The effects of self-care training on the self-concept, self-care behavior, and metabolic control of diabetic children

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THE EFFECTS OF SELF-CARE TRAINING
ON THE
SELF-CONCEPT, SELF-CARE BEHAVIOR, AND METABOLIC CONTROL
OF
DIABETIC CHILDREN

A Dissertation
presented to
The Faculty of the School of Education
The College of William and Mary in Virginia

In Partial Fulfillment
Of the Requirements for the Degree
Doctor of Education

by
Caryle H. Zorumski
December, 1997
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by

Caryle H. Zorumski

Approved December 1997 by

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Thomas Ward, Ph.D.

Sandra Ward, Ph.D.
DEDICATION

I dedicate this work to the children and the families who were willing to participate as subjects in this study. They have contributed to the body of knowledge about managing diabetes and finding its cure. I further dedicate this work to my husband, William Edward Zorumski, for his contribution to this research and for his championing of my cause. You remain my inspiration.
# TABLE OF CONTENTS

1 INTRODUCTION 2
   Statement of the Problem ......................................................... 2
   Purpose of the Study ................................................................. 2
   Theoretical Rationale ................................................................. 5
   Definition of Terms ................................................................. 10
   Research Hypotheses ............................................................... 12
   Sample Description and Data Gathering ..................................... 13
   Limitations of the Study ......................................................... 13

2 REVIEW OF THE LITERATURE 15
   Current Status of the Theory .................................................... 15
   Research Using Self-Efficacy Theory ......................................... 16
   Critique of Self-Efficacy Studies .............................................. 19
   Variable One: Self-Concept ...................................................... 20
   Critique of Self-Concept Studies ............................................. 27
   Variable Two: Self-Care .......................................................... 28
   Critique of Self-Care Studies ................................................... 36
   Variable Three: Metabolic Control .......................................... 37
   Critique of Metabolic Control Studies .................................... 43
   Population ................................................................................. 44
   Critique of Population Studies .............................................. 51
   Supplementary Research ....................................................... 52

3 COLLECTION OF DATA 53
   Population ................................................................................ 53
Study Procedure .......................................................... 54
Instrumentation .............................................................. 56
Demographics and Health Data ........................................... 56
The Self-Perception Profile for Children .............................. 56
The Self-Care Questionnaire .............................................. 59
Glycated Hemoglobin .................................................... 60
Research Design ............................................................. 63
Specific Hypotheses ....................................................... 63
Statistical Procedure ...................................................... 64
Ethical Considerations .................................................... 65

4 ANALYSIS OF RESULTS .................................................. 66
   Introduction .................................................................. 66
   Statistical Analyses ..................................................... 66
   Demographic and Diabetic Characteristics ......................... 67
   Hypothesis One .......................................................... 68
   Hypothesis Two .......................................................... 68
   Hypothesis Three ....................................................... 71
   Hypothesis Four ........................................................ 71
   Additional Analyses .................................................... 72

5 SUMMARY. CONCLUSIONS. AND IMPLICATIONS ................. 76
   Summary .................................................................. 76
   Conclusions .............................................................. 78
   Implications for Future Research ..................................... 83

A PILOT STUDY ............................................................... 86
<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purpose of the Study</td>
<td>86</td>
</tr>
<tr>
<td>Method</td>
<td>86</td>
</tr>
<tr>
<td>Description of Sample</td>
<td>87</td>
</tr>
<tr>
<td>Results</td>
<td>88</td>
</tr>
<tr>
<td>Discussion</td>
<td>88</td>
</tr>
<tr>
<td>Conclusion</td>
<td>89</td>
</tr>
<tr>
<td>B RECRUITMENT LETTERS</td>
<td>90</td>
</tr>
<tr>
<td>Letter to Parents of Experimental Subjects</td>
<td>90</td>
</tr>
<tr>
<td>Letter to Parents of Control Subjects</td>
<td>91</td>
</tr>
<tr>
<td>C SUBJECT CONSENT FORM</td>
<td>92</td>
</tr>
<tr>
<td>D CHILD'S SELF-CARE TRAINING QUESTIONNAIRE</td>
<td>97</td>
</tr>
<tr>
<td>E PARENT'S SELF-CARE TRAINING QUESTIONNAIRE</td>
<td>98</td>
</tr>
<tr>
<td>F SELF-PERCEPTION PROFILE FOR CHILDREN</td>
<td>99</td>
</tr>
<tr>
<td>Directions for the Self-Perception Profile</td>
<td>99</td>
</tr>
<tr>
<td>The Self-Perception Profile</td>
<td>100</td>
</tr>
<tr>
<td>G SELF-CARE QUESTIONNAIRE</td>
<td>104</td>
</tr>
<tr>
<td>Directions for the Self-Care Questionnaire</td>
<td>104</td>
</tr>
<tr>
<td>The Self-Care Questionnaire</td>
<td>105</td>
</tr>
<tr>
<td>BIBLIOGRAPHY</td>
<td>108</td>
</tr>
<tr>
<td>VITA</td>
<td>115</td>
</tr>
<tr>
<td>ABSTRACT</td>
<td>116</td>
</tr>
</tbody>
</table>
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Most importantly, I am grateful beyond words to my husband, William Edward Zorumski, for his unfailing support and encouragement. He is sensitive as an editor, perseverant as a statistical analyst, and unflappable as a desktop publisher. He evoked my best efforts in the execution of this work.

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LIST OF TABLES

4.1 Demographic characteristics. ......................................................... 69
4.2 Diabetic characteristics. .............................................................. 70
4.3 Effect of training on the self-concept of diabetic children. ............ 70
4.4 Effect of training on the self-care of diabetic children. ................. 70
4.5 Effect of training on the glycated hemoglobin level of diabetic children. 71
4.6 Self-concept and self-care interactions of diabetic children. .......... 72
4.7 Interactions of age and duration with measures of self-concept, self-care behavior, and metabolic control in diabetic children. ............... 72
4.8 Effects of demographic characteristics on the self-concept scores of diabetic children. ............................................................... 73
4.9 Effects of demographic characteristics on the self-care behavior scores of diabetic children. .......................................................... 74
4.10 Effects of demographic characteristics on the glycated hemoglobin levels of diabetic children. ....................................................... 75
THE EFFECTS OF SELF-CARE TRAINING ON THE SELF-CONCEPT, SELF-CARE BEHAVIOR, AND METABOLIC CONTROL OF DIABETIC CHILDREN

ABSTRACT

This study investigated the effects of self-care training on the self-concept, self-care, and metabolic control of 49 diabetic children. The children, ages eight to 13, all received basic self-care training from their physicians. Twenty-seven of the children also attended a week long day camp providing additional diabetes self-care instruction. All subjects completed the Self-Perception Profile for Children and the Self-Care Questionnaire twice at a four month interval to assess their self-concept and self-care behaviors. Glycated hemoglobin tests measured metabolic control.

Hypotheses were that after training, and compared with the control group, the experimental group would demonstrate improvements in self-concept, self-care, and metabolic control. It also was hypothesized that children with better initial self-concepts would show greater improvement. Data analyses failed, however, to support these hypotheses.

All subjects initially registered positive self-concepts, performed many self-care behaviors, and showed fair to good metabolic control. The experimental group demonstrated no significant gains when evaluated after training. Conclusions were that the training, therefore, did not affect subjects' self-concept, self-care, or metabolic control, regardless of initial self-concept level. The total number of children and family size, however, predicted subjects' metabolic control level.

More research is needed with children from diverse backgrounds with varying levels of self-concept, self-care performance, and metabolic control. Research to identify the many factors that affect diabetic children's self-concept, self-care, and metabolic control also is necessary, as is study of other training programs.

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ix
THE EFFECTS OF SELF-CARE TRAINING
ON THE
SELF-CONCEPT, SELF-CARE BEHAVIOR, AND METABOLIC CONTROL
OF
DIABETIC CHILDREN
CHAPTER 1: INTRODUCTION

Statement of the Problem

The problem of this study is to assess the applicability of the concept of self-efficacy to the self-concept, self-care behavior, and metabolic control of diabetic children.

Purpose of the Study

The purpose of this study was to investigate the effects of self-care training on the self-concept, self-care behavior, and metabolic control of diabetic children. Fifty-six prepubertal and early adolescent children were recruited to participate in the study as they completed standard programs of diabetic self-care management training. Twenty-seven of the subjects also attended a week long summer day camp for diabetic children which supplemented the instruction they received from their physicians. The other twenty-two control subjects received routine diabetes patient instruction, but did not attend the camp. All subjects completed the Self-Perception Profile for Children, the Self-Care Questionnaire, and a measure of glycated hemoglobin twice during the study period. The experimental group attending the camp did so once before and once after the training. The control group completed the measures during routine medical appointments. A series of ANOVAS, $\chi^2$ analyses and descriptive statistics were used to evaluate the data.

More than 14 million people with diabetes live in the United States. According to the American Diabetes Association (1990), each year 150,000 individuals die of diabetes or its complications. Although youngsters represent a small proportion of diabetics, insulin dependent diabetes mellitus (IDDM), also known as early onset or juvenile diabetes, is the most common endocrine disorder of childhood, and the third largest cause of death by disease (Johnson, 1984). With onset reaching its peak
between the ages of seven to nine and 11-13 (Bland & Wood, 1991), diabetes is the second most common chronic childhood disease. The mortality rate among diabetic children is higher than that among adults, possibly because youngsters are unable to communicate their symptoms clearly, thus increasing the risk of delayed initial diagnosis and subsequent inadequate care.

With the development of compact and inexpensive meters to measure blood glucose levels, self-management has emerged as the preferred method for diabetics to maintain normal metabolic control. Peterson (1982) and others have demonstrated that diabetics can use self-monitoring devices in a program of successful self-care. Saucier (1984) indicated that children ages 10-12 can practice self-care effectively. Follansbee (1989) challenged, however, the widespread assumption that children necessarily should assume as much self-care responsibility as possible as soon as possible. She argued convincingly for individualized assessment of several cognitive, behavioral, familial, and psychological variables in making self-management decisions. Savinetti-Rose (1994) has reiterated the need for such considerations in her discussion of developmental issues that affect self-management by children with diabetes.

Studies of psychological aspects of diabetes in children, as reviewed by Helz and Templeton (1990) and Anderson and Auslander (1980), have provided inconsistent and contradictory data. Self-concept, as well as the related constructs of self-esteem, self-worth, perceived competence, and self-efficacy, is among the psychological factors many researchers recognize as significant in the coping response of diabetic children. The import of this factor is well understood within the framework of self-care theory as articulated by Orem (1971). That theory assumes a motivational state characterized by self-esteem sufficient to engender action on behalf of one's own health.

The relationships between self-concept, self-care, and consequent metabolic control, however, remain unclear. Grey, Cameron, and Thurber (1991) reported no
association between measures of self-care and either self-worth or metabolic control, while the latter two variables correlated significantly. Auslander, Anderson, Bubb, Jung, and Santiago (1990) also reported no significant findings relating self-esteem levels and metabolic control. Self-care scores, on the other hand, did correlate significantly with metabolic control. Jacobson, Hauser, Wertlieb, Wolfsdorf, Orleans and Vieyra (1986) found self-esteem and perceived competence to be predictive of self-care. Saucier (1984) found no association between self-concept alone and level of self-care. She did find, however, that self-concept, in combination with some other variables, related significantly to self-care activities. Grey, Genel and Tamborlane (1980) also documented correlations between scores on measures of self-esteem, psychosocial adjustment, and diabetic control. Working with adults, Uzoma and Feldman (1989) found significant correlations between self-efficacy and adherence to diabetic control behaviors. Age was another strong correlate in the adult study, suggesting that younger people may not take diagnosis seriously, perhaps because they have not experienced severe symptoms. Age does seem to be a factor in self-worth and diabetic control, with both becoming more problematic at the onset of adolescence (Grey, Cameron & Thurber, 1991).

The studies cited above provided primarily correlational data. The current study entails a quasi-experimental design which investigated the effects of self-care training on the subsequent self-concept, self-care practices and metabolic control of diabetic children. The study addresses the need expressed by Anderson and Auslander (1980) for longitudinal studies initiated early in the course of the illness. Developmental issues were considered in the limitation on subjects' ages. Further, the use of self-concept, self-care and blood glucose measures linked the more specific variable of self-care, as well as the more general self-concept factor, to a concrete measure of metabolic control. This approach addresses the suggestions of Johnson (1984) for movement
toward theoretical clarity through better specification of the expected relationships among these variables. The results of this study can contribute to the evaluation and possible modification of self-care training programs in ways that will benefit diabetic children.

Theoretical Rationale

Because diabetics must be involved so personally in their own health care, perceived self-efficacy provides a cogent framework within which to consider the psychological impact of this chronic illness and subsequent coping health behaviors. Albert Bandura's self-efficacy model, a central element of social cognitive theory, provides the theoretical rationale for this research proposal. The outpouring of comments in response to an article by Bandura (1989) exemplifies the current influential status of social cognitive theory (Corcoran, 1991; Powers, 1991; Rottschaefer, 1991). A consistently prolific author, Bandura articulated in detail the nature and role of human agency within his triadic reciprocal causative model of determinism. Rejecting concepts of both autonomous and mechanical agency, he presented an emergent and interactive model in which personal agency, along with environmental and other personal influences, affects human behavior.

According to Bandura's model, a dynamic interaction operates among elements of the environment, cognitive and other personal factors, and peoples' behavior. Within this model human beings significantly influence their own actions rather than simply respond to the stimuli of external factors. This self-determinism is crucial to the process by which individuals come to know and, at least partially, to influence their worlds.

Five basic capabilities comprise the self processes that Bandura viewed as central to human functioning. He posited the use of symbols as the means by which persons
internalize fleeting experiences so they can guide future behavior (Bandura, 1986). He also claimed that most behavior is purposive, arising from the human capacity for forethought. Such forethought is possible only because of the capability to symbolize. Thirdly, he believed that the capability for vicarious, observational learning is an inherent human characteristic and is one that frees individuals from the tedium and hazards of trial and error skill acquisition. He also postulated the capability for self-regulation, the adoption and pursuit of personal standards, as a significant behavioral determinant. Finally, Bandura considered the capability for self-reflection to be a distinctively human feature. He maintained that a central aspect of reflective self-consciousness concerns "people's judgments of their capabilities to deal effectively with different realities" (Bandura, 1986, p. 21).

Bandura (1977a) stated that behavior is governed much more by anticipated than by actual consequences. Thus, the judgments people make of their capabilities lead to their engagement or avoidance of certain courses of action. These judgments reflect "people's sense of personal efficacy to produce and to regulate events in their lives" (Bandura, 1982, p. 22). Accurate appraisals of self-competence to deal with the environment contribute to successful functioning.

The relationship between judgments of self-efficacy and human action varies according to several conditions (Bandura, 1982). First, people must have the incentive to practice skills they feel competent to perform. They also must possess the equipment and other resources necessary to perform. Further, neither physical nor social constraints can exist which impede the action. If such conditions do exist, judgment of self-efficacy will surpass the actual observed performance of the behavior.

The time elapsed from the point of self-appraisal is another factor in the equation. Self-perceptions, especially weaker ones, change over time. Unless opportunities for reappraisal occur, there is likely to be more of a discrepancy between self-efficacy
judgments and actual performances. Self-perceptions also are more accurate when the choice of a course of action relates to comparatively more significant consequences. Additionally, "discrepancies between efficacy judgment and performance will arise when either the tasks, or the circumstances under which they are performed, are ambiguous" (Bandura, 1982, p. 24). Misjudgments also may occur because people either lack the experience to assess themselves accurately, or because personal factors distort their process of self-appraisal.

Bandura (1982) claimed that perceived self-efficacy can have diverse effects on persons' behavior, patterns of thought, and level of affective arousal. He stated that self-efficacy judgments influence choices of both activities and environment, with people attracted to activities they believe themselves capable to handle. He also asserted that these judgments determine the level of effort and amount of time people will invest in order to overcome obstacles or aversive experiences they may encounter in the execution of chosen activities.

The extent of one's self-knowledge and the degree of accuracy about one's personal efficacy derive from four basic sources according to Bandura (1982). The first and most important source of such information results from the accomplishments of actual performances. Bandura viewed this source as the most influential because it represents experiences of authentic mastery. Vicarious experiences, observing or visualizing other people successfully perform, is a second and important source of such information. The impact of observations is determined not only by the characteristics of the people observed, that is to say how like the observer they are, but also by the level of comparability of the observed activities. A third source of self-efficacy information is verbal persuasion, a means widely utilized to induce successful performances by others. The final source is the performer's personal level of emotional arousal. Bandura contended that under extreme stress actual performance is debil-
itated. In his view, people are much more apt to anticipate successful outcomes as likely to result from their efforts when they are free of excessive tension and agitation.

Once provided the various sources of self-efficacy information, individuals next must process the data cognitively. Performance, or enactive, information is affected by the difficulty of the task at hand, the amount of effort invested in the task, how much outside assistance is provided, and the surrounding circumstances of the performance, as well as the pattern of successes and failures over a period of time. Biases in the self-monitoring process, too much attention to either negative or positive aspects of performance, also have an impact upon the self-efficacy appraisal. Bandura (1982) asserted the value of people seeing themselves perform tasks without error. He claimed that such input informs people about how to perform appropriately, and strengthens their beliefs that they are capable of success.

Vicarious efficacy information, in like manner, is processed cognitively according to those indications of efficacy that the models present. Both successes and failures modeled by similar others have the greatest impact on self-appraisals. Coping models are preferable, therefore, to pure mastery models. Social comparison is not the only significant aspect of information derived from modeled performances. Vicarious data also inform people about the nature and degrees of difficulty inherent to tasks.

The cognitive processing of persuasive efficacy information depends greatly upon the identity and the credibility of the individual attempting the persuasion. The more credible the individual is, the greater is the impact of the persuasive effort. Even credible people are discounted if judged ignorant of the task at hand. Finally, arousal information about efficacy derives from people's past experiences. Bandura (1982) contended that moderate levels of arousal contribute positively to performance, but higher levels disrupt it. The more complex the task, the clearer the relationship between level of arousal and performance.
Bandura (1989) asserted the centrality and pervasiveness of self-efficacy beliefs among the elements of self-instrumentality in his model. He elaborated the effects of such beliefs on cognitive, motivational, and affective processes. He linked self-efficacy beliefs to cognitions regarding goal setting, persistence in problem-solving and analytic processes, and expected outcomes. He also related self-efficacy beliefs to motivational levels, degrees of personal perseverance, optimism in the face of difficulties, recovery from setbacks, and responses to rejection, as well as to both personal and professional successes in life.

In the affective realm Bandura asserted the impact of self-efficacy beliefs on anxiety and stress levels under conditions of risk or threat, on avoidant behaviors and depression, and on health functions, particularly immunosuppressive mechanisms. He stated further, that self-efficacy beliefs contribute to choices people make about activities and environments, shaping, in turn, their life paths. Bandura claimed a positive correlation between levels of self-efficacy and personal performance standards, which results in differential motivational levels and goals among people. He stressed the importance of perceived self-efficacy in activities whose significant outcomes derive from the exercise of competence. He put forth self-generated influences, self-efficacy beliefs among them, as essential elements of human freedom and self-determinism.

Social cognitive theory, known earlier as social learning theory, explains psychological problems as the result of dysfunctional or unrealistic expectancies, particularly with regard to perceived self-efficacy (Hergenhan, 1984). Corsini and Marsella (1983) maintained that the concept of self-efficacy lies at the heart of therapy for social learning. Psychological problems develop when people fail to "discover and emit behaviors that lead to appropriate consequences" (p. 327). The task of therapy is to help clients regain their sense of self-efficacy or conviction that, through their own endeavors, they can master a set of circumstances and effect desirable outcomes. Thus
they return to a state of proper functioning in which, as well-tuned organisms, they are “capable of adapting to changing conditions in the environment” (Pervin. 1984, p. 407). According to Bandura, therapeutic change entails a process of the acquisition, generalization, and maintenance of new patterns of thought and behavior. The emphasis of treatment is on the use of modeling and guided participation in order to acquire both cognitive and behavioral competencies based on realistic perceived self-efficacy. The work at hand relates Bandura's construct of perceived self-efficacy to self-concept, self-care behavior, and the metabolic control of diabetic children.

