hostility toward others and destruction of their own and others' property, while in girls, there was a significant relationship between their exposure to marital discord and increased sensitivity. In both boys and girls, domestic tension was associated with fighting with peers, and children from homes with more parental discord had increased difficulty settling down at the start of school. The strengths of this study were the large sample size and the use of multiple informants (i.e., parents, teachers, school physicians) to gather information on the children's adjustment. However, the generalizability of the study's results was limited by the characteristics of the sample (i.e., all first-born, all 7-years-old) and the use of limited adjustment measures, which had unestablished validity and reliability and which tapped a narrow range of behaviors.

There has been some suggestion that the relationship between marital dissatisfaction and adjustment problems may be a linear one, although it appears that this relationship has not been studied recently. In 1971, Rutter reported that in families with a "good marriage," no children in his sample demonstrated anti-social behavior. However, 22% of those children from families with a "fair marriage" and 39% of those children from families with a "very poor marriage" exhibited anti-social behavior. Marriage quality was assessed by gathering information regarding the affectional relationship between parents, marital dissatisfaction, shared leisure activities,

communication between partners, mutual enjoyment of each other's company, and the extent of quarreling and hostility between partners. Children's behaviors were measured by teachers who completed a behavioral questionnaire that Rutter developed.

In sum, there is a great deal of evidence indicating significant associations between family relations and children's adjustment. There appears to be a positive association between children's adjustment and family cohesion and organization, a negative association between children's adjustment and marital discord, and significant associations between perceptions of the sibling relationship and children's adjustment.

Social support

The social support literature is infamous for being a "literature that has almost as many measures as studies" (Cohen & Syme, 1985, p.14). There are several dimensions of social support viable for study, such as the source (e.g., family, friends, professionals), recipient (e.g., parent, target child, sibling), content (e.g., emotional, instrumental) and disposition (i.e., available, enacted) of the support. Many measures have been developed to target one or more of these dimensions (Payne & Jones, 1987). Although one might expect the variety of measures employed to result in tremendous variability across study findings, a consensus has emerged demonstrating a positive association between social support and physical and mental health (see review by

Broadhead, et al., 1983).

In studies assessing the relationship between social support and the adjustment of children with disability or chronic illness, social support of children and/or their parents has been found related to fewer externalizing behavior problems in children (Barakat & Linney, 1996; Varni, Wilcox & Hanson, 1988; Wallander & Varni, 1989), fewer internalizing behavior problems (Hamlett, et al., 1992; Varni, Wilcox & Hanson, 1988), and higher self-esteem (Varni, et al., 1989a).

In an effort to assess whether different sources of social support are important to children at different ages, Wallander and Varni (1989) investigated the relationship between social support from family and friends and adjustment in children between the ages of 4 and 16. They hypothesized that peer social support would be more important during adolescence than during middle childhood. For statistical analyses, children were divided into two groups: those 4 to 11-years-old and those 12 to 16-years-old. Results revealed no interactions between social support, age, and gender of the children. However, across age groups, greater support from both families and peers was associated with fewer behavior problems.

In addition to a child's own social support, parents' social support is also related to the child's adjustment (Cochran & Brassard, 1979; Hamlett, et al., 1992; Holahan & Moos, 1987). Hamlett and colleagues assessed the behavioral adjustment of 60 children, 30 of whom had asthma or juvenile

diabetes, and 30 who were controls matched on age and gender to target children. Results indicated that lower maternal social support predicted increased internalizing behaviors in children with and without chronic illness.

There is controversy about the process whereby social support impacts adjustment. The three models considered are the direct effects model, the buffer (moderator) model, and the mediator model. The direct effects model suggests that social support influences one's psychological well-being independent of the person's stress level; there is a direct relationship between social support and psychological outcome. The buffer model purports an interaction between social support and stress, such that individuals with high levels of stress, who also have adequate social support, are protected against the negative impact of the stress they experience. Finally, the mediator model suggests that social support works as a mediating variable between stress and outcome. That is, stress is related not only to outcome, but it also affects social support, which in turn affects outcome. For example, the occurrence of a stressful event (e.g., diagnosis of a chronic illness) may lead to members of a social support network avoiding the person who experienced the stressful event, which may lead to that person's increased distress (Quittner, Glueckauf, & Jackson, 1990). During the past decade, much attention has been devoted to ascertaining which of these processes explains how social support works to impact adjustment (e.g., Cohen & Wills, 1985; Quittner, et al., 1990).

Cohen and Hoberman (1983) demonstrated the moderating effects of

social support on the relationship between major life events and depressive symptomatology in adults. Social support was measured with the Interpersonal Support Evaluation List, which yields an overall score in addition to several subscale scores (e.g., instrumental support). There was a significant interaction between the overall social support score and number of life events when predicting depressive symptomatology. No direct relationship was found between life events and depression.

In a study of the families of children with HI, evidence supported the mediational model of social support. Quittner, Glueckauf, and Jackson (1990) studied parenting stress, social support, and psychological distress in mothers of children with HI and controls. Each construct was assessed with several measures in an effort to explore multidimensional aspects of each variable. For example, four measures were used to assess parenting stress and three measures were used to assess social support. One of the goals of the study was to evaluate the mediating and moderating models of social support. The researchers report that they used LISREL and multiple regression techniques to test the mediator model, but because it is reportedly difficult to estimate interaction terms for the moderator model using LISREL, they report results only from their multiple regression analyses in their paper (Quittner, et al., 1990). Results were supportive of the mediating model of social support, with social support found to mediate maternal and child stressors. Direct effects were found between child stressors and psychological distress and maternal

stressors and (children's) psychological distress, and these relationships decreased significantly when the effects of social support were controlled. Increased stressors were associated with lower perceived social support, which in turn was related to increased psychological distress. That is, greater maternal stress (e.g., parenting stress) was related to decreased social network size and social contact, which was related to increased psychological distress. Mothers of children with HI rated their children as more demanding, moody, hyperactive, and less adaptable than mothers of control children. Thus, Quittner and colleagues hypothesized that parents dealing with more difficult children may view themselves as ineffective parents and be embarrassed to socialize with others, which leads to decreased socialization and help-seeking behavior.

In summary, there is ample evidence demonstrating that social support is associated positively with adjustment. Further research is necessary to clarify whether social support works as a moderator or mediator of adjustment, since there are findings supporting both models.

Coping and Adjustment

In their model of adjustment of children with disability, Wallander and Varni incorporate the concepts of Lazarus and Folkman (Folkman, 1984) when discussing the model's "stress processing" component (Wallander & Varni, 1992), which was termed "coping" in the present study. Lazarus and Folkman

(Folkman, 1984) proposed that coping involves two processes, which they labeled primary and secondary appraisal. Primary appraisal refers to the decision one makes about whether a situation is going to tax his/her coping resources. When primary appraisal results in a judgment of harm, loss, threat, or challenge, it is followed by secondary appraisal, a mental review of the coping resources and options one has available to deal with the stressor ("what can I do?").

Lazarus and Folkman define coping as all of the cognitive and behavioral efforts a person engages in to manage stressful transactions, independent of their outcome (i.e., success or failure in managing the stress). They suggest that there are two types of coping strategies: problem-focused and emotion-focused. Problem-focused strategies manage the distressing situation itself, working to change the situation by acting directly on the environment or oneself (e.g., developing a plan of action and following it). Emotion-focused coping involves changing the amount of attention one devotes to the stressful situation (e.g., increased avoidance or vigilance) or cognitively changing the meaning of the situation (e.g., begin looking at the "bright side" of the situation; Folkman, 1984; Lazarus, 1993) in an effort to manage the emotions or distress experienced. In most cases, both problem-focused and emotion-focused coping strategies are used to manage stressful situations. More problem-focused coping strategies tend to be used when problems are appraised as controllable or changeable, while more emotion-focused coping

strategies are used when problems are considered uncontrollable (Folkman & Lazarus, 1980). This appears to be an adaptive response, as evidence suggests that problem-focused coping may be counterproductive and lead to increased psychological distress when stressful situations are uncontrollable. At those times, emotion-focused coping is deemed more beneficial (Lazarus, 1993).

Although Lazarus and Folkman's theory is a model for adult coping, a study investigating the coping of healthy children and adolescents reported that this coping model also generalizes to children. Compas, Malcarne, and Fondacaro (1988) studied coping strategies used by children, ages 10 to 14. These children were requested to generate one particularly stressful interpersonal situation and one stressful academic event that had occurred within the past three months. Next they listed all of the ways they could have handled those situations and marked which of the strategies they actually used. All responses were classified as emotion-focused or problem-focused coping strategies by research assistants. Results revealed that problem-focused coping was related positively to adjustment (measured with the Youth Self Report and Child Behavior Checklist), whereas emotion-focused coping was related negatively to adjustment. In this study, qualitative analysis of the children's emotion-focused coping strategies revealed that the particular strategies they chose were maladaptive (e.g., hit the other person). Thus, the authors emphasize that generalizations regarding the negative relationship

between children's use of emotion-focused coping strategies and their adjustment should not be drawn from this study, as the results may only be an indication that emotion-focused coping is not well developed in children under 14 years of age.

Wallander and Varni have not yet explored the relationship between coping strategies used by children with disability and their adjustment. In fact, this has rarely been studied in pediatric populations. Instead, attention has been devoted to studying coping strategies used to manage medical procedures (Smith, Ackerson, Blotchy, & Berkow, 1990) and the relationship between coping and disease management (Band & Weisz, 1990; Reid, Dubow, Carey, & Dura, 1994) rather than assessing the relationship between coping and psychological status. The few studies that have explored the latter are reviewed below.

Studies that have investigated the relationship between children's coping and their adjustment have reported mixed findings. In a study of children with sickle cell disease, Thompson and colleagues (Thompson, Gil, Burbach, Keith, & Kinney, 1993) found that children's use of pain coping strategies was not related to parent-reported adjustment, but was related to self-reported adjustment. This is consistent with the theme that has emerged throughout this literature review, indicating that variability across study findings is likely due to differences in measures used. In this case, rater variance may be responsible for the contrasting results. Coping was assessed with an adapted version of

the Coping Strategies Questionnaire (Gil, Williams, Thompson, & Kinney, 1991), which was completed by children, and adjustment was measured with parent reports on the Missouri Children's Behavior Checklist (Sines, Pauker, Sines, & Owen, 1969) and children's interviews on the Child Assessment Schedule (Hodges, Kline, Stern, Cytryn, & McKnew, 1982). While coping strategies were not associated with parent-reported adjustment difficulties, pain coping strategies that reflected negative thinking explained 21% more of the variance in child-reported adjustment problems, above and beyond that accounted for by illness and demographic parameters.

Assessment of children newly diagnosed (i.e., within one year) with insulin-dependent diabetes mellitus revealed that children's use of behavioral coping strategies (e.g., seeking information about their diagnosis) was not associated with self-reported depressive or anxious symptomatology or self-esteem (Kovacs, Brent, Steinberg, Paulauskas, & Reid, 1986). Information regarding children's coping was gathered through interview and adjustment was measured with paper-and-pencil rating scales, including the Children's Depression Inventory (Kovacs, 1985), Revised Children's Manifest Anxiety Scale (Reynolds & Richmond, 1978), and the Coopersmith's Self-Esteem Inventory (Coopersmith, 1967).

In an unpublished doctoral dissertation, Faier-Routman (1994) found an inverse relationship between problem-solving coping strategies employed by children with spina bifida and their perceived self-worth, and a positive

relationship between their use of problem-solving coping and externalizing behavior problems. Children's coping was assessed with the Kidcope (Spirito, Stark, & Williams, 1988). Faier-Routman clustered the data from the Kidcope (rationally) into three scales including emotional regulation, problem solving, and/or active-passive strategies. Adjustment was assessed with the Harter Self-Perception Profile (Harter, 1985) and the Child Behavior Checklist (Achenbach & Edelbrock, 1983). Faier-Routman suggested that the study's unexpected findings (i.e., increased externalizing behavior problems was associated with increased use of problem-solving coping strategies) may have been due to the brevity of the coping measure. For example, she noted that clustering of the Kidcope yielded only three items for the problem-solving scale, and an average of only one item was endorsed by each child in her sample. Thus, the questionnaire may not have provided a thorough measure of children's coping strategies. In fact, Spirito (1996) later commented that due to the brevity of the Kidcope, exploring children's responses to each item may be the best approach in order to maximize understanding of children's coping strategies, rather than attempting to factor analyze the 10 items of the measure.

Additional research is necessary to gain a better understanding of the relationship between children's coping strategies and their adjustment. As many researchers have stated, while research on adult coping has been conducted for several decades now, exploration into children's coping is only in its infancy (e.g., Kliewer, 1991). This is particularly true for children with chronic

illness or disability.

Summary

In sum, research on the adjustment of children with disability or chronic illness reveals that these children are at risk for developing adjustment difficulties compared to healthy children. There is great variability among individual outcomes, with some children demonstrating significant adjustment problems and others exhibiting remarkable resilience. In an effort to gain a better understanding of the discrepant literature findings, Wallander, Varni, and colleagues (Wallander, et al., 1989; Wallander & Thompson, 1995) developed a model that includes risk and resistance factors that interact with one another, leading to a child's psychological outcome. This model was used as a theoretical guide for the present study.

Risk factors included in Wallander and Varni's model include a child's disability parameters, functional independence, and psychosocial stress. Despite all of the methodological limitations described above, there are some consensual findings. Overall, research has demonstrated a positive relationship between functional independence and adjustment, and a negative relationship between psychosocial stress and adjustment. However, the relationship between disability parameters and adjustment is less clear. Regarding disability severity, some researchers have found an inverse relationship between disability severity and adjustment, others have found no

relationship between these variables, while still others have found that children with mild disabilities are more poorly adjusted than children with moderate or severe disabilities (i.e., a marginality effect).

Resistance factors included in Wallander and Varni's model are social-ecological variables, intrapersonal factors (e.g., temperament), and coping. Research reveals that several social-ecological dimensions are related to the adjustment of children with disability, including social support parents receive, marital conflict, and family cohesion and conflict. Similarly, children's temperaments have been found related to their psychological adjustment. Finally, children's coping strategies have not been studied extensively, but there is a suggestion that their use of problem-solving strategies (versus emotion-focused coping strategies) may be related positively to their adjustment.

