A COGNITIVE DEVELOPMENTAL STUDY OF CHILDREN'S CONCEPTIONS OF STRESS AND EXPERIENCE WITH STRESSORS:
A COMPARISON OF DIABETIC, LEARNING DISABLED, AND NONCLINICAL GROUPS OF CHILDREN

DISSERTATION

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the Degree Doctor of Philosophy in the Graduate
School of the Ohio State University

By
Michelle F. Eabon, B.A., M.A.

*****

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Dissertation Committee:
Felicisima C. Serafica
Charles Wenar
Margaret O'Dougherty

Approved by
Felicisima Serafica
Adviser
Department of Psychology
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<tr>
<td>October 3, 1954</td>
<td>Born—Cleveland, Ohio</td>
</tr>
<tr>
<td>1976</td>
<td>B.A., Catholic University, Washington, D.C.</td>
</tr>
<tr>
<td>1980-1985</td>
<td>Graduate Research Associate, Behavioral Sciences Lab, National Center for Research in Vocational Education, and Department of Family Relations and Human Development, OSU</td>
</tr>
<tr>
<td>1983</td>
<td>M.A., Psychology, OSU</td>
</tr>
<tr>
<td>1983-1985</td>
<td>Graduate Teaching Associate, Department of Psychology, Ohio State University</td>
</tr>
<tr>
<td>1985-1986</td>
<td>Psychology Intern, Convalescent Hospital for Children, Rochester, N.Y.</td>
</tr>
<tr>
<td>1986-1987</td>
<td>Adjunct Instructor, Monroe Community College, Consultant, Hillside Children’s Center, Rochester, N.Y.</td>
</tr>
</tbody>
</table>
PUBLICATIONS


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Major Field: Developmental and Clinical-Child Psychology
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACKNOWLEDGEMENTS</td>
<td>ii</td>
</tr>
<tr>
<td>VITA</td>
<td>iii</td>
</tr>
<tr>
<td>LIST OF TABLES</td>
<td>vii</td>
</tr>
<tr>
<td>INTRODUCTION</td>
<td>1</td>
</tr>
<tr>
<td>CHAPTER</td>
<td></td>
</tr>
<tr>
<td>I. REVIEW OF THE LITERATURE</td>
<td></td>
</tr>
<tr>
<td>Conceptual and Definitional Issues</td>
<td>4</td>
</tr>
<tr>
<td>Research Trends in Illness and Stress Research</td>
<td>5</td>
</tr>
<tr>
<td>Children's Knowledge About Illness</td>
<td>8</td>
</tr>
<tr>
<td>Summary and Conclusions</td>
<td>19</td>
</tr>
<tr>
<td>II. AIMS OF THE STUDY</td>
<td>23</td>
</tr>
<tr>
<td>III. METHODOLOGY</td>
<td></td>
</tr>
<tr>
<td>Subjects</td>
<td>27</td>
</tr>
<tr>
<td>Instruments</td>
<td>27</td>
</tr>
<tr>
<td>Procedure</td>
<td>30</td>
</tr>
<tr>
<td>Data Analysis</td>
<td>33</td>
</tr>
<tr>
<td>IV. RESULTS</td>
<td>34</td>
</tr>
<tr>
<td>Preliminary Analyses</td>
<td>36</td>
</tr>
<tr>
<td>Conceptions of Stress</td>
<td>37</td>
</tr>
<tr>
<td>Conceptions of Illness</td>
<td>38</td>
</tr>
<tr>
<td>Stressor Experience</td>
<td>47</td>
</tr>
<tr>
<td>Vulnerability to Stress</td>
<td>50</td>
</tr>
<tr>
<td>V. DISCUSSION</td>
<td>55</td>
</tr>
<tr>
<td>Review of Results</td>
<td>60</td>
</tr>
<tr>
<td>Theoretical Implications</td>
<td>60</td>
</tr>
<tr>
<td>Directions for Future Research</td>
<td>73</td>
</tr>
<tr>
<td>Limitations of this Study</td>
<td>77</td>
</tr>
<tr>
<td>Conclusions</td>
<td>80</td>
</tr>
<tr>
<td>BIBLIOGRAPHY</td>
<td>81</td>
</tr>
<tr>
<td></td>
<td>83</td>
</tr>
</tbody>
</table>
APPENDICES ................................................................. 86

A. Parent Permission Letters ........................................ 87
B. Instruments .......................................................... 97
C. Scoring Manuals .................................................... 98
D. Subject Characteristics ............................................ 112
# LIST OF TABLES

<table>
<thead>
<tr>
<th>TABLE</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Subject Frequencies, Age, Group, Gender</td>
<td>110</td>
</tr>
<tr>
<td>2. Family Constellation, By Group</td>
<td>110</td>
</tr>
<tr>
<td>3. Preliminary Analyses</td>
<td>38</td>
</tr>
<tr>
<td>4. Means and Standard Deviations, By Age Conceptions of Stress</td>
<td>39</td>
</tr>
<tr>
<td>5. Inter-item Correlations, Stress Interview</td>
<td>40</td>
</tr>
<tr>
<td>6. Means and Standard Deviations, By Group Conceptions of Stress</td>
<td>41</td>
</tr>
<tr>
<td>7. Two-Way ANCOVA, Average Issues Score</td>
<td>42</td>
</tr>
<tr>
<td>8. Two-Way ANCOVA, Stress Description</td>
<td>42</td>
</tr>
<tr>
<td>9. Two-Way ANCOVA, Stress Explanation</td>
<td>43</td>
</tr>
<tr>
<td>10. Two-Way ANCOVA, Stress Coping</td>
<td>45</td>
</tr>
<tr>
<td>11. Two-Way ANCOVA, Stress Outcome</td>
<td>46</td>
</tr>
<tr>
<td>12. Means, Standard Deviations, By Age Illness Conceptions</td>
<td>47</td>
</tr>
<tr>
<td>13. Two-Way ANCOVA, Illness Conceptions</td>
<td>48</td>
</tr>
<tr>
<td>14. Means, Standard Deviations, By Group Illness Conceptions</td>
<td>49</td>
</tr>
<tr>
<td>15. Means, Standard Deviations, By Group Stressor Experience</td>
<td>50</td>
</tr>
<tr>
<td>16. Two-Way ANOVA, Stressor Impact</td>
<td>51</td>
</tr>
<tr>
<td>17. Two-Way ANOVA, Categories of Stressors</td>
<td>52</td>
</tr>
<tr>
<td>TABLE</td>
<td>PAGE</td>
</tr>
<tr>
<td>-------</td>
<td>------</td>
</tr>
<tr>
<td>18. Three-Way ANOVA, Stressor Prediction</td>
<td>53</td>
</tr>
<tr>
<td>19. Means, Standard Deviations, By Group Life Change</td>
<td>54</td>
</tr>
<tr>
<td>20. Two-Way ANOVA, Life Change</td>
<td>55</td>
</tr>
<tr>
<td>21. Means, Standard Deviations, By Group Personality Inventory For Children Scales</td>
<td>56</td>
</tr>
<tr>
<td>22. F Table, Personality Inventory For Children Scales, By Group</td>
<td>57</td>
</tr>
</tbody>
</table>
INTRODUCTION

The concept of stress and its relationship to physical illness in children has been popular in recent years, and has expanded to include the relationship of stress to psychological adjustment as well (Johnson, 1986). Several different theoretical models have been offered each of which attempts to define the concept quite differently. Some views hold that stress is equal to stressor with the presumption of some degree of emotional distress resulting from an accumulation of stress (stressors) (Coddington, 1972; Holmes & Rahe, 1967). Competing views suggest that stress is a subjective experience in response to external events which patterns itself after the General Adaptation Syndrome, a formulation developed by Hans Selye as a mechanism to explain physiological stress (disease) (Selye, 1956, 1976). More recent views (Lazarus, et al., 1984) again presume a subjective organismic response but suggest that the experience of stress is moderated by cognitive abilities which permit an appraisal of the impact of a particular stressor as well as an appraisal of one's abilities to cope with stressor exposure.

All of these models presume some degree of subjective response which is believed to be distressing and disruptive. Most have been derived from research on adults. No research, however, has systematically investigated what the components of this subjective response are nor whether
developmental changes in conceptualizing stress occur nor when they occur. This research attempted to provide an understanding of what stress means to children as well as to provide information about the manner in which conceptions of stress change across development.

In research with adults, stress has been implicated in sudden cardiac death and myocardial infarction. Underlying this research has been the belief that stress leads to either the onset of physical illness or to the worsening of already existing disease (Johnson, 1983). In most of these investigations stress has been defined as the occurrence of negative life change and has been related to the worsening of chronic disease conditions in both adults and children (Coddington, 1972; Heisel, et al., 1972; Johnson, 1983; Holmes and Rahe, 1967; Rahe, Mahon, and Arthur, 1972).

Another recent trend has also emerged in which the occurrence of minor stressful events (daily hassles) has been related to physical illness and psychological adjustment although no clear trends have emerged (Kanner, et al., 1981). Most research into stressor experience has focussed on adults with the exception of research reported by Johnson (1983) which investigated negative life change in the lives of children with different chronic illnesses, asthma, and diabetes, and research by Coddington (1972) which focused on children with rheumatoid arthritis and hemophilia.

Children with diabetes have been the focus of much psychological research with recent interest being directed to the reported links between stress and difficulties with diabetic control. This purported relationship has been investigated in only one study (Brand, Johnson, and Johnson, 1986) but psychological factors have been investigated in numerous studies (S.B. Johnson, 1982). No research exists as to whether diabetic children
conceptualize stress differently nor as to what daily stressors or life events they may perceive differently when compared to peers. This research investigated the possible existence of such differences.

Finally, current investigations in the area of stress are starting to focus on the influence of "moderator" variables which mediate an individual's experience with stress. These variables encompass a broad range of factors believed to influence appraisal, distress, and coping and include personality factors, social support, and intellectual resources. Most research has focussed on social support but new interest is being directed toward the possible influence of certain personality dispositions. In research with adults, 3 MMPI scales, Hypochondriasis, Morale-Loss, and Ego Strength have demonstrated elevations in individuals prone to physical illness (Cohen, 1982). Additionally, already existing physical disease has been speculated to render an individual more vulnerable to stress although this relationship has yet to be established. The proposed research attempted to address a possible hypersensitivity or vulnerability to stress based upon personality factors and the existence of a physical illness.

The individuals under study were children with diabetes as compared to children without a physical illness. A contrast group of learning disabled children served as a comparison to explore whether physical illness alone presents a coping challenge or whether stress relates to the need to cope with special circumstances (illness or psychological disability) in general.
CHAPTER I
REVIEW OF THE LITERATURE

Despite a large body of literature about the proposed relationship between stress and physical illness there have been few empirical studies of this relationship. Early behavioral science research conceptualized stress as a stressor which singly or cumulatively precipitated the onset of a physical illness (Holmes and Rahe, 1967). Recent studies lead to the conclusion that stress may be a subjective experience or feeling state produced by perception of stressors, appraisal of perceived threat of identified stressors and patterns of coping. The interaction of these factors, particularly when coping processes may be maladaptive, are hypothesized to relate to the onset of illness (Cohen, 1979; Garmezy, 1983; Johnson, 1983; Lazarus and Folkman, 1984).

Most investigators choose to relate stress to illness onset, rather than to consider stress as it effects the symptom expression or course of a chronic illness, or to the reciprocal relationship which could exist between an existing chronic illness and concomitant increased susceptibility to stressor exposure.

As stress research moves in the direction of investigating organismic variables such as personality characteristics, perceptions and cognitive appraisals of stress, it seems apparent that stress and illness research needs to investigate organismic variables which are involved in linking stress experiences to illness. There does not exist a well integrated body of research
to draw upon which can describe what these organismic variables might be. However, it seems useful to review the literature on empirical efforts to date which examine the relationship between experienced stressors and illness onset as well as on conceptions of illness as a means to approach an understanding of this relationship. As noted earlier, there does not exist a systematic approach to this topic in the literature. Information exists as to healthy children’s perceptions of illness, chronically ill children’s experience of stressors, healthy adults’ perceptions of daily hassles, and chronically ill children’s perceptions of what is stressful to them.

Major definitional problems have plagued all of this research and much of the research has been undertaken with the presumption that children understand the concept of stress. Little attention has been given to any possible developmental differences in conceptualizing stress nor to possible differential perceptions of stress between clinical and normal samples. The following discussion will review these separate bodies of research.

Conceptual and Definitional Issues

Stress is a frequently used and abused concept within the biological and behavioral sciences. Historically the term "stress" has meant an orchestrated pattern of physiological defenses against any form of noxious stimulus or environmental demand. Stress therefore is not an environmental demand but a dynamic state within the organism, a formulation derived from the work of Hans Selye (Selye, 1976).

Selye's work has long been regarded as a springboard for research on stress. His research represents an attempt to describe an organism's response to events in the environment which are noxious to physiological well-being.
He postulated a three phase response (The General Adaptation Syndrome, G.A.S.) involving 1) an alarm reaction, 2) resistance and/or adaptation, and 3) a stage of exhaustion if strategies in the previous stage prove ineffective. Since the latter stage can result in death it usually is not reached unless the organism is unable to adapt physiologically.

The alarm reaction involves not only the detection of the noxious, invasive stimulus but also the mobilization of the body's defenses to resist. Continued exposure to stress is postulated to reduce the amount of physiological energy available to respond to new challenges which can result in the exhaustion stage (Selye, 1976). Selye's early formulations of the G.A.S. were offered only as an explanation of bodily changes brought about by the need to deal with a threat to physiological health. It was offered as an explanation for "diseases of adaptation" i.e., ulcers, believed to result when adaptive strategies proved maladaptive.

In later writings (1976) Selye expanded his formulation to include psychological stress but never clearly delineated the process for psychological stress. Recent critics (Martin, 1984) have argued that even Selye overapplied his conceptualizations of stress to the psychological realm without sufficient attention paid to the differing processes of reaction to noxious stimuli which each system offers. This reaction also depends upon how 'noxious stimuli' are defined. The first two phases of the G.A.S., intuitively appear to relate to psychological reactions and coping but this has not been demonstrated empirically as was the application of this model to physiological reactions. Despite this, most investigators presume a parallel for psychological stress and base much psychological research on a more generalized interpretation of the G.A.S. The subjective experience of psychological distress has come to
represent Selye's alarm reaction and is regarded as an active response or reaction by an organism overwhelmed by noxious stimuli. This definition, however, has been extended to include organismic responses such as anxiety, conflict, frustration, and alienation to name a few. While each of these factors may intensify the experience of stress it is not clear whether stress is a construct including all of these feeling states or whether stress is a clearly delineated feeling state (i.e., strain) affected by the presence of each of the other factors.

The stress concept has also been applied to events external to the organism such as a form of stimulus or stressor or an external force requiring adaptation (Garmezy and Rutter, 1983). Since the term "stress" has been used to refer to both a stimulus and a response, the term "stress reaction" has crept into the literature in an attempt to distinguish an organismic response from an environmental stimulus or stressor. Resolution of this lack of definitional agreement is further complicated by the introduction of moderator variables such as social support or personality characteristics which are hypothesized to determine the quality of a stress reaction (Lazarus and Folkman, 1984). It does not seem useful to include such variables within a conceptualization of stress although their influence upon the subjective experience or perception of stress should not be ignored.

To differentiate between stress and stress reaction seems artificial. As research progresses the term "stress reaction" may very well come to be defined as adaptive or maladaptive coping but which could still be confused with a purely subjective experience. For that reason this discussion will revert to one of the earliest formulations of stress: that stress is an organismic and subjective reaction to external stressors. For the purposes of this
discussion stress will refer to psychological stress rather than Seyle's focus on physiological stress.

Despite the many conceptual issues surrounding the use of the word stress, much research has been undertaken concerning the role of stress in illness. The following section will discuss current research trends in this area.

**Research Trends in Illness and Stress Research**

Before discussing trends in the research it is necessary to address why this is such a significant area of interest. There are a number of ways stress is believed to lead to physical illness. Stress is hypothesized to lead to "diseases of adaptation" such as ulcers or increased susceptibility to infection, when tissue function is disrupted by neurohormonal stress responses (Monat and Lazarus, 1977). Stress is also hypothesized to contribute to the reduction of psychological energy needed to cope with adversity, i.e., physical illness (Boghmann and Haggerty, 1975). It logically follows that chronic illness management could also be problematic when stress occurs. Despite anecdotal or clinical case reports which appear to demonstrate a causal relationship, systematic investigations are few in number.