**Definition of Terms**

1. **Adherence** - Behavior by children with diabetes which follows the medical instructions given in order to maintain good health, implying the active application of certain skills and knowledge in order to conform to an overall treatment regimen. Also known as compliance.

2. **Blood glucose self-monitoring (BGSM)** - A self-care behavior performed by diabetics to maintain normal metabolic control. The procedure involves pricking a finger with a lancet to obtain a drop of blood, transferring the droplet to a special reactive strip, and inserting the strip into a glucose meter to obtain a reading of blood glucose level.

3. **Children** - boys and girls between the ages of eight and 13 who reasonably may be considered able to perform diabetic self-care behaviors.

4. **Diabetes** - Type I diabetes, or insulin-dependent or juvenile diabetes, (IDDM), a form of diabetes that tends to develop before age 30 but may occur at any age. It usually is caused when the immune system attacks the beta cells of the pancreas and the pancreas can no longer produce insulin. People who have type
1. I diabetes must take insulin to survive (ADA, 1997).

5. Diabetic - Diagnosed medically as having Type I, insulin dependent, diabetes mellitus (IDDM).

6. Glucagon - A hormone produced by the pancreas that raises blood glucose levels (ADA, 1997).

7. Glucose - A simple form of sugar that acts as the body’s fuel. It is produced when foods are broken down in the digestive system. Glucose is carried by the blood to cells. The amount of glucose in the blood is known as the blood glucose level (ADA, 1997).

8. Glycated hemoglobin (GHb) - A generic term for a blood glucose factor, measured by a laboratory assay, and used to indicate the level of metabolic control in diabetics over the past three to four months. Also known as glycohemoglobin, glycosylated or glucosylated hemoglobin (ADA, 1997). In research studies the measurement of GHb may be expressed as %Ghb, HbA1c or one of its components.

9. Insulin - A hormone produced by the pancreas that helps the body use glucose. It is the “key” that unlocks the “doors” to cells and allows glucose to enter. The glucose then fuels the cells (ADA, 1997).

10. Ketones - Acids produced when the body breaks down fat for fuel. This occurs when there is not enough insulin to permit glucose to enter the cells and fuel them or when there are too many stress hormones (ADA, 1997).

11. Metabolic control - The maintenance of medically acceptable GHb levels by diabetics, accomplished primarily by adherence to a daily self-care management
treatment regimen. Also known as diabetic or glycemic control.

12. Pancreas - A comma-shaped gland located just behind the stomach. It produces enzymes for digesting food and hormones that regulate the use of fuels in the body, including insulin and glucagon. In a fully-functioning pancreas, insulin is released though beta cells located in clusters called islets of Langerhans (ADA, 1997).

13. Self-care - The complex of behaviors people with diabetes perform on their own in order to maintain their blood glucose level within a healthy range. Self-care includes BGSM, insulin preparation and injection, dietary restrictions, appropriate exercise, attention and response to signs of both hyper- and hypoglycemia, as measured by the Self-Care Questionnaire (Saucier, 1993).

14. Self-Concept - A child’s perception of his or her overall competence, as measured by the global self-worth subscale of the Self-Perception Profile for Children (Harter, 1985).

Research Hypotheses

1. The self-concept of IDDM children, as measured by the Self-Perception Profile for Children, will be higher, and higher than that of the control group, after self-care training.

2. The number of self-care behaviors performed, as measured by the Self-Care Questionnaire, will be greater, and greater than that of the control group, after completion of self-care training.

3. Glycated hemoglobin (GHb) levels in IDDM children, as measured by laboratory assay, will be lower, and lower than that of the control group, after completion
of self-care training.

4. Diabetic children who enter training with higher initial self-concept levels will benefit more from the training, and will do better than the control group.

Sample Description and Data Gathering

The sample for this study comprised 49 diabetic children ages eight to 13, all of whom received basic self-care training in diabetes from their physicians. Twenty-seven of the children also obtained additional self-care training at a summer vacation diabetes camp located in southeastern Virginia. The majority of the children were referred to the camp program by physicians who are pediatric endocrinologists.

The investigator administered the Self-Perception Profile for Children and the Self-Care Questionnaire to subjects in the experimental group before the camp program began and four months after the camp concluded. Control subjects, being seen at like intervals for regular medical appointments throughout the study period, completed the same measures at the time of those appointments. Trained laboratory personnel obtained and evaluated the measures of glycated hemoglobin as part of all subjects' routine medical appointments.

Limitations of the Study

Generalizability of results was limited because of the non-random volunteer sample studied. Borg and Gall (1989) noted that volunteers tend to be better educated, from higher social class, more intelligent, more sociable, and in greater need of social approval than are non-volunteers. Such characteristics may have affected the variables under study. As in all longitudinal studies, subject attrition occurred. Only data from subjects who completed the study were used in the analyses. Subjects who did not
complete the study were not significantly different in either their demographic or diabetic characteristics.

The effects of social desirability also may have affected scores on the self-concept and self-care measures. Subjects may have become testwise and statistical regression was possible. Pre- and post-test sensitization, as well as possible demand characteristics, also could have affected scores. Other limitations include history, subject maturation, and staff and facility characteristics which may have interacted with the study data.
CHAPTER 2: REVIEW OF THE LITERATURE

Current Status of the Theory

Social cognitive theory, and self-efficacy theory in particular, is increasingly popular as evidenced by its widespread use as the theoretical rationale for numerous research studies (Corcoran, 1991). Hergenhahn (1984) attributed the popularity of the theory to its optimistic orientation to people, its focus on practical research, its present and/or future orientation, and its recognition of language, symbols and cognitive processes as significant to the understanding and prediction of human behavior. Pervin (1984) cited similar strengths as responsible for the pervasive influence of the theory. Feist (1985) also cited much interest in, but also more mixed opinions of, Bandura’s work.

As with the critics above, the authoritative Bower and Hilgard (1981) account of Bandura’s work predated the name shift from social learning to social cognitive theory. The authors asserted, nonetheless, that the theory “provides the best integrative summary of what modern learning theory has to contribute to the solution of practical problems” (p. 472). They stated further that the theory “may provide a basis of consensus for much of the learning research in the next decade.”

More than a decade later social cognitive theory remains a vital and influential force in psychology. Bandura himself, alone and in concert with others, is an active and productive investigator. Rottschaefer (1991) echoed the earlier opinion of Bower and Hilgard in his assertion that Bandura’s recent work indicates “the empirical and theoretical success of the second cognitive revolution in psychology” (p.153).
Research Using Self-Efficacy Theory

A 1981 study by Beck and Lund explored the relationships between threatening health communications, locus of control, personal efficacy, and subsequent health care intentions and behaviors in an early application of self-efficacy theory. Eighty dental patient volunteers were assigned randomly to one of four audio-visual programs about periodontal disease. The information regarding seriousness of the condition and patient susceptibility was manipulated to convey either high or low seriousness and susceptibility. Locus of control was measured by the Internal Health Locus of Control (IHLC) scale. Response and personal efficacy were measured by three questionnaire items each after the information was communicated. Three other items measured intention to perform the recommended behaviors and five items measured actual subsequent behaviors. Regression analyses indicated that personal efficacy, subjects' beliefs they could succeed, best predicted their intentions to perform and their actual performance of the recommended behaviors. Results did not show that locus of control mediated personal efficacy perceptions.

Representative of the recent emphasis on biomedical applications of self-efficacy theory, Wiedenfeld, O'Leary, Bandura, Brown, Levine, and Raska (1990) examined the relationship of perceived self-efficacy to changes in the human immune system under stressful conditions. Building on extensive prior research, they worked with a group of 20 severely snake phobic adults. Utilizing an intragroup control design, they measured gains in perceived coping self-efficacy and certain concomitant physiological indicators of stress before, during, and after the series of activities designed to induce mastery of the phobia. Subjects reported significant gains during and after the experiment, with self-report data indicating the attainment of essentially maximal efficacy by all participants. All but one measure of immunological functioning
reflected an increase during the phase of the experiment in which subjects were exposed to the snake while developing their sense of self-perceived coping efficacy. In the last, the maximal coping phase, indicators of immunological functioning changed in the direction of the pre-experimental baseline levels but still remained significantly to somewhat higher than before. The change pattern held true for about 75% of the subjects, with the remainder registering decrements in the same physiological measures during the efficacy acquisition phase. In both groups, measures moved toward the baseline levels in the maximal coping phase. Subjects who rapidly acquired a sense of self-efficacy were less likely to exhibit the decrements.

Seeking to expand the applicability of self-efficacy theory, Smith (1989) investigated a cognitive-behavioral coping skills program intended to affect the generalized self-efficacy expectations and locus of control in 42 test-anxious college students. Acknowledging the large body of research that has demonstrated the links between mastery and greater perceived self-efficacy in specific situations, Smith sought to assess the degree to which skills training also had an impact on subjects' sense of general self-efficacy. "The program emphasized personal responsibility for coping skills acquisition, as well as frequent reminders that the skills could be applied to a range of life situations" (p. 229). Stressing personal commitment and effort, the program was presented in an educational context comprising a variety of coping skills such as situational and behavioral activities, cognitive strategies, and desensitization.

Using a treatment-control, pre- and post-treatment design, Smith found a highly significant treatment group difference for expectancies specific to coping with tests and academic requirements. The program also had a significant effect on generalized self-efficacy, but not on locus of control. There were significant correlations as well between increases in self-efficacy and reductions in anxiety. The author emphasized the value of such training given "the demonstrated importance of perceived self-
efficacy in behavioral effectiveness, psychological adjustment and health-promoting behaviors" (p. 232). He further acknowledged that general self-efficacy expectancies "may be important contributors to more global psychological characteristics such as self esteem ..." (p. 232).

Further developing self-efficacy theory, Shelton (1990) summarized the work that has been done regarding both specific and general conceptions of the construct. She noted that Bandura (1977a) considered self-efficacy specific to an activity domain, with little or no generalization between domains. As a consequence, treatment for Bandura focuses specifically on the desired outcomes in a well-defined situation. Nonetheless, the work cited above (Wiedenfeld et al., 1990), which Bandura co-authored, acknowledged the concept of generalizability of perceived self-efficacy. Shelton and others have posited a generalized self-efficacy concept, one which she defined as "the composite of all important successes and failures ... a global trait, relatively stable, and changes (sic) over time with an accumulation of success and failure experiences" (p. 992). Citing "a mastery-oriented attitude toward daily challenges." Shelton's concept appears well-rooted in and clearly derived from self-efficacy theory (p. 992). Shelton maintained also that one's level of general self-efficacy influences one's expectations of self-efficacy in specific situations.

Also focusing on generalizability, Gorrell (1990) addressed the potential contribution of self-efficacy theory to the advancement of self-concept research. He maintained that such research virtually has been stalled since the 1960's because the concept is too global to be an adequate measure of specific treatment effects. He suggested a more limited concept confined to narrower spheres such as a learner self-concept. According to Gorrell, "recent trends in cognitive research and self-efficacy theory may provide evidence in favor of self-concept theory ... (in that) " self-efficacy theory provides theoretical and methodological focuses that overcome the major limitation
of self-concept theory and provide a framework for self-concept theory in the future” (pp. 76-77). Gorrell’s interest was self-efficacy studies in education. He cited numerous works that link self-efficacy not only with actual achievement, but also with persistence, feedback, modeling, self-monitoring, proximal goal-setting, and effective learning strategies. In Gorrell’s view, the primary contribution of self-efficacy theory and research to self-concept theory is support for the enhancement model of belief change, with increased self-efficacy beliefs leading to increased persistence and task performance. Despite his personal emphasis on the education field, Gorrell also valued self-efficacy theory because “Bandura’s introduction of the concept of self-efficacy beliefs into his ideas of the behavior change process represents an opportunity to integrate behavioral and humanistic psychology concerns into a single model” (p. 77).

Critique of Self-Efficacy Studies

The studies cited are representative of the diverse areas of human behavior to which self-efficacy theory has been applied. Equally diverse is the quality of the studies themselves. The early study by Beck and Lund (1981), for example, explained the results in terms of differences in personal efficacy. The authors, however, used only three self-report items to assess that efficacy, providing no reliability or validity data for the items. Other variables were measured similarly. The current study uses validated instruments to measure all variables. The well-executed study by Wiedenfeld et al. (1990) measured the perceived coping self-efficacy of snake phobics with an instrument validated in previous studies. Since most of that work has been done by Bandura and his colleagues, however, the current study contributes to validation and extension of the theory by an investigator other than the original theorist.

Smith’s (1989) study was a well-designed and implemented, though somewhat complex, effort to link specific and generalized self-efficacy. The author provided
reliability and validity data for the self-efficacy measure, but not for the other four instruments. The current study evaluates the dependent variables using a combination of validated self-report and physiological measures. Wiedenfeld et al. (1990) used a combination of validated measures, but the large number of variables, the repeated use of several measures, and the very complex design made it difficult to comprehend the procedure and results. The current work involves three dependent variables with results readily explained by appropriate statistics and tables.

Shelton (1990) delineated clearly the theoretical development of both specific and general self-efficacy. Her elaboration of the relationship between specific and general self-efficacy was both cogent and concise. In accordance with her research recommendations, the current study compares subjects' general self-efficacy scores with their performance scores on the specific tasks related to diabetes self-management. Gorrell expressed concern that "the prevailing problem of using self-concept as a global construct emerges in many studies that employ generalized self-concept measures to assess specific treatment effects" (1990, p. 76). The current study attempted to provide a link between self-efficacy and self-concept theory through the use of both specific and general measures in a specific learning situation with more general implications for the future.

Variable One: Self-Concept

Zimmerman, Carter, Sears, Lawson, Howard and Hassanein (1987) used a pre and post-test design to assess the effect of a week long diabetes camping experience on the knowledge, attitude toward diabetes and self-concept of both diabetic and non-diabetic children. The subjects were 63 children with diabetes and 18 children without the illness: the children were ages eight to 14.

The instruments utilized were modifications of both the Etzwiler Diabetic Knowl-
edge Questionnaire and the Attitude toward Disabled People Scale, and the Piers-Harris Self-Concept Scale. The authors also examined variances in knowledge and self-concept scores related to subjects' age, socioeconomic status, and age at onset.

Results indicated gains in knowledge regarding diabetes among all the subjects, though the gains for non-diabetic subjects were not significant. Neither group registered significant changes in attitude toward the illness. Age of onset and knowledge gain scores correlated inversely and self-concept correlated positively with the knowledge scores.

A prospective study of 42 recently diagnosed diabetic children (Auslander, Anderson, Bubb, Jung, & Santiago, 1990) explored possible correlations between metabolic control and four groups of variables, demographic characteristics, family social environment, self-concept, and adherence to the diabetes treatment regimen. The investigators followed the children and their families for the period of one to three years after diagnosis, with data collected through interviews, standardized instruments and laboratory assays completed during routine clinic visits. Mothers completed the Family Environment Scale (FES) and children completed the Piers-Harris Self-Concept Scale (PHSCS). Citing limitations on the ability to measure adherence to treatment reliably, the researchers posed two interview questions about adherence to both the mothers and children. HbA1 readings provided the measure of metabolic control.

Data reduction comprised multivariate analytical techniques to assess the independent effects of variables on the status of the diabetic child's health. The PHSCS sample scores did not differ significantly from established norms, and were unaffected by race, socioeconomic status, or number of parents in the home. There was no significant association between the metabolic control measures and the self-concept scores. There were significant correlations, however, with the HbA1 readings for race, socioeconomic status, parental constellation, family cohesion, and children's reports of
their compliance. Multiple regression analyses further explored predictors of variance in metabolic control. Follow-up data, gathered two and three years after diagnosis, suggested that metabolic control remains stable over time. Predictor variables also remained constant.

Kovacs, Iyengar, Goldston, Stewart, Obrosky, and Marsh (1990) conducted a six-year longitudinal study of the psychological functioning of 95 newly diagnosed diabetic children. Data were collected shortly after initial diagnosis, three to four times during the first year, and every eight to 10 months in subsequent years. Each evaluation comprised demographic data gathered in a semi-structured interview with parents, behavioral information gathered separately from children and parents, self-report instruments, and laboratory data. Children completed the Children's Depression Inventory (CDI), the Revised-Children's Manifest Anxiety Scale (RCMAS), the Coopersmith Self-Esteem Inventory (SEI), and the Coping with IDDM-Child Version (ICI-C) scale. The course of the illness was evaluated in terms of duration, glycated hemoglobin, and the number of hospitalizations for reasons related to diabetes.

The investigators explored several longitudinal models of symptomatology (depression and anxiety) and self-esteem. Results suggested that self-esteem remains stable over time for both genders, and that initial levels of self-esteem strongly predict future levels. To examine further the relationships between self-esteem and metabolic control, repeated measures of %GHb were added as a variable to the earlier model of longitudinal self-esteem scores, but no significant relationships were found. Neither were any significant relationships found relevant to hospitalizations, or for metabolic control and hospitalizations jointly, even when controlled for initial symptomatology. Similarly, self-esteem scores were nonsignificant in separate analyses of diabetes coping issues. Based upon the overall results, the authors concluded that respondents were well-adjusted in spite of their illness and their self-esteem generally was positive.
In addition, initial self-esteem, along with other factors, was an important predictor of later adjustment.

A study of the influence of age, coping, and self-care on various aspects of adaptation to diabetes through the onset of adolescence was conducted by Grey, Cameron, and Thurber (1991). A total of 103 respondents completed the Child and Adolescent Adjustment Profile (CAAP), the Self-Perception Profile for Children (SPPC), the State-Trait Anxiety Inventory for Children (STAIC) and the Children's Depression Inventory (CDI) to evaluate psychological adaptation. Measures of HbA1 assessed metabolic control. The Coping Orientation for Problem Experiences (A-COPE), The Coping Health Inventory for Parents (CHIP), the Self-Care Questionnaire (SCQ), and the Life Events Checklist (LEC) were used to appraise levels of coping, self-care, and recent stressors. Demographic data were gathered and self-reports of sexual maturation were recorded.

Analyses of variance compared the adaptation and coping of preadolescents and adolescents. Path analyses tested for predictor variables. Two subscales of the SPPC, behavior and school, showed decreases as subjects matured. Metabolic control also worsened. Weak associations emerged between higher scores on the self-perceived Global Self-Worth subscale and the specific coping behaviors of using humor, seeking spiritual support, and avoidance behaviors. Lower scores on that scale were associated with relaxation through daydreaming, listening to music, and riding in a car. Path analysis indicated that self-perceived global self-worth was a statistically significant predictor variable.

Using a multidimensional model, Hanson, Henggeler, Harris, Cigrang, Schinkel, Rodrigue, and Klesges (1992) examined the possibility that sibling relations might make a unique contribution to adaptation among children with IDDM. Subjects were 66 youth and their parents. The researchers evaluated psychosocial adaptation using
measures of self-esteem, behavioral problems, and social competence. HbA1c assays determined metabolic control and adherence was measured using a semistructured format. The Acceptance of Illness Scale (AIS) assessed respondents' feelings of acceptance and personal value in spite of the impact of their illness. The children completed the Self-Perception Profile for Children (SPPC) and mothers completed the Child Behavior Checklist (CBCL). Parents and youths completed the Family Adaptability and Cohesion Evaluation Scales (FACES-III), the Family Inventory of Life Events and Changes (FILE) or Adolescent-File (A-FILE). Parents also filled out the Marital Adjustment Scale. Siblings completed the Sibling Relationship Questionnaire (SRQ), a measure of the four dimensions of warmth/closeness, relative status/power, conflict, and rivalry.