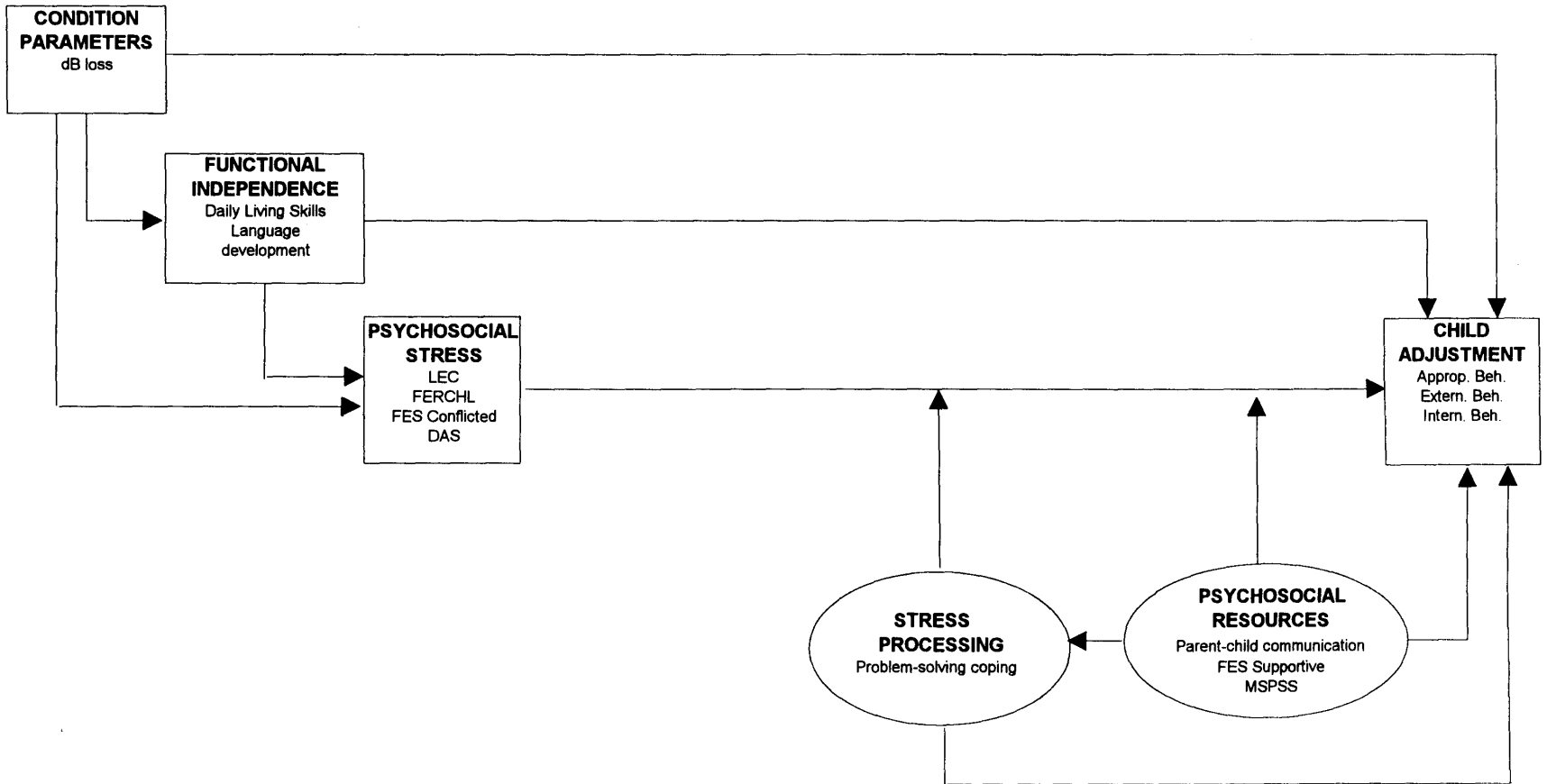
To date, research has indicated that children with HI are a population at risk for adjustment difficulties. It appears that variables from Wallander and Varni's model that have been studied with this population include only disability parameters, family functioning, and social support parents receive from family and friends. Contradictory findings regarding the relationship between level of hearing loss and adjustment have emerged, with two articles reporting no relationship between the variables (Musselman, et al., 1988; Rodda, 1984), and another researcher finding that increased hearing loss was associated with lower social competence (Levy-Shiff & Hoffman, 1985). Family functioning was

found to be related to children's adjustment after controlling for demographic variables (Watson, et al., 1990). Regarding social support, parents' social support was found to mediate the relationship between psychosocial stress (i.e., maternal and child stressors) and children's psychological outcomes (Quittner, et al., 1990).

The Present Study

The purpose of the present project was to identify predictors of adjustment in children with HI. Social-ecological strengths (psychosocial resources) and children's coping strategies were studied to determine if they moderate the relationship between psychosocial stress and children's adjustment. Greater understanding of the variables contributing to the adjustment of these children is expected to assist in preventing their maladjustment and in facilitating therapeutic intervention. A modified version of Wallander and Varni's conceptual model (Wallander, et al., 1989) served as a theoretical guide for this investigation (Figure 3). All components of the original model were investigated, with the exception of children's intrapersonal factors (e.g., temperament). This variable was excluded due to the age range of the sample included in this study (5 to 12), since temperament is generally studied in infants and young children (Garrison & Earls, 1987). Moreover, temperament in older children may not be readily modifiable; only variables amenable to treatment or preventive interventions were the focus of this

Figure 3. Moderator model of adjustment in children with hearing impairment.



investigation. There is much overlap between temperament and adjustment measures.

Hypotheses

Predictive utility (A)

(A1) The predictor variables (i.e., severity of a child's hearing loss, the child's functional independence, psychosocial stress, psychosocial resources, and the child's use of problem-solving coping strategies) were expected to account for a significant portion of the variance in the adjustment of children with HI. This prediction was based on the empirical findings reviewed above, indicating significant relationships between these variables and children's outcomes (e.g., Levy-Shiff & Hoffman, 1985; Stein & Jessop, 1984; Wallander, et al., 1989).

(A2) Of the psychosocial resources, communication efficacy between parents and their children with HI was anticipated to account for additional variance in the children's adjustment, above and beyond family supportiveness and parents' perceived social support. This prediction stemmed from the author's professional experience providing therapy for children with HI who presented with behavioral problems and who used sign language as their primary mode of communication. The majority of these children were unable to communicate basic thoughts and feelings with their parents, due to their parents' lack of sign language knowledge, combined with the child's lack of

speech and lipreading ability. It was thought that efficacy of parent-child communication would account for additional variance beyond family supportiveness and parents' social support. In other words, even within an affectionate, well organized family with a strong social support network, inadequate parent-child communication may impair the child's adjustment. Support for this hypothesis is found in the research of Greenberg and Marvin (1979), in which they report that children with HI who communicate effectively with their hearing mothers demonstrate more secure attachments than those children and parents who do not communicate effectively with one another. Furthermore, Marschark (1993) summarizes research suggesting that poor communication between hearing parents and their children with HI negatively affects the children's social development.

Mediators and moderators of adjustment (B)

(B1) Consistent with Wallander and Varni's model (e.g., Wallander & Thompson, 1995), functional independence was expected to mediate the relationship between hearing loss severity and the adjustment of children with HI. Children with more severe hearing losses were anticipated to be more limited in their functional independence and, therefore, more poorly adjusted than children with less severe hearing losses.

(B2) Also consistent with Wallander and Varni's conceptual model, it was hypothesized that psychosocial stress would mediate the relationship between

hearing loss level and the adjustment of children with HI. That is, children with more severe hearing losses were expected to experience more psychosocial stress, and, in turn, to be more poorly adjusted than children with less severe hearing losses.

(B3) Psychosocial stress was expected to mediate the relationship between functional independence and the adjustment of children with HI. Children with greater functional independence were expected to experience less psychosocial stress, and, in turn, be better adjusted than children with poorer functional independence. This prediction was based on Wallander and Varni's model.

(B4) Psychosocial resources were expected to moderate the relationship between psychosocial stress and the adjustment of children with HI. Higher stress was expected to be associated with poorer adjustment of children with HI when their psychosocial resources were lower. Higher psychosocial resources were expected to attenuate the impact of stress on the children's adjustment. This prediction was based on Wallander and Varni's model. Although Quittner and colleagues (Quittner, et al., 1990) reported a mediating effect of social support on the relationship between stress and outcome in children with HI, the design of the present project differed in that the psychosocial resources variable was comprised of family supportiveness and parent-child communication, in addition to social support. Furthermore, there is much evidence suggesting that social support may also act as a moderator of

adjustment (e.g., Broadhead, et al., 1983; Cohen & Hoberman, 1983).

(B5) The use of problem-solving coping strategies was expected to moderate the relationship between psychosocial stress and the adjustment of children with HI. That is, higher psychosocial stress was expected to predict poorer adjustment among children with HI who use problem-solving coping strategies infrequently; increased use of problem-solving coping strategies was expected to lessen the impact of stress on the children's adjustment. This prediction is consistent with Wallander and Varni's writings (e.g., Wallander, et al., 1988).

CHAPTER II

METHODS

Procedure

Families were recruited from hospitals, schools, and/or religious agencies in two metropolitan cities, Chicago and Cleveland, where the author has connections in the Deaf community. Rather than limiting the study to one geographical location, two sites were identified in an effort to assist recruitment so that the necessary sample size could be obtained. This procedure was also expected to increase the generalizability of the study's results. However, it happened that 46 families came from Chicago and only four families came from Cleveland, due in part to scheduling difficulties and low response rate to letters sent inviting families to participate in the study. There was no difference between the groups on a measure of socio-economic status (Hollingshead, 1975).

Recruitment procedures varied among sites based on the policy of each school, hospital, or religious agency. When working with those agencies that permitted the investigator to initiate contact with families directly to recruit them for the study, families with children with HI and between the ages of 5 and 12 were telephoned and the study explained. For those agencies that were

unable to provide the investigator with information regarding potential participants (i.e., names, telephone numbers) due to confidentiality policies, letters written by the primary investigator were sent by the agency to eligible families. Those interested in the study telephoned the principal investigator for further information. An interview was scheduled at a mutually convenient location for those families interested in participating in the project who also met the following eligibility criteria: 1) child with HI was between the ages of 5 and 12 (inclusive); 2) child's unaided hearing loss was 40 decibels (dB) or greater; 3) child had no mental or physical disability; 4) parents had normal hearing and read English well enough to complete the study questionnaires, which were available only in English. Families were compensated \$20.00 for their time and effort to complete the study.

Participants

Fifty families participated in this study. Participation involved the oldest child in the family who met criteria for the study and the primary caretaker, which was the mother in all but two cases. While both parents were invited to participate in the study, both participated in only six families. Thus, the data obtained from the primary caretakers' partners were not analyzed for this study.

The Hollingshead Index (Hollingshead, 1975) was used to calculate socio-economic status (Mean=43.9, SD=12.5, range 14 - 66); the average family in this sample was of middle income and educational level. This is

consistent with demographics of the population of families with deaf children (Marschark, 1993). Questionnaires were returned by 49 teachers regarding their observations of the children's behavior in school. The average age of children in this study was 9 years, 1 month (9-1; SD=2-1, range 5-2 - 12-9). The mean age at which parents suspected that their children were HI was 1-3 (SD=1-1), with children diagnosed with HI at 1-11 (SD=1-5). Per teacher report on the Language Development questionnaire, 27% of the sample had "low" language ability, using only primitive phrases or simple sentences, which is comparable to the language development level of a typical hearing child who is 3 years or younger.

Subject characteristics are listed in Table 1. It is noteworthy that 50% of the parents participating in this study did not know the cause of their child's hearing loss. Those families with more than one child with a congenital hearing loss who indicated that they did not know the cause of the target child's HI (n=3) were considered as having a child with a hereditary hearing loss. Severity of hearing loss was calculated using a three pure-tone-average (500, 1000, 2000 Hertz) in the better ear (Levy-Shiff & Hoffman, 1985). Parents responded to questions regarding the communication modality that their children use (e.g., sign only, total communication) in three different settings: with family, at school, and with friends (Watson, Henggeler, & Whelan, 1990). The average across settings was computed to quantify the child's primary communication modality.

Table 1.--Subject Characteristics

| | N | % of Sample |
|--|----|-------------|
| Child's gender | | |
| Female | 25 | 50 |
| Male | 25 | 50 |
| Ethnicity | | |
| Caucasian | 37 | 74 |
| African-American | 5 | 10 |
| Asian | 1 | 2 |
| Hispanic | 6 | 12 |
| Other | 1 | 2 |
| Family Structure | | |
| Two parent home | 35 | 70 |
| Single parent home | 15 | 30 |
| Unaided hearing loss (missing data=1) | | |
| Mild | 1 | 2 |
| Moderate | 4 | 8 |
| Severe | 15 | 30 |
| Profound | 29 | 58 |
| Aided hearing loss (missing data=8) | | |
| < 21 decibels | 3 | 7 |
| Slight to Mild | 17 | 40 |
| Mild to Moderate | 15 | 36 |
| Moderate | 5 | 12 |
| Severe | 1 | 2 |
| Profound | 1 | 2 |
| Etiology of hearing loss | | |
| Hereditary | 6 | 12 |
| Medication side effect | 7 | 14 |
| Meningitis | 4 | 8 |
| German Measles (maternal) | 2 | 4 |
| Other | 6 | 12 |
| Don't know | 25 | 50 |

Table 1 -- Continued.

| | N | % of Sample |
|---|----|-------------|
| Age at diagnosis of hearing loss | | |
| Less than 1 year old | 9 | 18 |
| 1 - 2 years old | 30 | 60 |
| 3 - 5 years old | 8 | 16 |
| 5 - 12 years old | 3 | 6 |
| Educational setting | | |
| Special school for deaf children | 10 | 20 |
| Self-contained class, regular school | 13 | 26 |
| Mainstreamed (inclusion) | 13 | 26 |
| Mainstreamed, partial day | 11 | 22 |
| Other | 3 | 6 |
| Communication modality used | | |
| Total Communication | 26 | 52 |
| Sign language only | 7 | 14 |
| Aural/oral only | 17 | 34 |
| Hearing amplification device | | |
| Hearing Aid | 44 | 88 |
| Cochlear Implant | 6 | 12 |

Measures

Predictor and outcome measures were selected to study the risk and resistance variables identified in Wallander and Varni's model, as summarized in Figure 3 (page 54).

Adjustment

Parent and teacher reports were used to assess children's adjustment

rather than obtaining self-reports. This is because children with HI often demonstrate delays in language development and reading acquisition (Clark, 1993; Greenberg & Kusche, 1987). The children in the present sample, ranging in age from 5 to 12, could not have been expected to meet the language demands of self-report questionnaires that are available to assess the children's adjustment (e.g., Harter Self-Perception Profile, Achenbach Youth Self-Report). As noted above, nearly one-third of these children had language skills at or below a 3-year-old age level (compared to expectations for hearing children).

The Achenbach Child Behavior Checklist (CBCL) (Achenbach, 1991a) was completed by mothers and the Achenbach Teacher Report Form (TRF) (Achenbach, 1991b) was completed by teachers. T-scores from the two composite scales of each of these measures were used for data analyses, namely, Internalizing and Externalizing Behavior Problems. Adjustment of children with HI was measured by two informants to assess the children's behavior across settings (e.g., home, school, and community). In addition, this approach incorporates the perspectives of two informants, thereby avoiding the measurement of a child's adjustment by relying on the (inevitable) bias of only one reporter.