As noted in the introduction, research trends have tended to focus on stressors rather than upon examining hypothesized links between the subjective experience of stress and illness. One major investigative program has attempted to link stressor exposure as represented by life change or events to the emergence of adult psychopathology (Kessler, et al., 1985) and child psychopathology (Garmezy and Rutter, 1983). A second research trend exists which examines life event stressors as precipitants of physical illness (Holmes and Rahe, 1967; Coddington, 1972; and Johnson, 1983). All of this
research has emphasized the relationship of stressors to the onset of physical and psychological disorders although most investigators allude to the exacerbation of symptoms of chronic diseases in the presence of stress. Very recently, an interest in investigating the effects of daily stressors upon adult psychological adjustment has emerged (Kanner, et al., 1981) and has begun to be considered in relation to physical illness in children (Kosub & Kosub, 1984).

The investigation into life events as stressful have focussed upon several variables regarded as most likely to produce disease outcomes. These include situations involving loss, bereavement, or loss of gratification, an accumulation of diverse life stressors or events requiring adjustment, and the occurrence of life events that the individual appraises as stressful. The latter perspective is one of the few to consider an organismic variable involving the individual’s perception of stressors (Cohen, 1979). Life events research with children has attempted to address all three of these perspectives but less emphasis has been given to the child’s perception of life changes nor to her affective response to them. In the early 1970’s Coddington (1972) and Heisel, et al. (1973) embarked upon a three phase investigation into the development of the Life Events Record (LER), an instrument whose scores they hoped would relate stress to illness onset. The development of this scale was based upon work by Holmes and Rahe (1967) with an adult population using the Schedule of Recent Events (SRE). The LER is a scale listing a number of life events that children can experience. Phase I entailed the rating of these events with respect to the magnitude of change they entailed. “Birth of a sibling” was arbitrarily assigned a magnitude change score of .50 and raters (professionals working with children) were asked to rate the remaining items
as compared to this standard. In Phase II, these items were presented to children to obtain frequency counts of actual occurrence. Phase III involved asking parents of chronically ill children to complete the LER and results of this phase were consequently related to illness onset or symptom exacerbation (Heisel, et al., 1973). The LER has subsequently been used by other investigators to examine the relationship of life event stress and psychological disorders and life event stress and physical illness. Some of these studies will be considered here. This body of literature is one of the few to move beyond examining the role of life events and illness onset and move toward the role of life events in the lives of children who already have a chronic disease.

Boyce, et al., (1973) (as reported in Johnson (1983)) assessed 58 children with respiratory illnesses. Information about the number of illness episodes per child as well as the average duration and severity of the episode was obtained to produce a composite sickness score. At the end of one year parents were asked to complete the LER. Results of this study indicated that life change scores were found to be correlated with both average duration and severity of illness but not with numbers of illnesses. Multiple regression analyses indicated that life stress scores were predictive of the composite sickness score. Heisel, et al. (1973) used the LER to examine life stress as it preceded the onset of juvenile rheumatoid arthritis, surgical procedures, general pediatric problems, psychiatric disorders, and hemorrhagic episodes in children with hemophilia. Life event change scores in the preceding year were higher for these groups than was evident for children in a healthy sample. However, it should be noted that it was not possible to determine if life change was a function of the disease process or if ongoing life stress increased a child's risk and vulnerability to the disease. It is significant that a
relationship emerged between stress and hemorrhagic episodes. While other findings in this study focus on the onset of a physical illness, the latter finding substantiates the perception that life stress contributes to the worsening of symptoms in chronic illness.

In 1977, Bedell assessed children with cystic fibrosis, asthma, and juvenile diabetes who were attending a three week summer camp. Parents were administered the LER and the children were assessed for anxiety and nature of self-concept. Additionally, camp counselors were asked to record the frequency of illness symptoms. Children with high life change scores were found to have an increased number of illness episodes and a poor self-concept. No differences among children were found for the anxiety measure.

In a study of healthy, high school age adolescents, subjects were asked to complete the LER and to keep a diary of the number of illnesses experienced over a 12 month period. They were also asked to rate their degree of incapacitation while sick (Hotaling, Atwell and Linsky, 1978). Results indicated a relationship between life-stress and the seriousness of the illness but not to the number of illnesses.

These studies all support the contention that stress as engendered by life change can intensify or increase the manifestation of chronic illness in children. It is interesting to note that life change does not relate to the numbers of illness episodes but rather to the seriousness of the illness. This finding suggests that what is significant about life stressors is their potential for increasing the debilitating effects of an illness.

While this research has served to clarify some of the issues surrounding the relationship between stress and illness, the Life Events Record has been criticized for its failure to derive separate scores for positive versus negative
life change and for its failure to determine salience of an event to the individual (Johnson, 1983). Johnson's argument is that negative life change leads to illness and that the LER does not adequately sample stressful events actually experienced by children. In response to these concerns, Johnson and McCutcheon (1980) devised the Life Events Checklist (LEC). In addition to gathering information about event occurrence, subjects are also asked to report what impact the event had, and whether it is a good or bad event. Subjects are asked to rate 46 life event stressors as well as to list four events not on the list which may have happened to them in the past year. Both positive and negative change scores are produced by this method determined by summarizing impact or salience ratings. These authors do not report what events children actually perceived as good, bad, or particularly salient. In healthy children, LEC scores have been found to correlate with illness and number of physician visits over a twelve month period. In subsequent investigations with this instrument children with cystic fibrosis were found to experience a decline in pulmonary functioning after an accumulation of family stress events (Patterson and McCubbin, 1982), onset of childhood cancer was related to life change (Jacobs and Charles, 1981), and the onset of juvenile diabetes was found to relate to life event stressors (Stein and Charles, 1971). Despite these findings, the relationship between experienced stressors and onset of illness is not clear and does not consider organismic variables such as the child's perceptions of or hypersensitivity to stress nor whether there is some reciprocal relationship between illness and stressor occurrence.

These few studies attempt to address possible relationships between cumulative life stressors and primarily, the onset of illness. Only a few investigators attempt to describe the worsening of symptoms of an existing
illness and the nature of this relationship is far from clear at this point. In general, investigating life events as stressors seems to be a useful approach although clear causal relationships cannot be established until other variables such as personality or appraisal of events are included in an analysis. A potential method for investigating stressor influence upon illness can be found in research concerning day to day stressful events or "daily hassles" a program of research begun by Richard Lazarus and his associates (Kanner, et al., 1981).

Although day to day stressors have not been systematically investigated in children or in adults with respect to their relationship to physical disease, "daily hassles" have been examined in healthy adults. Hassles have been defined as the irritating, frustrating, distressing demands of one's daily environment. This line of research acknowledges the importance of life change as stressful but suggests that examining the occurrence of daily hassles may provide better descriptive information about the processes of stress and coping, particularly where coping or adaptation may be maladaptive thus influencing the onset of either a psychological or physiological disorder.

These investigators have constructed what they call the Hassles and Uplifts Scales. This scale along with a life events scale, the Hopkins Symptom Checklist and the Bradburn Morale Scale were administered to 100 healthy adults during the course of a 12 month prospective study of mental health, stress, and emotions. At the end of one year, results indicated that an assessment of daily stressors and their perceived significance were better predictors of psychological symptoms than were life events. This method has not yet been used with regard to physical illness nor has it been applied to
children but its merit seems obvious particularly if used in prospective fashion.

In summary, most research has chosen a life event as stressor approach when investigating the relationship between stress and illness onset in children. Unfortunately, this research is atheoretical for the most part in explaining why a particular life event could be perceived as stressful. There is some reliance on the work of Bowlby and Sigmund Freud when events involving loss or death are involved but no particular theoretical explanation is offered to explain the salience of other stressors. One of the most serious criticisms of this research has to do with the difficulty in establishing a causal relationship between stressors and illness as well as in the failure to consider what organismic and/or environmental variables might moderate the subjective experience of stress.

Some investigators, while not endeavoring to understand cognitive developmental issues, have attempted to investigate perceived stress or worries in children with chronic illnesses. Children with diabetes have been a major focus of study. Allen, et al., (1984) investigated the concerns that insulin-dependent diabetic children had about their illness. Subjects were 34 children aged 8 to 17 years who had been diagnosed at least one year previously. Children’s level of cognitive development was assessed through evaluation of their responses to open ended questions about factual matters relating to diabetes. Although classification strategies designed by Bibace and Walsh (1981) were used, no data was collected psychometrically to assess general cognitive ability. It is therefore difficult to judge how their disease knowledge relates to their overall knowledge abilities. Some authors suggest that chronically ill children may lag in cognitive development (Varni, 1983) or
that there may be discrepancies between levels of knowledge in general and knowledge about disease. Data from Allen’s study could have been useful in evaluating this contention. Results of this study indicated that children with more advanced disease concepts expressed more concerns about its effects upon their lives.

Another study attempted to investigate perceived stress in 135 children aged 6-16 attending a summer camp for diabetic children. Children were asked to list things they found stressful and then subsequently were asked to complete the LER. A modest correlation was found between children’s spontaneously generated perceived stressors and the Life Events Record. Despite this modest relationship, multiple regression methods failed to demonstrate any predictive relationships. There were some differences in the types of stressors reported by older and younger children although no systematic qualitative analysis was performed and some differences appear to be semantic ones rather than real ones. The approach used in this study has merit, however the investigators chose to define stressors as any events which frighten or scare the child or about which one worries. Although responses to worrying were consistent with stressors reported in other research most of the children responded with events they were afraid about. Fear has not traditionally been included in conceptualizations of stress and it is unfortunate that this study employed this concept. As a result, this research actually assessed fear in diabetic children although they intended to assess stress.

Diabetic children, in particular have come to the attention of behavioral scientists because of the direct metabolic effects psychological factors have upon the stability of diabetes. Many emotional and behavioral factors have
been researched as to their existence in diabetic children and to a much lesser extend upon their influence upon diabetic control (S.B. Johnson, 1980). The experience of stress, variously defined as subjective experience and as stressor, is one such factor which has been related to diabetic control while a larger body of research has investigated the existence of a "diabetic personality." The latter research presumed certain character dispositions to exist among diabetic children and to be able to differentiate those in good control from those who were not. Despite this belief, this line of investigation has not fared well. Early research using projective tests (Swift, 1967) established diabetic children as having difficulty becoming independent, poor self-perceptions, greater hostility and anxiety, and poor peer relations when compared to healthy peers. When attempts were made to replicate these findings, using a more stringent methodology, the results were not demonstrated again, despite numerous investigations. Recent investigators have concluded that, in general, most diabetic children do not demonstrate more psychological problems than do their peers but then when problems are experienced, they tend to involve poor peer relations (S.B. Johnson, 1980).

A more promising line of investigation has examined the effects of stress upon diabetic control. Family conflict or other interpersonal conflicts have been targeted as one of the most significant stressors for diabetic children. These conflicts and the concomitant behavioral and emotional problems they may give rise to, are believed to influence diabetes in two ways. First, behavior problems (refusal to maintain a proper diet) undermine diabetic control and secondly, emotional disturbance (arousal) can cause metabolic disruption through psychophysiological means. The biological mechanisms which respond to stress, in the nondiabetic individual, result in the production
of pituitary hormones which lead to a decrease in insulin and an increase in fatty acids in the blood. Blood glucose is also increased when the experience of stress is severe. When the experience of stress abates, there is an exaggerated increase in insulin which helps to metabolize the increased blood glucose with a subsequent return to normal levels. The diabetic child, who does not produce sufficient insulin to manage blood glucose production under normal circumstances, is at a particular disadvantage for maintaining metabolic control when experiencing elevations in blood glucose and fatty acids as a function of stress (Tarnow and Silverman 1981). In research discussed earlier, stress was implicated in the onset of diabetes. More recent research has implicated life stress in day to day diabetic control.

Brand, et al., (1986) investigated the relationship between life stress and several measures of diabetic control (blood and urine sugar levels, urine ketone levels, and hemoglobin A1) in 141 children and adolescents attending a summer camp for diabetic children. Positive change was not found to relate to any measures of diabetic control but negative life change was significantly correlated with elevated urine ketone levels (a measure of fatty acids). This study is one of a very few which demonstrate the relationship of stress (defined as life stress) to diabetic control although the results suggest that more investigations investigating a broader range of stressors, including daily hassles, would yield important information about metabolic control.

This research in general would benefit from investigating stress as a subjective experience as well as stressor and needs to focus upon those characteristics which distinguish children in good diabetic control from those who are not. One issue which needs to be investigated is whether good versus poor control is based upon greater physiological reactivity of the latter group
or whether other psychological factors, such as knowledge about the disease, conceptions of health and illness, and perceptions of stressors play a role in managing stress (S.B. Johnson, 1980; Fischer, et al., 1982).

One investigation (S.B. Johnson, et al., 1982) has investigated the relationship of children's knowledge of diabetes to their knowledge about managing diabetes. Diabetic children aged 6-18 years were administered a test of general knowledge, and a test of problem solving for several diabetic conditions. Their skill at diabetic management was assessed by having them test a standard urine sample and prepare to self-inject. The results determined that knowledge in one content area did not relate well to knowledge in another. In general older children as compared to younger did better on the knowledge tests, but despite this, 80% of the sample made significant errors in urine testing and 40% made errors in preparing for self-injection. This study indicates that under normal circumstances, diabetic children have difficulties with diabetic control which could be expected to worsen in stressful situations. Another hypothesis investigated has been that diabetic control may relate to overall knowledge about illness (Eiser, Patterson, and Trip, 1984). This research was loosely modelled after that of Bibace and Walsh (1981) and demonstrated no differences in conceptions of health and illness between diabetic and nondiabetic children and adolescents. Finally, perception of stressors was examined in 135 diabetic children aged 6 to 16 years. Younger children were more stressed by aspects of day to day diabetic management, middle age children by management which disrupted personal or social routines, and older children were stressed by worrying about disruption of routines and had concerns for the future involving
physiological complications or transmission of the disease to offspring (Kosub and Kosub, 1982).

As can be determined from the research discussed so far, most investigations examine stressors not the subjective experience of stress. Research which deviates from fairly well integrated programs investigating life events is fragmented and for the most part theoretical. Research with chronically ill children that has not focussed upon life events as stressors tends to examine children's conceptions of illness, to a lesser degree their conceptions of health, and does not investigate at all children's perceptions about the relationship between stress and illness. Given the overall trend in stress research to begin to focus on factors within the individual which influence an understanding or perception of stress, it seems useful especially when considering children, to examine cognitive developmental factors as they relate to children's knowledge about stress and illness. No research to date has been reported about children's conceptions of stress. However, there is research which investigates children's understanding of illness. The final section describes some of the research efforts in this area.

Children's Knowledge About Illness

In sharp contrast to life-stress research, investigations of children's illness knowledge have a strong theoretical foundation and are based upon Piaget's and Werner's theories of cognitive development. The objective of this research has been to delineate age-related qualitative change in children's knowing about illness and health. Underlying explanations of research findings has been the premise that children's conceptions of illness develop
from the concrete to the abstract, from mere description to explanation and from simplistic to multidetermined causality (Bibace and Walsh, 1982).

Early studies of children's definitions of illness concentrated upon articulating changes in these definitions as the child matured. Campbell (1975) interviewed 264 children between the ages of six and twelve while they were hospitalized for a brief time. He asked questions on the order of "how do you know when you are sick" and "how do you know when you are well". These questions were also asked of the children's mothers. Results were analyzed for conceptual maturity and concordance with maternal definitions of illness and health. Older children were more likely to offer definitions of illness that were closer to the conceptual sophistication of their mothers while younger children were less likely to. Younger children gave definitions that described the illness in terms of non-localized feeling states. As children matured their definitions became more specific as they described specific symptoms and disease entities. Older children were more able to describe behavioral limitations imposed by illness as well as to apply qualifiers to their degrees of sickness or wellness (i.e., I'm not sick if I just have a cold). One implication of this study is that children's conceptions of illness may be influenced by their own health histories and, at least for younger children, that sick children may function differently cognitively than a same aged healthy peer. Other investigators have also posited cognitive lags as defensive regressive responses to illness (Varni, 1983). However this has not been systematically studied nor empirically demonstrated and as such remains a rather weak hypothesis.

Research subsequent to Campbell's has drawn more heavily from Piagetian theory and a study by Bibace and Walsh (1981) is one of the major
research efforts in this area. One hundred and eighty children aged 4-18 were interviewed as to their understandings of health and illness. Interviews had a semi-structured format and contained questions like "What is a cold", "where do colds come from", "what makes a cold get better". A number of similar questions were asked pertaining to illness, wellness, measles, and pain. Results of this study permitted the generation of three general categories of response: pre-logical explanations, concrete-logical explanations, and formal-logical explanations.

Pre-logical explanations are offered by children from ages 2-6. In Piaget's terms the child is functioning at the pre-operational stage, has difficulty decentering and is fairly tied to immediate perceptual experience. In other words, illness is determined by external cues—"rosy cheeks" or "hot forehead". Less mature children in this category give responses based upon phenomenism. Illness is a direct function of events that occur at the same time although these events may be spatially or temporally distant. Children at this stage are not able to explain causality. Older children in this stage do have a rudimentary understanding of contagion although they are not quite sure what the process means. Causality is magical at this stage of development.