To assess the existence of any association between sibling relations and adaptation to diabetes, and to determine if any such association were independent of other variables, the investigators calculated both zero-order correlations and hierarchical multiple regression analyses. Findings pertinent to self-concept were a significant association between low social class and low self-esteem, as well as a marginal association between high family cohesion and high self-esteem. Low self-esteem also related significantly to high sibling conflict. The high status/power of subjects in their sibling relationship associated marginally with low self-esteem. On the other hand, high self-esteem related marginally to close sibling relationships. The subsequent regression analyses indicated significant correlations of self-esteem with social class, family cohesion, and the closeness, status/power, and conflict dimensions of the sibling relations. High social class, a high degree of family cohesion, and a low level of sibling conflict predicted high self-esteem in the final equation. The measure of sibling relations represented an additional 12% of unique variance.

A correlational study of 34 diabetic children by Rothbaum, Salas, and Heiss (1992)
focused on the psychological and physiological dimensions of diabetic symptomatology. Participants completed the Rosenberg Self-Esteem Scale. Psychological distress was measured by the Children's Depression Inventory and the Mood subscale of the Health and Daily Living Form-Youth. The children rated both the presence and the frequency of somatic symptoms, as well as the extent to which they either attended to or tried to ignore the symptoms. The metabolic measure of HbA1c assessed control at the time of data collection. Medical records established subjects' level of pubertal development and yielded an HbA1c reading from three months earlier for comparison purposes.

The intercorrelational matrix developed in this study indicated significant relationships among self-concept, depression, and positive mood. Children reporting less depression had more positive self-concepts and more positive moods. No significant relationships emerged between HbA1c and either self-concept, depression or positive mood. Subjects who reported a higher self-concept and more positive mood also reported ignoring more symptoms. The investigators cited psychometric and methodological limitations as reasons to consider their results preliminary. They advocated longitudinal studies with multiple measurements which could account for individual differences and "may assist in assessing changes following interventions and in clarifying conflicting reports in the literature" (p. 225).

Hoare and Mann (1994) conducted a cross-sectional study of the relationship between self-esteem and behavioral adjustment in two groups of children with either epilepsy or diabetes. The children completed a modification of the Self-Perception Profile for Children (SPPC), normed for Scottish school children. Parents completed the Achenbach Child Behavior Checklist. The most recent glycated hemoglobin result determined the level of illness management for the diabetic subjects. Medical records yielded demographic data and information about the history of participants' illness.

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The children were categorized further according to their attendance of either regular or special education classes.

Preliminary analyses on each question of the schedules assessed distribution characteristics. Appropriate parametric and non-parametric measures constituted the subsequent analyses. Comparing the groups of children with the two different illnesses, the epileptic children registered significantly more deviant scores than did the diabetic children on four of the Achenbach sub-scales. Additionally, the group of children with epilepsy scored significantly lower than the diabetic group on five of the six SPPC sub-scales, with only the Physical Appearance sub-scale registering no significance difference. The child's age at onset of illness and the duration of treatment showed consistent associations with the more deviant scores for most sub-scales on the Achenbach, with gender an additional factor. Regression analysis of several demographic and illness variables revealed that treatment duration and male gender were the most important contributors to the variance. Neither metabolic control nor type of schooling was associated significantly with the Achenbach scores for the diabetic group. Correlation matrices for the SPPC sub-scales were similar for both the groups. Correlation matrices for the Achenbach and the SPPC sub-scales also showed similar patterns for both groups, though there were many more significant findings for the epileptic group. All correlations were negative between the two measures, with the strongest associations being those between the Global, Behavior, Appearance and Scholastic sub-scales of the SPPC, and the Achenbach scores.

The authors expressed confidence in their findings based upon comparisons with earlier research, recent standardization of the SPPC for this population, and the independent completion of the questionnaires by the subjects and their parents. They concluded that epileptic children are more at risk for behavioral disturbance than are diabetic children, but that duration of treatment for either illness is a vulnerability
factor. Low self-esteem and behavioral disturbance were associated strongly within both groups, leading the authors to advocate for prospective studies of psychosocial adjustment in children who are chronically ill.

**Critique of Self-Concept Studies**

The studies reviewed are atheoretical with regard to the construct of self-concept. Some of the studies imply a family systems orientation and some delineate a theoretical model of coping or adaptation, but none links these orientations with any theory of self-concept. This is evident by the way in which several authors use the terms self-concept, self-esteem, and self-perceived competence interchangeably. In addition, none of the studies explains the basis for the choice of the particular instrument used to measure the construct. The variety of instruments used for measurement in the past has made comparisons across studies difficult. The current study was based on the construct of self-efficacy as articulated by Bandura. The self-concept measure selected for the study because of the prospective link between self-efficacy and self-concept theory will contribute to the growing body of recent research which employs this instrument.

The bulk of the earlier studies utilized primarily correlational statistical analyses. Kovacs et al. (1990) did use inferential statistics to derive a model of the effects of IDDM on the psychological functioning of subjects employing a few analyses of variance. Comparative analyses were minor foci in other studies, except for that done by Hoare and Mann (1994). For example, both Grey et al. (1991) and Rothbaum et al. (1992) compared preadolescents and adolescents on aspects of coping and adaptation, including self-esteem. Rothbaum et al. also compared children with and without a diabetic family member on symptomatology. The current study employs a quasi-experimental design that lends itself to both descriptive and inferential statistics. with
important implications for the evaluation of diabetes self-care management training programs.

Characteristics of the samples represent a third weakness of the studies reviewed. Research has suggested that the age of the child with diabetes and the duration of the illness have an impact on the psychological functioning, including the self-concept of the child. While three of the studies, Hoare and Mann (1994), Rothbaum et al. (1992), and Grey et al. (1990), did address the significance of the onset of puberty for the diabetic child, all of the samples drew from a wide age range. Duration of the illness also varied greatly in the four cross-sectional studies. In Grey et al. (1991), for example, the range was six months to 16 years. While the two longitudinal studies, Kovacs et al. (1990) and Auslander et al. (1990), used samples of children at onset and one year post-onset respectively, both of these research efforts included pre- and post-pubertal subjects. Only about ten percent of the subjects in the current study were post-pubertal, with good clinical management of their diabetes. The time since onset for this cohort averaged less than three years.

Variable Two: Self-Care

Orem defined self-care as "the practice of activities that individuals personally initiate and perform on their own behalf to maintain life, health, and well-being" (1971, p. 13). For diabetics, adherence to such activities is a primary factor in the maintenance of adequate metabolic control. Barglow, Berndt, Burns, and Hatcher (1986) indicated that diabetic adherence includes medication, diet and life-style changes. Hanson, Henggeler, and Burghen (1987) designated diet, insulin adjustment, hypoglycemia, glucose testing, and foot care as important areas of self-care. Despite the demands of the diabetic treatment regimen, Karoly and Bay (1990) noted the increasing trend toward self-management for both adults and children who have diabetes.
Even after educational and instructional emphases on knowledge, skill building, and modifications of beliefs and attitudes, the success of self-care often has been limited (Stark, Dahlquist, & Collins, 1987). Johnson (1988) attributed such limitations to the multifaceted nature of adherence to the diabetic self-care treatment regimen.

Saucier (1984), basing her work on Orem's theory, conducted a descriptive correlational study of the relationship between the self-concepts of diabetic children and their performance of self-care behaviors to manage their diabetes. Subjects were 64 children, ages 10 to 12, who had been diabetic for an average of 3.6 years. They were attending a camp program for children with diabetes and most were attending for the first time. Participants completed a Demographic Data Form, the Piers-Harris Children's Self-Concept Scale (PHCSCS), and the Self-Care Questionnaire (SCQ). The SCQ was developed by the researcher in order to assess the frequency with which subjects performed diabetes management self-care activities. Scores range from 20 to 80.

Results indicated that the subjects of this study scored, on average, above the norm on the PHCSCS. They also performed diabetes self-care management activities most of the time. Findings further indicated, however, that there was no significant relationship between the self-concept scores and the self-care scores for this sample. Nor were other single variables such as age, gender, race, duration of disease, family history, or outside activities significantly related to the level of performed self-care behaviors. A stepwise multiple regression analysis did indicate that the subject's age, outside activities, and self-concept score jointly could predict the level of self-care activity. In addition, race, gender, and camp attendance did reach significant levels of correlation, but they failed to contribute to the regression and so were excluded. The author concluded that no single factor was sufficient to predict the level of self-care management in children. Given that an interaction of factors was significant in
such predictions, she advocated a holistic approach to the creation of management plans for children.

Anderson, Auslander, Jung, Miller and Santiago (1990), working out of an implied systems theory, examined the relationships between mother-child patterns of sharing responsibility for diabetic self-care tasks and several demographic variables, adherence to self-care tasks, and metabolic control. In a cross-sectional correlational study, they administered the Diabetes Family Responsibility Questionnaire (DFRQ), a 17-item instrument about diabetes and general situations and tasks related to health, to 121 subjects, ages six to 21, and their mothers. Results from the questionnaire, developed for this study, were correlated with interview data regarding demographic variables and one item about adherence to self-care behaviors, as well as a measure of HbA1c.

Age correlated significantly with the questionnaire scores of both mothers and children, the level of disagreement about who took responsibility for management tasks, and the HbA1c level, with older subjects in poorer metabolic control. Gender related significantly to mothers' questionnaire scores, with girls reported as more responsible than boys in certain areas. An index of disagreement between mothers and children on the questionnaire also correlated significantly with mothers' reports of better adherence to treatment. Children's reports of their overall adherence to self-care tasks correlated with their questionnaire scores. A general measure of adherence reported by both mothers and children correlated inversely with obtained glycated hemoglobin readings. Multiple regression analyses were performed to identify significant predictors of questionnaire scores and HbA1c readings. Children's ages, duration of the disease, and gender significantly predicted the patterns of responsibility sharing for self-care tasks by mothers and children. Mother-child disagreements about assumption of management responsibilities and level of adherence significantly predicted HbA1c readings.
In a study of self-care assessment, Reynolds, Johnson, and Silverstein (1990) investigated the accuracy of recall of diabetic management behaviors by 75 children, ages seven to 12, who attended a two-week therapeutic camp program. Twelve trained interviewer-observers monitored the subjects, with each child observed on three randomly selected days during their stay at camp. Researchers used the percentage of exact agreement method to determine observer reliability. For interval data, they computed Pearson product-moment correlations of observers' and checker's score, and also calculated dependent t-test comparisons. The day following each observation another of the interviewer-observers questioned the subject about all the events of the previous day. The subjects knew they would be observed and interviewed, but they did not know that the two methods of data collection would be compared.

The focus of the study was a variety of daily self-care behaviors including insulin injection, exercise, glucose/ketone testing, and dietary behaviors. All behaviors were assessed using percentage of exact agreement between children and observers. Analyses of variance tested for effects of age and gender. Where no effects emerged, Spearman correlation coefficients with age were calculated. Results indicated that all the children gave very accurate reports regarding the occurrence of the self-care behaviors, including information about both injections and testing. Data reported about the timing of behaviors was poorer, but still acceptable. There was a consistent underestimation of some exercise measures and of all the dietary behaviors. The authors stated that studies of groups of subjects could correct for such underestimation by statistical means. They indicated, as well, that studies focusing on individuals perhaps need to acknowledge the inevitability of dietary intake underestimations since their results were “highly consistent with the prior literature conducted in a variety of settings” (p. 509). A primary finding of this study was the existence of psychometric support, within limitations, for the use of recall interviews to evaluate adherence to
self-care tasks.

In a four year longitudinal study, Hauser, Jacobson, Lavori, Wolfsdorf, Herskowitz, Milley, Bliss, Wertlieb, and Stein (1990) examined the relationship of family environment to the self-care program adherence of 52 diabetic youngsters whose average age was 12.8 years and who had become diabetic within the previous year. Citing their effort as part of a larger ongoing research program, they implied a family systems theoretical framework, specifically the earlier efforts of the Minuchin group (Baker, Minuchin, Milman, Liebman, & Todd, 1970), as the basis for this empirical study. Subjects and their parents completed psychosocial assessments and met with an interviewer for a family session. After completing a family interaction task and a family coping discussion, participants completed self-report forms, including the Family Environment Scale (FES). The FES yields subscales for conflict, cohesion, expressiveness, organization, control and independence. Adherence of the subjects was evaluated by health care providers, pediatricians or diabetes nurse specialists, who utilized a semi-structured interview to assess “behaviors judged by pediatric diabetologists to be important areas of diabetes self-care” (p. 531). The areas measured were dietary behaviors, exercise, insulin usage, and metabolic monitoring. Only the latter three elements proved to be of acceptable reliability. They were combined to yield an additional composite score utilized in the analyses for this study.

Cross-sectional and longitudinal data analyses established family support as associated with both long and short-term self-care adherence. Analyses also indicated an inverse relationship between family conflict and adherence to self-care. In addition, parents’ perceptions of family organization correlated positively with levels of adherence. The same association did not hold true, however, for youngsters’ perceptions of family organization. No relationships were found between self-care adherence and either family valuing of independence or perceived family control. Finally, the only
connections between aspects of the family environment at the beginning of the study and changes in adherence over time related to cohesion.

Research by Hanson, De Guire, Schinkel, Henggeler, and Burghen (1992) claimed "the multisystemic model of adaptation" as its theoretical base (p. 559). This work sought to evaluate social learning and family systems models, "the conceptual bases for the majority of family-based clinical interventions conducted in pediatric psychology," as they relate to diabetic children (p.556). The authors examined issues that merit attention in the development of both illness-specific and general family treatments for such youngsters. Treatments are grounded necessarily in self-care behaviors youngsters must perform daily. Participants in the cross-sectional study at a regional children's hospital clinic were 95 youths, ages 11-22, and their parents.

Correlational analyses evaluated the relationship of illness-specific family relations to the psychosocial adaptation of the diabetic by using the support and nonsupport scales of the Diabetes Family Behavior Checklist (DFBC). A similar evaluation of general family relations was conducted through development of multiperspective composite family constructs derived from scores on the Marital Adjustment Scale (MAS), the Family Relationships Questionnaire (FRQ), and the Family Adaptability and Cohesion Evaluation Scales (FACES). From these scores the authors derived three principal components of family relations-general affection, adaptability, and conflict. Health outcomes specific to diabetes were measured by assays of HbA1c and by a semi-structured interview developed in previous research by the primary author. The interview addressed self-care behaviors such as compliance with the prescribed meal plan, glucose testing and insulin adjustment. Test-retest reliability of the instrument at three and six months was $r(17)=.70$ and $r(39)=.73$, with $p \leq .001$ for both time periods. Interrater reliability ranged from $r(19)=.95$ to $r(25)=.98$, ($p \leq .001$).

Statistical analyses derived two elements of self-care, dietary adherence and moni-
toring and being prepared, as the principal components of treatment adherence. Psycho­
social adaptation, both specific and general, was measured using the Acceptance of
Illness Scale (AIS) and the Self-Perception Profile for Children (SPPC). Hierarchical
multiple regression analyses indicated not only that illness-specific and more general
family relations covaried, but also that they were associated significantly with dietary
adherence and general psychosocial adaptation on the part of the diabetic youngster.
There were no such correlations with either acceptance of illness or metabolic control.
Nor did the self-care component of monitoring and preparation relate to metabolic
control.

In a 1995 cross-sectional study, Daviss, Coon, Whitehead, Ryan, Burkley, and
McMahon sought to determine those psychological and behavioral factors which were
the most predictive of metabolic control in a group of 79 youngsters, ages 10 to 14.
Glycated hemoglobin measures were the dependent variable in this investigation. A
sample of children attending a one-week camp for diabetics was matched with sample
drawn from a regional children's medical center. All subjects completed the Child
Behavior Checklist, the Coopersmith Self-Esteem Inventory, the Revised Children's
Manifest Anxiety Scale, and the Diabetic Adaptation Scale, a relatively new instru­
ment. Parents completed a demographic questionnaire and provided information
about the child's diabetic history and adherence, and answered questions about their
own attitudes toward the child and the illness. This study examined the number of
blood glucose measures taken daily and the child's dietary adherence.

Regression analysis examined the variables age, gender, income, number of family
dependents, and duration of illness as predictors of HbA1c. A surprising finding was
that larger family size predicted better metabolic control. Duration of illness also
was a significant background variable. The investigators then eliminated the effects
of background variables and simplified their model using principal-components analy-
sis. Three meaningful and correlated components, Psychopathology, Adjustment and Competence/Adherence, accounted for more than 70% of the variance in the predictor variables. The Competence/Adherence component reflected strong loadings on the parental measures of dietary adherence, frequency of blood glucose checks and the Total Competence scores derived from the Child Behavior Checklist. The Competence/Adherence component manifested a direct effect on glycated hemoglobin scores with increased competence and better dietary adherence and blood glucose monitoring, the latter two being important aspects of self-care, predicting better metabolic control. Further analysis indicated that the Total Competence variable constituted the primary effect of this component rather than adherence behaviors. Other conclusions were validation of the Diabetic Adaptation Scale which contributed to the Adjustment component, although that component was the least predictive of glycated hemoglobin readings in this study. Additionally, the investigators found that the Psychopathology and Adjustment components correlated significantly with one another, but not with Competence/Adherence, and so neither had significant direct or indirect effects on glycated hemoglobin.

The weaker correlation between measures of adherence, as reported by parents, and metabolic control lead the investigators to encourage reliance on objective measures such as glycated hemoglobin as indicators of diabetic outcomes. Based on this study and previous research, they concluded further that the majority of children with diabetes may be psychologically healthy enough that measures of anxiety, self-esteem and adjustment simply are not predictive for this population. As a result they cited the even greater significance and utility of the Total Competence scores as predictive of metabolic control. The researchers suggested clinicians might attend more closely to social, school and other activities of patients in order to identify those who are more at risk for poor control. Finally, they cited the predominance of Mormon cultural
values in their sample as a possible explanation of the finding that larger family size predicted better metabolic control, and indicated the need to replicate their findings in additional independent studies.

Critique of Self-Care Studies

In the reviewed studies of self-care a variety of measurement tools was employed by different investigators and research groups. This reflects the lack of a definitive self-care measure in the existing literature. Anderson et al. (1990) justified their use of a single interview item to assess adherence to self-care measures on the basis of "the absence of a more reliable and accurate method at the time of the present study" (p. 483). Hauser et al. (1990) also noted the lack of any generally accepted means to evaluate self-care adherence. The studies by Saucier (1984). Reynolds et al. (1990). and Hanson et al. (1992) each introduced methods of self-care measurement developed by the respective authors. Daviss et al. (1995) simply questioned the parents of subjects about the number of daily blood glucose checks and dietary adherence. The current study contributes to the research data base using the Self-Care Questionnaire (Saucier. 1984, 1993).

To date studies of self-care predominately have used cross-sectional, correlational designs. Hauser et al. (1990) did conduct a longitudinal study, but the analyses still were correlational. In addition, the authors noted a limitation of their study in that the numerous correlations were analyzed with no correction for Type I error. The current study is quasi-experimental and provides both descriptive and inferential statistics, with proper attention to error correction.

Sample characteristics represent a third weakness of self-care research. Both age and duration of disease affect self-care behaviors, with the onset of adolescence generally recognized as related to poorer metabolic control. Participants in all but the
studies by Saucier (1984) and Daviss et al. (1995) represented a wide range of ages. Similarly, all but one study researched self-care among subjects who had been diabetic for a wide range of time. The current study cohort is youngsters ages eight to 13, few of whom are post-pubertal.

Variable Three: Metabolic Control

Metabolic control, the maintenance of blood glucose (sugar) levels within a normal range, is the goal of the diabetes treatment regimen. The effectiveness of any element in the treatment strategy can be evaluated by the measurement of glycated hemoglobin, an indication of the percentage of hemoglobin in the body to which glucose has attached itself. The more glucose to which the body is exposed, the greater the percentage of glycated hemoglobin. The level of glucose in the blood may change rapidly, depending on the dietary intake, exercise level, stress, and other factors in the life of an individual with diabetes. The glucose attachment process, however, occurs slowly and glycated hemoglobin thus reflects an average reading of blood sugar levels. The Diabetes Control and Complication Trial (DCCT), a ten year study conducted by the National Institutes of Health (NIH), provided convincing evidence as to the benefits of near-normal blood glucose control (ADA, 1993). Although the benefits of tight control have not been established for children ages seven to 13, the results of the DCCT with a study group under the age of 30 indicated that the maintenance of normal blood sugar levels can prevent, delay, or even reverse the serious complication of diabetes mellitus. Measurement of glycated hemoglobin levels in diabetics has become the prevalent means of evaluating metabolic control.