The Achenbach measures were selected for this study for several reasons. First, the validity and reliability of the CBCL and TRF are well-documented (Achenbach, 1979; Achenbach, 1991a; Achenbach, 1991b).

Secondly, these measures have been used extensively in research exploring the adjustment of children with disabilities (Dyson, 1989; Henggeler, Watson, & Whelan, 1990; Wallander, et al., 1988). Finally, the two versions of the Achenbach behavior checklist (parent and teacher report) facilitate comparison of data across multiple informants because the measures yield scores on similar scales (e.g., Externalizing and Internalizing Behavior Problems).

The Matson Evaluation of Social Skills with Youngsters (MESSY) (Matson, Rotatori, & Helsel, 1983) was used to assess social competence. While the Social Competence scale of the CBCL has been used frequently by Wallander and colleagues (Wallander, et al., 1989; Wallander & Varni, 1992), the MESSY seems more appropriate for use with children with HI and was expected to provide a broader assessment of children's social abilities independent of family SES. For example, the CBCL assesses children's participation in sports, clubs, and hobbies. However, children's participation in these types of activities is affected often by parents' availability to take children to activities, the children's availability to partake in after school activities, and by the family's financial resources. In addition, children with HI may have socially isolated families (Dyson, 1989) or have restricted opportunities for becoming involved in social groups. Thus, the Social Competence scale of the CBCL is not always appropriate for assessment of children with disabilities (Drotar, et al., 1995).

In contrast to the Social Competence scale of the Achenbach measures,

the MESSY assesses children's appropriate behaviors within everyday social settings at home, school, or in the community, such as "smiles at people she knows," "makes other people laugh," and "helps a friend who is hurt." Thus, it appears that the MESSY is less likely to be confounded with SES level, and because observations are made of children in their classroom, home, and community environments, there is ample opportunity for children with HI to engage in these behaviors.

Primary caretakers and teachers completed the MESSY. Responses ranged from not at all (1) to very much (5) on items tapping both positive and negative social behaviors, such as "helps a friend who is hurt," "threatens people or acts like a bully," and "sticks up for friends." The MESSY yields two factor scores, Appropriate Social Skills and Inappropriate Social Skills, and a Total score. However, the Inappropriate Social Skills factor was not used because inappropriate behaviors were assessed with the CBCL and TRF. Adequate test-retest reliability, internal reliability, and concurrent validity have been documented for the MESSY using nondisabled samples (Kazdin, Matson, & Esveldt-Dawson, 1984; Matson, 1990; Wierzbicki & McCabe, 1988) as well as a sample of children with HI (Matson, Macklin, & Helsel, 1985).

Disability parameters

Information regarding the severity of a child's hearing loss was gathered from school, hospital, or audiological records. Three-pure-tone averages (500,

1000, 2000 Hertz) for the child's better ear were calculated from audiogram data to quantify children's hearing losses (Levy-Shiff & Hoffman, 1985; Musselman et al., 1988). Aided hearing loss (rather than unaided loss) was used for data analyses, as the majority of children who participated in this study wear their hearing amplification device(s) more than 50% of the time at home (n=32) and 100% of the time at school (n=50), so the aided hearing loss best represents their everyday hearing acuity.

Functional independence

Adaptive daily living skills. An adapted form of the Vineland Adaptive Behavior Scales (Appendix A; Sparrow, Bella, & Cicchetti, 1984) was used for this study. Interview questions from the Vineland were presented to parents in paper-and-pencil questionnaire format. Only scores from the Daily Living Skills subscale were used for this study, as data from this scale were expected to provide a measure of functional independence with minimal conceptual overlap with the dependent variable of behavioral and social adjustment. The scale was adapted by modifying items related to hearing or speech to increase sensitivity and relevance to individuals with HI (e.g., "summons to the telephone (or TTY)..."). High internal consistency of the Daily Living Skills scale is documented (Sparrow, Bella, & Cicchetti, 1984) and its validity with people with HI has been demonstrated (Dunlap & Sands, 1990). However, scores on the adapted pencil-and-paper version of the scale used in this study may not be

directly comparable to the normative data for the standardized, interview version of the scale. In addition, although normative data on children with HI living in residential settings are available, they were not used for statistical analyses in this study because no study participants attended a residential school, and differences between residential and non-residential samples are substantial (e.g., Braden, Maller, & Paquin, 1993).

Communication skills. Because HI challenges one's ability to develop communication skills (Cohen, 1980), children's language development was assessed as a dimension of functional independence. Comparable to the use of ambulatory status and bladder/bowel control as measures of functional independence in children with spina bifida (e.g., Wallander, Feldman, & Varni, 1989), communication is an adaptive behavior directly affected by the presence and severity of one's hearing loss.

As a measure of children's communication skills, teachers completed the Language Development Domain of the AAMD Adaptive Behavior Scale - School Edition (Lambert, Windmiller, Tharinger, & Cole, 1981), a questionnaire recommended for use with children with HI (Meacham, Kline, Stovall, & Sands, 1987).

Based on observation during interview, this language questionnaire was also completed by the author. This was done to assess the reliability between raters (i.e., this researcher and teachers) who assess communication skills.

Although Meacham et al. (1987) note that scores tend to be inflated on

the Language Development scale for children with HI, this did not pose a problem for this study because scores were considered only within the sample; comparisons were not made between norms for the measure and scores from this sample. Items were adapted to incorporate the use of sign language as an acceptable communication mode. For example, "Is able to talk" was changed to "Is able to talk (or sign)." Adaptations developed by Suess and colleagues (1983) that modified the articulation section of this measure to include sign execution (e.g., "signing or fingerspelling is hurried, accelerated, or pushed") were also used. A child's best articulation score, in sign or speech, was used to calculate his/her overall score on this measure.

Several aspects of language were assessed by this measure, including written language. This is important when measuring communication as a dimension of functional independence in children with HI, as these children often must rely on many different modes of communication to relay their message. For example, if the person receiving a message does not understand sign language, the child may attempt to speak. However, if that person does not understand the child's speech, the child may resort to writing. Thus, an indication of the level of these children's writing skills is valuable.

Psychosocial stress

The Coddington Life Events Checklist (LEC) (Coddington, 1972) was used to assess family stress. This 32-item questionnaire consists of life events

(e.g., death of a grandparent) that may have occurred in a family's life during the past year. Parents indicated whether an event happened in the past year by responding "yes" or "no". Families' major life events have been demonstrated to be related to children's adjustment (e.g., Abidin, Jenkins, & McGaughey, 1992; Goodman, Brumley, Schwartz, & Purcell, 1993; Hanson, et al., 1992).

Although there is evidence that microstressors (daily hassles) are better predictors of individual adults' adjustment than major life events (Kanner, Coyne, Schaefer, & Lazarus, 1981), it is not clear whether parents' daily hassles are related to children's adjustment. Very few children in this study would have been able to read and complete questionnaires independently. Therefore, it was necessary to rely on parents' reports regarding family stress, using major life events as the best validated measure.

Stress experienced by families that was directly related to a child's HI was explored, using the Family Experience Related to Children's Hearing Loss (FERCHL). The FERCHL (Appendix A; Wills, 1997) is a modified version of the Impact-on-Family Scale (Stein & Riessman, 1980), which was originally designed to assess families of children with chronic illnesses. The FERCHL addresses issues related to children's HI. Responses to items such as, "Traveling to the hospital is a strain on me," and "Fatigue is a problem for me because of my child's deafness," range from 0 (Not at all) to 3 (Very much). Two items were dropped from the measure for the present study including,

"Because of the deafness, we are not able to travel out of the city," and "My child has difficulty communicating with other children of the same age" due to low correlation with the overall scale ($r < .3$). Twenty-three items assessing "strain" (according to Stein and Riessman's 1980 factor analysis, buttressed by face validity of item content) were used for analyses (five "mastery" items were omitted). Internal consistency of the "strain" items for the present sample was high ($r = 0.89$).

Psychosocial resources

Family environment. The Moos Family Environment Scale (FES) (Moos & Moos, 1986) was completed by children's parents as a measure of family functioning. This 90-item questionnaire consists of 10 subscales (cohesion, expressiveness, organization, independence, achievement orientation, intellectual-cultural orientation, active-recreational orientation, moral-religious emphasis, conflict, and control) that assess the relationship, personal growth, and system maintenance dimensions of families. The supportive and conflicted factor scores defined by Kronenberger and Thompson (1990) in a study of families of children with chronic illness was used for this study, as family cohesion and conflict repeatedly have been demonstrated to be related to children's behavioral adjustment (Hamlett, Pellegrini, & Katz, 1992; Wallander, et al., 1989; Wertlieb, Hauser, & Jacobson, 1986). Kronenberger and Thompson's supportive scale is the sum of the T-scores from the cohesion,

expressiveness, independence, active/recreational, and intellectual/ cultural subscales. The conflicted factor is calculated by subtracting the sum of the T-scores from the cohesion and organization subscales from the T-score of the conflict subscale.

Adequate reliability and validity of the FES subscales have been reported (Moos & Moos, 1976). Convergent validity of the FES has also been demonstrated (Perosa & Perosa, 1990). This measure has been used often with families of children with disability or chronic illness (Hamlett, Pellegrini, & Katz, 1992; Thompson, Kronenberger, Johnson, & Whiting, 1989; Wallander, et al., 1989; Wertlieb, Hauser, & Jacobson, 1986). Studies show that higher family cohesion and organization, measured with the FES, is associated with fewer internalizing and externalizing behavior problems in children. In addition, family conflict is related to children's behavior problems (e.g., Wallander, et al., 1989).

Marital relationship. Marital adjustment was assessed with the Dyadic Adjustment Scale (DAS) (Spanier, 1976). An advantage of using this measure for the present study was that it is applicable to couples who are co-habiting, but are not married. Because marital status was not an inclusion criterion for the present study, the DAS was used to assess the relationship satisfaction of those parents whose significant others were living with them and their children. Thirty-five of the 50 families in this study completed the DAS, a 32-item questionnaire that yields an overall score of dyadic adjustment. Reliability and

validity of the measure have been documented (Spanier, 1976; Spanier & Thompson, 1976). The DAS differentiates between divorced and married couples (Cohen, 1985), and studies have demonstrated that marital adjustment is related to children's adjustment (Emery & O'Leary, 1982; Fincham, 1994).

Social support. In choosing a social support measure, it was important to select one that assesses perceived social support rather than one that looks extensively at network size. Research suggests that although families of children with chronic illness or disability have smaller networks, there is no difference between their perceptions of support and the perceptions of control families who have larger networks (Quittner, Glueckauf, & Jackson, 1990). Thus, a social support measure that emphasizes network size could have been misleading for this study. Instead, the Multidimensional Scale of Perceived Social Support (MSPSS) (Zimet, Dahlem, Zimet, & Farley, 1988) was selected. This measure provided an assessment of parents' perceptions of the social support they receive from family, friends, and significant others. Responses to items such as "there is a special person around when I am in need" range from strongly disagree (1) to strongly agree (7). Internal reliability, test-retest reliability, construct validity, and concurrent validity of this measure have been documented (Zimet, Dahlem, Zimet, & Farley, 1988; Kazarian & McCabe, 1991). Low scores on the MSPSS are associated with increased depressive symptomatology in adolescents and young adults, whereas high scores are associated with better self-concept in adolescents (Kazarian & McCabe, 1991).

Communication efficacy between parent and child. The ability of parents and their children with HI to communicate with one another was included as a dimension of the psychosocial resources variable, since it was considered an aspect of the child's family environment that may facilitate positive adjustment. Parents and their children completed a referential communication task to assess the effectiveness of their communication. Through consultation with a speech/language pathologist who works with children with HI (C. Siegel, personal communication, November 23, 1996), a parent-child communication task was developed for the present study. This task involved a form of referential communication (Whitehurst & Sonnenschein, 1985). Parents and children were seated at a table opposite one another, with a low panel impeding their view of each other's work space but allowing them to talk or sign to one another. First, a few training tasks were presented. Next, one member of the mother-child dyad (order was counterbalanced) was presented with a plasticized board printed with a classroom scene, complete with eight vinyl stickers of various objects and people. The other person received an identical board printed with the same classroom scene, but without the stickers. The person with the completed scene instructed the other to place vinyl stickers onto his/her plasticized board, in order to construct an identical completed scene. Use of any communication modality (e.g., sign language, speech, gesture, etc.) was permitted. Once the task was completed, the dyad changed roles so that the person initially receiving the instructions became the instructor,

using the classroom scene with different stickers and sticker locations.

Each vinyl sticker item was worth two points. Participants received one point for choosing the correct sticker and a second point for placing it in the correct location on the board. A total of 32 points per dyad was possible.

Coping

A parent-report measure of children's coping strategies was used instead of a self-report measure, due to the delayed acquisition of reading skills in children with HI (Clark, 1993; Greenberg & Kusche, 1987). The Self-Report Coping Measure developed by Causey and Dubow (1992) was changed from a self-report to parent-report format. Although no studies have been published using such an adaptation, at the time this project was designed, Dubow (personal communication, February, 1997) also was proposing to adapt the coping measure as a parent-report of children's coping strategies. While questions on Causey and Dubow's questionnaire are designed with one stressor in mind (i.e., when a child gets a bad grade in school), parents were instructed to complete the questionnaire thinking of any situation in which the child received upsetting news at home or school. This alteration in the instruction set was employed for this study since children as young as 5 were part of the study, and children in kindergarten presumably do not receive test grades. Responses to items such as "when _____ happens, he/she tries to think of different ways to solve it" ranged from never (1) to always (5).

The original measure included items referring to emotion-focused and problem-focused coping strategies. Only the items that assess use of problem-focused coping strategies were used for the present study due to Compas, Malcarne, and Fondacaro's findings (1988) suggesting that children's emotion-focused coping strategies are not well developed under the age of 14. In addition, many problem-focused coping strategies involve overt behaviors (e.g., "ask a family member for advice"), in contrast to emotion-focused coping strategies (e.g., "just feel sorry for myself"). Therefore, it was assumed that parent reports would be more reliable regarding children's use of problem-focused strategies than their use of emotion-focused coping. Items included for analyses were those from Causey and Dubow's "self-reliance/problem-solving" factor and some from the "seeking social support" factor (Causey & Dubow, 1992). Internal consistency for the resulting problem-solving coping scale was good ($r=.92$).