Concrete-logical explanations are offered from children between ages seven and ten. Children at this stage, according to Piaget are beginning to perform mental acts upon concrete object and events, illness being one of these events. The child becomes able to distinguish self from the environment, to begin to respond to internal cues for illness and to have a basic, if vague understanding of cause and effect.
Contamination responses are offered by younger children within this level and illness is explained as a function of contact with an illness inducing agent. Older children within this level give internalization explanations for illness although the inside of the body is not clearly comprehended.

Formal-logical explanations are offered by children eleven and older. Children whose thought is formal operational are able to hypothesize and to consider alternatives. Children of this age have a greater capacity for integrating both psychological and physiological aspects of human experience.

Younger children whose thought is formally logical tend to offer physiological descriptions and explanations for illness. The source of illness and the nature of symptoms is internal and causation for illness is attributed to internal sources. Older children tend to offer psychophysiological explanations for illness suggesting an awareness of psychosocial influences upon bodily function (Bibace and Walsh, 1981).

Other lines of research have employed these findings in investigations of children's conceptions of both health and illness. Natapoff (1982) interviewed 264 healthy children aged 6-13 asking them questions about how they knew when they were healthy or how they defined health. Results demonstrated that health is seen as a positive attribute. Older children were able to conceive of being part sick and part healthy (as in only having a cold). For older children health was long-term while illness was a transient state. Older children were also most likely to include considerations of mental health as a part of overall health.

In summary, the young child's understanding of illness tends to involve undifferentiated and superstitious logic. They are sick if someone tells them they are sick and they can't engage in favorite activities. Concrete
operational children consider specific events as responsible for illness but this type of causality is poorly articulated. Children whose thought is formal operational have a generalized understanding of the principles of infection, illness, and health and are more likely to rely upon internal physiological states to determine the presence of illness or health.

With the exception of a few studies, most research examines the perspectives of healthy children. It remains to be seen what conceptual differences may exist when comparing clinical groups to healthy groups. No data exists as to chronically ill children's conceptions of illness and health in general nor is information available which might address the perspective expressed by some authors that sick children demonstrate lags in cognitive development (Varni, 1983).

Summary and Conclusions

As was noted earlier, any examination of the relationship between stress and illness must draw from several different bodies of literature as no clear direction emerged from any one investigative endeavor. The literature on stress research in general has provided both a life events and daily hassles approach which is useful although the latter has yet to be applied to illness exacerbation in children. The consensus among investigators is that in addition to the influence of stressors, the experienced of stress must consider several organismic variables including cognition, perception, and personality characteristics which may render an individual hypersensitive to stress. Little research has investigated perceptions of stressors or has attempted to establish a cognitive-developmental interpretation of what stress means to
children. Little research has been done which explores the perceptions of children with chronic diseases of stressors or stress.
CHAPTER II
AIMS OF THE STUDY

The major objectives of this study were to examine developmental changes in children’s conceptions of stress and illness in children with and without chronic diseases. A second objective was to assess actual stressor exposure and impact in the form of both daily hassles and major life events. An attempt was made to determine if a hypersensitivity to stress exists within the clinical groups. Specific hypotheses to be investigated were:

1. $H_0$ That no statistically significant differences in conceptualizing stress exist among the three age groups to be studied.

2. $H_0$ That no statistically significant differences exist among the clinical and nonclinical sample as to conceptions of stress.

3. $H_0$ That no statistically significant differences exist among the three age groups for conceptualizing illness.

4. $H_0$ That no statistically significant differences exist among the clinical and nonclinical sample for conceptualizing illness.

5. $H_0$ That no statistically significant differences exist among age groups for predicted stressor impact, categories of stressors, or predicted stressor occurrence.

6. $H_0$ That no statistically significant differences exist among diagnostic groups for predicted stressor impact.

7. $H_0$ That no statistically significant differences exist among diagnostic groups for predicted stressor occurrence.
8. $H_0$ That greater numbers of daily hassles or perceived impact will not be due to greater life change.

9. $H_0$ That the clinical samples will not demonstrate a vulnerability to stress as demonstrated by elevated scores on the Personality Inventory for Children.
CHAPTER III
METHODOLOGY

Subjects

The sample for this study consisted of three groups of children between the ages of 8 years and 16 years. A total of 97 subjects participated. Twenty-six subjects had juvenile diabetes (X age, 12.6 years), 27 subjects were children with learning disabilities (LD), (X age, 13.6 years) and a nonclinical sample was comprised of 44 subjects (X age, 12.4 years). Ninety-five of these subjects were white. One child with diabetes and one child in the nonclinical sample were black. The clinical and nonclinical samples did not differ statistically with respect to chronological age, F (2,95) = 1.88, p > .10. The samples were significantly different with respect to gender composition (X^2 = 16.23, p < .0001). More of the LD sample were male while there were more females among the other two samples. When three age groups were created (Younger = 8-10 years, Middle = 11-13 years, and Older 14-16 years) no differences in gender composition were demonstrated (X = 2.06, p > .10). Frequencies by gender within age and diagnostic groups can be found in Appendix D.

Information was also collected regarding total annual income per household and family constellation (intact, single parent, or other) (Appendix D.) The figures reported for annual income indicated that the sample represented a middle income group with no significant differences-
demonstrated among the groups for average family income, $F(2,70) = .99, p >.10$. The mean income for the nonclinical sample was $35,210$, for the diabetic sample, $33,666$ and for the learning disabled sample, $41,277$. A chi square analysis demonstrated no significant differences between groups for family constellation ($\chi^2 = 5.95, p > .10$).

**Subject Recruitment**

**Children with Diabetes.** With the cooperation of a local chapter of the American Diabetes Association and the Diabetes Clinic at a University Medical Center, parents of 103 children were sent a letter describing the study and were asked to sign and return a consent form. One followup letter was also sent (Appendix A). Thirty-three parents returned signed consent forms. Seven potential subjects were hospitalized during the data collection phase and did not participate resulting in a final sample of 26 children with diabetes who had had the disease for at least two years. These participants had no other major illness nor a learning disability.

The children who did participate were rated by their parents as being in good diabetic control, with the exception of two children, whose parents rated them in fair to poor control. Many of these children had participated in psychological research in the past and had had diabetes for several years, appearing to accept and manage their diabetes fairly well. In contrast, many of the parents of children who did not participate felt that their children were having difficulty managing or accepting their diabetes or that both the child and family were undergoing stressful experiences at the time of the data collection. As a function of these factors they declined to participate.
Children with Learning Disabilities. Parents of 25 students at a private school for children with learning disabilities and of 175 students receiving special educational services in the public schools were mailed a description of the study and were asked to sign and return a consent form. A learning disability was determined by the school psychologist and was defined by state law as academic functioning at least two years below expected functioning as determined by I.Q. scores where the difficulties in learning could not be attributed to social or cultural factors or physical handicaps. Seventeen parents at the first site and 10 parents at the second site provided written consent for their children to participate. This resulted in a final sample size of 27 children with learning disabilities who had been diagnosed as such for at least two years and who had no significant physical diseases, or diagnosed psychological disorders other than the learning disability. The letters to the parents of public school students were mailed by the school and information received subsequent to the end of data collection indicated that a majority of these letters did not reach their destinations hence the small number of participants from the public schools.

The children in the private school were over age 11 and had made unsuccessful adjustments in a number of special service programs in the public schools. Many of them had been designated as behavior problems in the public school setting and were participating in the private school program because of the structure and disciplinary control available there. This particular private school advocated research and encouraged parents of their students to participate in research as much as possible. As a result, these families were quite familiar with research procedures and were comfortable with self-disclosure.
**Nonclinical sample.** Parents of children without physical diseases or learning disabilities were recruited through the Catholic school system in a suburban metropolitan city in the eastern United States. One hundred and eighty parents were sent a written description of the study and 44 parents provided written consent for the children's participation. All children participating in this research were also asked for their verbal assent prior to data collection.

**Instruments**

**Index of Intellectual Functioning.** The Vocabulary subtest of the Wechsler Intelligence Scale for Children-Revised was administered. The score for this particular subtest is reported to have the best correlation ($r = .79$) with overall scores of measures of general intelligence (Kaufman, 1979). Data for the seventeen subjects at the private school were obtained from school records where a WISC-R had been administered within the past six months.

**Information Form.** Parents were asked to provide information as to the family's yearly income, child's birth order and number of siblings, and family constellation. Information was also requested about the child's past experiences with illness and injury. See Appendix B for the form in its entirety.

**Conceptions of Stress Interview.** This is a 16 question interview-format questionnaire created for this study and refined during the pilot phase. The interview yields four scores, each representing a dimension of the stress concept: Description, Explanation, Coping and Outcome. An average issues
score can also be obtained by summing the scores for all four dimensions and computing an average.

The instrument was refined in a pilot phase and questions which did not yield relevant information were deleted. The remaining questions were expanded or clarified to elicit a more specific response. The final version contains 16 questions with probes and can be found in Appendix B.

Sixteen completed interviews were analyzed qualitatively to arrive at a scoring system. Four protocols for age group 1, six for age group 2, and five for age group 3 were examined. Each question was considered separately and its responses categorized into four developmental levels ranging from Level 0 to Level 3. Appendix C contains the detailed scoring manual. The responses to the last three interview questions could not be categorized developmentally and were dropped from subsequent analyses.

Data were coded by an undergraduate research assistant and forty percent of this sample was coded again by the principal investigator. Interrater reliability was determined by percent agreement. For Stress Description, agreement was 95%, for Stress Explanation, 93%, for Stress Coping, 88% and for Stress Outcome 85%. Kappa statistics calculated for each variable were $\kappa_{\text{Description}} = .82$, $\kappa_{\text{Explanation}} = .78$, $\kappa_{\text{Coping}} = .67$, $\kappa_{\text{Outcome}} = .68$.

Conceptions of Illness Interview. A subset of a protocol developed by Bibace and Walsh (1981) was used (Appendix B). Each question was assigned a developmental level score from 0 to 6 according to scoring criteria detailed in Appendix C. Consistent with the authors directions, one developmental level was determined for each protocol by selecting the highest level score which had occurred twice when considering levels assigned to all of the questions.
asked. The protocols were scored by one of the principal investigators and forty percent of the sample was coded by another research assistant to arrive at an interrater percent agreement of 46%. No reliability and validity information is available.

**Daily Hassles Scale.** This is a 35-item checklist created for this study and modelled after an adult version, the Hassles and Uplifts Scale (Kanner, et al., 1981). This rating scale yields one score for predicted stressor impact and one for predicted number of stressors over a six week period (Appendix B). This instrument was refined in the pilot phase and the format was changed to simply rating each item for impact when questions asking if the item could happen and has the item ever happened yielded the same results.

Items were rated on a 0 (no impact) to 3 (strong impact) scale. A mean was calculated for each item across each pilot subject and items with means below 1.5 were deleted resulting in a final version of the scale containing 35 items. Two of the followup questions were transferred to the Conceptions of Stress interview and the others were retained for later use and not included in statistical analyses.

**Life Events Checklist.** This is a 46 item rating scale designed by Johnson (1983). Test-retest reliability is reported to be .69 for positive change and .71 for negative change (Johnson, 1986). Two items regarding teenage pregnancy were deleted at the request of the Catholic schools. The remaining 44 items were administered to all participants and were rated on a scale of 0 to 3 (no impact to strong impact) and were designated as positive or negative. Ratings of positive and negative events are summed separately to yield a positive change score and a negative change score. Items refer to major life
events which are to be rated as to impact only if they have occurred in the preceding twelve months.

**Personality Inventory for Children.** This is a short version (280 items) of the original standardized 420 item true-false scale (Wirt, et al., 1982). Participants' parents completed the questionnaire. This study produces T-scores for 12 clinical scales and 4 factor scales. Three scales regarded as Internalization scales (Depression, Somatic Concern, and Anxiety) plus a scale for Family Relations were chosen to represent personality features which could lead to a hypersensitivity to stress. A large number of validity and reliability studies have been undertaken with this scale. Test-retest reliability is .65 for Somatic Concern, .93 for Depression, .89 for Anxiety, and .92 for Family Relations. Correlations with the full-length PIC are .95 for Somatic Concern, .98 for Depression, .97 for Anxiety, and .98 for Family Relations.

**Procedure**

Participants were interviewed individually by either the principal investigator or one of a number of undergraduate research assistants, in a single session lasting approximately 1 hour to 1 and 1/2 hours. Research assistants were trained in two 90 minute sessions and administered one practice interview prior to the actual interview.

Forty-three interviews were conducted in school with fifty-four interviews taking place in the child's home. Children interviewed at home were interviewed privately and care was taken to ensure similar circumstances to those for the children interviewed in school. Inspection of all of the protocols did not show striking differences in responsiveness between
the two settings. Parents who were at home while the child was being interviewed completed an information form and the Personality Inventory for Children. Children interviewed in school were given these forms to take home plus a stamped envelope in which to return them.

The Vocabulary subtest was administered first (except where scores were provided) followed by the Stress and Illness protocols, the daily stressor rating scale, and finally the life events checklist. Subjects who could read without difficulty completed the latter two scales under the supervision of the research assistant while those with reading difficulties had the scale read to them.

**Data Analysis**

Chi square analyses were conducted for the scores which represented developmental categories (Stress and Illness Conceptions). Analysis of variance procedures were used to analyze the data about stressor experience and hypersensitivity to stress.

In order to further investigate age and group differences for the five Stress variables and the Illness variable, several age (3) by group (3) analyses of covariance were performed using the General Linear Model procedure contained within the Statistical Analysis System (SAS, 1982). Vocabulary scores were entered as the covariate. This SAS procedure corrects for an unbalanced design where frequencies of observations are unequal for each cell. The printed output provides information for both the analysis of variance and multiple regression analyses. Where significant F ratios were demonstrated, pairwise comparisons of means were also undertaken accompanied by a Tukey studentized range (HSD) statistic. The latter
procedure, most suitable for unbalanced designs, provides a more stringent
test of group mean differences than is provided by the F ratio probability tests.
The Tukey procedure increases control for experimentwise error and is
regarded as more powerful than other comparison methods (SAS, 1982).
CHAPTER IV
RESULTS

The aims of this study were to examine age and group differences in children’s conceptions of stress and illness. Other objectives were to assess differences in stressor impact and stressor prediction among groups from both a daily hassles perspective and a life events perspective. In an attempt to isolate factors which might serve as a basis of a heightened vulnerability to the subjective experience of stress several personality factors were to be investigated to explore possible group differences for these factors.

An appraisal of the means and standard deviations of the major dependent variables (Tables 4, 6, 12, 14) raised some concerns that the results were not normally distributed, although nonnormality was only moderate. The F test is a fairly robust procedure and the degree of non-normality is within accepted limits for the use of analysis of variance procedures (Myers, 1979). The data were not suitable for a logarithmic transformation nor for rank-ordering statistics. In general, as this data is categorical the analysis of choice is a Chi-square analysis which was conducted for each of the stress conception and illness variables. It is not possible using the latter procedure to evaluate multiple main effects, interactions, or pairwise comparisons of means, nor to assess the effects of covariates. As a result, both chi-square and
analysis of variance procedures were conducted so as to make maximal use of the data.

Preliminary Analyses

Prior to undertaking the main analyses, all of the Stress variables and the Illness variable were analyzed for possible gender differences as the diagnostic groups differed statistically with respect to gender composition.

One way analyses of variance were performed for the average issues score, Description, Explanation, Coping, Outcome, and Illness scores. The results are summarized in Table 3 with no main effect for gender demonstrated. As a result, gender was not included in subsequent analyses for these variables.

Vocabulary scores were also analyzed to test for any group differences. A separate one way (group) ANOVA demonstrated no main effect for group differences in vocabulary scores (Table 3).

Inter-item correlations were also obtained for the four scores representing the dimensions of stress. This can be found in Table 5. As can be seen from this information the stress interview appears to have good internal consistency.

Conceptions of Stress

To test hypothesis 1 regarding age differences in conceptions of stress and hypothesis 2 regarding group differences, a chi square analysis was conducted to explore the relationship of age and stress conceptions and of group membership and stress conceptions. A $3 \times 3$ (age by group) analysis of
Table 3
Preliminary Analyses

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covariance was also conducted with vocabulary scores covaried for each of the five stress scores.