Anderson, Wolf, Burkhart, Cornell, and Bacon (1989) investigated the effect of a problem-solving intervention group training program on the metabolic control of young adolescents, ages 11 to 14, with IDDM. Sixty adolescents and their parents
participated in the standard program of clinic care for a period of 18 months. Subjects attended the clinic approximately every three to four months for about a three hour visit each time. Using a stratified randomized control group design, 35 of the subjects were assigned to receive the group intervention in addition to the standard care. The intervention consisted of five small group sessions, one and a half hours each, in which the subjects and their parents met concurrently, but separately. A diabetes nurse educator lead the sessions for the adolescents and focused on the topics of technical management skills, the effects of puberty on management, meal planning, exercise, and strategies for the use of SMBG in conjunction with intensive management therapies. Sessions with parents were lead by a psychologist and covered the same topics, but also addressed the need for both parental involvement and adolescent responsibility in daily diabetes management.

Least-squares multiple regression analyses were used to assess the age, duration of illness, and baseline HbA1 readings of the two groups in terms of their impact on follow-up HbA1 levels. Only the baseline HbA1 level was related to the follow-up level. Because of wide HbA1 variability in both groups, ANCOVA was utilized in the final analysis in order to control for the baseline readings. The authors also evaluated the impact of the intervention group on three SMBG-related self-care measures, using a series of $\chi^2$ analyses. Findings of the study were that follow-up HbA1 levels were significantly lower for the intervention group than for the standard care group. In addition, 76% of the subjects in the intervention group either improved or maintained their metabolic control level, while 23% registered a deterioration. By contrast, only 50% of the control group subjects improved or remained stable and the other 50% deteriorated. The self-care analyses indicated that significantly more subjects in the intervention group used SMBG data when they exercised. There were similar trends with regard to adjustments of both insulin and diet.
An important empirical study by Garrard, Mullen, Joynes, McNeil, and Etzwiler (1990) appears to be the most current of a limited number of research efforts intended to evaluate the impact of patient education on metabolic control. Working primarily with adults, this research group employed a quasi-experimental design to compare the HbA1 levels of diabetics who completed an outpatient daily management training program with the levels of diabetics who had received the routine education at time of diagnosis and in follow-up clinic visits. The experimental group, comprising subjects who requested or were referred to the program, attended five days of education based on a program developed by one of the investigators (Etzwiler, 1986). HbA1 levels were measured before training, after training, and at the next follow-up visit for the experimental group. The control group was evaluated at three consecutive points during the defined study period.

The experimental group showed a significant improvement in HbA1 levels from the pre- to post-training measures, with additional, but insignificant, improvement from the post-training to follow-up measurement. The control group did not differ from the first to the second point of measurement, but did demonstrate an improvement at the point of follow-up. Examination of differences between the two groups indicated a significant difference in HbA1 levels only at the point of post-training measurement. Citing methodological limitations, the researchers cautiously suggested that such training programs may contribute to improved metabolic control for some patients.

A cross-sectional study by Smith, Mauseth, Palmer, Pecoraro, and Wenet (1991) focused on the relationship between the glycated hemoglobin levels and the psychological adjustment of diabetic adolescents. Participants completed the Life Events Checklist, which measures life events during the previous year, and the Sullivan Diabetic Adjustment Scale. The latter instrument produces scores of adjustment in the
areas of dependence-independence, school, family relationships, peers, and attitudes about diabetes and body functioning. The method of determining levels of HbA1 was developed in part by one of the authors and has been used only in research. Norms have not been established, but were reported as consistent with expectations.

Relationships among variables were assessed using Pearson product-moment correlation coefficients. No correlations were found between metabolic control and age, duration of the illness, gender, or any scale of the Life Events Checklist. Adolescents who registered lower HbA1 levels reported higher levels of conflict with their parents and poorer family relationships overall. The authors noted that their findings contradicted those of previous studies, but also provided useful data regarding issues of metabolic control and psychological development in adolescents.

Hentinen and Kyngas (1992) focused on metabolic control compared with the results of a compliance questionnaire completed by 47 relatively long-term adolescent diabetics and the diabetes nurses who treated them. The assessment instrument was developed for this study and addressed areas of compliance such as insulin treatment, diet, home monitoring, and cooperation with nursing staff. Thirty-four percent of the subjects reported a high level of overall compliance, 45% reported average compliance, and 21% reported a low level of compliance. Compliance was best with insulin dosages. Dietary adherence and home monitoring were most problematic. These findings were seen as consistent with the immediacy of the effects of non-compliance with insulin, the dietary challenges of a typical adolescent lifestyle, and the developmental issues of adolescence. No significant differences were found between the subjects' and the nurses' evaluation of compliance. The researchers reported generally good congruence between measurements of HbA1 and the compliance assessments of the participants. Sixty-three percent of the subjects self-reporting a high level of compliance also registered very favorable HbA1 levels, more than twice the percentage of
those reporting low compliance.

A cross-sectional study by Saucier (1993) examined the relationship between self-care and metabolic control in 21 diabetic children, ages 10 to 14. Subjects provided demographic information and completed the Self-Care Questionnaire (SCQ), an instrument based on the management recommendations of Etzwiler (1986) and Backscheider (1972), and developed by the author. Measurement of HbA1c was used to determine metabolic control. While results indicated the expected inverse relationship between greater levels of self-care and lower levels of HbA1c, the correlation was not statistically significant. As a group the subjects performed self-care tasks independently most of the time and their metabolic control was less than adequate. Multiple regression analyses found significant relationships between levels of HbA1c and race as well as experience at a summer camp program for diabetic children. ANOVA indicated no significant differences among the five ages participating in the study, although the oldest group did score higher on the self-care measure. Focusing on the concern about documented deterioration of metabolic control with the onset of adolescence, the author noted that the findings of this study did not predict better metabolic control among children who were involved more actively in their self-care.

Viner, McGrath and Trudinger (1996), in another cross-sectional study, investigated the relationships between family life stress, family social support, and metabolic control in 43 children and adolescents. Mothers accompanying subjects to routine clinic visits completed the FILE (Family Inventory of Life Events) and a self-report instrument measuring social support by family and friends or acquaintances. Clinic staff secured measurements of blood glucose, urinary ketones, and HbA1c from the subjects. The researchers also obtained the number of admissions to the hospital for diabetes during the previous 12 months, taking this as indicative of poor metabolic control. They calculated the mean HbA1c for the previous 12 months as an indica-
tor of metabolic control during the period from which the questionnaire assessed life events. Spearman rank correlations, reported only at the $p < .01$ level because of the risk of chance association due to multiple correlations, constituted the statistical analyses. The relationship between the FILE and the control variables was calculated separately for children under the age of 12 (n=27).

Results indicated a significant association between the FILE and the glycated hemoglobin reading at the time the questionnaire was completed for both the under 12 age group and the subjects as a whole. A significant association between the FILE and the mean HbA1c reading also presented for both of the groups. Neither spousal support, network support subscales, nor total support was associated with either glycated hemoglobin reading. Further examining the high total social support group, the researchers dichotomized FILE scores at the mean into low and high categories, and analyzed the resultant means of mean Hb1c to test if high social support buffered the stress-control relationship. The researchers found no significant difference in the means for the two groups, thus suggesting that the high total social support does buffer the association between life stress and poor control. Blood sugar level at the time of questionnaire completion associated significantly with the glycated hemoglobin measure secured at the same time. There were no other significant associations. The authors indicated that this study was the first documentation of an association between family stress and metabolic control in preadolescent children, as well as the first evidence of high social support buffering the effects of life stress for that group. They also cited the failure to find an association between family stress and hospital admissions, but noted the need for caution in interpreting these data because of the small number of total admissions as well as the cross-sectional design of the study.
Critique of Metabolic Control Studies

Theoretical underpinnings are incomplete or absent in the reviewed research. Three studies, Smith et al. (1991), Hentinen and Kyngas (1992), and Viner et al. (1996) hinted at developmental and family systems theoretical rationales, but none articulated them clearly. Garrard et al. (1990) described an intervention based on the education and active participation of subjects, but set forth no underlying learning theory. Anderson et al. (1989) also described an educational intervention that was activity-based, problem solving-oriented, and skill-focused with the goal of self-regulation, but stated no theoretical rationale despite a reference to self-efficacy. Saucier (1993) drew upon Orem’s (1980) theory of self-care and hypothesized a positive relationship between level of self-care and level of metabolic control. That hypothesis and Orem’s theory are compatible with self-efficacy theory, but Saucier made no such theoretical declaration. The current study is based on the model of self-efficacy stated by Bandura.

Information about the means used to test glycated hemoglobin levels is insufficient or missing in all of these metabolic control studies. Smith et al. (1991) provided somewhat more data, but noted that their assay method had been used only in research and norms had not been established. The current study used data only from validated measures of glycated hemoglobin.

Age characteristics of subjects represent the third weakness of the metabolic control studies. Only the study by Viner et al. (1996) provided separate findings for a strictly preadolescent sample. Adolescent only, or adolescent and preadolescent, samples in four studies raise the question of generalizability to other groups of diabetics because of the metabolic control issues peculiar to adolescents with diabetes. The education program described by Garrard et al. (1990) was used with subjects between
14 and 78 years of age, with no indication of adjustments for developmental issues. The current study sample comprised children ages eight to 13, largely prepubertal. The few postpubertal subjects demonstrated fair to good metabolic control, and no problematic developmental issues were evident.

Population

The population sampled for this research study is diabetic children ages eight to 13, approximately half of whom participated in a diabetes self-care training program beyond their standard clinic or physician instruction. Participation in such a training program is common treatment for diabetes in children of this age group. These youngsters either have been hospitalized or have been treated by their physician for acute diabetic symptomatology and subsequently have been referred to the training program. The diabetes self-care training program is a standardized intervention that instructs diabetics in all aspects of the daily management of their chronic disease. Elements include insulin injections, ketone testing (when indicated), blood glucose monitoring (SMBG), exercise, and dietary constraints. The training goal is adherence to the treatment protocol in the belief that such adherence will produce near normal blood glucose levels (metabolic control) and, thus, prevent, delay, minimize or reverse the serious complications of diabetes. Investigations of the relationship between adherence and metabolic control have yielded contradictory results (Johnson, Kelly, Henretta, Cunningham, Tomer, & Silverstein, 1992).

An early study by Grey, Genel, and Tamborlane (1980) examined the relationship of psychosocial adjustment in such a group of children to their metabolic control. Twenty children, ages seven to 13, and their parents completed several psychosocial measures which, in turn, were related to metabolic control. A structured parent interview assessed childhood adjustment. Children completed the Coopersmith Self-
Esteem Inventory (SEI) and the primary care-giving parent completed a measure of parental competence developed by one of the researchers. A measure of family functioning also was completed. Metabolic control was evaluated by means of a 24-hour glucose excretion measure.

Mild or no adjustment problems were evident in 45% of the sample. Moderate to severe psychosocial adjustment problems presented in 55% of the subjects, a rate significantly higher than that found in normal children, but one consistent with findings in children with other types of chronic illness. Analyses of the relationships between psychosocial adjustment, personality factors and family functioning revealed direct and significant correlations with all of the variables. In addition, partial correlation analysis determined that the key factor was the level of parental self-esteem. Subjects were divided by scores into well- and poorly adjusted groups. The groups were similar demographically, but differed significantly in self-esteem, parental self-esteem, and family functioning. Metabolic control also was significantly worse in the poorly adjusted group. The investigators concluded that diabetes may have an impact on the self-esteem, behavior, and mental health of diabetic children. Such concerns, as well as assessment of the seemingly pivotal parental self-esteem, were deemed important considerations in addressing problems of diabetic control.

Band (1990) investigated differences among children at two levels of cognitive development in coping with diabetes. She studied 64 youngsters, ages seven to 17, using a Piagetian task to classify them as operating at either the pre-formal or formal operations level. Mean age of the preformal operations group was 8.8 years (SD=2.4). The formal operations group averaged 14.6 years of age (SD=1.9). A structured interview about broad and specific stresses of diabetes yielded a total of 809 coping responses. Responses were coded according to two systems: primary (externally focused) vs. secondary (internally focused) control coping styles, and descriptive categorization
into instrumental, cognitive, or emotional activities. Primary health care providers rated the subjects' general level of medical adjustment, based on HbA1 readings, daily glucose records, dietary compliance, cooperation and attitude regarding self-care, and ease of illness management. Ratings yielded a single overall score.

Analyses of differences in perceived control, perceived coping efficacy, and coping styles indicated a significant difference between the two groups, with the formal group using more secondary control coping. A two-tier analysis of three categories of coping strategies also revealed significant differences between the two groups. Within primary control approaches, the preformal group used significantly more instrumental and social-emotional strategies. Within secondary control approaches, the formal group employed significantly more instrumental and cognitive strategies. In general the movement was from externally to internally focused approaches, and from instrumental to cognitive strategies, with a significant effect present for level of cognitive development. Nonetheless, primary type instrumental strategies remained the most common way of coping within both groups.

The investigator also probed the effect of coping style on medical adjustment. ANOVA revealed better adjustment in children who predominately used primary coping styles. When the effect of coping style was eliminated, cognitive development showed a main effect for medical adjustment. The researcher discussed her findings in terms of children's development, with decreasing parental involvement in self-management over time, the well-known difficulties of effective compliance during adolescence, and the implications for disease adjustment.

Another study of diabetic children, conducted by Jacobson, Hauser, Lavori, Wolfsdorf, Herskowitz, Milley, Bliss, Gelfand, Wertlieb and Stein (1990), assessed the influence of coping and adjustment on adherence within two age groups. Subjects were designated at preadolescent (ages nine to 12) or adolescent (ages 13 to 16). Work-
ing with an onset cohort, the investigators gathered psychosocial and demographic information at the beginning of the study and then annually over a period of four years. An index of subject adjustment was derived from scores on measures of self-esteem, self and parental reports of behavioral problems, self-perceived and parental reports of competence, and self-reports of adaptation to diabetes. The measures used were the Coopersmith Self-Esteem Inventory (SEI), the Self and Parent report versions of the Child Behavioral Checklist (which assesses both behavioral problems and competencies), and the Diabetes Adjustment Scale (DAS). Assessment of three coping processes, locus of control, ego defense mechanisms, and adaptive strengths, was accomplished by completion of the Nowicki and Strickland scale, and analyses of semistructured interviews. Health care providers evaluated self-care adherence behaviors judged to be important by experts.

As the authors indicated, this naturalistic study yielded a very complex data set. Importantly, 12 of the 61 subjects missed at least one year of medical follow-up and, thereby, study participation. On average, subjects' adherence deteriorated over time, but individuals' position within the group as a whole remained stable. No demographic or psychosocial characteristics predicted change in adherence. Age at onset, however, related significantly to adherence, with younger children showing better adherence. In partial correlational analyses that controlled for age, significant relationships emerged between adherence and adjustment, ego defense level, adaptive strength, and locus of control. A final hierarchical regression analysis indicated significant relationships between adherence and adjustment and ego defense level, as well as age, over the four years, with those variables accounting for a full 47% of the variance. The researchers related their findings to the importance of early screening and intervention to promote adaptation in diabetic children and adolescents.

Kager and Holden (1992) examined the effects of certain family and individual
characteristics and stress, alone and in combination, on the adjustment of children and adolescents with diabetes. Sixty-four subjects, ages seven to 15, were recruited from among individuals registered to attend a two-week therapeutic summer camp program for diabetic youth. The children completed self-report instruments measuring self-competence, peer relations, and coping skills the first day at camp. The instruments used in this study were the Child Perceived Coping Questionnaire (CPCQ), the Global Self-Worth subscale of the Self Perception Profile for Children (SPPC), an unnamed self-report measure of peer relations, and the Diabetes Adjustment Scale (DAS). At mid-point HbA1c measures were obtained. On the last day of the camp the youngsters completed the Life Events Checklist. Mothers completed the Coping Health Inventory for Parents (CHIP), the Parent Diabetes Opinion Survey, and the Matthews Youth Test for Health (MYTH) to assess Type A behavior in the children.

Findings included a significant and positive relationship between number of negative life events and age, family disruption, and HbA1c level. There also was a significant and negative relationship between negative life events and self-competence and maternal coping. Child coping skills correlated significantly in the expected manner with self-competence, peer relations, and adjustment to diabetes. The Type A behavior measure related significantly to family disruption and adjustment. Expected relationships also were apparent in the moderate relationships among self-competence, peer relations, and adjustment. Age and gender correlated significantly with life stress and HbA1c level. Duration of illness related significantly to family disruption and HbA1c level. A series of hierarchical multiple regression analyses assessed the effects of child and maternal coping, family disruption, the child’s Type A behavior, and both psychosocial and illness adjustment. Significant relationships were found between age and self-competence (with older children scoring lower), maternal coping and self-competence (an inverse relationship), gender and peer relations (with girls
scoring higher), child coping and peer relations, gender and adjustment (with girls scoring higher), negative life events and adjustment.

Similar analyses with HbA1c as the dependent variable indicated significant relationships with gender (with girls registering higher levels). Life events stress and Type A behavior produced an interactive effect with HbA1c. At low stress levels, children with higher Type A behavior scores also had higher HbA1c levels. At higher stress levels, however, children with lower Type A scores had higher levels. One conclusion of the authors was that age represented an important variable in this large data set, with important implications for perceived self-competence and self-management as children mature. The inverse relationship between maternal coping and self-competence was deemed a small contributory factor, but it also raised some questions about family dynamics which may be relevant to adaptation.

Using LISREL to examine several diabetes-related variables. Johnson, Kelly, Henryetta, Cunningham, Tomer, and Silverstein (1992) analyzed adherence and health status in a sample of children, average age 11.9 (SD=2.9), identified through a regional diabetes program and a state diabetes camp organization. The focus was six adherence constructs which were assessed in 24-hour recall interviews. Both children and mothers were interviewed three times during a period of two weeks. Health status was determined by assays of HbA1c and triglycerides, another metabolic factor affected by diabetes.

Parent-child adherence ratings correlated significantly. After analyses of the six adherence constructs the researchers determined they could establish no strong associations between any of the behaviors and either of the metabolic control measures. Combination of the constructs also did not affect the results. There were, however, differences between a younger (under 13) subsample and an older (over 13) subsample. The coefficients linking adherence to control and to the amount of HbA1c variance
both were larger for the younger subsample. The investigators linked these results to
the impact of adolescents' independence strivings and greater risk-taking on adher­
ence. In addition, while HbA1c levels remained stable over time for all subjects, the
triglyceride levels were stable only for the younger subsample. This difference was
accounted for by the recent evidence of increased insulin resistance at the onset of
puberty.

Charron-Prochownik, Kovacs, Obrosky and Ho (1995) examined the most preva­
lent physical signs and symptoms in a group of 95 children ages eight to 13 at the time
of diabetes onset. Hypothesizing that the severity of the illness at the time of diagno­
sis could be explained partially by certain family characteristics, the authors specif­
ically looked at caregiver arrangement, household size, socioeconomic status (SES),
maternal education and the family's diabetes history. They also examined patient
characteristics such as age, gender, and the presence or absence of any psychiatric
disorders. These variables were combined in a psychosocial-demographic predictive
model of illness severity.

The children and their parents were evaluated, using a standardized interview, the
Interview Schedule for Children (ISC), to determine the children's psychiatric status.
The Intake Medical Information Sheet (IMIS) was utilized to record and quantify
presenting signs, symptoms, and other relevant data at IDDM onset. Seven IMIS
items were considered in deriving an index of illness severity.