CHAPTER III

RESULTS

Normalizing the Data

As the first step in data analyses, distributions of variables were inspected for normality. The mean, standard deviation, and range of each measure was calculated (Tables 2 and 3). Several variables had skewed distributions. To normalize the distributions, guidelines for data transformation outlined by Tabachnick and Fidell (1989) were followed. The type of transformation was selected based on examination of the initial distribution of the variables and subsequent inspection of the transformed distributions until the most nearly normal distribution of each variable was achieved. Due to moderate positive skewness, the square root was calculated for scores from the FERCHL. Due to moderate negative skewness, scores from the FES supportive scale, the DAS, and the parent-child communication efficacy task were reflected and then the square root was computed. Due to severe positive skewness (L-shaped) of the LEC, first, the inverse was computed. However, the resulting distribution did not approximate a normal distribution. Taking the logarithm of the original LEC data was successful in normalizing the distribution. The MSPSS scores were reflected and the logarithm was

Table 2.--Sample Mean, Standard Deviation, and Range for Predictor Variables

| Measure | Median | Mean | SD | Range |
|--------------------------------|--------|--------|--------|-----------|
| Disability Parameters | | | | |
| Aided Decibel Loss | 44.17 | 50.35 | 24.20 | 12-115 |
| Functional Independence | | | | |
| Vineland Daily Living Skills | 91 | 90.20 | 16.21 | 50-117 |
| Language Develop. | 34 | 35.55 | 23.88 | 3 - 96 |
| Psychosocial Resources | | | | |
| FES Supp. Factor | 278 | 270.56 | 36.27 | 160 -324 |
| Communication Task | 28 | 25.65 | 5.92 | 11 - 32 |
| MSPSS | 74.5 | 70.21 | 15.75 | 17 - 84 |
| Psychosocial Stress | | | | |
| FES Conflicted Factor | -70 | -68.96 | 21.59 | -100 - 10 |
| DAS | 47 | 45.51 | 8.07 | 20 - 59 |
| LEC | 155.5 | 176.52 | 130.57 | 27-678 |
| FERCHL | 14 | 16.30 | 12.01 | 1 - 54 |
| Problem-Focused Coping | 43 | 48.80 | 10.12 | 22 - 70 |

Note: FES=Family Environment Scale; MSPSS=Multidimensional Scale of Perceived Social Support; DAS=Dyadic Adjustment Scale; LEC= Life Events Checklist; FERCHL=Family Experiences Related to Children's Hearing Loss

computed due to moderate negative skewness. A statistical outlier was dropped from the FES conflicted scale.

Comparisons of Sample to Normative Data

Sample means were calculated for all study measures and compared to normative data on nondisabled children, which were available for the adjustment measures (i.e., Achenbach measures and MESSY), the LEC, the

MSPSS, and the DAS. Results revealed that the present sample experienced more life stress in the last year than the normative group (Sample M=176.52; SD=130.57; norm M=102.8; SD=not reported; Coddington, 1972). Similarly, co-habiting parents in the present study reported poorer marital/dyadic adjustment than the standardization group (Sample M=45.51; SD=8.07; norm M=50; SD=10). (The DAS was completed by 35 of the 50 participants; 15 were single parents.) Scores on the Vineland Daily Living Skills scale were also lower than those in the normative group (Sample M=90.2; SD=16.21; norm M=100; SD=15). There was no difference between the present and normative samples on reports of perceived social support (Sample M=70.21; SD=15.75; norm M=69.6; SD=10.32; Zimet, et al., 1988).

Sample means were calculated for all adjustment measures and compared with population means set to a T-score of 50 (Table 3). The present sample exhibited more overall behavior problems than the CBCL standardization sample, with a trend towards more externalizing behavior problems and no difference in internalizing behavior problems. On the CBCL Social Competence scale, the present sample appeared less socially competent than the normative group. However, on the parent-reported MESSY Appropriate Social Skills scale, the present sample demonstrated more positive behaviors than the normative group and fewer overall adjustment difficulties than the standardization sample. Thus, overall, children with HI displayed more behavior problems and more appropriate social

Table 3.--Outcome Variables: Sample vs. Standardized Norms

| | Mean | SD | T-score | % sample with $T \geq 63$ |
|------------------------------|-------|-------|---------|---------------------------|
| CBCL (n=50) | | | | |
| Social Competence | 47.10 | 7.90 | -2.38* | n/a |
| Internalizing Scale | 50.94 | 10.43 | .64 | 14 |
| Externalizing Scale | 52.84 | 11.19 | 1.79 | 22 |
| Total Behavior Probs. | 53.76 | 10.60 | 2.51* | 26 |
| TRF (n=49) | | | | |
| Internalizing Scale | 48.55 | 7.67 | -1.32 | 4 |
| Externalizing Scale | 52.20 | 9.61 | 1.61 | 14 |
| Total Behavior Probs. | 51.31 | 8.90 | 1.03 | 14 |
| MESSY, parent report (n=50) | | | | |
| Appropriate Behavior | 57.82 | 8.21 | 6.74*** | n/a |
| Inappropriate Behavior | 52.26 | 7.17 | 2.23* | 10 |
| Total Adjustment | 49.75 | 6.97 | -.26 | 2 |
| MESSY, teacher report (n=48) | | | | |
| Appropriate Behavior | 51.02 | 10.11 | .70 | n/a |
| Inappropriate Behavior | 47.50 | 7.39 | -2.34* | 2 |
| Total Adjustment | 47.41 | 6.75 | -2.66** | 2 |

* $p \leq .05$.** $p \leq .01$.*** $p \leq .001$.

behaviors than normative samples.

Clinical significance was also explored to determine how many children exhibited maladjustment that was at a clinically severe level (i.e., T-score ≥ 63 ; Table 3). Twenty-six percent (26%) of the sample obtained scores in the clinical range per parent report and 14% per teacher report on the Total

Behavior Problems scale, compared with 10% of the standardization group. On the MESSY, 2% of the sample fell in the clinical range for overall maladjustment, according to both parent and teacher report, compared to 10% of the standardization group. Examination of the scores for the individual children who fell at this clinically significant level of maladjustment revealed that none of these children had significantly low scores on the MESSY Appropriate Social Skills scale.

Data Reduction

Measures were aggregated to provide one score for each variable assessed. Measures that investigated various dimensions of a single construct (e.g., stress, resources) were combined to represent each multidimensional variable. This combination was done on a conceptual basis rather than on a statistical basis in order to develop a truly multidimensional construct, with multiple measures tapping into different dimensions of the overall construct (Quittner, et al., 1990). Had there been significant relationships between the measures, the multidimensionality of the aggregate variable would have been questionable, as the measures would have been tapping into similar aspects of the overall construct.

Aggregates were calculated by changing all variables into a uniform metric (z-score) and averaging them. Variables that were not normally distributed, including scores on the MSPSS, FES, LEC, DAS, and

communication task, were transformed, and the transformed variables were checked for normality, prior to calculating z-scores, as indicated above. Correlations were computed to assess whether the resources and stress variables were significantly related, since scores from the FES contributed to each (i.e., conflicted factor for stress, supportive factor for resources); there was no significant relationship ($r=-.20$, $p=.08$).

Functional Independence

The "functional independence" variable consists of the Daily Living Skills scale of the Vineland Adaptive Behaviors Scale and the Language Development domain of the AAMD-Adaptive Behavior Scale. While there was a positive correlation between these measures, the relationship was quite small and not significant ($r=.23$; $p=.06$). Higher scores on the functional independence variable were expected to be associated with better adjustment in the children.

Psychosocial Stress

Scores from the LEC, the FERCHL, and Conflicted factor of the FES were combined to form a "psychosocial stress" variable. The DAS was completed by only 35 families (i.e., all two-parent households). Because scores on the DAS did not add to the variance in outcome accounted for by the other stress variables and 25% of the sample did not complete the measure, it was dropped from analyses. There were no significant

relationships between the transformed FERCHL scores, transformed LEC scores, and the FES conflicted scale (Table 4). Higher scores on the psychosocial stress variable were expected to be related to poorer adjustment in the children.

Table 4.--Relationships among Psychosocial Stress Measures

| Measure | FES Conflict | LEC |
|--------------|--------------|------|
| FERCHL | .07 | .11 |
| FES Conflict | | -.01 |

Psychosocial Resources

Scores from the FES Supportive factor, parent-child communication efficacy task, and MSPSS were aggregated to provide a "psychosocial resources" variable (equivalent to Wallander and Varni's "social-ecological" variable; Wallander & Thompson, 1995). Transformed scores on the FES supportive factor were moderately correlated with transformed scores on the MSPSS (Table 5). Because the transformations for the FES Supportive factor, MSPSS, and communication task variables involved reflecting the scores to normalize the distributions (i.e., subtracting individual scores from a constant), the aggregate resources variable was multiplied by -1 so that higher scores on "resources" would represent more psychosocial resources. Thus, higher scores on the resources variable were expected to be associated

Table 5.--Correlations among Psychosocial Resources Measures

| Measure | FES Supp. | Communication |
|-----------|-----------|---------------|
| MSPSS | .35* | .14 |
| FES Supp. | | -.09 |

* $p \leq .05$.

with better adjustment in the children.

Adjustment

T-score averages were calculated from teacher and parent reports of children's adjustment, yielding one score for each child's externalizing behavior problems (CBCL and TRF), internalizing behavior problems (CBCL and TRF), and appropriate behaviors (MESSY). High scores on the Achenbach externalizing and internalizing behavior problems scales represent poor adjustment, whereas high scores on the MESSY appropriate behaviors scale indicate good social competence. Correlations between these three scales were minimal to moderate ($r \leq .4$), and the three outcomes have distinct conceptual definitions or empirical correlates in the literature (e.g., Wallander, et al., 1989). Thus, data were analyzed with externalizing behavior problems, internalizing behavior problems, and appropriate behaviors used as distinct outcome variables. There was a moderate correlation between parent and teacher reports on the externalizing behavior scale ($r = .47$, $p < .01$), but no significant correlation between parent and teacher reports on internalizing

behavior problems ($r=.20$, $p=.09$) or appropriate behaviors ($r=-.01$, $p=.48$).

While inter-rater agreement on the externalizing behavior scale was consistent with Achenbach's reported findings of correlations between 0.5 and 0.7 (Achenbach, 1991b), inter-rater agreement for the internalizing scale differed somewhat from his reported correlations falling between 0.3 and 0.5 (Achenbach, 1991b).

Correlations among Independent Variables

Correlations were computed to assess relationships among independent variables, including dB loss, functional independence, psychosocial stress, psychosocial resources, and coping. Psychosocial stress was significantly and negatively related to functional independence ($r=-.37$, $p<.001$). Psychosocial resources were significantly and positively related to children's use of problem-focused coping strategies ($r=.39$, $p<.01$). All other correlations were not significant, with values less than or equal to 0.2.

Identifying Covariates

Correlations were computed between demographic variables (age, gender, family structure, SES, race, etiology of HI, child's educational setting, and child's communication modality) and adjustment of the children. No significant correlations were evident. Correlations between demographic characteristics and independent variables, including each measure administered (e.g., LEC, FERCHL) and the aggregate variables (e.g.,

"functional independence") were also computed. Results revealed a significant correlation between age and performance on the parent-child communication task ($r=.55$, $p\leq.001$) and between age and the use of problem-focused coping ($r=.48$, $p\leq.001$), as would be expected. However, age was not related to outcome variables; therefore, age was not controlled for in analyses assessing the relationship between communication or coping and children's adjustment.

Hypotheses: Predictive Utility (A)

Hypothesis (A1)

The predictor variables (i.e., severity of a child's hearing loss, the child's functional independence, psychosocial stress, psychosocial resources, and the child's use of problem-solving coping strategies) were expected to account for a significant portion of the variance in the adjustment of children with HI.

Results

As noted above, due to low correlations between internalizing behavior problems, externalizing behavior problems, and appropriate social skills, analyses were conducted using each as a distinct outcome variable.

Predictors of children's adjustment were assessed with hierarchical multiple regression analyses. To assess the first hypothesis (A1), disability severity

(i.e., decibel (dB) loss) and functional independence were entered stepwise in the first step, followed by stepwise entry of psychosocial stress and resources in the second step, followed by the coping variable in the third step. This order of entry was selected based on the expectation that environmental variables (i.e., stress and resources) would account for variance in children's outcome above and beyond that accounted for by individual variables (i.e., disability severity and functional independence). How a child managed his/her individual and environmental situations (i.e., the extent to which the child engaged in problem-focused coping) was expected to account for yet additional variance in outcome. Stepwise entry of decibel loss and functional independence was used for step one, as there were no a priori hypotheses regarding which would contribute the most to outcome in children with HI. This was also the case in the second step, which included psychosocial stress and resources.

As table 6 and 7 indicate, risk and resistance factors accounted for a significant portion of the variance in the following dependent variables, after entry of all independent variables: overall externalizing behavior problems (i.e., average of parent and teacher reports regarding externalizing behavior problems)($F(5,43)=3.84, p \leq .01$), teacher-reported (TRF) externalizing behavior problems ($F(5,43)=2.51, p \leq .05$), parent-reported (CBCL) externalizing behavior problems ($F(5,44)=3.06, p \leq .05$), and parent-reported appropriate social skills ($F(5,44)=4.94, p \leq .001$). Correlations between

Table 6.--Hierarchical Multiple Regression of Risk and Resistance Factors on Externalizing Behaviors

| Step | B ^b | R ² Change |
|---|----------------|-----------------------|
| DV=Externalizing Behavior Problems ^a | | |
| 1. FI | -.23 | .13* |
| dB loss | -.00 | .00 |
| 2. Stress | .29 | .10* |
| Resources | -.01 | .01 |
| 3. Coping | -.28 | .07* |
| R ² | = .31** | |
| Adjusted R ² | = .23 | |
| DV=Teacher-reported Externalizing Behavior Problems | | |
| 1. FI | -.34 | .15** |
| dB loss | .01 | .00 |
| 2. Resources | .00 | .01 |
| Stress | .07 | .01 |
| 3. Coping | -.26 | .06 |
| R ² | = .23* | |
| Adjusted R ² | = .14 | |
| DV=Parent-reported Externalizing Behavior Problems | | |
| 1. FI | -.02 | .03 |
| dB loss | -.01 | .00 |
| 2. Stress | .38 | .15* |
| Resources | -.00 | .01 |
| 3. Coping | -.28 | .07* |
| R ² | = .26* | |
| Adjusted R ² | = .17 | |

^a Average of parent and teacher-reported externalizing behavior problems;

^b Beta values following last step of regression; FI= Functional Independence

* $p \leq .05$.

** $p \leq .01$

Table 7.--Hierarchical Multiple Regression of Risk and Resistance Factors on Parent-reported Appropriate Behavior

| Step | B ^a | R ² Change |
|-------------------------------|----------------|-----------------------|
| 1. FI | .11 | .03 |
| dB Loss | .02 | .00 |
| 2. Resources | .23 | .15** |
| Stress | .02 | .00 |
| 3. Coping | .46 | .17*** |
| R ² = .36*** | | |
| Adjusted R ² = .29 | | |

^a Beta values following last step of regression

FI=Functional Independence

* $p \leq .05$.

** $p \leq .01$.

*** $p \leq .001$.

independent variables and outcome variables are reported in Table 8.