Average Issues Score

Age Differences. The chi square analysis demonstrated a significant relationship between age and category of stress conceptions, ($\chi^2 = 48.39$, $p < .0001$) with greater conceptual maturity related to increasing age. The analysis of covariance demonstrated a significant main effect for age ($F(9,86) = 29.02, p < .0001$, and an effect for the covariate, vocabulary scores, $F(1,86) = 11.23, p < .001$ (Table 7). Pairwise comparisons demonstrated that each age group mean was significantly different from each of the other means and
Table 4

Means and Standard Deviations

Conceptions of Stress By Age Group

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<tr>
<td>Middle</td>
<td>1.72</td>
<td>.81</td>
</tr>
<tr>
<td>Older</td>
<td>2.22</td>
<td>.62</td>
</tr>
<tr>
<td>Explanation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Younger</td>
<td>.56</td>
<td>.77</td>
</tr>
<tr>
<td>Middle</td>
<td>1.50</td>
<td>.80</td>
</tr>
<tr>
<td>Older</td>
<td>2.06</td>
<td>.64</td>
</tr>
<tr>
<td>Coping</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Younger</td>
<td>.60</td>
<td>.71</td>
</tr>
<tr>
<td>Middle</td>
<td>1.53</td>
<td>.72</td>
</tr>
<tr>
<td>Older</td>
<td>2.10</td>
<td>.71</td>
</tr>
<tr>
<td>Outcome</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Younger</td>
<td>.64</td>
<td>.82</td>
</tr>
<tr>
<td>Middle</td>
<td>1.56</td>
<td>1.05</td>
</tr>
<tr>
<td>Older</td>
<td>2.17</td>
<td>1.03</td>
</tr>
</tbody>
</table>

This was substantiated by the Tukey HSD Test, at the .05 level of probability. The scores of the younger age group were statistically lower than the middle group's scores, which in turn were significantly lower than the scores of the older age group.

The multiple regression portion of this analysis demonstrated that age accounted uniquely for 31% of the variance in the average issue scores with vocabulary scores accounting uniquely for an additional 6% of this variance.
Table 5
Inter-item Correlations, Stress Interview

<table>
<thead>
<tr>
<th>Dimension</th>
<th>E</th>
<th>C</th>
<th>O</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>.93*</td>
<td>.83*</td>
<td>.75*</td>
</tr>
<tr>
<td>Explanation (E)</td>
<td></td>
<td>.77*</td>
<td>.69*</td>
</tr>
<tr>
<td>Coping (C)</td>
<td></td>
<td></td>
<td>.82*</td>
</tr>
<tr>
<td>Outcome (O)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*p < .0001

Age and vocabulary ability shared 13% of the variance accounted for above what they each accounted for separately.

**Group Differences.** The chi square analysis demonstrated no significant relationship between group membership and category of stress conceptions, \( \chi^2 = 20.20, p > .16 \). The analysis of variance provided further support for this finding as no main effect was demonstrated for group membership, \( F(2,86) = .64, p > .10 \) (Table 7). This finding indicates that no differences exist in conceptual maturity among the diabetic, learning disabled, and nonclinical samples. No significant group by age interactions were demonstrated.

**Description**

**Age Differences.** A chi square analysis examining the relationship between Description categories and age was significant \( \chi^2 = 49.96, p < .001 \) indicating that age and conceptual maturity are related with greater maturity related to increasing chronological age. The analysis of covariance substantiated this relationship, demonstrating a significant main effect for
Table 6
Diagnostic Group Means Stress Conceptions

<table>
<thead>
<tr>
<th>Variable</th>
<th>X</th>
<th>s.d.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Issues Score</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nonclinical</td>
<td>1.61</td>
<td>1.01</td>
</tr>
<tr>
<td>Learning Disabled</td>
<td>1.63</td>
<td>.82</td>
</tr>
<tr>
<td>Diabetic</td>
<td>1.40</td>
<td>.84</td>
</tr>
<tr>
<td>Description</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nonclinical</td>
<td>1.68</td>
<td>1.05</td>
</tr>
<tr>
<td>Learning Disabled</td>
<td>1.70</td>
<td>.82</td>
</tr>
<tr>
<td>Diabetic</td>
<td>1.58</td>
<td>.95</td>
</tr>
<tr>
<td>Explanation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nonclinical</td>
<td>1.50</td>
<td>1.02</td>
</tr>
<tr>
<td>Learning Disabled</td>
<td>1.52</td>
<td>.85</td>
</tr>
<tr>
<td>Diabetic</td>
<td>1.42</td>
<td>.90</td>
</tr>
<tr>
<td>Coping</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nonclinical</td>
<td>1.59</td>
<td>.97</td>
</tr>
<tr>
<td>Learning Disabled</td>
<td>1.67</td>
<td>.92</td>
</tr>
<tr>
<td>Diabetic</td>
<td>1.28</td>
<td>.83</td>
</tr>
<tr>
<td>Outcome</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nonclinical</td>
<td>1.68</td>
<td>1.25</td>
</tr>
<tr>
<td>Learning Disabled</td>
<td>1.63</td>
<td>1.11</td>
</tr>
<tr>
<td>Diabetic</td>
<td>1.35</td>
<td>1.06</td>
</tr>
</tbody>
</table>

age, F (2,86) = 28.29, p < .0001, and for the covariate, vocabulary, F (1,86) = 16.46, p < .0001 (Table 8). Pairwise comparisons further demonstrated significant differences between all age group means in the direction of increasing conceptual maturity with age. The post-hoc analysis further substantiated this finding at the .05 level of probability.

Age accounted for 30% of the variance in stress description scores with vocabulary scores accounting for an additional 9% beyond the 10% of the variance these variables shared.
Table 7
Two-Way ANCOVA, Average Issues Score

<table>
<thead>
<tr>
<th></th>
<th>df</th>
<th>SS</th>
<th>MSe</th>
<th>F</th>
<th>p &lt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>2</td>
<td>24.68</td>
<td></td>
<td>29.02</td>
<td>.0001</td>
</tr>
<tr>
<td>Group</td>
<td>2</td>
<td>.57</td>
<td>.64</td>
<td></td>
<td>ns</td>
</tr>
<tr>
<td>Age × Group</td>
<td>4</td>
<td>1.71</td>
<td></td>
<td>1.01</td>
<td>ns</td>
</tr>
<tr>
<td>Vocab</td>
<td>1</td>
<td>4.77</td>
<td></td>
<td>11.23</td>
<td>.001</td>
</tr>
<tr>
<td>MODEL</td>
<td>9</td>
<td>43.39</td>
<td>4.82</td>
<td>11.33</td>
<td>.0001</td>
</tr>
<tr>
<td>Error</td>
<td>86</td>
<td>36.589</td>
<td>.43</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 8
Two-Way ANCOVA, Stress Description

<table>
<thead>
<tr>
<th></th>
<th>df</th>
<th>SS</th>
<th>MSe</th>
<th>F</th>
<th>p &lt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>2</td>
<td>26.08</td>
<td></td>
<td>28.29</td>
<td>.0001</td>
</tr>
<tr>
<td>Group</td>
<td>2</td>
<td>1.13</td>
<td></td>
<td>1.23</td>
<td>ns</td>
</tr>
<tr>
<td>Age × Group</td>
<td>4</td>
<td>1.77</td>
<td></td>
<td>.96</td>
<td>ns</td>
</tr>
<tr>
<td>Vocab</td>
<td>1</td>
<td>7.58</td>
<td></td>
<td>16.46</td>
<td>.0001</td>
</tr>
<tr>
<td>MODEL</td>
<td>9</td>
<td>46.32</td>
<td>5.14</td>
<td>11.17</td>
<td>.0001</td>
</tr>
<tr>
<td>Error</td>
<td>86</td>
<td>39.64</td>
<td>46</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Group Differences.** The chi square analysis demonstrated no significant relationship between membership in a particular group and conceptual maturity, $\chi^2 = 10.34, p > .10$. The analysis of covariance provided additional evidence for the absence of a relationship between these factors, $F$
(2,86) = 1.23, p > .10 (Table 8). These results indicate that stress description is conceptualized similarly among diabetic, learning disabled, and nonclinical samples. No significant effect for age by group interaction was demonstrated.

**Explanation.**

**Age Differences.** The chi square analysis established a significant relationship between age and categories of stress explanation, \( \chi^2 = 49.38, p < .0001 \) with greater conceptual maturity related to increasing age. The ANOVA demonstrated significant main effects for age, \( F (2,86) = 8.68, p < .0001 \), and for the covariate, vocabulary, \( F (2,86) = 5.69, p < .02 \) (Table 9). Pairwise comparisons of age group means demonstrated each age group mean to be significantly different from each of the others in the direction of more mature conceptions from the younger to the older age groups. This difference was further supported by the Tukey HSD test which was significant at the .05 level of probability. Age and vocabulary uniquely
accounted for 28% and 4% of the variance in explanation scores, respectively, above their shared variance of 12%.

**Group Differences.** The chi square analysis demonstrated no relationship between group membership and conceptual maturity, $\chi^2 = 3.68$, $p > .10$. The analysis of covariance also demonstrated no main effect for group membership, $F(2,86) = .75$, $p > .10$ (Table 9). These results indicate that stress explanation is conceptualized similarly among the diabetic, learning disabled, and nonclinical samples. No significant interaction effect for age by group was demonstrated.

**Coping**

**Age Differences.** The chi square analysis demonstrated a significant relationship between age and conceptual maturity, $\chi^2 = 49.86$, $p < .0001$ with greater conceptual maturity related to increasing age. Additional information provided by the analysis of covariance substantiated a significant main effect for age, $F(2,86) = 9.82$, $p < .0001$, and for the covariate vocabulary, $F(1,86) = 8.57$, $p < .005$ (Table 10). Pairwise comparisons of means demonstrated that each age group mean was statistically different from the others in the direction of greater conceptual maturity with age, a finding substantiated by the post-hoc test at the .05 level of probability. Age accounted uniquely for 31% of the variance in stress coping scores with vocabulary accounting for an additional 5% once their shared variance of 13% had been accounted for.

**Group Differences.** No relationship between group membership and conceptual maturity was demonstrated by the chi square analysis, $\chi^2 = 8.26$, $p > .10$ a finding supported by the ANOVA which demonstrated no
Table 10

Two-Way ANCOVA, Stress Coping

<table>
<thead>
<tr>
<th></th>
<th>df</th>
<th>SS</th>
<th>MSe</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>2</td>
<td>24.82</td>
<td></td>
<td>26.42</td>
<td>.0001</td>
</tr>
<tr>
<td>Group</td>
<td>2</td>
<td>.45</td>
<td></td>
<td>.48</td>
<td>ns</td>
</tr>
<tr>
<td>Age × Group</td>
<td>4</td>
<td>.95</td>
<td></td>
<td>.51</td>
<td>ns</td>
</tr>
<tr>
<td>Vocab</td>
<td>1</td>
<td>4.02</td>
<td></td>
<td>8.57</td>
<td>.005</td>
</tr>
<tr>
<td>MODEL</td>
<td>9</td>
<td>41.51</td>
<td>4.61</td>
<td>9.82</td>
<td>.0001</td>
</tr>
<tr>
<td>Error</td>
<td>86</td>
<td>42.39</td>
<td></td>
<td>.47</td>
<td></td>
</tr>
</tbody>
</table>

significant main effect for group membership, F(2,86) = .48, p > .10 (Table 10). It appears that the nonclinical, diabetic and learning disabled samples conceptualize stress coping similarly. No significant group by age interaction effect was demonstrated.

Outcome

**Age Differences.** The chi square analysis demonstrated a significant relationship between age and categories of stress outcome conceptions $\chi^2 = 33.62, p < .0001$ with greater conceptual maturity related to increasing age. A significant main effect was demonstrated by the analysis of covariance for age, F(2,86) = 6.39, p < .0001 and for vocabulary, F(1,86) = 5.96, p < .02 (Table 11). Pairwise comparisons established that the mean from the younger age group was different from the middle age group, which in turn was statistically different from the older age group. This finding was substantiated by the post-hoc test at the .05 level of probability.
Age uniquely accounted for 19% of the variance in conceptions of stress outcome scores with vocabulary accounting for an additional 4% of the variance once shared variance of 11% was accounted.

**Group Differences.** No significant relationship between group membership and conceptual maturity was detected $\chi^2 = 8.27, p > .10$ nor was there a main effect for age demonstrated by the ANCOVA, $F(2,86) = .48, p > .10$ (Table 11). No significant group by age interaction effect was demonstrated. Diabetic, learning disabled and non clinical samples appear to conceptualize stress outcome similarly.

**Table 11**

<table>
<thead>
<tr>
<th>Two-Way ANCOVA, Stress Outcome</th>
<th>df</th>
<th>SS</th>
<th>MSE</th>
<th>F</th>
<th>p &lt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>2</td>
<td>24.77</td>
<td></td>
<td>13.98</td>
<td>.0001</td>
</tr>
<tr>
<td>Group</td>
<td>2</td>
<td>.32</td>
<td></td>
<td>.18</td>
<td>ns</td>
</tr>
<tr>
<td>Age $\times$ Group</td>
<td>4</td>
<td>5.16</td>
<td></td>
<td>1.45</td>
<td>ns</td>
</tr>
<tr>
<td>Vocab</td>
<td>1</td>
<td>5.28</td>
<td></td>
<td>5.96</td>
<td>.05</td>
</tr>
<tr>
<td>MODEL</td>
<td>9</td>
<td>50.95</td>
<td>5.66</td>
<td>6.39</td>
<td>.0001</td>
</tr>
<tr>
<td>Error</td>
<td>86</td>
<td>76.21</td>
<td>.87</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Summary**

**Age Differences.** The results of the five separate analyses for stress scores consistently demonstrate significant differences in conceptual maturity across all three age groups. For each dimension of stress conception, the youngest age group had the least mature conceptions, with the middle age
group progressing to the mature conceptions of the older age group. This result indicates that the null hypothesis proposing no differences among age groups can be rejected.

**Group Differences.** The five separate analyses consistently fail to demonstrate any group differences in conceptual maturity for the variables under consideration. As a result, the null hypothesis regarding differences in conceptual maturity across groups cannot be rejected. No such differences were demonstrated statistically.

**Conceptions of Illness**

To test hypothesis 3 regarding differences among age and diagnostic groups a $3 \times 3$ (age by group) analysis of covariance was performed with vocabulary as the covariate. Chi square analyses were also undertaken to explore the relationship between conceptions of illness and age or diagnostic group membership.

Table 12

**Means and Standard Deviations Illness
Conception by Age Group**

<table>
<thead>
<tr>
<th>Group</th>
<th>X</th>
<th>s.d.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Younger (8-10)</td>
<td>2.96</td>
<td>1.02</td>
</tr>
<tr>
<td>Middle (11-13)</td>
<td>3.59</td>
<td>1.13</td>
</tr>
<tr>
<td>Older (14-16)</td>
<td>3.75</td>
<td>1.03</td>
</tr>
</tbody>
</table>
**Age Differences.** The chi square analysis demonstrated no significant relationship between age and maturity of illness conceptions ($\chi^2 = 12.31$, $p > .10$). It should be noted that several categorical values were zero which rendered this analysis invalid for this particular data.

<table>
<thead>
<tr>
<th></th>
<th>df</th>
<th>SS</th>
<th>MSe</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>2</td>
<td>13.03</td>
<td></td>
<td>6.88</td>
<td>.001</td>
</tr>
<tr>
<td>Group</td>
<td>2</td>
<td>13.38</td>
<td></td>
<td>7.06</td>
<td>.001</td>
</tr>
<tr>
<td>Age $\times$ Group</td>
<td>4</td>
<td>.95</td>
<td></td>
<td>.25</td>
<td>ns</td>
</tr>
<tr>
<td>Vocab</td>
<td>1</td>
<td>6.32</td>
<td></td>
<td>6.68</td>
<td>.01</td>
</tr>
<tr>
<td>MODEL</td>
<td>9</td>
<td>32.47</td>
<td>3.61</td>
<td>3.81</td>
<td>.001</td>
</tr>
<tr>
<td>Error</td>
<td>86</td>
<td>81.52</td>
<td>.95</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The analysis of covariance, however, demonstrated significantly that differences existed between the younger age group when compared to the combined older groups $F (2,86) = 6.88$, $p < .001$. Pairwise comparisons established that no differences existed between the middle and older age groups and this was supported by the post hoc Tukey test at the .05 level of probability. The differences which were established were in the direction of more mature conceptions with age (Table 13).

**Group Differences.** No relationship was again demonstrated between group membership and conceptual maturity by the chi square analysis ($\chi^2 = 8.2$, $p > .10$) although this test can be regarded as valid as no cell values were less than 2.
The analysis of variance, however, demonstrated a significant main effect for group membership, (Table 13) $F (2,86) = 7.06, p < .01$. Pairwise comparisons also supported significant differences between groups with the diabetic subjects having the most mature illness conceptions, the nonclinical sample having the next most mature conceptions and the learning disabled sample having the least mature conceptions of illness. The statistical differences did not hold up with the post-hoc Tukey test which determined statistical differences to exist only between the clinical samples, with diabetic children providing the most mature conceptions of stress.