Exploratory analyses, using the gamma statistic or Pearson's correlation coeffi­
cient, examined univariate relationships. Chi-square tests or analyses of variance were
used to assess differences among children defined as mildly, moderately or severely ill.
Determination of certain subsets of children as severely ill at time of their admission
to the hospital was established using regression tree methodology. Stepwise linear
regression provided confirmatory analyses.
The authors established polyuria, polydipsia, weight loss, and nocturia as the most frequent symptoms of IDDM, with a mean duration of 6.3 weeks of symptomatology. Illness severity scores indicated that 51% of the children could be designated minimally to mildly ill, 27% as moderately ill, and 22% as severely ill at the time they were admitted to the hospital. Among the family characteristics considered, only caregiver arrangement and SES were associated with the level of illness when admitted. Children living in single-parent households were more ill at onset diagnosis than the rest of the subjects. Caregiver arrangement was the only significant predictor of illness severity in stepwise linear regression analyses.

The authors concluded that their results confirm recent clinical impressions regarding the relatively small number of children who are severely ill, defined as exhibiting hyperglycemia and ketoacidosis, at the time of initial diagnosis with IDDM. They concluded, further, that youngsters from single-parent families may be at risk for poor outcomes related to diabetes for up to at least several years following the onset of the illness.

Critique of Population Studies

Most of the current research being done with the population of diabetic children either is atheoretical or is based on a purely medical model. At best, there are implications made regarding the principles of childhood development and family systems theory. The current research effort is based on Bandura's theory of self-efficacy, thus adding to the articulation of theory relevant to studies with this population.

The majority of studies with this population has included subjects who are likely to be both pre- and post-pubertal, despite the generally known fact that the onset of puberty affects metabolic control negatively in diabetic youngsters. Indications are that diabetes may delay the onset of puberty, but none of the studies reviewed above
assessed the subjects' level of sexual maturity. Johnson et al. (1992), representing a leading research group in this field, documented significant differences in pre- and post-pubertal subsamples and recommended that future studies focus on populations that are more homogeneous with regard to age. The current study works with an essentially prepubertal sample, contributing an added dimension to research efforts with this population.

Finally, no studies of this population have addressed the impact of diabetes self-management instruction on the self-concept and the self-care behaviors, as well as the metabolic control, of prepubertal diabetic children. The current study contributes to that important aspect of research with this population.

**Supplementary Research**

In the interest of ethical safeguards and considerations, as well as to refine data gathering procedures, the current research included a pilot study (Appendix A). The instruments used in the full study were administered to seven prepubertal diabetic children. Participants were recruited through contact with leaders of a local support group for diabetic children. Pilot study questionnaires solicited demographic and diabetic history information, self-care data, self-concept responses, and participants' opinions as to the potential willingness of others to participate in such a study, with or without a financial incentive. The pilot study required approximately 50 minutes of each participant family's time.
CHAPTER 3: COLLECTION OF DATA

Population

The population studied was two distinct groups of children, ages eight to 13, with insulin dependent diabetes mellitus (IDDM) who were otherwise healthy. The experimental group (n=27) included children who attended a week long summer diabetes camp program during which they were taught self-management behaviors. The control group (n=22) comprised youngsters who never had attended any such camp or other training program, but who were in treatment with the same physicians.

The sample for the study was recruited by letter (Appendix B), in cooperation with camp staff from the participating hospital and the pediatric endocrinologist from the sponsoring medical school, as well as from patients of local pediatric endocrinology practices and military pediatric clinics. One hundred twenty-four (124) prospective participants were identified and contacted: 56 were willing to participate and met the inclusionary requirements. A total of 49 subjects completed the study.

The experimental group was 55.6% male and 44.4% female. The control group was 36.4% male and 63.6% female. The average age was 10.20 for the experimental group and 10.43 for the control group. Firstborn children represented 66.7% of the experimental group and 54.5% of the control group. Families with one or two children constituted 44.4% of the experimental group and 63.6% of the control group. Families generally were small with up to four total members in 55.6% of the experimental group and 68.2% of the control group. Two parent households represented 70.4% of the experimental group and 63.6% of the control group. In the experimental group 51.9% attended elementary school while 54.5% of the control group did so. The remainder were in middle schools. The two groups differed significantly regarding racial/ethnic identity. In the experimental group 96.3% were Caucasian. Only 63.6%
of the control group was Caucasian. Higher socioeconomic status characterized most of the subjects. In the experimental group 70.4% were in the major/medium business, professional, or technical categories. In the control group 59.1% of the subjects were in those categories. The children resided in urban, suburban or semi-rural areas which were close enough to the medical facility sponsoring the diabetes camp to participate in that program. It is likely that these children are representative of youngsters with diabetes who reside in the area studied, given that management of the illness requires regular, on-going medical services.

Study Procedure

The participating hospital sponsors a summer diabetes camp self-management training program which has been recognized formally by the American Diabetes Association. During the study period, 49 subjects, ages eight to 13, were followed. Clients with psychiatric diagnoses or other chronic illnesses were excluded from the study. Parents and subjects signed a consent form (Appendix C). Both subjects and one parent of all subjects also completed general demographic and health status information questionnaires at the beginning of the study (Appendices D and E).

The intervention was the standard self-care management training provided to children at the camp and conducted by clinic staff at the participating hospital. The camp program complies with the recommendations of the American Diabetes Association published as the National Standards for Diabetes Patient Education and American Diabetes Association Review Criteria (1986). The program standards and review criteria address the areas of needs assessment, planning, program management, communication/coordination, patient access to teaching, follow-up, evaluation, and documentation. Training involves active participation as well as more standard educational presentations. The children not only observe self-care behaviors, but
also must demonstrate an acceptable level of proficiency in performing the behaviors themselves. Instruction covers all aspects of diabetic self-management from monitoring, blood testing and insulin administration to psychological adjustment, family involvement, nutrition, exercise, medications, illness, complications, and hygiene. Instructors are specially trained health care professionals who are certified as diabetes educators (CDEs).

Initial measurements using the Self-Perception Profile for Children (SPPC) (Appendix F) and the Self-Care Questionnaire (SCQ) (Appendix G) were completed at the beginning of the study, just before the self-management training program commenced for the experimental group. Less than one hour was necessary for completion of the instruments. The investigator provided clear written and verbal instructions with the instruments. To ensure correct completion of the instruments, she was available personally to offer assistance if necessary. The second set of measurements was secured from subjects in the experimental group in follow-up sessions approximately four months later. Subjects in the control group completed the same sets of measurements in conjunction with appointments, approximately four months apart, for their routine diabetes management care.

Glycated hemoglobin levels, providing the physiological measure in the study, were obtained routinely as part of the diabetes treatment protocol carried out by the subjects' physicians. Samples were secured from subjects in the experimental group prior to camp attendance and at follow-up appointments with the same physicians at approximately the same time the experimental subjects completed the second set of measurement instruments. The glycated hemoglobin levels of subjects in the control group were tested at two consecutive routine medical appointments. Subjects were offered compensation at each instance of measurement. They could choose one bottle of insulin, one 25-strip vial of blood glucose test strips, or a cash equivalent of $20.00.
Instrumentation

Demographics and Health Data  Demographic and basic diabetes data forms (Appendices D and E) were used to collect information from study subjects and parents. Data included gender, racial/ethnic identity, age, educational level, occupation of parent(s), birth order, family constellation, and date of diabetes onset. Medical determinations of health status and stage of pubertal development, were made by subjects' physicians at the beginning of the study.

The Self-Perception Profile for Children  The Self-Perception Profile for Children (SPPC) (Appendix F) is a 36-item, self-report measure which assesses children's judgments of their personal competence and adequacy. The instrument examines five specific subscales, scholastic competence, social acceptance, athletic competence, physical appearance, behavioral conduct, plus the more general global self-worth subscale. Each subscale comprises six items. The SPPC was designed for use with youngsters ages eight to 13, but also is appropriate for use with older children. The instrument derives from two theoretical sources. The first is James' (1892) construct of global self-esteem as a ratio of one's accomplishments to one's aspirations across the several domains of one's life. The second is Cooley's (1909) construct of self-worth as a summative reflection of the appraisals significant others make of oneself.

The questionnaire subjects complete is titled "What I Am Like," and contains 36 items in a structured alternative format designed to reduce the tendency toward socially desirable responses. Each item comprises two statements, one positive and one negative, about a specific skill or personal characteristic. Subjects choose the positive or the negative statement, then indicate whether the chosen statement is "really true" or "sort of true" for them. Item wording is counterbalanced across the domains. Possible scores range from one to four for each item.
The SPPC represents the most recent version of the Perceived Competence Scale for Children (PCSC) and has been developed through factor analytic means, with extensive additional analyses performed in order to establish and improve upon its psychometric characteristics. The instrument has been administered to more than 2,200 school children, grades three to six, at several locations across the United States (Harter, 1982). Alpha coefficients of internal consistency for the SPPC subscales ranged from .71 to .86. Reliabilities for the global self-worth subscale ranged from .78 to .84 across four samples. Subscale means generally centered around 3.0 and were found to be moderately stable across grades and samples. SPPC means for the global self-worth subscale ranged from a low of 2.76 for third grade girls to a high of 3.24 for both fifth and seventh grade boys. Test-retest reliability coefficients derive from data for the subscales comprising the original instrument, the PCSC. The correlation for the global self-worth subscale, based on a sample retested after three months, was .70. The correlation for the subscale was .69 for another sample at nine months. Harter (1988) argued that low reliability coefficients do not indicate necessarily poor psychometric properties for an instrument that purports to measure behaviors or self-evaluations that vary with environmental and developmental factors.

Harter (1982) investigated the relationship between teachers' and children's self-ratings of cognitive competence in an assessment of convergent validity. For a sample of children in grades three through nine, the teacher-student correlations were in the .40's. A developmental pattern of increasing correlation was evident. Harter (1982) also reported on one study of the construct validity of the SPPC. A sample of sixth graders was divided into three groups according to their self-ratings of cognitive competence. When given free choice of anagrams to complete, there were significant correlations between the self-ratings and the difficulty of the anagrams the subjects selected. Harter (1982) indicated support for the discriminative validity of
the instrument in a study of the social and physical domains measured by the SPPC. The findings showed that subjects who were chosen to participate on sports teams scored significantly higher on the social and physical competence scales than did those subjects who were not chosen.

A study by Tanaka and Westerman (1988) also supported the convergent validity of the SPPC. In their broad investigation of the competence construct, the authors measured the degree of congruence between the PCSC, an earlier version of the SPPC, and the Child Behavior Checklist (CBC) for a sample of 76 girls, ages eight to 11, and their mothers. Bivariate correlation of the composite scores yielded a score of .24 ($p \leq .04$). Analyses of the subscales yielded three moderately sized and significant correlations. The PCSC cognitive competence subscale correlated with the CBC School subscale ($r = .30, p \leq .008$). For the PCSC social competence subscale and the CBC social subscale, the correlation was .36 ($p \leq .001$). The PCSC general self-worth subscale also correlated with the CBC social subscale ($r = .29, p \leq .01$).

Marsh and Gouvernet (1989) evaluated the construct validity of the Perceived Competence Scale for Children (PCS), another early version of the SPPC, using factor analyses, multitrait-multimethod (MTMM) analyses, and correlations with other criterion variables. The subjects were more than 500 Australian students in grades seven through nine. They completed the PCS, the Self-Description Questionnaire I (SDQI), the Multidimensional Measure of Children's Perception of Control, the Self Determination Index (SDI) measuring external versus intrinsic motivation, and two achievement tests of mathematics and reading. Factor analyses of the responses indicated that both the PCS and the SDQI identified the factors the instruments intended to measure. Target coefficients for the PCS were large (range = .32-.75, $Mdn = .56$).

MTMM analyses yielded a complex data set that supported both the convergent and discriminant validity of the PCS and the SDQI. Similar score patterns for the
two instruments suggested the patterns were independent of the measure used. Additional correlations with the SDI and the academic achievement tests provided further evidence of construct validity. For example, academic motivation scores correlated substantially with academic self-concept measures while general self-concept scores correlated less. Both the achievement scores correlated most highly with the PCS academic score. Overall results supported the convergent and discriminant validity of the specific domain measures of the PCS and the SDQI relative to academic achievement. In addition, all convergent validity coefficients for the two instruments, across all grades, were statistically significant.

The Self-Care Questionnaire  The Self-Care Questionnaire (SCQ) (Appendix G) measures the frequency with which children perform an array of diabetes self-care management activities. The instrument contains 20 items, based on the diabetes self-care regimen recommended by leading experts in the field (Etzwiler, 1962; Backscheider, 1974). The SCQ is written on a level easily understood by school-age children and can be completed in no more than 15 minutes. Subjects respond to items about how often they perform an activity using a Likert-type scale with possible answers being never, sometimes, most of the time, or always. SCQ scores range from 20 to 80 and represent interval level data.

Developed by Saucier (1984), the content validity of the instrument was assessed by a panel of diabetes experts which included a pediatric endocrinologist, a certified diabetes nurse educator, and a statistician. The original version of the instrument included items covering the measurement of insulin dosages, insulin administration, insulin injection site rotation, blood glucose level testing at least twice a day, recording of blood glucose testing results, urine testing for ketones, adjustment of the management regimen, responses to ketonuria or low blood glucose levels, exercise, meal plan-
ning, practice of good hygiene, wearing of identification as a diabetic, and maintaining a current level of knowledge about diabetes. The current version of the instrument (Saucier, 1993) also includes items about self-blood glucose monitoring (SBGM) since that activity has become a standard element in diabetes self-care management over the past few years.

As discussed earlier, no instrument developed to date has been deemed the standard measurement of diabetic self-care. In the current study, one item was modified to accommodate differing physician instructions regarding the blood sugar level threshold to test for ketones in the urine. In a study of self-care and metabolic control by Grey, Cameron, and Thurber (1991), the researchers failed to establish the convergent validity of the SCQ. Saucier (1993), studying a sample of 21 children, found the predicted inverse relationship between higher levels of self-care and lower HbA1c levels, but the correlation was not statistically significant \( r = -0.09, p \leq 0.68 \). These results are representative of findings throughout the literature using a variety of self-care measures such as those reviewed earlier.

**Glycated Hemoglobin** Measures of glycated hemoglobin (GHb), hemoglobin to which glucose is attached, became common about a decade ago. The attachment process occurs slowly and, therefore, GHb levels are not susceptible to factors such as the recent intake of food, a single bout of exercise, or episodes of stress (Metzger, 1983). GHb reflects, instead, the average blood sugar level over the previous one to three months. Accordingly, GHb levels can be utilized in both evaluations of the effects of different methods of diabetes management and in routine diabetes care.

A precise determination of the mathematical relationship between GHb and blood sugar concentration is not feasible, but studies have demonstrated strong linear correlations between the two measures according to several research groups. Svendsen.
Lauritzen, Sogaard, and Nerup (1982), for example, documented an $r = 0.98$ correlation in 15 diabetics over a period of five weeks. Similarly, Nathan, Singer, Hurxthal, and Goodson (1984) found a correlation coefficient of $r = 0.958$ in 21 diabetic subjects over an eight-week period.

The discriminative validity of GHb measures also has been established in a number of studies. Jeppson, Jerntorp, Sundkvist, Englund, and Nylund (1986), for example, examined a sample of 137 patients suspected of having diabetes. Based on the results of glucose tolerance tests, the subjects were classified as normal, impaired, or diabetic. Comparative average HbA1c readings indicated that subjects with impaired tolerance registered significantly higher ($p \leq 0.01$) HbA1c readings than did those subjects with normal results, and significantly lower ($p \leq 0.001$) readings than did diabetic subjects. The HbA1c tests successfully identified 80% of the subjects, eliminating the need for a more complicated, time-consuming, and expensive follow-up procedure, the two-hour oral glucose tolerance test. The results of this study indicated further that use of a fasting blood glucose test alone would have lead to inconclusive results for 64% of the suspected diabetics. These individuals would have required an oral glucose tolerance test, at a significantly higher level ($p \leq 0.001$), in order for their diagnoses to be definitive.

More recently, Gebhart, Wheaton, Mullins, and Austin (1991) compared Ghb levels and three other objective measures of glycemic control with the results obtained from home-based glucose self-monitoring. Following 17 diabetic patients for a period of four months, the correlation coefficients for two types of GHb measures with the average home glucose level readings were $r = .667, p \leq .01$ and $r = .416, p \leq .01$ respectively. Singer, Coley, Samet, and Nathan (1989) concluded from their overview of various glycemia tests for diabetics that “glycated hemoglobin is presently the most accurate single assay of chronic glucose control: . . .” (p. 134).
There is more than one test for glycated hemoglobin. The most specific measure is of HbA1c. Depending on the method of assay used, the amount of HbA1c in the blood represents 3-6% of the total for nondiabetics and as much as 20% in diabetics whose disease is controlled poorly (Goldstein, Little, Wiedmeyer, England, & McKenzie, 1986). The other GHb measure is HbA1, which includes A1a, A1b, and A1c. Reference values for both measures inevitably vary somewhat among labs, but the inclusive HbA1 readings consistently are two to four percent higher than the HbA1c readings. In diabetics the GHb levels generally are more than 3% above the normal limit, regardless of the assay method used. Established HbA1c norms for non-diabetic children are 1.8-4.0%. While there is some disagreement about realistic target goals for diabetic children, the current trend is toward tighter metabolic control. Good diabetic control has been defined by Metzger (1983) as 2.5-5.9% HbA1c, but there is not consensus in the field.

Measures of glycated hemoglobin can be divided into three major categories. They represent methods based on charge differences among different hemoglobin components (the most widely used), methods based on chemical reactivity, and methods based on differences in the chemical structure of various hemoglobin components (Goldstein et al., 1986). The various methods of assay vary among themselves and among laboratories. In addition, no single consensual reference value or GHb standard exists. Guidelines set forth by the Diabetes Data Group Expert Committee on Glucosylated Hemoglobin of the National Institute of Health do suggest both intra- and inter-assay critical values of 5% as attainable and desirable in all laboratories. Goldstein et al. (1986) have stressed the importance of a non-diabetic reference value for all labs conducting such assays, indicating that all of the available methods provide comparable clinical information, provided the tests are conducted properly. The current study utilized one type of assay score.
Research Design

The current study constituted a quasi-experimental, single-factor single-treatment design, with one post-test measurement, which examined changes in self-concept, self-care practices, and glycated hemoglobin levels for all subjects. Statistical analyses compared scores for the group of children who participated in the designated self-care training with scores for the group of children who did not do so. The designated training was a week long summer vacation diabetes camp, a time-limited group training that addresses the several elements of diabetes self-care.

The intent of the study was to examine changes in self-concept, self-care behaviors, and glycated hemoglobin levels for subjects in the two subgroups. Three repeated measures MANOVAs were used to compare the pre-training scores of the experimental and control groups on the measures of self-concept, self-care, and glycated hemoglobin level. These results were carried into the post-training analyses. A series of three $2 \times 2$ (group x time) repeated measures analyses of covariance evaluated changes in self-concept, self-care behaviors, and glycated hemoglobin levels from before to after the completion of the self-care training. In addition, a set of two $2 \times 2$ (group x time) repeated measures ANCOVAs, with self-concept as a covariant, was used to compare subjects on the Self-Care Questionnaire and measures of glycated hemoglobin. Appropriate descriptive statistics were used to delineate the demographic characteristics of the sample and the responses of the sample to the measurement instruments.

Specific Hypotheses

The hypotheses of the research study were:

1. The self-concept of prepubertal children with IDDM, as measured by the Self-Perception Profile for Children, will be higher, and higher than that of the
control group, after training in diabetes self-care management.

2. The number of self-care behaviors prepubertal children with IDDM perform, as measured by the Self-Care Questionnaire, will be greater, and greater than that of the control group, after training in diabetes self-care management.

3. Glycated hemoglobin levels in prepubertal children will IDDM, as measured by standard laboratory tests, will be lower, and lower than that of the control group, after training in diabetes self-care management.