Overall externalizing behavior problems (based on the average of teacher and parent reports) were associated with lower functional independence, higher psychosocial stress, and decreased coping skill. Two of these predictors, functional independence and psychosocial stress, were negatively correlated with one another ($r = -.37$, $p \leq .001$). Hierarchical regression revealed that individual factors (specifically, functional independence) accounted for a small but significant portion (13%) of the variance in overall externalizing behavior problems; environmental factors (psychosocial stress and resources) accounted for 11% more of the variance in outcome; and finally, coping skills

Table 8.--Relationship between Independent Variables (IV) and Outcome.

| IV | Extern. Behavior ^a | TRF Extern. Behavior | CBCL Extern. Behavior | Approp. Behavior-PR |
|-----------------|-------------------------------|----------------------|-----------------------|---------------------|
| dB Loss | .00 | .03 | -.01 | -.06 |
| FI ^b | -.36** | -.39** | -.17 | .17 |
| Stress | .42*** | .23 | .42*** | .12 |
| Coping | -.35** | -.30* | -.33** | .54*** |
| Resources | -.22 | -.18 | -.19 | .42*** |

^a Average of parent and teacher reports

^b Functional Independence

* $p \leq .05$.

** $p \leq .01$.

*** $p \leq .001$.

accounted for an additional 7% of the variance in overall externalizing behaviors. The full model explained 31% of the variance in overall externalizing behavior of children with HI. Individual differences in the child's adaptive functioning, differences in the family's psychosocial stress, and differences in coping skills each contributed significantly to overall scores for externalizing behavior.

The factors that predicted teacher-reported externalizing behavior problems (TRF-EXT) were somewhat different from those that predicted parent-reported externalizing behavior problems. Lower functional independence and decreased coping skill were related to teacher-reported externalizing behavior problems. Hierarchical regression indicated that 15%

of the variance in TRF-EXT was accounted for by individual factors (specifically, functional independence). Environmental factors (psychosocial stress and resources) did not explain a significant amount of additional variance in outcome (2%). Addition of coping skill to the equation also failed to significantly improve the model (6%), even though coping was significantly and negatively correlated with TRF-EXT ($r = -.30$, $p \leq .05$). Thus, low functional independence (assessed by measures of language development and daily living skills) was the strongest predictor of increased externalizing behavior problems at school. The full model explained 23% of the variance in teacher-reported externalizing behavior problems.

In contrast, parent-reported externalizing behavior problems (CBCL-EXT) were not associated with functional independence, but were strongly related to increased psychosocial stress. Together, environmental variables (psychosocial stress and resources) accounted for 16% of the variance in CBCL-EXT, above and beyond individual factors, due mostly to the relationship between CBCL-EXT and psychosocial stress. Children's coping skills accounted for an additional 7% of the variance in outcome, above and beyond individual and environmental factors. The full model accounted for 26% of the variance in CBCL-EXT.

Finally, parent-reported appropriate behavior was unrelated to individual factors (dB loss and functional independence). Adding environmental factors to the equation yielded significantly improved prediction of children's

appropriate behavior (explaining 15% of the variance), due mainly to the positive correlation between parent-reported appropriate behavior and psychosocial resources (assessed by efficacy of parent-child communication, supportive family environment, and parents' perceived social support).

Inclusion of coping skills explained an additional 17% of the variance in outcome. Even though better coping was significantly related to increased psychosocial resources ($r=.39$, $p<.01$), it appears that coping contributed uniquely, above and beyond differences in resources, to individual differences in parent-reported appropriate behavior of children with HI. The full model accounted for 36% of the variance in parent-reported appropriate behavior.

Hypothesis (A2)

Of the psychosocial resources, communication efficacy between parents and their children with HI was anticipated to account for additional variance in the children's adjustment, above and beyond family supportiveness and parents' perceived social support.

Results

To evaluate hypothesis A2, a hierarchical multiple regression was computed (Table 9). The FES supportive scale and the MSPSS were entered simultaneously in the first step (as there were no a priori hypotheses regarding which of these two measures would contribute the most variance to outcome; they were expected to be equally important to outcome), followed by

Table 9.--Hierarchical Regression of Resource Measures on Outcome

| Step | <u>B</u> : Extern. Behavior (DV) | <u>B</u> : Intern. Behavior (DV) | <u>B</u> : Approp. Behavior (DV) |
|---------------|--|--|--|
| 1. | | | |
| FES Supp. | -.33* | -.02 | .07 |
| MSPSS | -.04 | -.05 | .33* |
| 2. | | | |
| Communication | -.13 | -.07 | .05 |
| | R ² change = .02 | R ² change = .00 | R ² change = .00 |
| | R ² = .13 | R ² = .01 | R ² = .14 |
| | Adjusted R ² = .07 | Adjusted R ² = -.06 | Adjusted R ² = .08 |

Note: B values are following last step of regression; FES Supp.=Family Environment Scale, Supportive factor; MSPSS=Multidimensional Scale of Perceived Social Support

* $p \leq .05$.

entry of the communication task variable. There was a trend towards a relationship between the resources variable (i.e., using all three measures) and children's adjustment, when adjustment was defined as overall externalizing behavior problems ($F(3,45)=2.27$, $p=.09$) or overall appropriate behaviors ($F(3,45)=2.45$, $p=.08$). There was no significant relationship between the resources variable and adjustment, when adjustment was operationalized as overall internalizing behavior problems ($F(3,45)=0.13$, $p=.94$). Communication did not add to the variance in outcome, above and beyond other resource variables (family supportiveness and parents' perceived social support).

Hypotheses: Mediators and Moderators of Adjustment (B)

Hypothesis (B1)

Consistent with Wallander and Varni's model (e.g., Wallander & Thompson, 1995), functional independence was expected to mediate the relationship between hearing loss severity and the adjustment of children with HI. Children with more severe hearing losses were anticipated to be more limited in their functional independence and, therefore, more poorly adjusted than children with less severe hearing losses.

Hypothesis (B2)

Also consistent with Wallander and Varni's conceptual model, it was hypothesized that psychosocial stress would mediate the relationship between hearing loss level and the adjustment of children with HI. That is, children with more severe hearing losses were expected to experience more psychosocial stress, and, in turn, to be more poorly adjusted than children with less severe hearing losses.

Results

There was no significant relationship between disability severity (dB loss) and adjustment (Table 10). Therefore, there was no relationship for psychosocial stress or functional independence to mediate; further analyses were not conducted.

Table 10.--Relationship between Hearing Loss Severity and Outcome

| | Extern. Behavior | Intern. Behavior | Approp. Behavior |
|------------|---------------------|---------------------|---------------------|
| Aided Loss | .00 | -.20 | -.02 |

Hypothesis (B3)

Psychosocial stress was expected to mediate the relationship between functional independence and children's adjustment. Children with greater functional independence were expected to experience less psychosocial stress, and, in turn, be better adjusted than children with poorer functional independence.

Results

Using procedures outlined by Holmbeck (1997), results indicated that hypothesis B3 was supported for overall externalizing behavior problems and internalizing behavior problems (Figure 4). That is, the following conditions were met: functional independence (FI) was significantly correlated with psychosocial stress ($r = -.37$, $p \leq .001$); FI was significantly correlated with overall externalizing behaviors ($r = -.36$, $p \leq .001$) and overall internalizing behaviors ($r = -.33$, $p \leq .01$); psychosocial stress was significantly correlated with overall externalizing behaviors ($r = .42$, $p \leq .001$) and overall internalizing behaviors ($r = .31$, $p \leq .01$); and when stress was controlled for, FI was no longer

significantly related to adjustment (Figure 4). There was a 33% drop in the relationship between FI and externalizing behaviors, and a 27% drop in the relationship between FI and internalizing behaviors when stress was controlled.

Hypothesis (B4)

Psychosocial resources were expected to moderate the HI. Higher stress was expected to be associated with poorer adjustment of children with HI when their psychosocial resources were lower. Higher psychosocial resources were expected to attenuate the impact of stress on the children's adjustment.

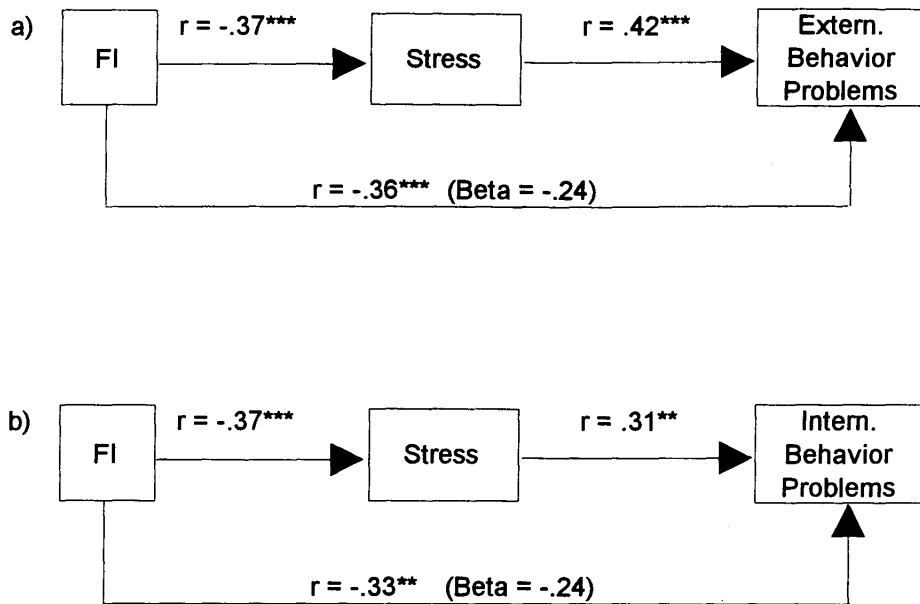
Results

Again using the statistical techniques outlined by Holmbeck (1997), which involve computing a multiple regression equation that includes an interaction term of the independent variables, support for hypothesis B4 was found. As indicated in Table 11, the relationship between stress and parent-reported appropriate behavior varied with high ($r = -.39, p \leq .05$) and low ($r = .51, p \leq .01$) resources (Figure 5).

Hypothesis (B5)

The use of problem-solving coping strategies was expected to moderate the relationship between psychosocial stress and the adjustment of children

Figure 4. Stress as a mediator of the relationship between functional independence (FI) and a) externalizing behavior problems and b) internalizing behavior problems.



Note: r values are simple correlations. Betas indicate relationship after mediator was controlled.

** $p \leq .01$

*** $p \leq .001$

Figure 5. Stress by parent-reported appropriate behavior for low and high resources groups.

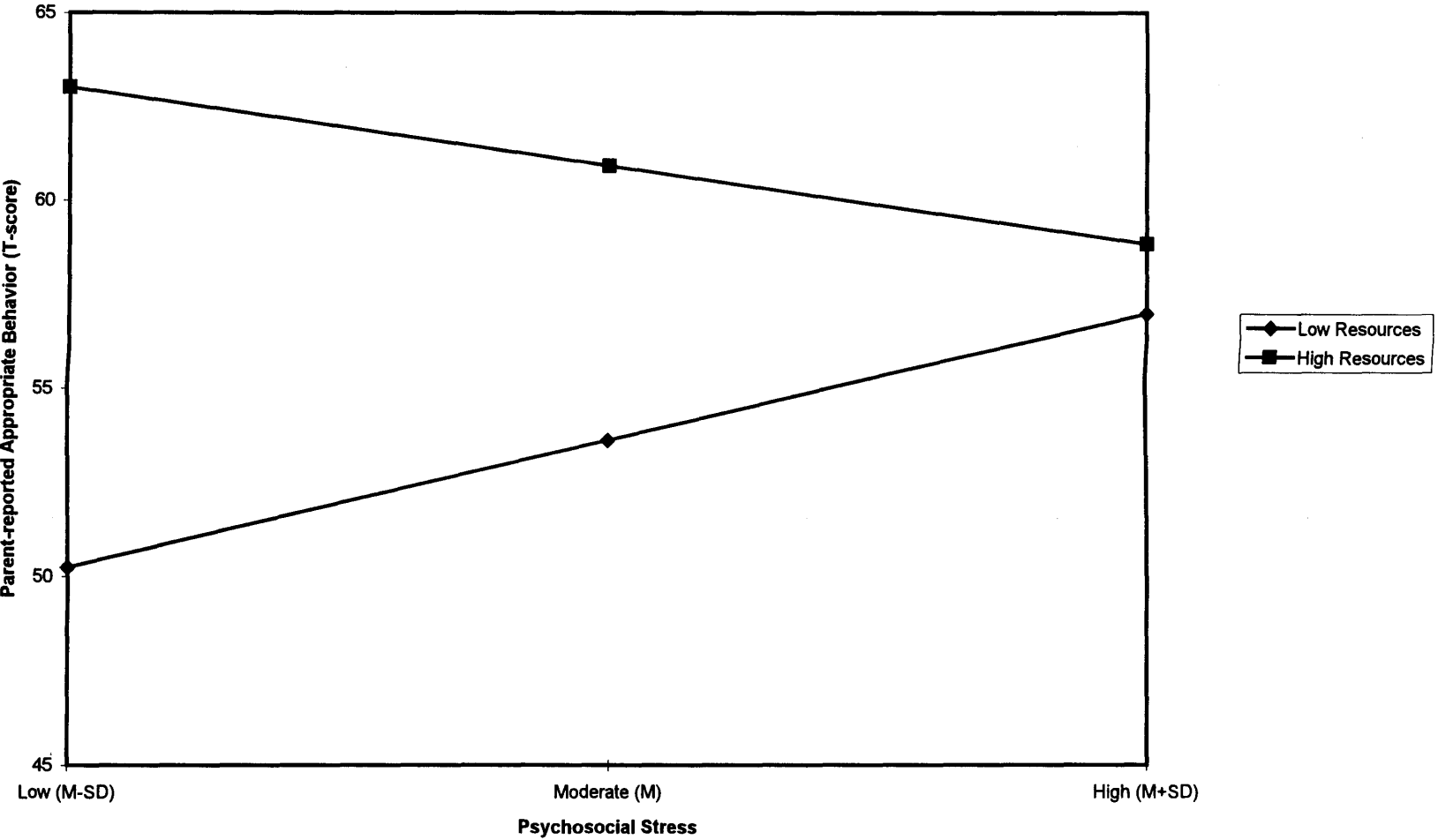


Table 11.--Regression: Moderating Effect of the Interaction of Stress and Resources on Parent-Reported Appropriate Behavior of Children with HI

| Step | B | <u>B</u> |
|-----------------------|-------|----------|
| 1. Stress | 1.07 | .08 |
| 2. Resources | 5.47 | .45*** |
| 3. Stress x Resources | -6.72 | -.36** |

** $p \leq .01$.

*** $p \leq .001$.

with HI. That is, higher psychosocial stress was expected to predict poorer adjustment among children with HI who use problem-solving coping strategies infrequently; increased use of problem-solving coping strategies was expected to lessen the impact of stress on the children's adjustment.