### Table 14
**Means and Standard Deviations Illness Conception by Group**

<table>
<thead>
<tr>
<th>Group</th>
<th>X</th>
<th>s.d.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nonclinical</td>
<td>3.52</td>
<td>1.17</td>
</tr>
<tr>
<td>Diabetic</td>
<td>3.81</td>
<td>1.06</td>
</tr>
<tr>
<td>Learning Disabled</td>
<td>3.15</td>
<td>.95</td>
</tr>
</tbody>
</table>

**Summary**

The results clearly establish age differences between the younger and older participants with respect to conceptual maturity. The results with regard to group differences in conceptual maturity are difficult to interpret but it is significant that the clinical groups did not differ from the nonclinical sample and only differed with each other. It is very likely that the differences
actually represent differences in experience with illness where one would expect the diabetic subjects to be better informed than other clinical samples with regard to illness concepts.

Based upon the established age differences, rejection of null hypothesis 3 is warranted although null hypothesis 4 regarding group differences in conceptualizing illness cannot be rejected.

**Stressor Experience**

**Daily Stressors**

Scores representing perceived impact (Table 15) of daily stressors were

<table>
<thead>
<tr>
<th>Group</th>
<th>Impact X</th>
<th>Impact s.d.</th>
<th>Prediction X</th>
<th>Prediction s.d.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nonclinical</td>
<td>64.78</td>
<td>12.54</td>
<td>14.17</td>
<td>6.76</td>
</tr>
<tr>
<td>Learning Disabled</td>
<td>60.44</td>
<td>20.70</td>
<td>16.37</td>
<td>6.57</td>
</tr>
<tr>
<td>Diabetic</td>
<td>56.28</td>
<td>13.01</td>
<td>11.13</td>
<td>3.59</td>
</tr>
</tbody>
</table>

analyzed in a $3 \times 3$ (age $\times$ group) analysis of variance to test hypothesis 6 that no differences exist among groups as to the impact of daily stressors.

**Age Differences.** No significant main effect was demonstrated for age, $F(2,83) = .09, p > .10$ (Table 16). When data was reorganized to reflect categories of daily stressors: School, Social, Self, Family, again no significant
Table 16

Two-Way ANOVA, Stressor Impact

<table>
<thead>
<tr>
<th></th>
<th>df</th>
<th>SS</th>
<th>MSe</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>2</td>
<td>43.09</td>
<td>.09</td>
<td></td>
<td>ns</td>
</tr>
<tr>
<td>Group</td>
<td>2</td>
<td>1416.06</td>
<td>2.86</td>
<td></td>
<td>ns</td>
</tr>
<tr>
<td>Age x Group</td>
<td>4</td>
<td>1465.61</td>
<td>1.48</td>
<td></td>
<td>ns</td>
</tr>
<tr>
<td>MODEL</td>
<td>8</td>
<td>2938.77</td>
<td>367.35</td>
<td>1.48</td>
<td>ns</td>
</tr>
<tr>
<td>Error</td>
<td>8</td>
<td>20545.71</td>
<td>247.54</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Differences were demonstrated among the three age groups (Table 17). It appears that children in all three age groups perceive similar degrees of impact for daily stressors.

Group Differences. The two way analysis of variance did not demonstrate an effect for group membership as to perceived stressor impact, $F(2,83) = 2.86, p > .10$. When data were reorganized to reflect categories of stressors, diabetic children were found to have statistically fewer concerns about themselves than were the other two samples, $F(2,81 = 2.58, p < .02$. These differences were substantiated by pairwise comparisons and the post-hoc Tukey test which was significant at the .05 level of probability.

Summary

The analyses pertaining to perceived impact of daily stressors do not indicate that any of the diabetic, learning disabled, or nonclinical samples anticipate greater stressor impact than any of the other groups. Diabetic
Table 17

Two Way ANOVA, Categories of Stressors

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>SS</th>
<th>MSe</th>
<th>F</th>
<th>p</th>
<th>&lt;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Age</td>
<td>2</td>
<td>55.89</td>
<td></td>
<td>1.97</td>
<td>ns</td>
</tr>
<tr>
<td></td>
<td>Group</td>
<td>2</td>
<td>12.69</td>
<td></td>
<td>.45</td>
<td>ns</td>
</tr>
<tr>
<td></td>
<td>Age×Group</td>
<td>4</td>
<td>10.14</td>
<td></td>
<td>.18</td>
<td>ns</td>
</tr>
<tr>
<td></td>
<td>MODEL</td>
<td>8</td>
<td>1148.43</td>
<td>9.84</td>
<td>.69</td>
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</tr>
<tr>
<td></td>
<td>Error</td>
<td>81</td>
<td>1227.16</td>
<td>14.17</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Age</td>
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<td>115.86</td>
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<td>2.51</td>
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</tr>
<tr>
<td></td>
<td>Group</td>
<td>2</td>
<td>8.62</td>
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<td>.19</td>
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</tr>
<tr>
<td></td>
<td>Age×Group</td>
<td>4</td>
<td>150.74</td>
<td></td>
<td>1.64</td>
<td>ns</td>
</tr>
<tr>
<td></td>
<td>MODEL</td>
<td>4</td>
<td>275.22</td>
<td>34.31</td>
<td>1.49</td>
<td>ns</td>
</tr>
<tr>
<td></td>
<td>Error</td>
<td>81</td>
<td>1866.59</td>
<td>23.04</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Age</td>
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<td>6.89</td>
<td></td>
<td>.19</td>
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</tr>
<tr>
<td></td>
<td>Group</td>
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<td>18.09</td>
<td></td>
<td>.50</td>
<td>ns</td>
</tr>
<tr>
<td></td>
<td>Age×Group</td>
<td>4</td>
<td>49.81</td>
<td></td>
<td>.69</td>
<td>ns</td>
</tr>
<tr>
<td></td>
<td>MODEL</td>
<td>8</td>
<td>60.87</td>
<td>7.61</td>
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</tr>
<tr>
<td></td>
<td>Error</td>
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<td>1452.03</td>
<td>17.93</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Age</td>
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<td>36.76</td>
<td></td>
<td>.49</td>
<td>ns</td>
</tr>
<tr>
<td></td>
<td>Group</td>
<td>2</td>
<td>247.01</td>
<td></td>
<td>3.28</td>
<td>.05</td>
</tr>
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<td></td>
<td>Age×Group</td>
<td>4</td>
<td>273.65</td>
<td></td>
<td>1.81</td>
<td>ns</td>
</tr>
<tr>
<td></td>
<td>MODEL</td>
<td>8</td>
<td>940.84</td>
<td>85.53</td>
<td>2.27</td>
<td>.05</td>
</tr>
<tr>
<td></td>
<td>Error</td>
<td>81</td>
<td>2940.55</td>
<td>37.69</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

children anticipate that they will be less stressed by daily stressors having to do with issues of competence or self-esteem.

Predicted Daily Stressors

Scores representing predicted number of daily hassles over a six week period were analyzed in a 3 × 3 (age by group) analysis of variance to test hypothesis 7 that no difference exist among groups as to predicted numbers of daily stressors.
**Age Differences.** No significant main effect was demonstrated for age, F (2,75) = 1.21, p > .10. An age by group interaction was significant (Table 18).

Table 18

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>SS</th>
<th>MSe</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>2</td>
<td>74.27</td>
<td>1.21</td>
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<tr>
<td>Group</td>
<td>2</td>
<td>346.44</td>
<td>5.65</td>
<td>.001</td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td>1</td>
<td>120.00</td>
<td>3.91</td>
<td>.0516</td>
<td></td>
</tr>
<tr>
<td>Age×Group</td>
<td>4</td>
<td>291.04</td>
<td>2.37</td>
<td>ns</td>
<td></td>
</tr>
<tr>
<td>Group×Gender</td>
<td>2</td>
<td>62.43</td>
<td>1.02</td>
<td>ns</td>
<td></td>
</tr>
<tr>
<td>MODEL</td>
<td>11</td>
<td>1070.84</td>
<td>97.34</td>
<td>3.17</td>
<td>.001</td>
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<tr>
<td>ERROR</td>
<td>75</td>
<td>2300.15</td>
<td>30.67</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Group Differences.** A main effect for group was demonstrated, F (2,75) = 5.65, p < .005. Given previously established gender differences across diagnostic groups, this analysis was rerun as a 3 × 3 × 2 analysis of variance to attempt to separate group effects from effects due to gender as well as to address the age by group interaction (Table 18). The results of this analysis indicated again no main effects for age but this time no age by group interaction was demonstrated. Significant effects were again demonstrated for group but with only marginal effects for gender which failed to reach statistical significance (p = < .0516). Pairwise comparisons for gender demonstrated that females anticipated more stressors would occur than males but the more stringent post-hoc test failed to substantiate this finding. Pairwise comparisons for group effects demonstrated that learning disabled children predicted that significantly more daily stressors would occur to them.
over a six week period than did the diabetic or nonclinical children. These results were substantiated by the Tukey test at the .05 level of probability.

**Summary**

The results of the analyses for stressor experience do not demonstrate that any of the groups anticipate greater stressor impact than the other groups. Learning disabled children do predict that greater numbers of stressors will happen to them over a six week period than the other two samples. These results support a rejection of the null hypothesis regarding group differences in stressor occurrence (number 7). Null hypothesis 5 regarding age differences for impact or occurrence and null hypothesis 6 regarding group differences in stressor impact, cannot be rejected. It is interesting to note that children with diabetes anticipate less stressor impact in the category of self-concerns, but this was not a prediction of hypothesis 6.

Table 19

**Means and Standard Deviations, Life Change**

<table>
<thead>
<tr>
<th>Group</th>
<th>Negative</th>
<th>Positive</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>X</td>
<td>s.d.</td>
</tr>
<tr>
<td>Nonclinical</td>
<td>7.15</td>
<td>10.29</td>
</tr>
<tr>
<td>Learning Disabled</td>
<td>10.20</td>
<td>9.94</td>
</tr>
<tr>
<td>Diabetic</td>
<td>4.63</td>
<td>4.50</td>
</tr>
</tbody>
</table>
Vulnerability to Stress

To test hypothesis 8 regarding the role of life events as a predictor of perceived impact or occurrence of daily stressors and to test hypothesis 9 regarding personality factors as predictors of stressor occurrence or perceived impact, separate analyses of variance were performed to detect group differences prior to entering these scores into multiple regression analyses. Two life change scores and four personality scores were analyzed.

Positive and Negative Life Change

Two way analyses of variance (age by group) demonstrated no main effects for age, group, or a significant age by group interaction for either positive life change $F(2,80) = .71, p > .10$, or for negative life change, $F(2,80) = 1.65, p > .10$ (Table 20). It appears that age groups and diagnostic groups experience life events similarly.

Table 20

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>SS</th>
<th>MSe</th>
<th>F</th>
<th>p &lt;</th>
</tr>
</thead>
<tbody>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
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<td>.71</td>
<td>ns</td>
</tr>
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<td></td>
<td>.28</td>
<td>ns</td>
</tr>
<tr>
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<td>.67</td>
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<td>.71</td>
<td>ns</td>
</tr>
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<td>72.05</td>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
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<td></td>
<td>1.84</td>
<td>ns</td>
</tr>
<tr>
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<td></td>
<td>2.25</td>
<td>ns</td>
</tr>
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<td>.80</td>
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<td>6313.80</td>
<td>78.92</td>
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</tr>
</tbody>
</table>
**Personality Scores**

Separate one way analyses of variance (group) were performed on the four personality scale scores: Family Concerns, Somatic Concerns, Depression and Anxiety (Table 21). No main effect for group was demonstrated for Family Concerns, $F(2,84) = .01, p > .10$ (Table 22).

<table>
<thead>
<tr>
<th>Table 21</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Means and Standard Deviations Personality</strong></td>
</tr>
<tr>
<td><strong>Inventory for Children</strong></td>
</tr>
</tbody>
</table>

<table>
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<tr>
<th>Scale</th>
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<th>s.d.</th>
</tr>
</thead>
<tbody>
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<td></td>
</tr>
<tr>
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<td>48.15</td>
<td>7.36</td>
</tr>
<tr>
<td>Learning Disabled</td>
<td>58.29</td>
<td>11.35</td>
</tr>
<tr>
<td>Diabetic</td>
<td>62.44</td>
<td>14.58</td>
</tr>
<tr>
<td><strong>Depression</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nonclinical</td>
<td>51.95</td>
<td>10.74</td>
</tr>
<tr>
<td>Learning Disabled</td>
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<td>16.57</td>
</tr>
<tr>
<td>Diabetic</td>
<td>55.44</td>
<td>12.32</td>
</tr>
<tr>
<td><strong>Anxiety</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nonclinical</td>
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<td>9.33</td>
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<td>10.62</td>
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<td></td>
</tr>
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</tr>
<tr>
<td>Learning Disabled</td>
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<td>8.92</td>
</tr>
<tr>
<td>Diabetic</td>
<td>52.20</td>
<td>9.22</td>
</tr>
</tbody>
</table>

Significant effects for group were demonstrated for somatic concerns, $F(2,84) = 14.70, p < .0001$. Pairwise comparisons demonstrated that both diabetic and learning disabled children had higher scores on this variable and
Table 22

**F Table, Personality Inventory for Children**

<table>
<thead>
<tr>
<th>Source</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
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<td>Somatic Concern</td>
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<td>.0001</td>
</tr>
<tr>
<td>Depression</td>
<td>7.19</td>
<td>.001</td>
</tr>
<tr>
<td>Anxiety</td>
<td>4.00</td>
<td>.05</td>
</tr>
<tr>
<td>Family Relations</td>
<td>.01</td>
<td>ns</td>
</tr>
</tbody>
</table>

This was substantiated by the Tukey test at the .05 level of probability. Although the clinical groups differed significantly from the nonclinical group with respect to being concerned about bodily processes, they were not significantly different from each other.

A significant main effect for group was also demonstrated for Depression, $F(2,80) = 7.19, p < .001$, and for Anxiety, $F(2,80) = 4.00, p < .02$. Pairwise comparisons substantiated by the post-hoc procedure demonstrated the learning disabled children to be significantly more depressed and anxious than the other two groups, either singly or in combination.

Subsequent to these analyses multiple regression analyses were conducted to determine the explanatory importance of life change and personality scores for stressor impact and separately, for stressor predictions.

**Stressor Impact.** The variables entered into this analysis were: age, group, positive change, negative change, stress, conceptions, anxiety, depression, and somatic concern. This model as a whole accounted for 27% of the variance in the perceived impact of daily stressors with negative change in
the preceding year being the only significant predictor, $F = 6.6, p < .02$, and accounting for 5% of the variance in impact scores. Conceptions of stress approached significance as a predictor variable, $(F = 3.89, p < .0524)$ but failed to reach the criterion. None of the personality scale scores nor group membership were significant predictors despite the established group differences.

These results indicate that negative life change is a significant predictor of stressor impact and suggest that the null hypothesis (#8) regarding no influence of life change upon stressor impact can be rejected. The absence of group membership as a predictor of stressor impact begins to suggest that group membership per se has little predictive importance for perceiving stress.

**Stressor Prediction.** The same variables were entered in a separate multiple regression analysis to evaluate their influence upon the number of stressors participants predicted would occur over a six week period. The overall model accounted for 35% of the variance in stressor predictions. Negative life change was again found to be a significant predictor, accounting for 17% of the variance in the dependent variable $F = 17.53, p < .0001$. Depression scores were also significant predictors and accounted for an additional 5% of the accounted for variance, $F = 4.99, p < .03$. Scores for Anxiety approached significance, $F = 3.76, p < .0567$ but failed to reach the criterion. Group membership was again a nonsignificant predictor.

The findings regarding negative life change again support a rejection of the null hypothesis #8 regarding life change and stressor prediction.

The results from both multiple regression analyses begin to suggest that personality factors plus negative life change may relate to perceptions about
stress, but no relationship of group membership to perceived impact. As a result, null hypothesis number 9 regarding a hypersensitivity or vulnerability to stress cannot be rejected.
CHAPTER V
DISCUSSION

Review of Results

Conceptions of Stress

Clear developmental trends were apparent for children's abilities to conceptualize the four dimensions of stress. Chi square analyses established the relationship between increasing age and increased conceptual maturity. The analysis of variance, which statistically controlled for children's general verbal abilities, demonstrated distinct and significant differences among the three age groups where a clear progression toward a mature understanding of the concepts was demonstrated. Inspections of the age group means for each variable suggests that this concept may have little meaning for the youngest of the 8 to 10 year olds, although a rudimentary understanding of stress begins to emerge by the end of this period. At this age, stress is defined as a vague sense of strain where single emotional and physiological responses occur which are overtly manifested in a single observable behavior. Explanations for stress imply a vague understanding of exertion, either mental or physical, but there is as yet no explanation as to why exertion produces a feeling of stress. Coping strategies offered by younger children are
ineffective and rely upon passive mechanisms involving escape from or avoidance of stressors. Children at this stage have some sense that physical functioning can be disrupted by experiencing stress but the outcome of this tends to be manifested in a single symptom which produces physiological discomfort but which is not believed to lead to illness or disease.