4. Prepubertal children with IDDM who register higher scores on the Self-Perception Profile for Children also will obtain higher scores on the Self-Care Questionnaire and will achieve lower levels of glycated hemoglobin after training and in comparison with the control group.

Statistical Procedure

A series of 2×2 (group × time) repeated measures analyses of variance was used in the present study to evaluate the first three hypotheses. A set of two 2×2 (group × time) repeated measures ANCOVAs, with self-concept as a covariant, examined the last hypothesis. Data were analyzed according to gender, race, age, socioeconomic status, birth order, and family constellation to determine if any of those factors interacted with the dependent variables. Appropriate descriptive statistics also were used to delineate the demographic characteristics of the sample and the responses of the sample to the measurement instruments. All means and standard deviations were reported. An $\alpha = .05$ level of significance pertains to all analyses.
Ethical Considerations

This study entailed no substantive risks to the subjects. All participants received a written explanation of the general purpose and procedures of the study in an introductory letter (Appendix B) and in the Subject Consent Form (Appendix C). Subjects were informed partially of the study's purpose in order to reduce any effects of social desirability. Consent was secured from a parent of all subjects, as well as the subjects themselves, with appropriate documentation on the Subject Consent Form. The right of subjects to decline to participate or to withdraw in full or in part at any time was guaranteed. A comparison of participants and non-participants, based on anonymous clinic data, was used to assess the representativeness of the sample.

Upon completion of the study, results will be made available to subjects and their parents for review. The confidentiality of all subjects has been protected by assignment of a code number on the measures. Access to the data was restricted to the investigator, doctoral committee members, and participating medical personnel. If any subjects demonstrated impaired self-concepts, inadequate self-care behaviors, or unhealthy levels of glycated hemoglobin, the investigator cooperated with clinic staff efforts to establish improvements.
CHAPTER 4: ANALYSIS OF RESULTS

Introduction

The purpose of this study was to investigate the effects of self-care training on the self-concept, self-care behavior, and metabolic control of diabetic children. Statistical analyses compared scores for a group of children who participated in the designated self-care training with scores for a group of children who did not do so. All subjects completed the Self-Perception Profile for Children, the Self-Care Questionnaire, and a measure of glycated hemoglobin once before and once after the training in order to assess the dependent variables.

Statistical Analyses

Descriptive statistics, t-tests for independent samples and \( \chi^2 \) analyses were used, as appropriate, to describe the characteristics of the sample and the initial responses of the sample to the measurement instruments. Means and standard deviations are reported. An \( \alpha = .05 \) level of significance pertains to all analyses.

Analyses of variance evaluated the four research hypotheses formulated for this study, with conclusions based on comparisons using two sets of measurement of global self-worth, the number of self-care behaviors performed, and the glycated hemoglobin levels of the two groups of children. In addition, subjects were compared regarding both the number of self-care behaviors they performed and their glycated hemoglobin levels, with consideration given to their global self-worth scores as a covariant. Separate statistical reports are presented for each hypothesis. Additional repeated measures ANOVAS evaluated all of the study subjects on the major dependent variables according to the remaining demographic variables.
Demographic and Diabetic Characteristics

Tables 4.1 & 4.2 show that there were 27 subjects in the experimental group and 22 subjects in the control group, with similar mean ages of 10.20 and 10.43 respectively. The experimental group was 55.6% male and 44.4% female. The control group was 36.4% male and 63.6% female. Firstborn children represented 66.7% of the experimental group and 54.5% of the control group. Families with one or two children constituted 44.4% of the experimental group and 63.6% of the control group. Smaller families with up to four total members represented 55.6% of the experimental group and 68.2% of the control group. Two parent households typified 70.4% of the experimental group and 63.6% of the control group. In the experimental group 51.9% attended elementary school while 54.5% of the control group did so. The remainder were in middle schools. In the experimental group 96.3% were Caucasian. Only 63.6% of the control group was Caucasian. Higher socioeconomic status characterized most of the subjects. In the experimental group 70.4% were in the major/medium business, professional, or technical categories. In the control group 59.1% of the subjects were in those categories. To evaluate the comparability of the experimental and the control groups on all the demographic factors, categories were created as shown in the tables cited and a chi square statistic was applied. The only demographic variable where a difference between the two groups was detected was that of racial/ethnic identity. Because of this significant difference, $2 \times 2$ (racial/ethnic identity × time) repeated measures ANOVAs were applied to test each of the hypotheses. No differences were found and, therefore, no adjustments were made to the major analyses.

The two groups were similar in their diabetic characteristics. The mean duration of the illness in the two groups, 2.70 and 2.79 years for the experimental and control group respectively, was not significantly different and illustrates the chronic nature of
IDDM. In addition, the mean glycated hemoglobin readings at the time the subjects entered the study was not significantly different. Initial metabolic control was good for the control group, with a mean of 9.93, and fair to good for the experimental group, with a mean of 10.85.

**Hypothesis One**

Hypothesis One states that the level of global self-worth of diabetic children will be higher, and higher than that of the control group, after training in diabetes self-care management. A 2 × 2 (treatment × time) analysis of variance was used to evaluate this hypothesis. As shown in Table 4.3, subjects in the experimental group scored lower on this scale from pre-training to post-training, while those in the control group scored higher from the first to the second measurement. Because there was no interaction effect, the data fail to support the hypothesis.

**Hypothesis Two**

Research hypothesis Two states that the number of self-care behaviors performed by children with IDDM will be greater, and greater than that of the control group, after they have been trained in diabetes self-care management. A 2 × 2 (treatment × time) analysis of variance was used to test this hypothesis. Subjects in both the experimental and the control groups scored higher on this scale from the first to the second measurement. Table 4.4 presents the analysis. Because there was no interaction effect, the data again fail to support the hypothesis.
<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Experimental</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>n = 27</strong></td>
<td><strong>n = 22</strong></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>10.20</td>
<td>10.43</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>1.67</td>
<td>1.57</td>
</tr>
<tr>
<td>Birth order</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Firstborn</td>
<td>66.7%</td>
<td>54.5%</td>
</tr>
<tr>
<td>Later born</td>
<td>33.3%</td>
<td>45.5%</td>
</tr>
<tr>
<td>Number of children</td>
<td></td>
<td></td>
</tr>
<tr>
<td>One or Two</td>
<td>44.4%</td>
<td>63.6%</td>
</tr>
<tr>
<td>Three or More</td>
<td>55.6%</td>
<td>36.4%</td>
</tr>
<tr>
<td>Family Size</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Up to Four</td>
<td>55.6%</td>
<td>68.2%</td>
</tr>
<tr>
<td>More than Four</td>
<td>44.4%</td>
<td>31.8%</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>55.6%</td>
<td>36.4%</td>
</tr>
<tr>
<td>Female</td>
<td>44.4%</td>
<td>63.6%</td>
</tr>
<tr>
<td>Grade</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elementary</td>
<td>51.9%</td>
<td>54.5%</td>
</tr>
<tr>
<td>Middle School</td>
<td>48.1%</td>
<td>45.5%</td>
</tr>
<tr>
<td>Household Type</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Two parent</td>
<td>70.4%</td>
<td>63.6%</td>
</tr>
<tr>
<td>Other</td>
<td>29.6%</td>
<td>36.4%</td>
</tr>
<tr>
<td>Racial/ethnic group*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Caucasian</td>
<td>96.3%</td>
<td>63.6%</td>
</tr>
<tr>
<td>Other</td>
<td>3.7%</td>
<td>36.4%</td>
</tr>
<tr>
<td>Socioeconomic Status (SES)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Major/medium business,</td>
<td>70.4%</td>
<td>59.1%</td>
</tr>
<tr>
<td>professional, technical</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Skilled-unskilled workers,</td>
<td></td>
<td></td>
</tr>
<tr>
<td>clerical, sales/service</td>
<td>29.6%</td>
<td>40.9%</td>
</tr>
<tr>
<td>(X^2_{(p=1), n=49} = 8.62, p &lt; .01)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 4.1: Demographic characteristics.
<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Experimental</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n = 27</td>
<td>n = 22</td>
</tr>
<tr>
<td>Onset of Diabetes (years)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>2.70</td>
<td>2.79</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>2.13</td>
<td>2.37</td>
</tr>
<tr>
<td>Initial GHb Reading</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>9.93</td>
<td>10.85</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>2.90</td>
<td>2.14</td>
</tr>
<tr>
<td>Camp Attendance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never Before</td>
<td>51.9%</td>
<td></td>
</tr>
<tr>
<td>Once</td>
<td>22.2%</td>
<td></td>
</tr>
<tr>
<td>Twice</td>
<td>11.1%</td>
<td></td>
</tr>
<tr>
<td>Three Times</td>
<td>11.1%</td>
<td></td>
</tr>
<tr>
<td>Four Times</td>
<td>3.7%</td>
<td></td>
</tr>
</tbody>
</table>

Table 4.2: Diabetic characteristics.

<table>
<thead>
<tr>
<th></th>
<th>First</th>
<th>Second</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group</td>
<td>Subjects</td>
<td>Mean</td>
</tr>
<tr>
<td>Experimental</td>
<td>27</td>
<td>3.52</td>
</tr>
<tr>
<td>Control</td>
<td>22</td>
<td>3.27</td>
</tr>
</tbody>
</table>

Interaction Effect: $F_{(v=1, n=49)} = 4.74, \ p < .05$

Table 4.3: Effect of training on the self-concept of diabetic children.

<table>
<thead>
<tr>
<th></th>
<th>First</th>
<th>Second</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group</td>
<td>Subjects</td>
<td>Mean</td>
</tr>
<tr>
<td>Experimental</td>
<td>27</td>
<td>57.59</td>
</tr>
<tr>
<td>Control</td>
<td>22</td>
<td>53.73</td>
</tr>
</tbody>
</table>

Interaction Effect: $F_{(v=1, n=49)} = .15, \ p > .05$

Table 4.4: Effect of training on the self-care of diabetic children.
Hypothesis Three

Hypothesis Three states that the glycated hemoglobin levels of diabetic children will be lower, and lower than those of the control group, after they have been trained in diabetes self-care management. A $2 \times 2$ (treatment $\times$ time) analysis of variance was used to evaluate this hypothesis. As illustrated in Table 4.5, subjects in the experimental group registered higher levels of glycated hemoglobin after training, while subjects in the control group registered lower levels from the first to the second measurement. Because there was no interaction effect, the hypothesis is not supported.

<table>
<thead>
<tr>
<th>Group</th>
<th>Subjects</th>
<th>Mean</th>
<th>SD</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental</td>
<td>27</td>
<td>9.93</td>
<td>2.90</td>
<td>10.49</td>
<td>2.07</td>
</tr>
<tr>
<td>Control</td>
<td>22</td>
<td>10.85</td>
<td>2.14</td>
<td>10.47</td>
<td>2.80</td>
</tr>
</tbody>
</table>

Interaction Effect: $F_{(\nu=1, n=49)} = 3.05, p > .05$

Table 4.5: Effect of training on the glycated hemoglobin level of diabetic children.

Hypothesis Four

Research hypothesis Four states that children with IDDM who register higher global self-worth scores also will perform more self-care behaviors and will register lower glycated hemoglobin readings after training, and in comparison with the control group. Table 4.6 shows the results of a set of two $2 \times 2$ (treatment $\times$ time) ANCOVAs with self-concept as a covariate, that examined this hypothesis. Because there was no interaction effect, the data fail to support the hypothesis.
<table>
<thead>
<tr>
<th>Covariate</th>
<th>Measure</th>
<th>Global Self Worth Subscale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-Care Score</td>
<td>( t = 0.32 )</td>
<td>( p &gt; .05 )</td>
</tr>
<tr>
<td>Glycated Hemoglobin Level</td>
<td>( t = 0.68 )</td>
<td>( p &gt; .05 )</td>
</tr>
</tbody>
</table>

Table 4.6: Self-concept and self-care interactions of diabetic children (\( n = 49 \)).

<table>
<thead>
<tr>
<th>Covariate</th>
<th>Measure</th>
<th>Covariate</th>
<th>Measure</th>
<th>Age</th>
<th>Duration of Illness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Global Self-Worth Subscale</td>
<td>( t = 0.32 )</td>
<td>Age</td>
<td>( p &gt; .05 )</td>
<td>Duration of Illness</td>
<td>( p &gt; .05 )</td>
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<tr>
<td>Self-Care Score</td>
<td>( t = 1.51 )</td>
<td>( p &gt; .05 )</td>
<td>( t = -1.90 )</td>
<td>( p &gt; .05 )</td>
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<td>Glycated Hemoglobin Level</td>
<td>( t = 0.83 )</td>
<td>( p &gt; .05 )</td>
<td>( t = 1.72 )</td>
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Table 4.7: Interactions of age and duration with measures of self-concept, self-care behavior, and metabolic control in diabetic children (\( n = 49 \)).

**Additional Analyses**

Data describing the subjects were analyzed according to age, duration of illness, birth order, number of children, family constellation, family size, gender, grade, racial/ethnic identity and socioeconomic status to determine if any other factors interacted with the dependent variables.

A set of six \( 2 \times 2 \) (treatment \( \times \) time) ANCOVAS, with age or duration of illness as a covariate, analyzed the degree of interaction for age and duration of diabetes with the variables of global self-worth, self-care behaviors, and glycated hemoglobin levels, as shown in Table 4.7.

Other \( 2 \times 2 \) (demographic category \( \times \) time) ANOVAS were applied to the remaining demographic variables, birth order, number of children, family constellation, family size, gender, grade, racial/ethnic identity and socioeconomic status, according to the categories delineated in Table 4.1. Tables 4.8, 4.9, and 4.10 present the computational results. These analyses established significant effects for the number of children in the family and for the total size of the family.
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Table 4.8: Effects of demographic characteristics on the self-concept scores of diabetic children.
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Table 4.9: Effects of demographic characteristics on the self-care behavior scores of diabetic children.
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\[F_{(v=1, n=49)} = 4.07, p < .05\]

\[F_{(v=1, n=49)} = 7.85, p < .01\]

Table 4.10: Effects of demographic characteristics on the glycated hemoglobin levels of diabetic children.
CHAPTER 5: SUMMARY, CONCLUSIONS, AND IMPLICATIONS FOR FUTURE RESEARCH

Summary

Today self-care is the norm in the management of insulin-dependent diabetes, and self-care training is accepted widely as an effective tool to educate patients regarding self-care. Many self-care training programs exist, and the best of them not only conform to American Diabetes Association (ADA) standards, but also are recognized by the ADA for their thoroughness. These programs typically operate upon the principles of social cognitive theory, and especially the construct of self-efficacy. Nonetheless, research to date does not support conclusively the effectiveness of these self-care training programs. While various studies have examined changes in the knowledge, skills or attitudes of patients who complete self-care training program, clinical measures of metabolic control seldom have been included as well.

This study presents results that concern hypotheses regarding the effects of self-care training on the self-concept, self-care behavior and metabolic control of diabetic children. The research studied two samples of diabetic children. Subjects in the experimental group attended a week long summer day camp for diabetic children during which they were taught, by observation and supervised practice, various aspects of self-care. Youngsters in the control group did not complete any special self-care training program. All subjects, however, were treated by the same physicians and received the same routine clinical care and diabetic patient training.

The subjects completed the Self-Perception Profile for Children (SPPC), (Harter, 1985), the Self-Care Questionnaire (Saucier, 1984), and a measure of glycated hemoglobin twice, at an interval of approximately four months. Children in the experimental group completed the measures once before and once after completing the
self-care training program. Children in the control group completed the measures twice at the time of routine appointments with their doctors. A series of ANOVAS and descriptive statistics evaluated the data to determine if there were significant differences between the two samples.

The results presented in Chapter Four indicated no real differences in self-concept, self-care behavior, or metabolic control for diabetic children, regardless of participation in any special self-care training. A summary of the results by hypothesis follows:

Hypothesis One stated that the self-concept of diabetic children will be higher, and higher than that of the control group, after training in diabetes self-care management. The children who attended the self-care training program started out with positive self-concepts and maintained them for the duration of the study. Children in the control group also recorded positive initial self-concept readings and improved further during the study period.

Hypothesis Two stated that the number of self-care behaviors performed by children with IDDM will be greater, and greater than that of the control group, after training in diabetes self-care management. It would seem reasonable that youngsters would be more active in their self-care after training in performance of those behaviors. Nonetheless, children who attended the camp performed no better on this measure after training than the children who did not go to camp. All subjects demonstrated approximately 70% compliance with the measured self-care behaviors and maintained about the same fairly high level of consistency in performance throughout the period of study.

Hypothesis Three stated that the glycated hemoglobin levels of diabetic children will be lower, and lower than those of the control group, after training in diabetes self-care management. Once again, there was no significant difference between the two groups, with all subjects maintaining fair to good levels of metabolic control for
the duration of the study.

Hypothesis Four stated that children with IDDM who register higher global self-worth scores also will perform more self-care behaviors and will register lower glycated hemoglobin readings after training and in comparison with the control group. The subjects' initial self-concept had no significant impact, however, on either their self-care behaviors or their glycated hemoglobin readings.

Additional examination of the demographic characteristics of the study subjects indicated that the number of children in the family and the total size of the family had significant effects on the subjects' glycated hemoglobin levels, regardless of exposure to self-care training. Subjects from larger families with more children registered higher glycated hemoglobin readings.

Conclusions

This study contributes to the small set of existing studies that assess the impact of self-care training on the psychological and clinical elements of diabetes management in children. To date the results of these studies remain mixed. However, certain conclusions can be drawn from the results of this research which contribute to that body of knowledge.

First, the self-care training program attended by subjects in this study did not appear to affect either their self-concept, self-care behavior, or glycated hemoglobin levels over a four month period. This study, therefore, does not suggest that self-care training contributes in the long run to either psychological or clinical improvement for children with IDDM. These results contradict those of Garrard et al. (1990) who reported improvement in the immediate post-training glycated hemoglobin levels of subjects, notably older, who completed a patient education program similar to the one in this study. Experimental group subjects in the investigation by Garrard et
al. registered higher initial glycated hemoglobin levels ($\mu = 13.03, SD = 2.86$) than did the subjects in the current study. Post-training glycated hemoglobin readings for the experimental group studied by Garrard et al. averaged 11.78 ($SD = 2.37$): the decrease from pre-training was highly significant ($p = .0001$). These glycated hemoglobin levels indicate fair metabolic control. In the current study, by contrast, the post-training measurements were taken after a four month interval. It may be that immediate post-training measurements would have yielded results more similar to those obtained by Garrard et al. Subjects in the present study also started out with better initial metabolic control: additional improvements may be more difficult to obtain. The results of this effort do support, however, the findings of Saucier (1984) who concluded that no single factor such as self-care training could predict, by itself, the level of self-care activity in children.

The self-concept measure used for this study, the Global Self-Worth subscale of the Self-Perception Profile for Children (Harter, 1985), had reported means from 2.76 to 3.24, above the midpoint on its one to four point scale, for four samples of children in grades three through eight. Standard deviations ranged from .44 to .85, indicating sizable differences among individuals. Mean scores on the Global Self-Worth subscale for both groups in this study, at both times of measurement, were above all the means cited by Harter. The initial mean self-concept score for the experimental group was 3.52 ($SD = .55$) and for the control group was 3.27 ($SD = .63$). Given that subjects began the study registering such positive self-concept levels, one might not expect much additional change.

In this study a significant difference did emerge between the experimental and control groups on the second measure of self-concept, obtained four months later. The difference, however, was in the opposite direction from that predicted by the original hypothesis. The follow-up mean self-concept score for the experimental group was
3.41 ($SD = .50$) and for the control group was 3.56 ($SD = .52$). The difference mostly reflected the .29 point gain made by subjects in the control group while the scores for the experimental group essentially remained the same. Harter (1982) established satisfactory test-retest reliability for the subscale this study employed at both three and nine month intervals. The actual import of a .29 gain on the Global Self-Worth subscale of the SPPC, however, representing only a seven per cent gain over the full range of the subscale, likely is negligible. Not only did the two samples in this study not differ substantively from one another, but they also both registered quite positive self-concept levels, as measured by the SPPC, throughout the study. These youngsters are quite well-adjusted, despite their illness.