Results

Similar statistical strategies employed to investigate hypothesis (B4) were used to evaluate hypothesis (B5). Results revealed a moderating effect of problem-solving coping strategies on the relationship between psychosocial stress and adjustment, when adjustment was operationalized as internalizing problems (overall and teacher-reported) and as teacher-reported externalizing problems (Table 12). The relationship between psychosocial stress and outcome in children with HI varied with their use of problem-focused coping strategies (Table 13; Figures 6, 7, and 8). The strength of the relationship

Table 12. -- Regression: Moderating Effect of the Interaction of Stress and Problem-Solving on the Adjustment of Children with HI

| Step | B | <u>B</u> |
|--|------|----------|
| DV = Overall Internalizing Behavior Problems | | |
| 1. Stress | 2.37 | .20 |
| 2. Coping | -.04 | -.06 |
| 3. Stress x Coping | .08 | .29* |
| DV = TRF Internalizing Behavior Problems | | |
| 1. Stress | .36 | .03 |
| 2. Coping | -.04 | -.06 |
| 3. Stress x Coping | .11 | .37* |
| DV = TRF Externalizing Behavior Problems | | |
| 1. Stress | .59 | .04 |
| 2. Coping | -.29 | -.30* |
| 3. Stress x Coping | .16 | .40** |

* $p \leq .05$.

** $p \leq .01$.

Table 13.--Correlates between Psychosocial Stress and Outcome at Different Levels of Coping

| | Stress and Overall Intern. Behavior | Stress and TRF-Intern. Behavior | Stress and TRF-Extern. Behavior |
|-------------------|---|---------------------------------------|---------------------------------------|
| Low Coping Skill | .35* | .09 | .41* |
| High Coping Skill | .30 | .21 | .07 |

* $p \leq .05$.

Figure 6. Stress by overall internalizing behavior problems for low and high coping groups.

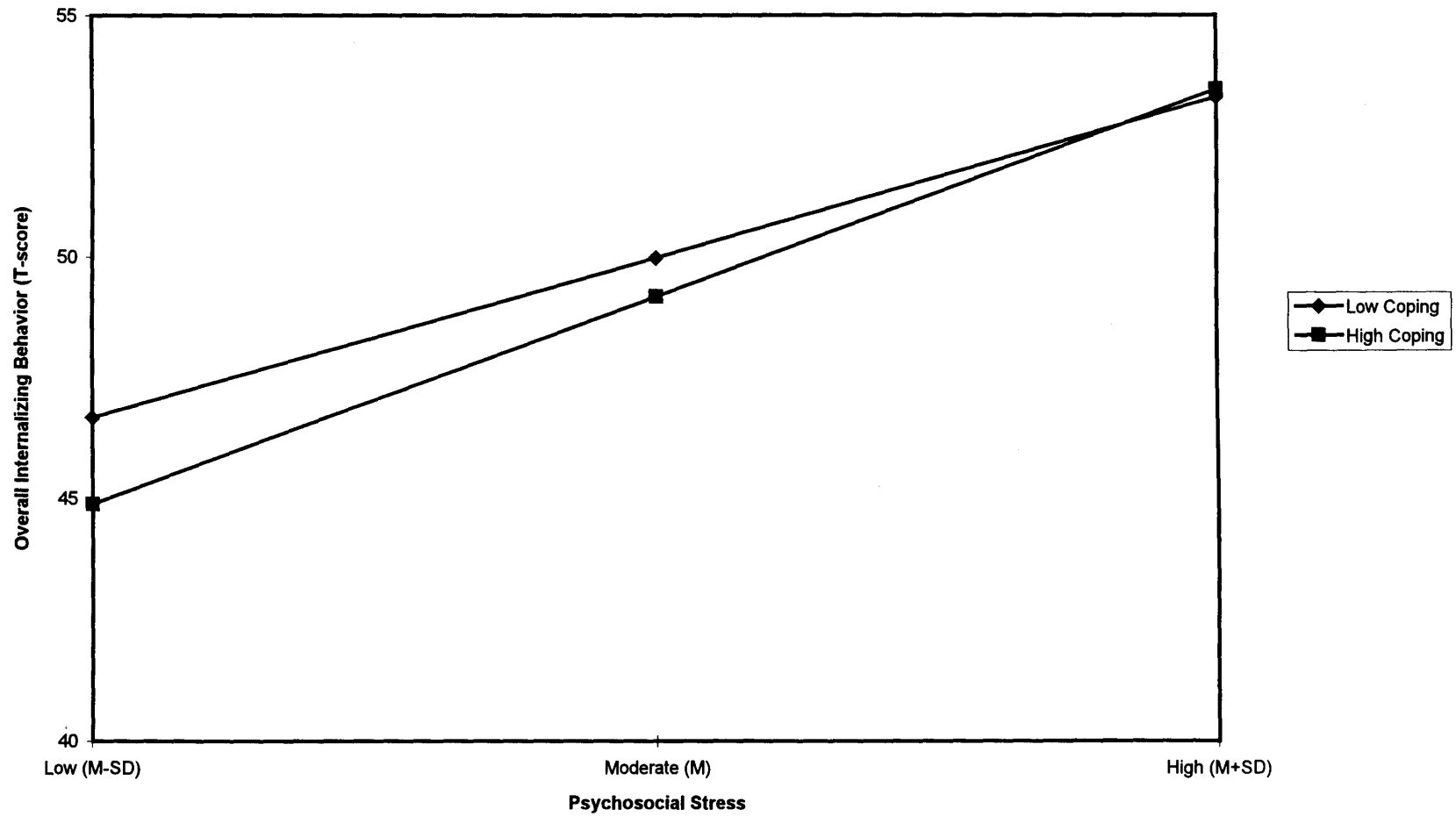


Figure 7. Stress by teacher-reported internalizing behavior problems for low and high coping groups.

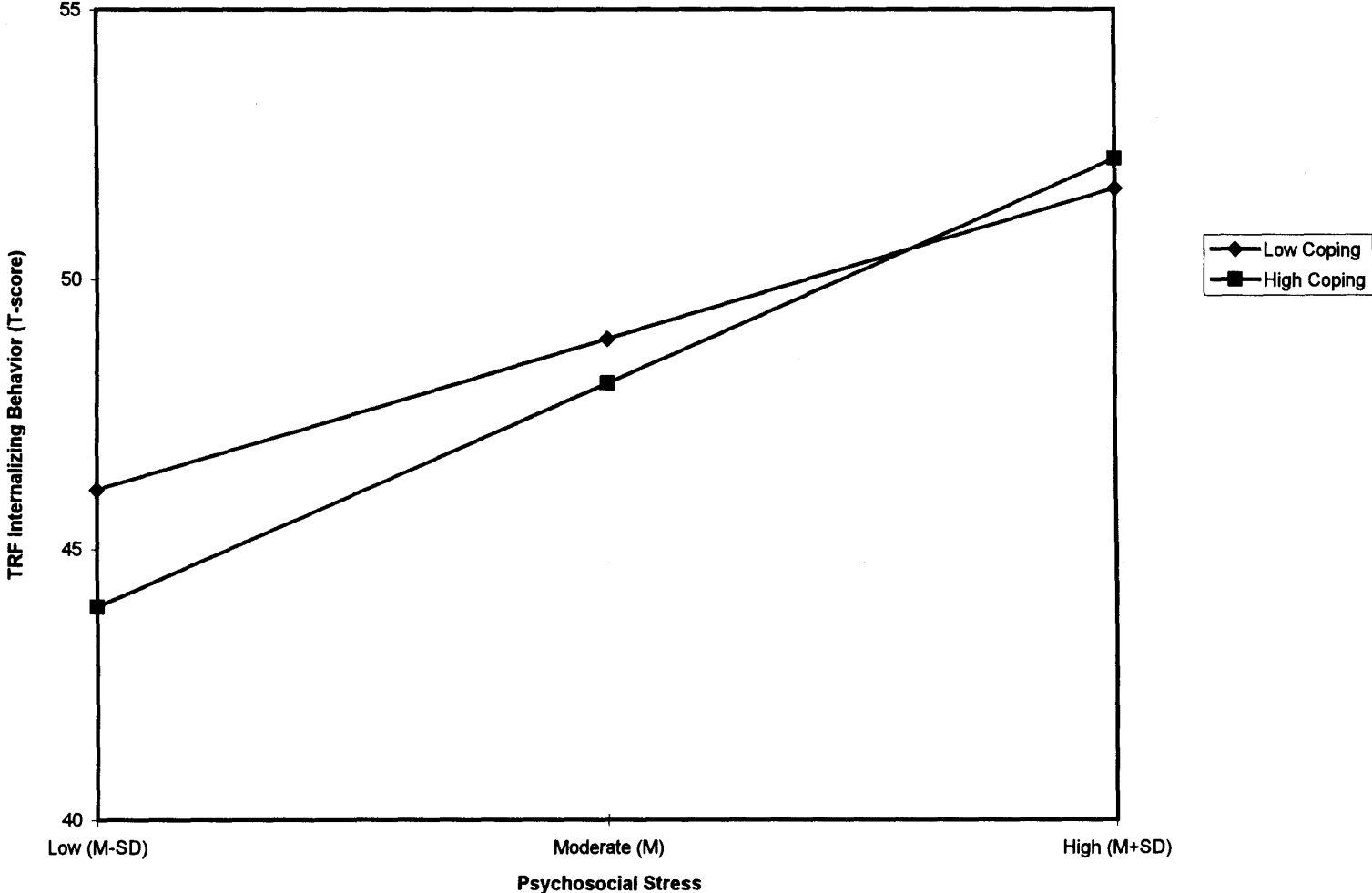
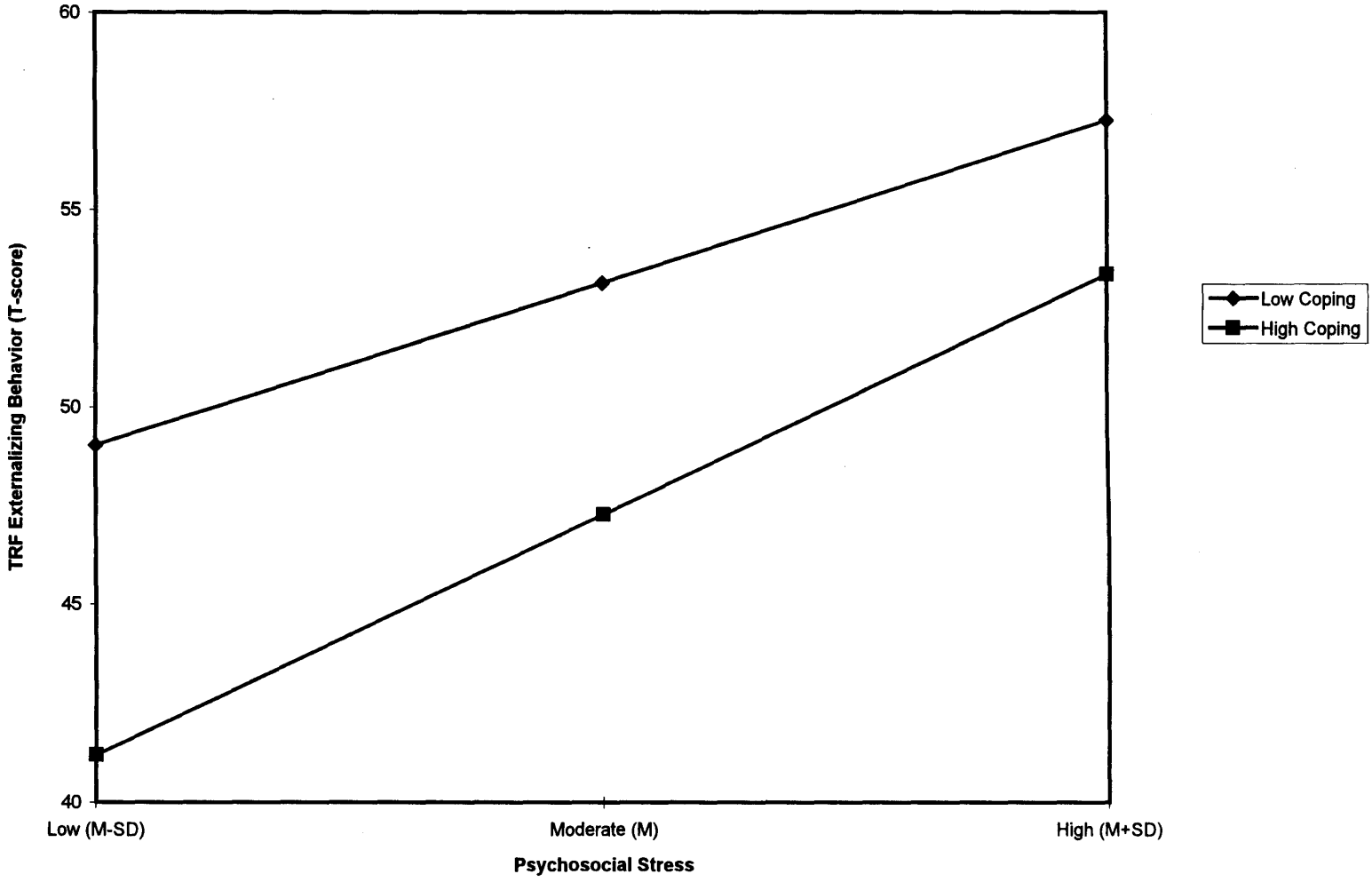


Figure 8. Stress by teacher-reported externalizing behavior problems for low and high coping groups.



between stress and overall internalizing behavior problems, as well as between stress and teacher-reported externalizing problems, was decreased for those children engaging in more frequent use of problem-focused coping strategies. However, the relationship between stress and teacher-reported internalizing behavior problems was stronger for those children using more problem-focused coping, which was an unexpected finding. It is also noteworthy that children with high levels of psychosocial stress who were using more problem-focused coping strategies displayed more overall and teacher-reported internalizing behavior problems than those children who used fewer problem-focused coping strategies.

Exploratory Analyses

After testing the main hypotheses of the present study, exploratory analyses were conducted. The relationship between children's scores on the MESSY and the Achenbach scales was investigated to further explore the validity of the MESSY when used with a sample with HI. Significant relationships were found between parent reports on the CBCL externalizing behavior scale and the MESSY inappropriate scale ($r=.78, p<.01$), the CBCL total behavior problems scale and the MESSY total adjustment scale ($r=.68, p<.01$), and the CBCL social competence scale and the MESSY appropriate behavior scale ($r=.34, p<.05$). Significant relationships were apparent between teacher reports on the TRF externalizing behavior scale and the

CHAPTER IV

DISCUSSION

The purpose of the present project was to assess whether the risk and resistance factors identified by Wallander and colleagues (Wallander, et al., 1989) predict adjustment in children with HI. Consistent with Wallander and Varni's model, risk factors studied include severity of hearing loss, functional independence, and psychosocial stress (e.g., family conflict, major life events). Resistance factors included psychosocial resources (e.g., family supportiveness, parents' perceived social support) and children's coping skills. Measures of internalizing and externalizing behavior problems, as well as appropriate social skills, were used to assess the children's outcome.