Greater complexity and differentiation enters into stress conceptions of children aged 11 to 13 years. Stress definitions offered during this developmental period reflect a sense of internal conflict involving multiple feeling states and emotional and physiological arousal, most commonly expressed as tension. This internal state results in overt behaviors which disrupt an individual’s normal personal or social routines. Stress is explained as resulting from an accumulation of stressors which lead to feeling pressured and unconfident in one’s ability to cope. Coping strategies involve some action which will amend one’s behaviors to make them more competent, to expend more mental effort in being competent, and for the first time, help-seeking is offered as a strategy. Physical outcomes begin to be represented as illnesses (rather than single symptoms) which result from the diversion of an individual’s efforts from self-care to managing the accumulation of stressors.

The most mature conceptions of stress, offered by the 14 to 16 year old participants, involve a complex emotional and physiological response where the concept of overload is expressed directly. Not only do multiple feeling states and muscular tension exist, but for the first time a generalized sense of physical, cognitive, and psychological dysfunction is introduced. Not only are one’s social routines disrupted, but also one is at risk for depression, difficulties reasoning, and becoming so aroused that physical illness results. It is interesting to note that overt indices of being stressed subside in
descriptions offered at this level and one's internal state becomes less likely to be apparent to a casual observer. Explanations for stress at this level focus on the effects of prolonged mental effort required by the management of stressors. The perception that one can create stress for oneself by setting goals, or from poor organization emerges for the first time in responses given at this age period. Coping strategies involve a preventive aspect where it becomes necessary to take action so as to prevent an accumulation of stressors. Outcomes for experiencing stress reflect not only physical illnesses but for the first time reflect the knowledge that psychophysical and psychological illnesses can result as a direct result of the emotional overload one experiences when stressed.

Multiple regression analyses expanded upon the findings of the analyses of covariance by delineating the relationship between maturity and word knowledge. There was some overlap of these two variables in explaining the results but even when partialling out their shared contributions, age remained a better explanatory variable than was word knowledge for children's conceptualization abilities.

Age, in and of itself, does not have much developmental significance. As an index of maturational changes, however, age co-occurs with a pattern of perceptual and cognitive development which makes it a useful marker to denote increasing maturity in a given realm. The results of this study indicate that as children mature, so do their abilities to describe and explain stress. For the younger child stress is understood in terms of single events but little explanation is yet offered. Children in the middle age group begin to understand the causal relationship between stress and stressor but have not yet developed effective coping mechanisms, although they have begun to
recognize that the responsibility for managing stressors is theirs and not the task of others. Adolescents in the older age group understand fully, not only causal relationships, but also psychophysiological reactions and the need for preventive action. Such knowledge becomes important, as many health education programs emphasize the need to avoid stress and take preventive action.

The concept of stress is one which is introduced into instructions to children as to how to manage aspects of chronic illness, particularly diabetes (Anderson, 1984). Directions to minimize stress in one’s life so as to maximize diabetic control are not going to be particularly helpful for the young child whose cognitive development is not yet advanced enough to comprehend the concepts being discussed. The field of health psychology has been a rapidly expanding one in recent years but critics have argued that health psychology for children has largely ignored issues of development which influences a child’s ability to comply with treatment regimens or engage in preventive behaviors (Maddux, et al., 1986; Barclay and Hagen, 1987). The research reported here emphasizes, not only the relevance of the concept at varying developmental periods, but also indicates that even a rudimentary relationship between stress and physical illness or worsening of already existing symptoms does not emerge until well into the concrete operational period.

The analysis of variance which investigated the effects of group membership (diabetic, learning disabled, or non-clinical) revealed no significant differences among these three groups for conceptual maturity. All three samples conceptualized the four dimensions of stress similarly and these
results were substantiated by the Chi square analysis. No relationship was found between group membership and maturity of stress conceptions.

It is significant that no differences emerged between the clinical and nonclinical samples with respect to stress conceptions. A small number of investigators (Varni, 1983) have suggested that the cognitive development of chronically ill children can be expected to lag behind that of same-aged but healthy peers. The results of this study provide evidence that no such differences exist with respect to the variables under study. This issue will be discussed further in the next section.

**Conceptions of Illness**

The analysis of covariance demonstrated significant differences between the youngest age group (8 to 10 years) and the two older age groups for conceptions of illness. No differences were apparent between the 11 to 13 year olds and the 14 to 16 year olds. These findings are consistent with those found by Bibace and Walsh (1981) where subjects aged 7 to 10 were found to differ in conceptual maturity from subjects aged 11 to 14. These investigators did not have an older sample in this particular study but later studies found the developmental ranges they established to apply to subjects up to college age (Bibace and Walsh, 1982). As with conceptions of stress, vocabulary knowledge made a significant contribution to conceptual maturity but age was the better and more significant predictor.

The relationship between age and conceptual ability did not hold up with a Chi square analysis. When contrasting this finding with the stringent post-hoc tests performed on the results of the analysis of covariance it seems that the chi square procedure may not have been a valid one for this data. Further
inspection of the chi-square analysis supported this interpretation as many of the cell frequencies were zero and did not lend themselves to statistical analysis. The post-hoc tests did support the differences between the younger and combined older groups which is a finding consistent with the literature in this area.

This analysis found no significant differences among the diabetic, learning disabled, and nonclinical samples in illness conceptions. Initial differences did surface between the three groups in the pairwise comparison procedure but the post-hoc test revealed only a difference between the diabetic and learning disabled sample with no difference demonstrated between these samples and the nonclinical participants. It is significant that no differences were apparent between the clinical and nonclinical participants. The differences between the clinical samples in this study (with the diabetic individuals having slightly more mature conceptions) may reflect different experiences with the concepts under study which exist separately from abilities to reason about the concepts. There was a general trend for the diabetic subjects to have slightly more mature illness concepts than both of the other groups but the statistical differences may be more artifactual than real for this particular sample.

The differences in conceptual maturity which exist between the clinical samples illustrates the confusion which has entered the literature as to the status of cognitive development of children with chronic diseases. As noted earlier, some investigators favor a view that indicates delays in cognitive development for these children while other investigators suggest that such children may have more sophisticated illness concepts but may lag behind in other cognitive abilities which derive from academic achievement (Barclay
and Hagan, 1987). In the latter case, increased absences from school due to the chronic illness contributes to delays in the acquisition of academic related material but does not point towards delays which could be expected to be maturational.

**Stressor Experience**

**Daily Hassles.** The analysis of variance revealed no differences between either age groups or diagnostic groups for predicted stressor impact. When the data were reorganized to reflect categories of stressors (Family, School, Social, Self) no differences in predicting stressor impact were apparent among the three age groups or among the three diagnostic groups with the exception that diabetic children have fewer concerns about issues of competence. Experiences with daily stressors appear to be generally similar for the learning disabled, diabetic and non-clinical samples and across the age groups studied. In general, group members perceive themselves similarly with respect to the degree they anticipate they will react to the occurrence of typical daily stressors.

No age differences were demonstrated for children’s predictions of the number of daily stressors they would predict over a six week period. Learning disabled children, however, predicted they would experience more daily hassles than did members of the other two samples.

The findings of the present study do not correspond well to research with adults and older adolescents using the original version of the Lazarus scale (Lazarus, 1984; Miller, et al., 1985) where differences in categories of stressors were noted across age groups and among differing professional groups. The sample for these studies ranged in age from 15 to 65. Younger subjects rated
preoccupations with the physical and social self as their greatest concern while college students were concerned by achievement related stressors. Middle aged subjects were concerned about economic issues and professionals were more concerned about having too many responsibilities and trouble relaxing in contrast to nonprofessionals. Some age differences have been detected in research with children where subjects have been asked to spontaneously generate daily events which they find stressful (Kosub and Kosub, 1982) but no systematic research has been reported with other versions of daily hassles scales. This would be an important area of investigation as daily hassles have been reported to be more significant predictors of health status than are life events (Lazarus, 1984; Johnson, 1986). The scale designed for the present study did not discriminate between age or diagnostic groups when it could have been expected to. It is likely that in an effort to transform the adult scale into one relevant for children, items were chosen which were too common to all children's daily experiences.

The prediction by learning disabled children that they expect to experience more daily stressors over a six week period than both other healthy and chronically ill peers begins to suggest a psychological vulnerability to experiencing stress although this can not yet be construed as hypersensitivity to stress. This finding provides a basis for arguing against physical illness as a predisposing factor for the subjective experience of stress and more towards the susceptibility of individuals who struggle with disabilities which are psychological rather than physical. This will be discussed further in succeeding sections.
**Vulnerability to Stress**

One of the least clear aspects of this study is the role that personality dispositions have in creating a vulnerability to stress. In an attempt to approach determining factors which relate to a hypersensitivity to stress, as represented either by predicted stressor impact or predicted stressor occurrence derived from the Daily Hassles scale, four personality scales from the Personality Inventory for Children were compared for explanatory importance with positive and negative life change and stress conceptions. Differences between groups for the personality measures and life events are presented below prior to addressing the results of the hypersensitivity to stress question.

**Personality Dispositions.** No differences among groups emerged for Family Concerns as each group was rated similarly for this variable. The learning disabled children and the diabetic children were found to have more somatic concerns than the nonclinical sample. Further analyses demonstrated that the learning disabled children were rated as more anxious and more depressed than the other samples when considered singly or in combination. In general, the learning disabled sample had more internalization concerns than did either of the other two samples although diabetic children had somatic concerns similar to the learning disabled sample.

**Life Events.** When total positive change and total negative change over the past year were analyzed, no differences were demonstrated in either case among the three age groups studied or among the three diagnostic groups studied. In general, children across all three age groups experience life events similarly as do children in the three diagnostic groups.
**Explanations for sensitivity to stressors.** The multiple regression analysis demonstrated that the best predictor for perceived stressor impact was the amount of negative change which had occurred in the past year. There appeared to be a trend for maturity of stress conceptions as a predictor but this failed to reach statistical significance. Neither the personality variables nor group membership had explanatory importance in predicting perceived stressor impact. It should be noted that although negative life change did account for a significant amount of variance in this dependent variable, the overall model where only 27% of the variance was accounted for, suggests that factors other than the ones under investigation have greater explanatory power than do the factors discussed here. The variables under study here do not suggest a hypersensitivity to stress based upon group membership or personality dispositions but do suggest that negative life change may contribute to the development of a hypersensitivity to stress.

A separate multiple regression analysis for predicted stressor occurrence found negative life change and depression to best predict the numbers of anticipated stressors. Group membership was again nonsignificant, despite the predilection for learning disabled children to expect greater numbers of daily stressors. Anxiety scores approached significance but failed to reach a statistical criterion.

No hypersensitivity to stress was demonstrated by group membership alone. A trend for hypersensitivity surfaces when actual stressor experience in the form of negative life change is considered with depressive and anxious personality dispositions but it is not clear to what degree the personality factors may be confounded with group membership. It is possible that having difficulties which are primarily psychological in nature, as is true for learning
disabled children, may lead to elevated internalization personality features which then override group membership as an explanatory construct.

It is apparent that diabetic children and the nonclinical sample appear similar with respect to stressor experience and personality dispositions and perhaps less susceptible to stress as a function of expecting fewer daily stressors and demonstrating less evidence of internalization symptoms.

The results of this study correspond quite well with ongoing programs of research into life events as stressors for children and adolescents (Johnson, 1983, 1986). Negative life change as opposed to positive life change has been found to correlate highly with depression and anxiety, and with diabetic control (Johnson, 1986).

The study reported here did not address issues of diabetic control but did find depression, anxiety, and life change to be related to perceived stressor impact or occurrence. Johnson cautions that although negative life change has been found to relate to both physical and psychological adjustment it accounts for only a small portion of variance in indices of health or psychological adjustment. Attention needs to be focussed upon moderator variables which mediate children's experiences of stress above and beyond the influence of life change. Many speculations have been offered in the stress literature as to factors which intensify the subjective experience of stress or as to life conditions which may make one vulnerable to the occurrence of greater numbers of daily and life event stressors. Much speculation has been offered in particular, as to the influence of stressors upon the course of a chronic disease, with the underlying assumption that individuals with chronic diseases are more vulnerable to stress. This relationship has proven difficult to demonstrate empirically in investigations where individuals with a specific
illness have been compared to those who are designated as healthy. In general, no specific pattern of stress response has been identified which relates to a specific disease although numerous studies have found certain other psychosocial patterns to relate to chronic illness in general (Barclay and Hagen, 1987). Many investigators are now indicating that a more useful approach to understanding psychological factors in chronically ill children would be to identify patterns of stressors, (cognitive, affective, social) which are common to all of these children given the absence of research which reports psychological patterns specific to any one disease.

This would be a useful direction to take with chronically ill children. The results of this study suggest, however, that it is not the physically ill child who is at risk for stress or stressor experience but that it may be the child who is required to manage an impairment which is primarily psychological in nature. In the current study, the learning disabled children emerged as the most vulnerable psychologically, although it is not completely clear how vulnerable they are to intensified feelings of stress or increased incidence of stressors. Undoubtedly they believe more will happen to them but it can’t be determined from this research if more daily stressors actually do occur for these children. The elevated depression, anxiety, and somatic concern scores suggest that learning disabled children may be oriented toward internal concerns which may distract their attention away from preventive issues and reduce the amount of psychological energy they have available to meet daily challenges.

As noted earlier, much research into moderator variables has focussed on social support and with the exception of the life event research has not focussed exclusively on personality factors. The present research did find
results which corresponded to prior life event research but it appears that vulnerability to stress involves much more than personality factors or membership in a particular diagnostic group, whether it be a psychological disorder/disability or chronic disease. Research into children's invulnerability to stress (Garmezy and Tellegen, 1984) suggests that factors beyond personality and intellectual functioning are involved in developing resistance to stress. It stands to reason that the same holds true for vulnerability to stress as well. Garmezy and colleagues investigated children who had been identified as adapting quite well to a series of life situations which were regarded as highly stressful. These children were found to be adept at interpersonal problem solving and arriving at means-ends solutions, as well as having well differentiated understandings of the several components of humor. The focus of Garmezy's research has gone beyond basic personality and cognitive factors and has begun to develop a description of the stress-resistant child as possessing strengths in many intellectual and affective dimensions. Research with children believed to be vulnerable to stress would fare better if it went beyond personality factors to consider factors which relate to generalize problem solving, as coping with stress or managing stressors can be regarded as one kind of problem solving ability.

The perspective for a noncategorical approach to understanding psychosocial and educational factors when studying children with chronic diseases suggests that this might be a useful approach for children with various psychological disorders as well. Research which intends to develop an understanding about children's vulnerability to stress could be more useful if common patterns of reacting to stress were investigated across diagnostic groups.
Theoretical Implications

Stress Conceptions

The concept of stress is one which has been debated and dissected by many scientists with a consistent lack of consensus. Three basic models for the concept exist which rely upon varying combinations of perspectives from the biological, behavioral, and social sciences (Johnson, 1968). Stimulus oriented views describe stress as stressor, an event or circumstance which impinges upon the individual and which is believed to make adaptational demands. This perspective presumes emotional distress but never directly addresses the subjective response descriptively. Response oriented views, derived most commonly from the work of Selye (1976) describe stress as an internal response of the individual and attempt to fit psychological reactions into the three phase model of biological responses which comprise Selye's General Adaptation Syndrome (G.A.S.). Psychological stress, however, is a much more complicated experience than Selye's model can account for which has led to the perspectives offered by Lazarus and colleagues (1984) which view stress as a subjective organismic response but which relies upon the individual's appraisal of the stressor (or stimulus), actual experiences with stressors (daily hassles or life events) plus the resources an individual brings to bear upon coping (internal resources such as personality factors and external resources such as social support).

Each of these three models for stress research presumes some within-individual response which produces discomfort. Theoretically based formulations have been offered for the description of what investigators
assume to be an adult's subjective experience of stress. This experience is believed to include subjective feelings of being overwhelmed and emotional and physiological arousal but no descriptive research has been undertaken which actually elucidates what stress means to the individual. An understanding of this experience would better describe what an alarm reaction consists of and what resources an individual brings to appraising the impact of stressors and in formulating a coping strategy. This knowledge is particularly important in investigating stress in children as theoretical adult formulations of the concept are not applicable. The present research has attempted to provide a description of children's subjective experience of stress, their understanding of why stress occurs, and their knowledge about coping and the results of a failure to cope with stress effectively. The results of this study indicate that there are specific developmentally related changes which occur in all of the dimensions of the stress concept. There is also some suggestion that the ability to define and explain stress emerges before the ability to devise coping strategies or speculate about outcome. The only modest correlations between the latter and the former dimensions seem to indicate that this may be the case.