There were no significant differences between the two groups on the measures of self-care behavior or glycated hemoglobin at either time one or time two. Despite participation in a self-care training program that one reasonably would expect to increase levels of self-efficacy, at least with regard to the practice of diabetic self-care, there were no significant gains for the experimental group in either self-care performance or metabolic control. Notably, subjects entered the study already performing many self-care behaviors quite consistently. In Saucier's (1984) early study subjects attained a mean score of 48.25 on the Self-Care Questionnaire (SCQ), representing 60% compliance with recommended self-care behaviors. Saucier's later study (1993) found 72% compliance for a cohort of ten to 14-year-olds, but that cohort achieved a mean HbA1c level of only 11.6% which is considered to be fair metabolic control. In this study the mean SCQ scores for all subjects were 55.86 at time one and 56.59 at time two, indicating 70% compliance with the recommended self-care behaviors. The range of glycated hemoglobin levels in this study was from 9.93% to 10.85%, representing fair to good metabolic control. Further improvement in either adherence to self-management recommendations or level of metabolic control may be difficult.
to achieve among youngsters in this age group.

Despite the satisfactory self-care compliance levels, ANCOVA indicated no interaction between self-care and metabolic control. This finding contrasts with the report of Anderson et al. (1990) as to significant correlations between metabolic control measures and self-care reports. Johnson (1988) noted the multi-faceted nature of adherence to self-care which complicates both compliance and an understanding of the many factors that contribute to it. Furthermore, subjects' initial self-concept level, linked to social cognitive theory and self-efficacy through the measurement used in this study, did not interact with their scores on the other variables. These results are consistent with those of previous studies (Rothbaum et al., 1992; Auslander et al., 1990). They fail, however, to support Gorrell's view (1990) that higher levels of self-efficacy beliefs lead to increased persistence and task performance. They contradict, as well, the findings by Saucier (1984) who found an association between a better self-concept and improved metabolic control.

It is highly probable that the pre-treatment self-concept levels of subjects in this study, reflecting a positive sense of global self-worth, simply were too high for the self-care training to effect any additional improvement beyond the subjects' already adequate levels of self-care and fair to good metabolic control. These findings, nonetheless, contrast with those reported by Jacobson et al. (1986) regarding level of perceived self-competence as a predictor of adaptation and coping behaviors. Nor do they add to the correlative findings by Grey et al. (1980) relating self-perceived competence to both self-care behaviors and glycated hemoglobin levels. They do confirm partially the results reported by Auslander et al. (1990) regarding the lack of significant correlation between self-esteem and metabolic control, despite a significant relationship between self-care and metabolic control. In addition, they serve to confuse the later findings by Grey et al. (1991) regarding associations between measures
of self-worth, self-care behavior and metabolic control.

Self-efficacy, self-perceived competence, self-worth, self-concept and self-esteem are not precisely the same constructs. There is some confusion evident in the literature about the usage of these terms, and this may explain some of the differences in results across studies. Harter (1982) criticized several popular self-concept and self-esteem scales as using constructs she described as vaguely defined at the conceptual level and lacking clear operational definitions. At the same time she posited the global self-worth construct as indicative of how much an individual likes himself or herself as a person, independent of and superordinate to self-evaluations of specific competence judgments, one's self-efficacy.

Lastly, certain familial characteristics did have an impact on the metabolic control of diabetic children. Study subjects from families with more children and more family members overall registered significantly higher glycated hemoglobin levels throughout the study. One might expect less parental or other adult availability to supervise and ensure the completion of self-care behaviors, or perhaps more stress, in larger families. Interestingly, the literature contains very few studies that considered either of these demographic features which clearly contributed to metabolic control in this investigation. The Daviss et al. (1995) study, in contradiction to the present effort, found that larger family size predicted better metabolic control, at least for a sample of children from Mormon households.

To summarize, the program of self-care training did not have the anticipated effects upon self-concept, self-care behaviors, or glycated hemoglobin levels, regardless of participants' initial level of self-concept. Among the study subjects as a whole only the number of children in the family and the total size of the family affected their glycated hemoglobin levels. This specific learning situation did not illustrate clearly, therefore, a link between social cognitive theory, self-efficacy and self-concept.
theory: or between self-concept and good diabetes self-care or metabolic control. One can observe, nonetheless, that these diabetic youngsters, a majority of whom were attending camp for the first time, demonstrated positive self-concepts, practiced self-care most of the time, and were maintaining fair to good metabolic control. Several studies (Grey et al., 1991; Auslander et al., 1990; Kovacs et al., 1990; Saucier, 1984) indicated that findings such as those from this study seem to predict positive self-concepts, regular self-care practices and fair to good metabolic control for these children in the future, at least until they become adolescents.

Implications for Future Research

The lack of significant findings in this study is subject to a number of challenges. First, the generalizability of the findings is limited by the size, demographic and diabetic characteristics of the samples. Most of the subjects in this study were white children of comparatively high socioeconomic status whose diabetes was not extremely long term. Additionally, their self-concepts and self-care behavior levels were notably high, while their metabolic control ranged from fair to good from the beginning of the investigation.

Results from this study might have varied considerably with subjects who entered the self-care training program with poorer self-concepts, lower levels of self-care, and/or poor metabolic control. A closer examination of the three subjects comprising the bottom ten per cent of the experimental group in the study is instructive. Two of the three youngsters were attending the camp for the first time: the third had attended twice before. Their average age was 11.03 and the average duration of illness was 4.5 years. The mean initial self-concept score for this subsample was positive at 3.28 on the SPPC. The mean initial glycated hemoglobin reading, however, was 16.1, more than two standard deviations above the experimental group's initial GHb.
mean. and was indicative of poor metabolic control. This subsample, nonetheless, obtained a mean SCQ score of 54.7. After training, this subsample maintained a still positive 2.94 mean self-concept score while registering an impressive 10.3 point mean increase on the SCQ, indicating much higher compliance with recommended self-care activities. One subject's score increased only three points, but the other two posted gains of 13 and 15 points each. Only one other subject in the study registered a greater gain, at 16 points. The mean post-training glycated hemoglobin reading for the subsample was 13.8. Two subjects' readings improved by 2.7 points, the other by 3.0 points. These metabolic control levels still are poor, but they also are headed in the right direction and represent a 14% decrease in the glycated hemoglobin levels of these subjects.

Future research needs to identify and assess the effects of the many factors that contribute to the self-concept, self-care practices and metabolic control of diabetic children. Duration of illness, for example, has been shown to be a factor in metabolic control (Kager and Holden, 1992). The focus of this study was youngsters who had been diabetic for relatively short periods of time. Some subjects had been diagnosed the same year they entered the study: their glycated hemoglobin readings may have reflected some residual insulin production, the so-called "honeymoon effect." Future research needs to examine any changes in self-concept, self-care practices and metabolic control among diabetic children over a longer period of time.

Overall, the subjects in this study may not be representative of other samples of children with diabetes. Further improvements in the self-concept, self-care behavior and metabolic control of these subjects may relate to other factors not evaluated by this study. Future investigations need to employ more complex research designs and to include larger numbers of subjects from more diverse socioeconomic levels, with varying levels of initial self-concept, self-care behavior, and metabolic control. This
study suggests that self-care training programs may not be recruiting successfully the children with diabetes who could benefit most from such programs. Outreach efforts and scholarships to underwrite the cost of attendance could extend self-care instruction to children with IDDM who lack the financial and other resources that characterize the subjects in this study.

The self-care training program constituting the intervention in this study is recognized as fully compliant with ADA educational standards for such programs, but it may not represent adequately other programs. For example, a week long day camp is not the same as a two week or month long residential camp program. Also, most of the subjects in the experimental group for this study were attending the self-care training camp program for the first time. Anderson et al. (1989) documented improvements in glycated hemoglobin readings for youngsters only slightly older than this cohort who attended a group training program that met quarterly for 18 months. It may well be that additional benefits accrue to youngsters who attend camp repeatedly. That is to say, perhaps children who return to the program year after year experience additional improvements in their self-concept, self-care behavior and metabolic control. Such repetition may be necessary to the establishment of a sufficient sense of self-efficacy, at least as it pertains specifically to diabetic self-care. More extensive longitudinal studies are needed to explore this possibility.
APPENDIX A: PILOT STUDY

Purpose of the Study

The purpose of this pilot study was to assess the feasibility of a more extensive proposed investigation regarding the effects of self-care training on the self-concept, self-care behavior, and metabolic control of diabetic children.

Method

Subjects were recruited from among families who recently had attended local diabetes support groups and from referrals by certified diabetes educators in the local area. A diagnosis of insulin-dependent diabetes mellitus (IDDM) was the sole requirement for participation in the pilot study. The investigator explained the pilot study and the proposed larger study at the beginning of the interviews with the subjects and their parents. Respondents consented verbally to participation in the pilot study.

The subjects completed an 8-item demographic questionnaire, the Self-Perception Profile for Children (SPPC) (Harter, 1985) and the Self-Care Questionnaire (SCQ) (Saucier, 1993, 1984). The SPPC is a 36-item instrument that measures respondents' perception of their competence or adequacy across six domains. The SCQ is a 20-item instrument that poses questions about the frequency of several daily diabetes self-care behaviors potentially performed by the respondents. The proposal for the full study provides more complete information about these instruments.

Parents answered a 14-item demographic questionnaire which took 5 to 7 minutes to complete. Their responses were used to determine family socioeconomic status according to the five-category index developed by Hollingshead (1975). The parent questionnaire also elicited data regarding household constellation and parental
opinion about the likelihood of others’ willingness to participate in such a study.

The interviews, conducted by the investigator, were scheduled by telephone and were held at locations chosen by the parents. The interviews occurred primarily in subjects’ homes. One interview took place at a parent’s place of employment where the child also attended school. Another interview was conducted in the office of the investigator.

Description of Sample

The subjects were seven prepubertal children, four females and three males. The female subjects ranged in age from 9 years, 4 months to 12 years, 2 months (mean = 10.67 years). The male subjects ranged in age from 10 years, 6 months to 12 years, 10 months (mean = 11.36 years). One subject was African-American: the remaining subjects were white. Subjects were free of any additional medical diagnoses.

Respondents were entering the 4th through the 8th grades in either public or private schools. Three of the seven subjects were enrolled in advanced or accelerated academic programs. One subject had skipped a grade.

The subjects of the pilot study represented a variety of medical approaches to diabetes management. The mean duration of IDDM in these subjects was 2.66 years with a range of less than 1 month to 5 years. All subjects performed some self-care behaviors. In all cases the subjects were the only children in their families with a diagnosis of IDDM.

All but one subject lived in two-parent/step-parent households. There were from one to three children living in the households (mean = 2.14). The subjects held various birth order positions within their families. All the children in these households were siblings, half-siblings or step-siblings.

Socioeconomic status of the subjects, determined from the parent questionnaires.
clustered in the two highest categories delineated by the Hollingshead (1975) index. The sample scores ranged from 45 to 59.5 (mean = 50.71) on a scale of 8 to 66. All the parent questionnaires were completed by mothers, 71% of whom were employed. All of the fathers or step-fathers also were employed. The parents of these subjects ranged from high school graduates to holders of graduate degrees and were employed in business, professional or technical positions.

Results

Sample scores on the Self-Perception Profile for Children were compared with the appropriate norms for grade and gender (Harter, 1985). The sample scores generally fell within one standard deviation of those norms. For all but the oldest subject the only significant difference was a lower score on physical appearance by fifth grade males. The oldest subject registered significantly lower scores on social acceptance and athletic competence, but significantly higher scores on behavioral conduct and general self-worth.

Scores on the Self-Care Questionnaire, representing interval data, can range from 20 to 80. Saucier (1984, 1993), author of the SCQ, reported the mean scores of two samples of slightly older children to be 48.25 (n = 64, ages 10-12) and 57.4 (n = 21, ages 10-14). The mean score of this sample, falling between the two comparison groups, was 55.14, with a range from 50 to 67. This mean score suggests that the youngsters perform daily self-care behaviors somewhere between sometimes and most of the time.

Discussion

Subjects needed from 20 to 45 minutes to complete the three instruments. A few younger subjects found it helpful to consult an adult regarding some of the vocabu-
lary in the demographic and self-care questionnaires, suggesting the need for minor modifications. The subjects often did not recall how much time had elapsed since they first had been diagnosed with IDDM, but they could figure out the data with parental assistance.

The oldest subject in this sample was an academic achiever who had skipped a grade. This youngster, who registered some significantly divergent scores on the SPPC, had been diagnosed with IDDM within the month prior to participating in the pilot study. The impact of divergent scores by a single individual certainly is mediated within a study sample of appropriate size. These results, nonetheless, also suggested the possibility of real differences in self-perception among children with IDDM who have established skills in self-care management and among newly diagnosed youngsters who have not achieved such mastery. The design of the full study addressed more thoroughly the possible existence of such differences.

Subjects and their parents completed the instruments without objection to any of the items. Parents unanimously stated their belief that other families would be willing to participate in a study such as the one proposed. Children also agreed that others would be willing to participate in such a study. The youngsters were about evenly divided in opinion as to whether or not monetary compensation would affect other children's willingness to participate.

Conclusion

Youngsters with IDDM and their parents can and are willing to respond to the instruments intended for use in the proposed full study. Monetary compensation did not appear to be necessary in order to assure sufficient participation. Based upon the results of the pilot study, the proposed investigation seemed to be a feasible undertaking.
APPENDIX B: RECRUITMENT LETTERS

Letter to Parents of Experimental Subjects

(title) (firstname) (lastname)
(number) (street)
(city) (state) (zipcode)

Dear (title) (lastname):

I am writing to ask you and your child, (childname), who will attend Vacation Diabetes Camp, to be in a study to help children with diabetes. The study also will help medical people help children care for themselves better. Eastern Virginia Medical School has approved this study. Dr. Reuben D. Rohn of Children’s Hospital of the King’s Daughters and Dr. Leon-Paul Georges, Director of the Diabetes Institutes, endorse it, which will be very helpful to our efforts. Nancy Clark, R.N., C.D.E., Director of The Diabetes Center, and Chesapeake General Hospital also support it.

If you choose to participate, we will ask you and (childname) to fill out a questionnaire before Vacation Diabetes Camp starts. (childname) also will fill out two other questionnaires. We will ask (childname) to fill out the same questionnaires again in about four months. It will take about 45 minutes to fill out the answer sheets. We also will look at (childname)’s medical records for information about general health and diabetic control.

This study requires two glycated hemoglobin tests, routine tests to check blood sugar control. Any tests done for this study will be free to you but in general we use results from tests your physician orders.

If you choose to be in this study, we will give you two boxes of 25 test strips or two bottles of insulin, one box or bottle each time we meet. I will ask you in advance the brand of strips or the brand and type of insulin you select. If you prefer, you may choose a $20.00 cash equivalent instead at each meeting.

We make sure individual results are kept confidential by using coded answer sheets. Only Diabetes Center staff, the doctors, my doctoral committee members and I see the results. At the end of the study I will tell you the results if you want to know them. If you are willing for (childname) to be in this study, please fill out and mail the attached postcard so I can contact you.

Thank you for considering your child being in this study. Please feel free to contact me if you have any questions. I look forward to meeting you.

Sincerely,

Caryle H. Zorumski, LPC
Doctoral Candidate, The College of William and Mary
Letter to Parents of Control Subjects

(title) (firstname) (lastname)
(number) (street)
(city), (state) (zipcode)

Dear (title) (lastname):

I am writing to ask your child, (childname), to be in a study designed to help children with diabetes. The study also will help medical people help children care for themselves better. Eastern Virginia Medical School has approved this study. Dr. Reuben D. Rohn of Children's Hospital of the King's Daughters and Dr. Leon Paul Georges, Director of the Diabetes Institutes, both in Norfolk, endorse it, which will be very helpful to our efforts. Chesapeake General Hospital and Nancy Clark, R.N., C.D.E., Director of The Diabetes Center at that facility also support it.

This invitation to be in the study assumes (childname) has not attended any special training for diabetes self-care. If you choose to participate we will ask you and (childname) each to fill out a questionnaire during a meeting at your home or your doctor's office. (childname) also will fill out two other questionnaires. We will ask (childname) to fill out the same questionnaires again in about four months. It will take about 45 minutes to fill out the answer sheets. We also will look at (childname)'s medical records for information about general health and diabetic control.

The study requires two glycated hemoglobin tests, routine tests to check blood sugar control. Any tests done for this study will be free to you, but in general we use results from tests your physician orders.

If you choose to be in this study, we will give you two boxes of 25 test strips or two bottles of insulin, one box or bottle each time we meet. I will ask you in advance the brand of strips or the brand and type of insulin you select. If you prefer, you may choose a $20.00 cash equivalent instead at each meeting.

We make sure individual results are kept confidential by using coded answer sheets. Only Diabetes Center staff, the doctors, my doctoral committee members and I see the results. At the end of the study I will tell you results if you want to know them. If you are willing for (childname) to be in this study, please fill out and mail the attached postcard so I can contact you.

Thank you for considering your child being in this study. Please feel free to contact me if you have any questions. I look forward to meeting you.

Sincerely,

Caryle H. Zorumski, LPC
Doctoral Candidate, The College of William and Mary

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APPENDIX C: SUBJECT CONSENT FORM

SUBJECT CONSENT FORM

The Effects of Self-Care Training on the Self-Concept, Self-Care Behavior, and Metabolic Control of Diabetic Children


PARTICIPATION: (In the following description "I" and "my" refer to "my child.") I understand I am being asked to participate in a research project to help the investigators better understand how self-care training can be beneficial to children with diabetes. I understand that participation in the study involves answering an initial information sheet. I also understand that I will complete a set of two questionnaires at the beginning of the study and once again four (4) months later. I understand that each set of questionnaires will require 30 to 45 minutes to complete. I understand that I will complete these questionnaires at the time of my routine visits to my physician or to the hospital. I understand that I am being asked to provide samples of blood for the study and that approximately two teaspoons of my blood will be needed two different times. The procedure involves placing a needle into a vein in my arm and requires only a few minutes of my time. I understand that data from measures of glycated hemoglobin and other medical information routinely gathered as part of the training program and my care will be included in the study.

EXCLUSIONARY CRITERIA: I understand that any diagnosis of an additional chronic medical condition or a current emotional disorder precludes my participation in the study. Examples are epilepsy, severe asthma, depression or attention deficit disorder.

RISKS: I understand that there is a chance of bruising, infection and pain at the site of blood drawing. There may be other risks not yet identified.

BENEFITS: I understand that the potential benefits from the research to me or to others with insulin dependent diabetes mellitus (IDDM) are the improvement of patient self-care management education programs to help children learn better how to manage their diabetes. I understand there are no guaranteed specific benefits to me personally for my participation in this study.

ALTERNATIVE TREATMENTS: I am aware that there are alternative training programs, as well as support groups and special camp programs for children with diabetes, which may be advantageous to me.
COSTS AND PAYMENTS: I understand there are no additional costs to me above and beyond those associated with my standard medical care. I understand that I will receive my choice of one bottle of insulin, one 25-strip box of test strips, or a $20.00 cash equivalent each time I complete a set of questionnaires as compensation for my participation in this study. The Lifestyle Fitness Center of Chesapeake General Hospital is donating some of the test strips offered as payment to volunteers. All other costs of this study are being paid for by the student investigator.

NEW INFORMATION: Any new information obtained during the course of this research that may affect my willingness to continue participation in the study will be provided to me.

CONFIDENTIALITY: I understand all personal information learned about me during this research will be kept strictly confidential and that my records will be protected within the limits of the law. I also understand non-personal information learned from this study could be used in reports, presentations and publications, but I will not be identified personally. It may be necessary for my records to inspected by federal regulatory authorities such as a representative of the Food and Drug Administration (FDA).