Comparisons between Sample and Normative Data

Behavior Problems: HI vs. Norms

Results indicated that, overall, children with HI did not exhibit high levels of behavioral maladjustment. Although there was a statistically significant difference between the parent-rated adjustment of the present sample and normative, nondisabled samples, the difference was not clinically significant. That is, the sample's mean T-scores fell within the average range. However,

while scores assessing adjustment were not elevated for the sample as a whole, significant concerns were apparent for individual children. Examination of the outcome of individual children revealed that 26% of the children exhibited clinically significant maladjustment (CBCL Total Behavior Problems scale), in contrast to a 10% base rate of clinically significant problems in the general population. Teacher reports identified 14% of the sample as being clinically maladjusted, again compared with a 10% base rate in the general population.

Findings based on parent ratings are consistent with previous research. Meadow and Schlesinger (1971) reported a 30% prevalence rate of maladjustment in children who were deaf. Mitchell and Quittner (1996) reported somewhat higher rates of clinical maladjustment in their sample, ranging from 35% (teacher reports) to 48% (parent reports). Adjustment was measured by Mitchell and Quittner (1996) using the Achenbach scales, however, Meadow and Schlesinger (1971) used a questionnaire developed for a mental health survey conducted in 1966. Thus, results do not appear to be an artifact of the measure used, since results are consistent across measures. High rates of maladjustment reported in studies assessing children with HI highlight that these children are at risk for adjustment difficulties, even though the majority exhibit normal behavioral adjustment.

While it is unclear why prevalence rates of maladjustment reported by teachers are lower than those reported by parents, it may be because

teachers consider a wider range of behavior "normal" or "acceptable" for children with HI. In addition, in the present study, teacher data were collected approximately three months into the school year; thus, many teachers reported knowing the children only "moderately well" (vs. very well). Perhaps if teacher reports were gathered later in the school year, their reports would have been more similar to parent reports.

Appropriate Social Skills: HI vs. Norms

Scores on the Appropriate Social Skills scale of the MESSY - parent report, which assesses specific prosocial behaviors (e.g., smiles at people he/she knows), were higher than the normative group. However, again, the difference was not clinically significant. The sample's high scores on the CBCL problem behavior scales and the MESSY appropriate behavior scale suggest that children with HI may be generally more behaviorally active, energetic, or expressive, both positively and negatively, than normally-hearing samples. However, it should be noted that the same children who were high on a behavior problem scale were not the same children who were high on the appropriate behavior scale. The sample's high scores may also suggest that normative data on hearing samples is not an appropriate standard of comparison for children with HI when assessing deviancy or clinical maladjustment within a HI population, in that the mean for children with HI may be higher due to their expressiveness.

Children's overall appropriate behavior (but not problem behavior) was related to their language skill. That is, children with better overall language ability demonstrated increased social skills. This suggests that children with HI who have greater ability to communicate with their peers, in either sign language or speech, are more apt to assert themselves to meet others and engage in prosocial behavior. This is consistent with previous research reporting a significant relationship between language skills and psychosocial adjustment in hearing (Beitchman, et al., 1986) and deaf samples (Musselman, McKay, Trehub, & Eagle, 1996).

The above findings support the notion that prosocial behavior and problem behavior can be distinct and independent dimensions of adjustment, and therefore should be measured separately. Examination of the scores of individual children who had clinically significant behavioral problems revealed that they were not the same individuals who had clinically significant poor social skills, nor were they the same children who were especially skilled socially.

Outcome Measures: MESSY vs. Achenbach Scales

Results regarding the sample's appropriate and problem behavior varied with the measure used. Prevalence rates of clinical maladjustment gleaned from the MESSY revealed that only 2% of the sample obtained scores at a clinically significant level. It appears that fewer children were identified as

clinically maladjusted based on the MESSY versus the Achenbach scales in part due to the fact that calculation of the MESSY total adjustment scale incorporates scores from the appropriate behavior scale. As noted above, there was a significant difference between the normative and present samples on the parent-reported appropriate behavior scale, with the present sample exhibiting more appropriate behavior. Those high scores on the "appropriate" scale led to better overall adjustment ratings on the MESSY. In contrast, scores on the Achenbach are calculated separately for positive and negative behaviors, yielding a social competence score and a total behavior problems score (versus a total adjustment score).

Differences in the normative data between the Achenbach and MESSY measures also seem to account for lower prevalence rates of maladjustment resulting from the MESSY. Only 10% of the sample was identified as clinically maladjusted based on the parent-reported MESSY inappropriate behavior scale, versus 22% of the sample based on the parent-reported (CBCL) externalizing behavior scale. Similarly, only 2% of the sample fell at a clinically maladjusted level based on teacher reports on the MESSY inappropriate scale versus 14% of the sample based on the teacher-reported (TRF) externalizing behavior scale.

Regarding appropriate behavior, parental report on the Social Competence scale of the CBCL indicated that children in the present sample exhibited poorer social competence than the normative sample, which is

consistent with previous research studying children with chronic illness or disability (Wallander, et al., 1988). While the difference between the normative and present samples, again, was not clinically significant, 21% of the sample exhibited social skills that were at a clinically significant low level compared to a nondisabled, normative sample. However, this scale may underestimate the social adjustment of children with disabilities due to its narrow focus, as there are only a few questions that comprise the scale and the questions center around children's participation in organizations and athletics, and their school performance (Drotar et al., 1995). Children with HI may have limited opportunity or desire to join sports teams or clubs due to communication challenges, and school performance is often compromised in children with HI.

Despite the discrepant findings between measures used to assess the outcome of children with HI, there were significant associations between the problem behavior scales from each measure. This suggests that scores moved together in the same direction (i.e., high scores on the MESSY were related to high scores on the Achenbach scales) and that the measures were tapping into a uniform construct. For the present project, scores from the Achenbach scales were used to assess behavior problems, as it is much better validated and has separate normative data for teacher and parent-reports (Achenbach, 1991a; Achenbach, 1991b). There was only a small correlation between the Social Competence scales of the Achenbach CBCL

and the Appropriate Social Skills scale of the MESSY. Because the MESSY is more face valid for a sample with HI, asking questions relevant to children regardless of their hearing status, and because reliability and validity of the MESSY was demonstrated previously with children with HI (Matson, Macklin, & Helsel, 1985), scores from the MESSY were used to assess appropriate behavior for this sample.

Predictor Variables: HI vs. Norms

Scores on the LEC were higher than normative data. While frequent life events may be related to the children's HI (e.g., change in parents' financial status), high scores may also reflect a cohort effect. That is, normative data were published in 1972 (Coddington, 1972), and families in the 1990s may be experiencing more stressors than families comprising the normative group. Updated norms would be necessary to evaluate this possibility.

Parent reports on the adapted form of the Vineland yielded a statistically lower mean on the Daily Living Skills scale than for the normative group. This discrepancy may be an artifact of the adaptation of the measure from an interview format, in which the interviewer completes the ratings, to a paper-and-pencil questionnaire format that parents completed independently. No normative data are available on this adapted measure for comparison with the sample's scores. Some questions on the Vineland are ambiguous, such as "Uses the emergency telephone in emergency," as a child should be rated as

doing this "habitually" if he/she knows the emergency number and could call if an emergent situation arises. However, individual questionnaire items were explained to parents only when they inquired. Thus, it is likely that some of their ratings were not completed in the manner in which the Vineland manual prescribes. Nevertheless, the difference between the normative group and this sample was not clinically significant, as the average score of the sample was less than one standard deviation lower than the mean of the standardization sample.

Predictors of Adjustment in Children with HI

Significant predictors of adjustment in children with HI varied depending on the operationalization of the outcome variable, which underscores the point that results from studies investigating one aspect of psychological functioning should not be grouped with those studying a different dimension (e.g., appropriate behavior vs. externalizing behavior problems). Therefore, in the discussion that follows, positive and negative outcomes will be addressed separately.

What Predicts Behavior Problems?

The severity of a child's hearing loss was not related to behavioral adjustment. This is consistent with work published by Rodda (1984), Musselman and colleagues (1988) and the unpublished work of this author (Burk, 1994). This is an optimistic finding, as variables that are amenable to

change through intervention or prevention seem to have stronger associations with the outcome of children with HI than the severity of the children's aided hearing loss, which cannot be improved in all cases.

Functional independence, assessed by measures of language development and daily living skills, was related to fewer overall externalizing behavior problems (the average of parent and teacher ratings). Separate analysis of teacher and parent-reported behavior problems revealed that functional independence was related only to teacher-reported externalizing behavior problems. Parents of children with disability, who often tend to be over-protective (Schlesinger & Meadow, 1972), may expect their children to lack independent care skills and age-appropriate language skills, whereas teachers may have higher expectations. Higher expectations may then lead to increased display of externalizing behavior problems in the children due to the children's frustration of not being able to meet their teacher's demands.

Psychosocial stress mediated the relationship between children's functional independence and their overall externalizing and internalizing behavior problems. Higher functional independence was related to lower psychosocial stress which was, in turn, related to fewer externalizing and internalizing behavior problems. This suggests that when children with HI are better able to care for themselves and develop adaptive daily living skills (e.g., personal grooming, self-care), family conflict and stress is lower. Lower stress then results in fewer externalizing and internalizing behavior problems in the

children. Conversely, a child who has lower functional independence is likely to show more oppositional behavior because of increased family stress (in part due to the child's need for increased care). An alternative hypothesis is that high family stress leads to poorer functional independence and increased externalizing and internalizing behavior. The direction of these relationships could not be determined in the present study, as data analyses were correlational.

Psychosocial stress also was related directly to parent-reported externalizing behavior problems. It is likely that children with HI are hypervigilant observers of their environments, and are keenly aware of stress within the family. Whereas a hearing child is often comforted by a parent's verbal reassurance about stress or changes that the family is experiencing, children with HI are often not informed of things occurring around them (Spradley, 1985). For example, when a family is in "crisis," it is not difficult to imagine a child with a HI standing by, watching intently for cues about what is happening, only to receive a brief synopsis from someone who does not want to redirect his or her attention away from what is occurring or who is not competent at communicating in the child's language (e.g., sign language). This type of interaction, which is common in the life of a person with HI (Spradley, 1985), may be difficult for the child to manage and understand, and may therefore be related to increased behavioral problems at home. It is also possible that the relationship between psychosocial stress and parent-

reported behavior problems is a function of parents having a lower threshold for tolerance of their children's behavior due to high levels of stress in the family; thus, parent ratings of child behavior by parents who are more stressed may exaggerate the child's problems. Finally, parents may have less training and skill for managing children's behavior problems, so problems are worse at home, which, in turn, increases family stress.

What the child does to handle the stress he or she is experiencing or witnessing seems to be essential to the child's outcome. The child who acts upon stress with a problem-focused approach, for instance seeking social support or assistance to improve the situation, seems to fare better than children with HI who lack that coping ability. This is supported by findings revealing that children's use of problem-focused coping strategies accounted for variance in their parent and teacher-reported externalizing behavior problems, above and beyond that accounted for by other individual and environmental variables.

In addition, coping skills moderated the relationship between psychosocial stress and overall internalizing behavior problems, teacher-reported internalizing behavior problems, and teacher-reported externalizing behavior problems. Increased use of problem-focused coping strategies attenuated the impact of psychosocial stress on teacher-reported externalizing behavior problems. The impact of stress on internalizing behavior (overall and teacher-reported) was also lessened by children's use of problem-focused

coping, but only at low and moderate levels of stress. It is possible that for those children experiencing high levels of stress, their effort to engage in problem-focused coping is not sufficient, but instead it is the effectiveness of that effort that affects the level of a child's internalizing behavior. This could not be evaluated in the present study, as data regarding the effectiveness of the children's coping efforts was not gathered. Taken together, results suggest that it is not the presence or absence of psychosocial stress alone that is important in predicting the outcome of children with HI; how well the child is able to manage that stress strongly affects his or her behavioral adjustment, particularly in school.

What Predicts Appropriate Behavior?

Children's language skills (high vs. low) were positively related to overall appropriate behavior (the average of parent and teacher ratings). Perhaps children with HI who had well developed language abilities (in sign or speech) had the skills necessary to be more assertive and prosocial with their peers, initiating conversation, doing nice things for others, and being friendly to others.

Higher psychosocial resources, assessed by family supportiveness, parents' perceived social support, and efficacy of parent-child communication, were related to increased parent-reported appropriate behavior. Perhaps positive, appropriate social behavior is modeled more often in families with

higher resources. Children living in this type of environment may learn that their families place strong value in being friendly, helpful, and supportive to others, so these children may be more likely to engage in prosocial behavior.

Psychosocial resources also moderated the relationship between psychosocial stress and children's appropriate behaviors. While high family resources were expected to lessen the impact of stress on children's social skills, this relationship was found only among families with high resources. Instead, among children who had low psychosocial resources, higher stress was related to more appropriate behavior. This finding does not make intuitive sense. Examination of the scatterplots suggested that this finding may have been due to a restricted range of stress values for families with low resources, nearly all of whom had average to high stress but few of whom had low stress. Had there been more families within the low resources group that also reported moderately low stress, it is likely that the overall relationship between stress and appropriate behavior would have been decreased.

Coping skill was also related to parent-reported appropriate skills. Children with HI who use more problem-focused coping strategies may have a greater sense of control over their environment, which in turn, manifests itself in the children asserting themselves more proactively with their peers.

While it is not clear why the above predictors were not significantly related to teacher-reported appropriate behavior, it may be due to the limited variability in the teacher-reported data regarding appropriate behavior. Few

children fell at statistically high levels on the appropriate behavior scale, per teacher report. In contrast, parent reports resulted in several children falling at high levels, indicating frequent display of appropriate social skill. This difference in reporting may represent a social desirability effect, as parents may be invested in depicting their children as well behaved, social youngsters. The difference may also reflect "true" variance in the children's behavior between settings.

The Risk and Resistance Model

Findings from the present study provide support for use of the adapted version of the model developed by Wallander and colleagues (Wallander, et al., 1988) to predict adjustment in children with HI. Four of the five components evaluated in this study, specifically functional independence, psychosocial stress, psychosocial resources, and coping, were related to the children's outcome. While no significant relationship was found between severity of children's hearing loss and functional independence, psychosocial stress, or children's adjustment, that may be a function of the operationalization and measurement of the variable (see below).

Support was found for distinguishing disability parameters from functional independence, since hearing loss was not related to children's adjustment, whereas functional independence, as assessed by daily living skills and language development, was significantly related to outcome.

Furthermore, results indicated that the relationship between functional independence and children's outcome is mediated by psychosocial stress, also consistent with the model.

Some support was also found suggesting that use of problem-focused coping strategies and psychosocial resources moderate the relationship between psychosocial stress and children's outcome. Support for a positive relationship between coping skill and psychosocial resources was also found.