Lazarus postulates that cognitive appraisal is a process which intervenes between an encounter with a stressor and a reaction to that stressor and involves categorizing an event with respect to its significance for well-being. The components of this appraisal process involve identification, judgement, discrimination and an assessment of risk to the individual. This assessment includes an evaluation of which of the individual's adaptive resources are going to be taxed and lead directly to the choice of a coping activity. In essence, this perspective indicates that not only is an
understanding of the effects of the stressor necessary, but also, one's knowledge about coping and outcome are important as well.

The research reported here indicates that children of different ages will appraise a stressor quite differently as a function of their knowledge about stress, including beliefs about outcome. Younger children with their focus upon single organismic responses and single methods of coping may fail to appraise the complexity of the situation and apply a coping strategy which is consistent with their understanding of stress but which proves ineffective because it attends to only one of several features of responding to stress and stressors. Children in the middle age group begin to appraise stress from a broader perspective and also appear to recognize that more resources than they have are required to manage stress, hence their focus on help-seeking and being more competent. Adolescents appear best able to appraise the degree of threat from a potential stressor as not only do they perceive and understand the complex nature and causality for stress but also they recognize multiple disorganizing outcomes and a need for different coping strategies depending upon how they identify the stressor and assess its risk.

The developmental period at which the concept of stress first becomes meaningful is consistent with research in social cognition. Many topics have been investigated within the Piagetian framework upon which this work is based (Shantz, 1983). Children's understanding of authority has been researched (Damon, 1977), children's conceptions of illness (Bibace and Walsh, 1979) and children's competence to make treatment-based decisions (Weithorn and Campbell, 1982). Each of these investigators has been able to describe a consistent pattern of developmentally related changes which progress from a preoperational and undifferentiated understanding, to a
concrete understanding which includes more complexity, to a formal logical understanding which encompasses hypothetical constructs or the need to generate alternatives. Conceptions of illness and conceptions of authority appear to be within the capacity of a preoperational child to understand at least at some rudimentary level. Children's capacity to make treatment based decisions and children's understanding of stress shed some new light upon the developmental period at which other concepts become genuinely meaningful. Weithorn and Campbell (1982) were able to elicit some degree of response from subjects below age 9 with respect to treatment but this response was not representative of all of the component parts of the issues they were investigating. It was not until after age 9 that subjects were able to give responses that consisted of at least a basic understanding of the necessary concepts. The results of the present study also yielded information which suggests that stress does not become a meaningful concept until an individual is well into the concrete operational period of cognitive development. It is possible that the less tangibly a concept is represented or the more it relies upon a need to consider the possible as well as the actual the more difficult it will be for the child who is not fully concrete operational to articulate a response.

Understanding the dimensions of stress appears to involve a number of cognitive abilities which do not emerge until a child is well into the concrete operational period of development. As can be seen from the tasks involved in the appraisal of an event, a child needs to be able to identify an event and classify it according to some degree of perceived threat. Classificatory strategies begin to emerge early in Piaget's concrete operational period and some young participants in this research were able to at least simplistically
understand stress. Given that the younger child deals with stress in a concrete manner it is apparent that more than classification skills are needed. Children need to be able to match current stressful experiences with prior ones so as to be able to discriminate between effective and ineffective coping. In order to accomplish this, children need to be able to remember past events and to evaluate them. While these abilities are present in rudimentary form in young children, they do not become efficient and more broadly effective until the child is in the later portion of the concrete operational period. Finally, not only must a child classify and remember but also the child must be able to test hypotheses so as to evaluate the degree to which adaptive resources will be challenged and to speculate as to outcome. These cognitive abilities do not emerge until adolescence. As can be seen from this research, the ability to reason about hypothetical situations and generate solutions emerges in the adolescent's reasoning about stress which recognizes its complex nature, multiple causes (including one's own goals) and the need to select one effective coping strategy from an array of strategies which have developed as the child and adolescent have matured.

**Directions for Future Research**

It would be useful to explore the development of stress conceptions with older age groups to continue to develop a descriptive understanding of the patterns of change for these conceptual abilities. It would be especially interesting to explore transitional phases and a larger sample size as well, and a broader age range would make this possible. The current research suggests, albeit tentatively, that coping and predicting outcomes may emerge
developmentally later than does an understanding of basic definitional issues and needs to be explored further. If this is found to be the case this suggests a different direction for health education programs which currently assume that definitional knowledge about stress indicates the same level of maturity in solution oriented knowledge. This direction is consistent with the growing number of investigators in children’s health psychology who contend that any preventive education program must consider developmental change (Maddux et al., 1986).

It would be useful to also explore the role cognitive variables such as classification, memory, and hypothesis testing have in the development of children’s understanding of the stress concept. Vocabulary abilities were evaluated in the present research and were found to relate significantly to a child’s abilities to reason about stress. Other variables need to be investigated so as to understand their interplay in cognitive development.

The psychometric properties of the stress interview were not examined in this research. The interview needs to be refined further with greater emphasis given to questions about coping and outcome. Once this has been accomplished, it would be important to obtain information about validity and reliability. Once a more detailed understanding of coping is developed, future research could begin to explore methods in which children’s coping with stress can be maximized so as to prevent difficulties in psychological adjustment or health problems.

Further research with instruments designed specifically for children needs to be undertaken in investigating the daily hassles which children experience. Given the differences apparent in the adult literature between older and young samples, it is likely that similar differences will emerge in
research with children. This approach would be particularly beneficial given the growing belief that experiences with daily hassles is a better predictor of health adjustment than is the negative change associated with life events.

As has been already noted, a broader perspective needs to be taken in investigating moderator variables which could lead to a hypersensitivity or vulnerability to stress. The use of the Personality Inventory for Children which, like the MMPI, was created to discriminate psychopathological samples from those without psychological disorders may not be sensitive enough to isolate relative differences in personality in non-disordered samples such as children with a chronic illness. It would be useful to choose different personality measures which could detect these differences and then relate these findings to stressor response.

As has been noted, research needs to go beyond investigating only personality dispositions as a moderator of stress. Future research needs to explore temperament, social support, parental models for coping and the role that external resources play in intensifying or moderating the subjective experience of stress and in developing coping strategies.

Greater emphasis needs to be directed toward examining children’s beliefs about coping as it may be that their knowledge of available resources for stress management may directly influence their identification of events as stressful as well as their beliefs about outcome. The subjective experience of stress may be intensified for children who fear they cannot cope and who therefore expect unsuccessful outcomes.
Limitations of the Present Study

The absence of an age group of 16 to 18 year olds results in a somewhat incomplete developmental continuum for ordering children's stress conceptions. Conceptualizing stress could also be better understood if six levels, including transitional phases, were developed instead of the three broad developmental levels produced by these results. A larger sample size would have permitted more discrete categorizations of participants' responses.

The measure used to assess the impact of daily stressors clearly was not sensitive enough to discriminate between age groups or between diagnostic groups, with the exception that diabetic subjects had fewer self concerns than did the other participants. A more useful direction would be to have different groups of children generate spontaneously the types of daily stressors they find bothersome and then proceed to develop an objective checklist from there. It is very likely, based upon the research in the field, that legitimate differences do exist among all groups studied as to the nature of events they find stressful.

The use of the Personality Inventory for Children may not have been optimal given that two of the three samples were nonclinical samples with respect to psychological problems. This instrument is not sensitive enough to detect differences within normal samples of children (Lachar, 1987) and other personality inventories for children exist which could detect these differences.

One significant limitation of this study had to do with possible sample bias. In retrospect, it appears that a particularly robust group of children with diabetes participated while an especially vulnerable group of children with learning disabilities were involved. The absence of significant group
differences for stressor experience and vulnerability to stress may have resulted from differences in psychological health for these specific samples which may not accurately represent either of the two populations under study. Different results about stressor experience might have emerged if children who had difficulties with diabetic management had been involved or if children with learning disabilities had less of a history of poor psychological and behavioral adjustment. Not only were the child participants quite different, but parental responses indicate that the parents of these two samples may represent their children’s situations differently given different degrees of acceptance and different attitudes toward self-disclosure.

This research needs to be undertaken with samples more representative of the populations from which they were selected. The results of the present study are limited in terms of the extent to which they can generalize to the populations of diabetic and learning disabled children as a whole.

Conclusions

What does stress mean to children? In the words of one 8 year old participant it means “you get so nervous that you feel your blood’s going to open up and you will blow up.” For this child, stress is certainly not a good thing and he has a rather dramatic concept of what his physiological response to stressors would be. Drama aside, even at age 8 the concept of stress has begun to be meaningful although global perceptions may generate less than realistic outcomes.

The research reported here indicates that while the subjective experience of stress for children does carry with it elements of pressure and
overload as is consistent with adult experience, these feelings are not likely to be directly expressed or understood. Children instead appear to understand stress more from external, behavioral perspectives rather than from the sense of internal disruption which emerges in adolescence. As a result, communicating with children about stress, especially as a component of health education, would be facilitated by a focus on the feelings and behaviors which accompany the subjective experience of stress rather than upon the concept itself.

This research has provided descriptive information about the subjective experience of stress which has been presumed but never examined directly in all three of the models for stress research. The results of this study have particular importance for those studies which emphasize the individual's appraisal of stressors. For children, there are developmental differences in how they understand stress and this can be expected to influence how they appraise stressors and what resources they have available to manage an accumulation of stressors.
BIBLIOGRAPHY


APPENDIX A

Parent Permission Letters
Dear Parent:

We are writing to ask if you and your child would be willing to participate in a study investigating children’s understanding of the concepts of stress and illness and the relationship between the two. We are particularly interested in comparing children who have juvenile diabetes with children without diabetes to find out if differences exist in the way they understand the concepts of stress and illness. We would like to interview your child as to her/his beliefs about stress and illness, and the influence of stress upon illness. Additionally, we would like to ask your child some questions about major and minor happenings that could be considered stressful so that we can learn what kinds of things children actually perceive as stressful. Some of these questions, particularly those regarding the child’s family environment could be considered personal. Finally, we would like to ask you some questions about your child. Approximately 1 hour of your time would be involved and about 2 hours of your child’s time (less if your child is under 10). We would like to arrange a convenient time for the interview with you and anticipate no more than three sessions of about 45 minutes with your child.

We are hopeful that the results of this study will contribute to a better understanding of how children conceptualize stress and illness. We are particularly interested in exploring what ages stress becomes a meaningful concept and how that concept matures as children develop. We hope also to develop some understanding of possible differences between non-diabetic and diabetic children’s understanding of the concepts under study. Finally, we hope to learn what events all children regard as stressors and how the nature of these events may change as children become older. All of this information would be very helpful in planning health education programs and could possibly contribute to a better understanding of the experiences of chronically ill children in general.

In addition to obtaining your written consent we will also be asking your child’s permission for her/his participation in this study. You and your child are free at any time to withdraw from participation in this research. Upon completion of the interview your child’s name will be removed from all materials to ensure that all replies remain confidential.

If you would be willing to have your child participate in this study please sign the attached permission form and return it to us. If you would like more information please feel free to call Ms. Eabon at 272-0669.

Sincerely,

Felicitas C. Serafini, PhD
Principal Investigator
Associate Professor, Dept. of Psychology
The Ohio State University
Columbus, Ohio

Michelle F. Eabon, M.A.
Doctoral Candidate
Department of Psychology
Ohio State University
College of Social and Behavioral Sciences
CONSENT FOR PARTICIPATION IN
SOCIAL AND BEHAVIORAL RESEARCH

I consent to participating in (or my child's participation in) research entitled:

Children's understanding of Stress, Stressors, and illness.

Felicia C. Sarafica/Michelle F. Eabon
(Principal Investigator)
or his/her authorized representative has explained the purpose of the study, the procedures to be followed, and the expected duration of my (my child's) participation. Possible benefits of the study have been described as have alternative procedures, if such procedures are applicable and available.

I acknowledge that I have had the opportunity to obtain additional information regarding the study and that any questions I have raised have been answered to my full satisfaction. Further, I understand that I am (my child is) free to withdraw consent at any time and to discontinue participation in the study without prejudice to me (my child). The information obtained from me (my child) will remain confidential unless I specifically agree otherwise by placing my initials here.

Finally, I acknowledge that I have read and fully understand the consent form. I sign it freely and voluntarily. A copy has been given to me.

Date: ____________________ Signed: ____________________

Signed: Michelle F. Eabon, M.A. Signed: X
(Principal Investigator or his/ her Authorized Representative) (Person Authorized to Consent for Participant - If Required)

Witness: ____________________

PHONE NO. ____________________

MS-027 (Rev. 10-31-81) -- To be used only in connection with social and behavioral research.
October 27, 1986

Dear Parent:

Last week I sent you some information describing a research project I am conducting here in Rochester on the topic of young people's knowledge and opinions about stress and physical illness. I am writing to you at this time as I have not yet learned your plans for participating.

I encourage you to ask any questions you may have about the project and hope that you and your son or daughter will agree to participate. It would be helpful for me to know as soon as possible what you decide. Please use the stamped, addressed envelope I included with my original communication to let me know your decision. You may reach me at 272-0669 if you would like more information about the project.

Thank you for your time.

Sincerely,

Michelle F. Eabon, M.A.
Michelle F. Eabon, M.A.
Doctoral Candidate
Department of Psychology
Ohio State University
APPENDIX B

Instruments
CONCEPTIONS OF STRESS

1. Have you ever heard of the word stress? What does stress mean? Can you think of words that mean the same as stress? (Ask children to guess if they do not know the meaning. Ask questions 2, 3, and 16. If child answers don't know to any then don't continue.)

2. How does a person get stressed? (What makes a person stressed)

3. Where does stress come from? Is it from inside you or outside you?

4. How does your body feel when you are stressed?

5. What kind of feelings (emotionally) do you have if you are stressed?

6. How do you act (behave) when you are stressed?

7. How do you know when you are stressed?

8. How would other people know if you are stressed?

9. How do you get over being stressed? (What could you do) How do you know you are supposed to do these things?

10. Is there anything you can do to make sure you won't get stressed again? What?

11. Can you get sick from being stressed?

12. If you are already sick, can you get worse by being stressed? Why? (How does this happen, what is going on inside your body)

13. What happens to someone who gets stressed a lot? What is the worst that could happen?

14. Is there more than one kind of stress? (Make sure child responds to the feeling of stress, not to different kinds of stressors)

15. Do you feel you get stressed a lot?

16. Is stress ever a good thing?
INFORMATION

Child's date of birth ____________ Male or Female (Circle one)

Grade in school ____________

Has child ever had a serious illness? When (Year) ____________

Nature of illness ________________

Was child hospitalized? __________ How long? ____________

Has child ever been hospitalized for an injury? How long? _______

Has child ever known anyone well who had a serious illness? ________

Do you feel they knew a lot about this illness? ________

How old was child at this time? ____________

-----------------------------------------------

Family Information

Who does child live with? (circle all that apply)

Natural father Natural mother Stepfather Stepmother
Foster father Foster mother Grandmother Grandfather
Other ______________

Does child have siblings? (Yes or No). If Yes, how many? ____________

What is child's birth order? Only child, First, Second, Third, or _____.
(circle one)

What is family's approximate yearly income? ____________ (Do not
include child or spousal support in this figure)

If child is not living with both natural parents is it due to:

At child's age:

Death of parent
Divorce
Marital separation
Other ____________

PLEASE NOTE: All of this information will be useful in understanding
the results of this study. However, if you would be more comfortable not answering certain questions, please
leave them blank.
1. Does your child have a learning disability? ____________
   At what age was this determined? ____________
2. Does your child currently have a placement in a program for children with learning disabilities? ____________
   If yes, what is the nature of the placement?
   (Check one) Resource room ____________
   Full-time special education class in public school ____________
   Attendance at a school educating children with learning problems? ____________
   Other ____________
3. What is the nature of your child's learning disability?
INFORMATION

*children with Diabetes*

1. How long has your child had diabetes? ______ Age at Diagnosis ______

2. Who tests child's urine or blood sugar?
   
   (Circle one) Parent alone  Child alone
   
   Child with parental supervision
   
   Other ______

3. Who administers child's insulin?
   
   (Circle one) Parent alone  Child alone
   
   Child with parental supervision
   
   Other ______

4. In general, would you say your child's diabetes is:
   
   (Circle one) In good control
   
   In fair control
   
   In poor control
   
   Other ______
listed below are some things that could happen from day to day to people your age. if these were to happen to you, how bothered or hassle would you feel? use the faces and the numbers beneath them to say how bothered you would be. put the number in the blank by each thing.

not bothered at all  a little bothered  bothered some  bothered a lot

1. losing something
2. friends pestering you
3. going to a party you don't want to go to
4. mom or dad smoking
5. mom or dad drinking too much
6. mom or dad fighting with each other
7. mom or dad fighting with you
8. fighting with sisters/brothers
9. not having enough money to buy something you want
10. family not having enough money
11. too much to do at school
12. too much to do at home
13. having trouble being calm
14. having trouble getting along with close friend
15. teachers giving you a hard time
16. not liking school
17. not liking kids at school
18. having to finish or do something by a certain date
19. not enough time to have fun
20. being afraid you will get into a fight
21. having to wait a long time to do something you like
22. making a mistake you think is stupid
23. having to clean your room
24. not getting homework done on time
25. having trouble talking to people
26. not liking the way you look
27. missing a friend or relative who is far away
28. worried about not doing things good enough
29. feeling you don't have enough friends
30. trouble with reading
31. trouble with math or arithmetic
32. not having enough energy
33. having nightmares
34. feeling bad about things you have done
35. feeling bad because other people hurt your feelings.

(total)
What Bothers Me, Part II

1. Can you name 3 other things that make you feel bothered or hassled?

2. How many of the things on the list would make you a little stressed?

3. How many of the things on the list would make you very stressed?

4. Go back to the first page and circle all the things you think will happen to you in the next six weeks.

What Bothers Me, Part III

For people who have diabetes: (Use the faces on the first page)

How bothered are you by:

- Checking your blood sugar
- Adjusting your insulin dosage
- Needing to be careful about what you eat
- Other things: (please list if there are any)

____

____

____

____

____
CONCEPTIONS OF ILLNESS
(Bibace and Walsh, 1981)

*** 1. What does it mean to be healthy?

*** 2. Do you remember anyone who was sick? What was
   wrong? How did he or she get sick? How did
   he or she get better?

*** 3. Were you ever sick? Why did you get sick?
   How did you get better?

*** 4. What is the worst sickness to have? What is
   the best sickness to have? Why?

*** 5. What happens to people when they are sick?

6. What is a cold? How do people get colds? Where
do colds come from? What makes colds go away?

7. What are the measles? How do people get the
   measles? Where do measles come from? What
   makes measles get better?

8. What is a heart attack? Why do people get heart
   attacks?

9. What is cancer? How do people get cancer?

10. What is a headache? Why do people get headaches?

11. Have you ever had a pain? Where? What is a
    pain? Why does it come? Where does it come
    from?

*** 12. What are germs? What do they look like? Can
    you draw germs? Where do they come from?
    Are germs the only things that can make you
    sick? What else might make you sick?

*** Denotes a question used in this study. Questions
    administered in the order they appear here.
APPENDIX C

Scoring Manuals
CONCEPTIONS OF STRESS
Scoring Manual

Stress Description

Overview

An understanding of the description of stress begins to emerge in an overall expression of strain which progresses to a description of overload. Dimensions included in this conceptualization refer to physiological, emotional, and behavioral events. Less mature conceptions begin to demonstrate aspects of physiological arousal which begin with a sense (sometimes dramatic) that an internal state (i.e., heartbeat) can be manifested externally and in an observable manner (heart pounding). This understanding evolves into a more internalized sense of arousal (physical tension or mental fatigue) culminating in an understanding of a completely internal state of arousal which disrupts one's normal physiological functioning (fidgety and unable to function normally, overall bad feeling). With respect to emotions, less mature responses reflect the knowledge that an emotional response exists, but it is usually reported to be a single feeling state (mad, scared). A sense of complexity and also of self-responsibility begins to develop as thinking matures and more complicated feeling states (several emotions at once: mad, sad, bad, horrible) begin to be articulated as do feelings of frustration or anger with oneself. The most mature conceptions reflect multiple feeling states plus the impression of overload where one cannot achieve order or organization (overwhelmed and unconfident of getting things done).
Behaviorally, respondents report expressions of overt tension (evil look on face, body gets stiff) without a comment on the disruptive effects of such behavior. The next level of response reflects tension which disrupts behavioral and/or social routines with the most mature conceptions reflecting tension which disrupts one's own internal routines (can't relax and fall asleep) but overt cues have become much more subtle or absent entirely (pale look, or other people would be unable to detect distress unless they were told).

Specific Scoring

**Stress Description:** Questions 1, 4, 5, 6, 7, 8

**Level 0:** Incomprehension/Irrelevant

**Examples:**

Don't know, Never heard of it, a fake word, happy.

**Level 1:** Internal feeling state where there begins to be a sense of strain or drain of energy. Does not involve an expression of overload. Something internal will manifest itself in an observable way. Observable means to be able to feel something that normally goes undetected (heartbeat) or to believe one can actually see something. A single emotional state expressed without elaboration. A single behavior, emotion, or overt, noticeable cue.

**Examples:**

Fatigue, tired, feeling you have a lot to do, feeling you have a lot on your mind.
You will blow up, blood will open up, heart beats faster, grit your teeth, you feel weird, you feel bad, something happens to your body, get a headache or stomachache.
Feel mad, scared, feel like you want to run.
Body gets stiff, pull hair and crack knuckles, face gets an evil look on it, stamp feet, go to my room, act scared.

**Level 2:** Emotional state where the concept of conflict is introduced or implied. Concept of mental fatigue as well as a general state
of physical arousal implying physical tension. A complex emotional state containing elements of self-blame. Behavior which disrupts social or personal routines.

Examples:

Pressure (expressed without elaboration), mad, confused, bothered by something external.
Feeling you get when you don't do something right.
Feel upset, tense, muscles tense up, body feels frustrated, muscles get stiff.
Angry, frustrated with self. Can't get on top of things.

Level 3: Idea of multiple emotional states coexisting with and resulting from an impediment to normal functioning. State of physical and emotional arousal which interferes with overt physical functioning. A very complex emotional state where the concept of overload is introduced directly. Observable cues become more subtle and emotion laden in general. Noticeable reactions may disappear entirely. Physiological routines can be disrupted. Stress becomes more internal to the person.

Examples:

Pressure plus anxiety, aggravation, feeling you have when you are pushing yourself to do more. Worried, guilty and can't cope. Uptight and nervous. Jittery, overall bad feeling, overall physically sick.
Anger and panic and the need to rebel, feeling overwhelmed. Confused, frustrated and can't get on top of things. Depressed and over-reactive. Have trouble making decisions. Can't relax and fall asleep, become quiet and tense and upset with myself. Get a pale, worried look. Conceal my feelings from others. Oversensitive. People would only know if told.
Stress Explanation: (Questions 2 and 3)

Overview

Less mature explanations for stress rely upon the idea of effort alone, or your mind alone but does not incorporate an understanding of why this produces stress. As abilities to conceptualize mature, a sense of the accumulation of stressor impact emerges, although specified stressors are not named. At this level there is a vague sense that one should do something to cope but this ability is out of reach. The most mature conception includes not only the sense of accumulated stressor impact but also included is the sense that one can create stress for oneself by the creation of goals or setting of standards. At this level several stressors are usually cited.

**Level 0:** Incomprehension/Irrelevant
- Don’t know
- See a ghost
- Get your foot run over by a car

**Level 1:** Concept of exertion alone
- Being busy
- Working hard
- From my father’s work
- My mind (no explanation)
- From inside your body when you get mad

**Level 2:** Stress comes from an accumulation of stressors which results in a feeling of a quantity of things which need to be dealt with.
- Too much pressure and you can’t handle it/can’t cope
- Doing a lot of things
- Having a lot of problems

**Level 3:** A sense not only of an accumulation of stressors but now that an expenditure of mental effort is involved
- Work overload, poor time scheduling (poor mental organization)
- Get worried about being under pressure
- Worry plus doing a lot
- Problems from inside you and having to make a tough decision
- Goals you set for yourself
- Money plus friends plus school work plus deadlines
**Stress Coping:** (Questions 9 and 10)

**Overview**

Coping methods range from passive processes to describing behaviors which involve the expenditure of mental effort to both manage the situation and to do whatever you were doing, but better. In other words to cope the same way but be more competent at it. The most mature responses include some aspect of preventative action so that coping is not needed.

**Level 0:** Incomprehension
   - Don't know

**Level 1:** A passive response which is avoidant or ineffective
   - Quit working for a week
   - Walk away from a fight
   - Can't cope/panic builds and I can't think
   - Feel angry and want to get out
   - Go to sleep

**Level 2:** Amend behaviors to make them more competent. Think about what you are doing. Implication of mental effort. Seek help.
   - Look to positive side/Think about it
   - Go see a counselor/talk to mother
   - Try to solve the problems
   - Deal with things one by one/react before it gets worse
   - Try to do everything right
   - Try not to do things the same way as before

**Level 3:** Take specific action to prevent accumulation of stressors.
   - Be aware of limitations and don't get involved in so much
   - Don't procrastinate next time
   - Be more organized
   - Try to eliminate some problems but can't eliminate all

**Stress Outcome:** (Questions 11, 12, and 13)
Overview

Most respondents felt that the experience of stress led to a not positive outcome. Less mature responses refer to the occurrence of a single physical symptom without an explanation as to why this happens nor any generalization of the event to an overall illness (i.e., a sick stomach that becomes the flu.) Intermediate types of response refer to serious illness (pneumonia, strep throat) rather than isolated symptoms which have occurred in response to the accumulation of stressor effects which divert the individual away from consciously taking care of themselves which could help them get well. The most mature responses refer to emotional overload which directly cause the disruption of bodily routines including mind-body relationships as a basis for psychosomatic or psychological illnesses.

Level 0: Incomprehension

Level 1: Single event or symptom or single events linked together.
Muscles get sore
Sick to stomach
Can die (no sense of how)
Go nuts
Stomachache tells your head and then your head hurts
Stomachache gets worse

Level 2: Physical illness is a function of the accumulation of stressors because the need to focus on problem solving diverts a person away from caring for self. Also, normal behavioral or social routines (including self-care) are disrupted. Concept of generalized illness introduced rather than only symptoms. Normal healing processes are disrupted.
Worry makes you worse
Some illnesses get worse when you have a lot to deal with
Get pneumonia or strep. Not just a single symptom.

Level 3: Emotional overload affects physiological well-being, prolongs the duration of illnesses you already have, leads to psychosomatic illnesses or psychological disturbances.
Get emotionally sick
Commit suicide
High blood pressure or ulcers
Nervous breakdown
Nerves make body irregular
Bad attitude makes illness worse
Get body mixed up because have to do so much
DEVELOPMENTAL CONCEPTIONS OF ILLNESS

Scoring Categories

(Bibace and Walsh, 1981)

Category 0: Incomprehension

The child evades the what, why, and how of the question or gives answers which appear irrelevant insofar as the child does not appear to respond in any way to the content of the question. Rather, the child’s attempt to be responsive results in his/her responding in a way which indicates a lack of comprehension of the question or in giving a response which is non-scoreable.

Pre-logical Explanations

According to Piaget, pre-logical thinking is typical of children between two and six years of age. It is characterized by children’s inability to distance themselves from their environment which results in explanations accounting for the cause-effect relationship in terms of the immediate spatial and/or temporal cues which dominate their experience. In both types of pre-logical explanation of illness–Phenomenism and Contagion–we see children being overly swayed by the immediacy of some aspects of their perceptual experience.

Category 1: Phenomenism

Definition of health and illness in terms of distantly related, concrete, perceptual, singular event/phenomenon that may co-occur with health/illness and which is unique to child’s experience.

Cause/cure of illness is an external concrete phenomenon which may co-occur with illness but which is spatially, temporally remote, and which remains independent of child’s activity/responsibility.
The child perceives no degree of illness, no responsibility for illness. The time framework with relation to illness includes only the present, not the past or future.

**Category 2: Contagion**

Definition of health and illness in terms of concrete, perceptual, events or symptoms which are proximate to the body.

Cause of illness is perceived to be objects/people proximate to, but not touching, the child. These people/events are responsible for the child contracting the illness. Child cannot explain how activity/proximate object or person transmits illness.

Any responsibility on the part of the child for contracting the illness is in the form of a single activity that is idiosyncratic and unrelated to the illness.

Cure is perceived in terms of an external, and singular event or object or action. The child does not explain how this event or action has a curative effect.

The child perceives no degrees of severity of illness. The time framework with reference to the illness is the present.

**Concrete-logical Explanations**

Concrete-logical reasoning is manifest by children roughly between seven and ten years of age. In this stage, according to Piaget, the major developmental shift is an accentuation of the differentiation between self and other, such that the child clearly distinguishes between what is internal and what is external to the self. This distinction is manifest in the two explanations of illness characteristic of this age group—Contamination and Internalization.
Category 3: Contamination

Definition of health and illness can now be stated in terms of more generalized classes of illness. Often the child refers to illness to which a moral value (good/bad) is attributed. Child is seen as responsible for activities that lead to health/illness.

Cause of illness explained in terms of the body's surface coming into contact (via touching, rubbing, etc.) with a contaminant (e.g., dirt, germ, etc.) or in terms of the child's engaging in an activity which is morally contaminated, i.e., "bad." The child now distinguishes between the cause of illness and the means of transmission of the illness.

Cure is also perceived in terms of the child's removing his/her body from contact with the contaminant (via rubbing it off or moving away) or by removing oneself from (i.e., stopping) the immoral activity that is causing the illness.

The child perceives illness within a broader time framework. The illness has a relatively brief past and future. Further, the child refers to various degrees of illness. Some illnesses are seen as worse than others on the basis of 1) amount of pain, 2) endurance of illness, 3) amount of mobility that illness restricts.

Category 4: Internalization

Definition of health and illness is perceived in terms of overall physical condition of the body, or the general state of the internal organ/system.

Causes of illness are 1) a contaminant or harmful object entering/affecting the internal body, or 2) the qualitative condition (good, poor) of the organ/system/person, or both.

Cure is described as the process of external activity which affects the body in a general and positive way. Also, the child may perceive the body as healing itself.

Diseases not only have a temporal duration, but the child also understands a developmental cause of an illness. The concept of heredity illnesses may be introduced.

Formal Logical Explanations

According to Piaget children who are approximately eleven years and older manifest formal-logical thinking. At this stage, there is the greatest
amount of differentiation between the self and the other. Conversely, the organism is least likely to manifest the effects of stimulus-boundedness. In this stage the greatest amount of differentiation between the external and internal world is expressed, such that the illness is located within the body even though an external agent is often described as the cause.

**Category 5: Physiological Explanation**

Definitions of illness are based on the stimulus and functioning of the internal parts of the body.

Immediate causes of illness are seen primarily as the nonfunctioning or malfunctioning of internal body organs or processes, which is explained in terms of a step-by-step process culminating in illness. The child can distinguish between immediate and remote causes.

Cures are described as sequential sequences of events involving internal anatomy and physiology. The internal structure functions of the body are responsible for "defeating" the illness.

Individual differences within a disease and consequences of varying illnesses depending upon the individual become apparent at this stage as does the concept of immunity.

**Category 6: Psychophysiological Explanation**

Illness is defined in terms of internal and sequentially organized physiological processes, and their malfunctioning. Here psychological attitudes and actions, as well as physiological structures/functions describe health and illness. The child in this stage is aware that a person's thoughts or feelings can affect the way the body functions.

In addition to internal physiological causes, a person's thoughts or emotions are also seen as possible causes of a particular illness.

The explanation of cure is basically the same as category 5. Psychological cures are less common than causes. A child who attributes a psychological cause usually offers a physiological cure. The only cure is seen as stopping the activity or avoiding it, avoiding the emotions that accompany it. Most children, however, refer to specific medicine, doctors, and rest as cures for people with psychophysiological illnesses.
Children perceive various kinds of illnesses, with varying degrees of severity. They also perceive themselves to have a reasonable amount of control over onset and cure of the illness.
APPENDIX D

Life Events Checklist
Table 1

Family Constellation By Diagnostic Group

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<th>Constellation</th>
<th>NC</th>
<th>D</th>
<th>LD</th>
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<tbody>
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<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Single Parent</td>
<td>10</td>
<td>3</td>
<td>1</td>
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<tr>
<td>(Other blended, adoption)</td>
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<td>4</td>
<td>6</td>
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Table 2

Subject Frequencies, by Gender, Age and Diagnostic Group

<table>
<thead>
<tr>
<th>GROUP</th>
<th>Nonclinical</th>
<th>Diabetic</th>
<th>Learning Disabled</th>
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<tr>
<td></td>
<td>M</td>
<td>F</td>
<td>M</td>
<td>F</td>
</tr>
<tr>
<td>Younger (8-10)</td>
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<td>5</td>
<td>5</td>
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<tr>
<td>Middle (11-13)</td>
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<td>8</td>
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<tr>
<td>Older (14-16)</td>
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<td>3</td>
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<tr>
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