The present adaptation of the Wallander and Varni model did not include the intrapersonal factor (e.g., temperament) due to measurement difficulties, overlap with outcome, and the age of the present sample. It is possible that inclusion of the intrapersonal factor would have accounted for additional variance in the prediction of adjustment of children with HI.

Overall, findings were consistent with previous research demonstrating significant relationships between children's adjustment and functional independence (Stein & Jessop, 1984; Wallander, et al., 1989), coping (Compas, Malcarne, & Fondacaro, 1988), stress (Murch & Cohen, 1989; Varni, et al., 1989a, 1989c), and psychosocial resources (e.g., Hamlett, Pellegrini, & Katz, 1992; Lewis & Khaw, 1982; Wallander, et al., 1989).

Limitations and Strengths of the Study

As always, limitations of this study must be considered to evaluate the generalizability of the findings. Most participants were from one geographic

location, and therefore it is difficult to determine whether results will generalize to other areas. Furthermore, there was a selection bias, as the majority of families responded to letters they received in the mail explaining the study. It is likely responses came only from those families who were highly invested in learning about HI and learning to communicate in the modality that their children use. Thus, results from this study probably represent findings from families who are adapting relatively well to having a child with a HI.

Measurement of aided hearing loss was limited to current hearing status, and therefore, history of hearing acuity was not taken into account. Some children in this study may have a progressive hearing loss, or presently may be benefitting either more or less from their hearing aids, yet only their current audiological data were gathered. Thus, conclusions suggesting that there is no relationship between hearing loss level and adjustment should be interpreted with caution. Furthermore, results may have differed if unaided hearing loss had been used, rather than aided loss. Individual differences related to hearing loss that were not assessed in the present study include age of onset of HI, pre- versus post-lingual onset, and history of language (either sign language or speech) exposure. This information is very difficult to obtain reliably, since it is inevitably retrospective data. The difficulty in gathering detailed information about a child's hearing loss and its treatment is inherent in studying this population.

Finally, another weakness of the present study is that the moderating

effects of the psychosocial resources factor may have been diminished by the design of the study. That is, the psychosocial stress variable included the conflicted factor of the FES. This factor is calculated by subtracting scores on the cohesion and organization subscales of the FES from the conflict subscale. Likewise, the cohesion and organization subscales were used to compute the supportive factor of the FES scale, which comprised the psychosocial resources factor. Because the psychosocial resources variable was examined as a moderator of the relationship between psychosocial stress and adjustment, the use of the cohesion and organization subscales for both variables may have attenuated any moderating relationships, and therefore operated against the hypotheses of the study.

On the other hand, there were several strengths of this study as well. This study is the first to comprehensively evaluate the Wallander and Varni model. Typically, researchers have considered only one or two of the model's factors in a study (e.g., Wallander, et al., 1989).

Another strength of this study was that adjustment was measured multidimensionally within a single sample. This permitted comparison of predictors across distinct definitions of adjustment. Results suggest that although there are similarities among predictors of unique aspects of adjustment, there are also differences, confirming the value of examining dimensions of adjustment separately.

The measures of appropriate and problem behavior also represent an

advance over prior research. Rather than using the CBCL to assess social competence, the MESSY was used, providing a broader assessment of the children's prosocial behaviors. In addition, two informants rated the children's behavior. Therefore, children's adjustment was assessed across settings (home, community, and school). Finally, only children between the ages of 5 and 12 were included in this study in an effort to avoid the confounding effects of adolescent issues.

Summary

Findings from the present study suggest that predictions regarding a child's outcome should not be based on the severity of his/her hearing loss. This is a very optimistic finding, as it appears that factors that are amenable to change contribute more to a child's social-emotional and behavioral adjustment than does the severity of a child's hearing loss. It is clear from these findings that intervention and prevention efforts with children with HI should focus on decreasing family stress, as well as increasing family resources, children's use of problem-focused coping strategies, and their functional independence. However, findings also suggest that improvement in only one of these areas would not make a clinically significant impact on the adjustment of children with HI. Therefore, intervention must address multiple predictors and outcomes.

Based on this project, stressors that should be explored include the

family's adjustment to their child's HI, family conflict, and major life circumstances (e.g., death of a grandparent) that the family has experienced recently. Resources that should be evaluated include family supportiveness, maternal social support, and efficacy of parent-child communication.

The attention of parents and professionals should be focused on developing and maximizing a child's functional independence and coping abilities, while simultaneously working to maintain low levels of stress and high levels of support in a family. In addition, due to results suggesting that better language skills (in sign language or speech) are related to increased appropriate social skills, results support the continued emphasis on the development of children's language skills, regardless of the modality in which they communicate.

Replication of the present results is needed to determine the generalizability of these findings. In addition, future consideration should include the exploration of the predictors of adjustment in adolescents with HI, as predictors may change over time. Evaluation of parent-child communication between hearing parents and adolescents with HI, particularly those using sign language, should be studied to determine whether parents seem to develop language skills that are commensurate with their adolescents' skills. Relationships between the efficacy of communication between parents and their adolescents with HI and the adjustment of those adolescents should then be analyzed to determine whether poor

communication is related to increased behavior problems in those adolescents. Study of an adolescents with HI may also permit completion of self-reports regarding adjustment and observations of the family environment, but the language level of individual participants would have to be considered.

Future research might also involve assessing the efficacy of intervention and prevention efforts focused on improving problem-solving coping abilities and functional independence in children with HI, bolstering their psychosocial resources, and minimizing their psychosocial stress. That research would help validate the present findings. Finally, it would be beneficial for future research to tease apart the relationships between functional independence, psychosocial stress, and the adjustment of children with HI in an effort to understand the direction of causality. That, in turn, would help better direct the focus of intervention and prevention efforts.

APPENDIX
PROTOCOL MEASURES

BACKGROUND INFORMATION FORM

Please complete the following questions about your family background.

I.

| | | |
|---------------|----------------------|-----------------|
| Child's Name | Birthdate | Grade in school |
| Mother's Name | Yrs. of Education | Occupation |
| Father's Name | Yrs. of Education | Occupation |

Parents' Marital Status (please circle):

Married/Remarried Separated/Divorced Widowed Never Married

Please list the address where your child lives all or most (>50%) of the time:

| | |
|----------------|----------|
| Street Address | Apt. |
| City | State |
| | Zip Code |

() _____
Phone Number

Please list information regarding your child's brothers and sisters:

| | | |
|----------------|--------|---|
| Child's age | Gender | Does this child have any chronic health or disability concerns? Please explain. |
|----------------|--------|---|

II.

How old was your child when you suspected he/she was hearing-impaired?

_____ How old was your child when hearing impairment was diagnosed? _____ Do you know or suspect what caused your child's hearing impairment? _____ If so, please explain: _____

Are you hearing impaired? _____ Is your child's father hearing-impaired? _____ Are any other relatives hearing-impaired? _____ (If so, please specify) _____

If your child wears a hearing aid, please specify the type (circle all that apply):

- a. conventional aid
- b. hearing aid with computerized filtering of frequencies
- c. cochlear implant (Date of surgery: _____; Date of stimulation: _____)
- d. other (please specify) _____
- e. my child does not wear a hearing amplification device.

Please indicate the percentage of time your child wears a hearing aid or cochlear implant at home:

- a. 0-25% of the time
- b. 26-50% of the time
- c. 51-75% of the time
- d. 76-100% of the time

Please circle the response that indicates the type of educational setting in which your hearing-impaired child is enrolled:

- a. Special school for hearing-impaired children
- b. Regular public or private school, special class for hearing-impaired children
- c. Regular public or private school, hearing-impaired child is mainstreamed part of the day
- d. Regular public or private school, hearing-impaired child is completely mainstreamed
- e. Other (please specify) _____

Please circle the appropriate number that indicates the communication mode that your hearing-impaired child primarily uses in the following situations:

- 1 = Oral/aural communication most of the time
(speaking/lipreading)
- 2 = Oral/aural communication frequently
(speaking/lipreading)
- 3 = total communication or cued speech used
(signed English/voice/gesture)
- 4 = American Sign Language used frequently
- 5 = American Sign Language used most of the time

a. With family members:

1 2 3 4 5

b. With friends:

1 2 3 4 5

c. At school:

1 2 3 4 5

Please list the name, phone number, and address (if available) of your child's primary teacher:

Teacher's Name _____

School Name _____

Address _____

Phone number () _____

**VINELAND ADAPTIVE BEHAVIOR SCALES
DAILY LIVING SKILLS**

Please circle a 0, 1, 2, N, or DK for what your child usually or habitually does. Please note that for some questions an N or a 1 do not apply, and therefore are not listed. Please circle one of the responses that is listed for each question that best describes your child.

Your child probably doesn't do all of the behaviors listed below, since this questionnaire is used for ages 4 to 18. When you have circled seven 0's in a row for the questions, you may stop completing the questionnaire.

- 2 Yes, usually
- 1 Sometimes or partially
- 0 No, never
- N No opportunity
- DK Don't know

| | | | | | |
|--|---|---|---|---|----|
| 1. Summons to the telephone (or TTY) the person receiving a call, or indicates that the person is not available. | 2 | 1 | 0 | N | DK |
| 2. Sets table with assistance. | 2 | 1 | 0 | N | DK |
| 3. Cares for all toileting needs, without being reminded and without assistance. | 2 | 1 | 0 | N | DK |
| 4. Looks both ways before crossing the street or road. | 2 | 1 | 0 | N | DK |
| 5. Puts clean clothes away without assistance when asked. | 2 | 1 | 0 | N | DK |
| 6. Cares for nose without assistance. | 2 | 1 | 0 | N | DK |
| 7. Clears table of breakable items. | 2 | 1 | 0 | N | DK |
| 8. Dries self with towel without assistance. | 2 | 1 | 0 | N | DK |
| 9. Fastens all fasteners. | 2 | 1 | 0 | N | DK |
| 10. Assists in food preparation requiring mixing and cooking. | 2 | 1 | 0 | N | DK |

FAMILY EXPERIENCE RELATED TO CHILDREN'S HEARING LOSS

Please indicate whether each item applies to the family now or in the past month. Please answer all items, thank you. Please circle the number at the right which best describes the extent to which each item applies:

0 = Not at all; 1 = Just a Little; 2 = Pretty much; 3 = Very much.

| | | | | |
|--|---|---|---|---|
| 1. Additional income is needed to cover medical expenses for my deaf child. | 0 | 1 | 2 | 3 |
| 2. The deafness is causing financial problems for the family. | 0 | 1 | 2 | 3 |
| 3. Time is lost from work because of hospital appointments. | 0 | 1 | 2 | 3 |
| 4. I am cutting down on the hours that I work in order to care for my child. | 0 | 1 | 2 | 3 |
| 5. Our family gives up things because of my child's deafness. | 0 | 1 | 2 | 3 |
| 6. People in the neighborhood treat us specially because of my child's deafness. | 0 | 1 | 2 | 3 |
| 7. We see family and friends less because of the deafness. | 0 | 1 | 2 | 3 |
| 8. I don't have much time left over for other family members after caring for my deaf child. | 0 | 1 | 2 | 3 |
| 9. We have little desire to go out because of my child's deafness. | 0 | 1 | 2 | 3 |
| 10. Because of the deafness, we are not able to travel out of the city. | 0 | 1 | 2 | 3 |
| 11. Sometimes we have to change plans at the last minute because of my child's state. | 0 | 1 | 2 | 3 |
| 12. Sometimes I wonder whether my child should be treated "specially" or the same as a normally hearing child. | 0 | 1 | 2 | 3 |
| 13. I think about not having more children because of my child's deafness. | 0 | 1 | 2 | 3 |
| 14. Nobody understands the burden I carry. | 0 | 1 | 2 | 3 |
| 15. Traveling to the hospital is a strain on me. | 0 | 1 | 2 | 3 |
| 16. Sometimes I feel like we live on a roller coaster. In crisis when my child is having problems, OK when things are stable. | 0 | 1 | 2 | 3 |
| 17. It's hard to find a reliable person to take care of my deaf child. | 0 | 1 | 2 | 3 |
| 18. I live from day to day and don't plan for the future. | 0 | 1 | 2 | 3 |
| 19. Fatigue is a problem for me because of my child's deafness. | 0 | 1 | 2 | 3 |
| 20. Learning to manage my child's deafness has made me feel better about myself. | 0 | 1 | 2 | 3 |
| 21. Because of what we have shared, we are a closer family. | 0 | 1 | 2 | 3 |
| 22. My partner and I discuss problems related to my child's deafness together. | 0 | 1 | 2 | 3 |
| 23. We try to treat my child the same as we would if he or she were a "normal" (hearing) child. | 0 | 1 | 2 | 3 |
| 24. My relatives have been understanding and helpful with my child. | 0 | 1 | 2 | 3 |
| 25. I feel frustrated that my child does not understand me. | 0 | 1 | 2 | 3 |
| 26. I feel frustrated that I cannot understand what my child wants to tell me. | 0 | 1 | 2 | 3 |
| 27. My child has difficulty communicating with other children of the same age. | 0 | 1 | 2 | 3 |
| 28. My child's life would be better if he or she could hear normally. | 0 | 1 | 2 | 3 |
| 29. My life would be easier if my deaf child could hear normally. | 0 | 1 | 2 | 3 |
| 30. I worry about my deaf child's safety. | 0 | 1 | 2 | 3 |

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VITA

Karen Burk-Paull was born in Cleveland, Ohio. She is the daughter of Phyllis and Mel Burk, and the wife of Michael Paull. Ms. Burk-Paull graduated from Indiana University in May 1991, where she earned the degree of Bachelor of Arts in Psychology and Speech and Hearing Sciences. She graduated from Indiana University with high distinction, and as a member of Phi Beta Kappa.

Ms. Burk-Paull entered the M.A./Ph.D. program in Clinical Psychology at Loyola University Chicago in September 1991. She completed her clinical internship at the Children's Memorial Medical Center in Chicago, IL. In September 1998, Ms. Burk-Paull will begin a 2-year postdoctoral fellowship at the Children's Hospital in Boston, MA. Her fellowship will be in pediatric neuropsychology, with a specialization in working with children who are deaf.

DISSERTATION APPROVAL SHEET

The dissertation submitted by Karen Burk-Paull has been read and approved by the following committee:

Grayson Holmbeck, Ph.D.
Associate Professor of Psychology
Loyola University Chicago

Paul Jose, Ph.D.
Associate Professor of Psychology
Loyola University Chicago

Patricia Rupert, Ph.D.
Associate Professor of Psychology
Loyola University Chicago

Karen Wills, Ph.D.
Assistant Professor of Psychology
Loyola University Chicago

The final copies have been examined by the director of the dissertation and the signature which appears below verifies the fact that any necessary changes have been incorporated and that the dissertation is now given final approval by the committee with reference to content and form.

The dissertation is therefore accepted in partial fulfillment of the requirements of Doctor of Philosophy.

April 3, 1998
Date

Karen E. Wills
Director's Signature