WITHDRAWAL PRIVILEGE: I understand that I may withdraw from or refuse to participate in this study at any time. If I do, I will have exactly the same care at this institution as I would normally receive. I also understand it may be necessary for Dr. Rohn to withdraw me from the study. If I do withdraw, or am withdrawn, I agree to undergo all evaluations needed for safety and well-being as determined by Dr. Rohn.

COMPENSATION FOR ILLNESS OR INJURY: I understand if I suffer a physical injury or illness as a direct result of my participation in this research study, immediate medical treatment will be made available to me at an additional charge. Financial compensation for a research related injury or illness, lost wages, disability, or discomfort is not available. However, I understand I do not waive any of my legal rights by signing this consent form. The Medical College of Hampton Roads (MCHR) provides no compensation plan or free medical care plan to compensate me for such injuries. If I believe I have suffered an injury as a result of my participation in any research program I may contact Dr. Gerald Pepe, (804) 446-8423, an employee of MCHR, who will review the matter with me.

VOLUNTARY CONSENT: I certify I have read all of this consent form or it has been read to me and that I understand it. If I have questions pertaining to the research or my rights as a research subject I may contact Dr. Reuben D. Rohn, M.D. whose phone number is (804) 668-7237. A copy of this consent form will be given to me. My signature below means I freely agree to participate in this experimental study.

Page 2 of 5
INVESTIGATOR'S STATEMENT: I certify I have explained to the above individual the nature and purpose of the study, potential benefits, and possible risks associated with participation in this study. I have answered any questions that have been raised and have witnessed the above signature. I have explained the above to the volunteer on the date stated on this consent form.
ASSENT OF THE CHILD

STUDY TITLE: The Effects of Self-Care Training on the Self-Concept, Self-Care Behavior, and Metabolic Control of Diabetic Children

CHILD'S NAME: __________________________________________________________

I. The person doing this experiment has explained to me what will happen if I take part in this activity. I know that no one will get mad at me if I say no. I agree to be in this experiment.

SIGNATURE OF CHILD ___________________________ DATE

SIGNATURE OF WITNESS ___________________________ DATE
WAIVER OF ASSENT OF THE CHILD

I. I have determined that this child does not have the capacity to give assent because of the following:
   [  ] Age  [  ] Maturity  [  ] Psychological state of the child

_____________________________   ________________________
SIGNATURE OF INVESTIGATOR     DATE

II. Despite the fact that this child does not wish to undergo this procedure, it has been determined by both the parents and the physician that it is in the child’s best interest to participate in this study.

_____________________________   ________________________
SIGNATURE OF PHYSICIAN        DATE

_____________________________   ________________________
SIGNATURE OF PARENT(S) OR GUARDIAN   DATE

_____________________________   ________________________
SIGNATURE OF PARENT(S) OR GUARDIAN   DATE
APPENDIX D: SELF-CARE TRAINING STUDY QUESTIONNAIRE - CHILD

SELF-CARE TRAINING STUDY QUESTIONNAIRE - CHILD

Please check only one answer to each of the following questions.

1. How old are you today? ___8___9___10___11___12.

2. What is your date of birth? ___________________________.
   month   day   year

3. I am a ___ boy ___ girl.

4. I am in the ___3rd___4th___5th___6th___7th___8th grade.

5. I have had diabetes since ___________________________.
   month   day   year

6. Today’s date is ___________________________.
   month   day   year

___ C#
APPENDIX E: SELF-CARE TRAINING STUDY QUESTIONNAIRE - PARENT

SELF-CARE TRAINING STUDY QUESTIONNAIRE - PARENT

Please check only one response to each of the following questions. Today’s date ___________________

1. What is your relationship to the child participating in this study?
   _ mother _ father _ step-mother _ step-father _ other (specify) ____________________________

2. What is your marital status? _ married _ separated _ divorced _ widowed _ never married

3. What is your age? _____ What is the age of the child’s other parent or step-parent? _____

4. Which of the following categories best describes your household composition?
   _ two-parent household _ single parent household _ parent - step-parent household
   _ parent - other adult(s) household

5. Which of the following categories best describes your child’s racial or ethnic group?
   _ white/caucasian _ black/african-american _ hispanic/latino _ asian _ biracial
   _ other (please specify: ________________________________________________________________)

6. Are you employed? _ yes _ no. What is your occupation? _______________________________

7. Is the child’s other parent or step-parent employed? _ yes _ no.
   What is his/her occupation? ______________________________

8. Which of the following categories best describes the level of school you have completed?
   _ less than 7th grade _ high school graduate _ some graduate work
   _ junior high school _ some college/trade school _ graduate degree
   _ part of high school _ college graduate

9. Which of the following categories best describes the level of school completed by your present
   spouse (if married) or by the participating child’s other parent (if separated, divorced, widowed
   or never married)?
   _ less than 7th grade _ high school graduate _ some graduate work
   _ junior high school _ some college/trade school _ graduate degree
   _ part of high school _ college graduate

10. How many children/step-children do you have? _____ Do any other children (for example.
    nieces, grandchildren or foster children) live in your household? _____ If so. how many? _____
    What is their relationship to you? _________________________________________________

11. Counting from your oldest child/step-child down, the child participating in this study is # ______
    of children (total) _____ living at home (for example. #2 of 4 children total living at home).

12. Has your child with diabetes ever skipped a grade in school? _____
    If so. how many times? _____
    Repeated a grade? _____ If so. how many times? _____

13. Does your child with diabetes attend any special classes in school? If so. what kind?
    _ advanced/accelerated _ ED/LD
    _ other (explain: ________________________________________________________________)

14. Does anyone else living in your household have IDDM diabetes? _____
    If so. who? ____________________________________________________________________

P#________

98
APPENDIX F: SELF-PERCEPTION PROFILE FOR CHILDREN

Directions for the Self-Perception Profile

DIRECTIONS FOR THE "WHAT I AM LIKE" QUESTIONNAIRE

Here are some sentences and as you can see from the title where it says "What I am like," we are interested in what you are like, what kind of a person you are like. This is a survey, not a test. There are no right or wrong answers. Since kids are very different from one another, you will put down something different from other kids.

Here is how these questions work. There is a sample question at the top, marked (a). Read it to yourself before you begin. This question talks about two kinds of kids, and we want to know which kids are most like you.

Decide first if you are more like the kids on the left side who would rather play outdoors or if you are more like the kids on the right side who would rather watch TV. Don't mark anything yet, but first decide which kind of kid is most like you, and go to that side of the sentence.

The second thing to do, now that you have decided which kind of kids are most like you, is to decide if that is only sort of true for you, or really true for you. If it's only sort of true, then put an X in the box under sort of true. If it's really true for you, then put an X in the box under really true.

For each sentence you only check one box. Sometimes you will check one side of the page and other times you will check the other side of the page, but you can only check one box for each sentence. You don't check both sides, just the one side most like you.

The first sentence is just for practice. Now read the rest of the sentences. For each one, just check one box, the one that goes with what is true for you, what you are most like.
The Self-Perception Profile

What I Am Like

Name __________________________  Age _____  Birthday ________  Group _____
month    day

Boy or Girl (Circle which)

SAMPLE SENTENCE

<table>
<thead>
<tr>
<th>(a)</th>
<th>Really Sort of True True for me for me</th>
<th>BUT Other kids would rather watch T.V.</th>
<th>Sort of Really True True for me for me</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Some kids would rather play outdoors in their spare time</td>
<td>BUT Other kids would rather watch T.V.</td>
<td>Sort of Really True True for me for me</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>1.</th>
<th>Really Sort of True True for me for me</th>
<th>BUT Other kids worry about whether they can do the school work assigned to them.</th>
<th>Sort of Really True True for me for me</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Some kids feel that they are very good at their school work.</td>
<td>BUT Other kids worry about whether they can do the school work assigned to them.</td>
<td>Sort of Really True True for me for me</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2.</th>
<th>Really Sort of True True for me for me</th>
<th>BUT Other kids find it's pretty easy to make friends.</th>
<th>Sort of Really True True for me for me</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Some kids find it hard to make friends.</td>
<td>BUT Other kids find it's pretty easy to make friends.</td>
<td>Sort of Really True True for me for me</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>3.</th>
<th>Really Sort of True True for me for me</th>
<th>BUT Other kids don't feel that they are very good when it comes to sports.</th>
<th>Sort of Really True True for me for me</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Some kids do very well at all kinds of sports.</td>
<td>BUT Other kids don't feel that they are very good when it comes to sports.</td>
<td>Sort of Really True True for me for me</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>4.</th>
<th>Really Sort of True True for me for me</th>
<th>BUT Other kids are not happy with the way they look.</th>
<th>Sort of Really True True for me for me</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Some kids are happy with the way they look.</td>
<td>BUT Other kids are not happy with the way they look.</td>
<td>Sort of Really True True for me for me</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>5.</th>
<th>Really Sort of True True for me for me</th>
<th>BUT Other kids usually like the way they behave.</th>
<th>Sort of Really True True for me for me</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Some kids often do not like the way they behave.</td>
<td>BUT Other kids usually like the way they behave.</td>
<td>Sort of Really True True for me for me</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>6.</th>
<th>Really Sort of True True for me for me</th>
<th>BUT Other kids are pretty pleased with themselves.</th>
<th>Sort of Really True True for me for me</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Some kids are often unhappy with themselves.</td>
<td>BUT Other kids are pretty pleased with themselves.</td>
<td>Sort of Really True True for me for me</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>7.</th>
<th>Really Sort of True True for me for me</th>
<th>BUT Other kids aren't so sure and wonder if they are as smart.</th>
<th>Sort of Really True True for me for me</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Some kids feel like they are just as smart as other kids their age.</td>
<td>BUT Other kids aren't so sure and wonder if they are as smart.</td>
<td>Sort of Really True True for me for me</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>8.</th>
<th>Really Sort of True True for me for me</th>
<th>BUT Other kids don't have very many friends.</th>
<th>Sort of Really True True for me for me</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Some kids have a lot of friends.</td>
<td>BUT Other kids don't have very many friends.</td>
<td>Sort of Really True True for me for me</td>
</tr>
</tbody>
</table>
9. Some kids wish they could be a lot better at sports. **BUT** Other kids feel they are good enough at sports.

10. Some kids are happy with their height and weight. **BUT** Other kids wish their height or weight were different.

11. Some kids usually do the right thing. **BUT** Other kids often don’t do the right thing.

12. Some kids don’t like the way they are leading their life. **BUT** Other kids do like the way they are leading their life.

13. Some kids are pretty slow in finishing their school work. **BUT** Other kids can do their school work quickly.

14. Some kids would like to have a lot more friends. **BUT** Other kids have as many friends as they want.

15. Some kids think they could do well at just about any new sports activity they haven’t tried before. **BUT** Other kids are afraid they might not do well at sports they haven’t ever tried.

16. Some kids wish their body was different. **BUT** Other kids like their body the way it is.

17. Some kids usually act the way they know they are supposed to. **BUT** Other kids often don’t act the way they are supposed to.

18. Some kids are happy with themselves as a person. **BUT** Other kids are often not happy with themselves.

19. Some kids often forget what they learn. **BUT** Other kids can remember things easily.

20. Some kids are always doing things with a lot of kids. **BUT** Other kids usually do things by themselves.
<table>
<thead>
<tr>
<th>Really True for me</th>
<th>Sort of True for me</th>
<th>BUT</th>
<th>Sort of True for me</th>
<th>Really True for me</th>
</tr>
</thead>
<tbody>
<tr>
<td>21.</td>
<td>Some kids feel that they are better than others their age at sports.</td>
<td>BUT</td>
<td>Other kids don’t feel they can play as well.</td>
<td></td>
</tr>
<tr>
<td>22.</td>
<td>Some kids wish their physical appearance (how they look) was different.</td>
<td>BUT</td>
<td>Other kids like their physical appearance the way it is.</td>
<td></td>
</tr>
<tr>
<td>23.</td>
<td>Some kids usually get in trouble because of things they do.</td>
<td>BUT</td>
<td>Other kids usually don’t do things that get them in trouble.</td>
<td></td>
</tr>
<tr>
<td>24.</td>
<td>Some kids like the kind of person they are.</td>
<td>BUT</td>
<td>Other kids often wish they were someone else.</td>
<td></td>
</tr>
<tr>
<td>25.</td>
<td>Some kids do very well at their classwork.</td>
<td>BUT</td>
<td>Other kids don’t do very well at their classwork.</td>
<td></td>
</tr>
<tr>
<td>26.</td>
<td>Some kids wish that more people their age liked them.</td>
<td>BUT</td>
<td>Other kids feel that most people their age do like them.</td>
<td></td>
</tr>
<tr>
<td>27.</td>
<td>In games and sports some kids usually watch instead of play.</td>
<td>BUT</td>
<td>Other kids usually play rather than just watch.</td>
<td></td>
</tr>
<tr>
<td>28.</td>
<td>Some kids wish something about their face or hair looked different.</td>
<td>BUT</td>
<td>Other kids like their face and hair the way they are.</td>
<td></td>
</tr>
<tr>
<td>29.</td>
<td>Some kids do things they know they shouldn’t do.</td>
<td>BUT</td>
<td>Other kids hardly ever do things they know they shouldn’t do.</td>
<td></td>
</tr>
<tr>
<td>30.</td>
<td>Some kids are very happy being the way they are.</td>
<td>BUT</td>
<td>Other kids wish they were different.</td>
<td></td>
</tr>
<tr>
<td>31.</td>
<td>Some kids have trouble figuring out the answers in school.</td>
<td>BUT</td>
<td>Other kids almost always can figure out the answers.</td>
<td></td>
</tr>
<tr>
<td>32.</td>
<td>Some kids are popular with others their age.</td>
<td>BUT</td>
<td>Other kids are not very popular.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Really True for me</td>
<td>Sort of True for me</td>
<td>BUT</td>
<td>Really True for me</td>
</tr>
<tr>
<td>---</td>
<td>------------------</td>
<td>-------------------</td>
<td>-----</td>
<td>------------------</td>
</tr>
<tr>
<td>33.</td>
<td>Some kids <em>don't</em> do well at new outdoor games.</td>
<td></td>
<td>Other kids are <em>good</em> at new games right away.</td>
<td></td>
</tr>
<tr>
<td>34.</td>
<td>Some kids think that they are good looking.</td>
<td></td>
<td>Other kids think that they are not very good looking.</td>
<td></td>
</tr>
<tr>
<td>35.</td>
<td>Some kids behave themselves very well.</td>
<td></td>
<td>Other kids often find it hard to behave themselves.</td>
<td></td>
</tr>
<tr>
<td>36.</td>
<td>Some kids are <em>not</em> very happy with the way they do a lot of things.</td>
<td></td>
<td>Other kids think the way they do things is <em>fine</em>.</td>
<td></td>
</tr>
</tbody>
</table>

Susan Harter, Ph.D., University of Denver, 1985.
Directions for the Self-Care Questionnaire

DIRECTIONS FOR THE SELF-CARE QUESTIONNAIRE

Here are 20 questions about some things you may or may not do to take care of your diabetes. There are no right or wrong answers. Different kids do different things depending on how old they are and what their doctor says to do.

This is how you answer the questions. Read each question and decide if you never, sometimes, most of the time, or always do that self-care behavior. Put a check mark or an "X" above the answer that is right for you. Your answer should tell what you do, not what your parents or other adults do to help you.

For each question you mark just one answer. The right answer is what you really do, not what you think you should do.
The Self-Care Questionnaire

**SELF-CARE QUESTIONNAIRE**

1. Do you get your syringe (needle) and insulin when it is time for your shot without being reminded?

<table>
<thead>
<tr>
<th>never</th>
<th>sometimes</th>
<th>most of the time</th>
<th>always</th>
</tr>
</thead>
</table>

2. Do you draw up and measure your own insulin?

<table>
<thead>
<tr>
<th>never</th>
<th>sometimes</th>
<th>most of the time</th>
<th>always</th>
</tr>
</thead>
</table>

3. Do you give your own insulin shot?

<table>
<thead>
<tr>
<th>never</th>
<th>sometimes</th>
<th>most of the time</th>
<th>always</th>
</tr>
</thead>
</table>

4. Do you rotate injection sites around your body (arms, legs, stomach, buttocks)?

<table>
<thead>
<tr>
<th>never</th>
<th>sometimes</th>
<th>most of the time</th>
<th>always</th>
</tr>
</thead>
</table>

5. Do you test your blood sugar at least two times a day?

<table>
<thead>
<tr>
<th>never</th>
<th>sometimes</th>
<th>most of the time</th>
<th>always</th>
</tr>
</thead>
</table>

6. Do you test your blood sugar without your parents reminding you to?

<table>
<thead>
<tr>
<th>never</th>
<th>sometimes</th>
<th>most of the time</th>
<th>always</th>
</tr>
</thead>
</table>

7. Do you write down the results of your blood sugar?

<table>
<thead>
<tr>
<th>never</th>
<th>sometimes</th>
<th>most of the time</th>
<th>always</th>
</tr>
</thead>
</table>
8. If your blood sugar is higher than 240 (or whatever number your doctor says) or if you are sick, do you test your urine for ketones?

never         sometimes         most of the always time

9. Do you call your doctor or tell your parents when you have acetone (ketones) in your urine?

never         sometimes         most of the always time

10. Do you test to see if your blood sugar is high when you are really thirsty or going to the bathroom a lot (urinating)?

never         sometimes         most of the always time

11. Do you make a change in your insulin, food, or exercise (or contact your doctor) based on the results of your blood sugar?

never         sometimes         most of the always time

12. Do you eat something with sugar when you feel weak, shaky, and dizzy or have a bad headache?

never         sometimes         most of the always time

13. Do you carry some form of sugar with you in case you have an insulin reaction?

never         sometimes         most of the always time

14. Do you get exercise (dancing, playing or running around, bicycle riding) or play some sport that takes a lot of energy at least 3 times a week?

never         sometimes         most of the always time
15. Do you change your diet when you exercise, like eating a snack or taking along some fast-acting sugar?

<table>
<thead>
<tr>
<th>never</th>
<th>sometimes</th>
<th>most of the time</th>
<th>always</th>
</tr>
</thead>
</table>

16. Do you help your parents plan your meals according to your diet?

<table>
<thead>
<tr>
<th>never</th>
<th>sometimes</th>
<th>most of the time</th>
<th>always</th>
</tr>
</thead>
</table>

17. Do you know what foods you can eat when you are not at home?

<table>
<thead>
<tr>
<th>never</th>
<th>sometimes</th>
<th>most of the time</th>
<th>always</th>
</tr>
</thead>
</table>

18. Do you check your feet every day for cuts, sores, or dryness?

<table>
<thead>
<tr>
<th>never</th>
<th>sometimes</th>
<th>most of the time</th>
<th>always</th>
</tr>
</thead>
</table>

19. Do you wear or carry some type of identification (I.D.) saying that you have diabetes?

<table>
<thead>
<tr>
<th>never</th>
<th>sometimes</th>
<th>most of the time</th>
<th>always</th>
</tr>
</thead>
</table>

20. Do you keep up to date about diabetes by reading about it or having someone read to you?

<table>
<thead>
<tr>
<th>never</th>
<th>sometimes</th>
<th>most of the time</th>
<th>always</th>
</tr>
</thead>
</table>
BIBLIOGRAPHY


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Vita

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THE EFFECTS OF SELF-CARE TRAINING ON THE SELF-CONCEPT, SELF-CARE BEHAVIOR, AND METABOLIC CONTROL OF DIABETIC CHILDREN


The purpose of this study was to investigate the effects of self-care training on the self-concept, self-care behavior, and metabolic control of diabetic children. The author hoped to obtain information to help improve training programs for children with diabetes.

Forty-nine diabetic children, ages eight to 13, participated in the study as they received basic self-care training from their physicians. Twenty-seven of the children also attended a week long summer day camp where they received additional instruction in diabetes self-care.

The subjects completed the Self-Perception Profile for Children and the Self-Care Questionnaire two times at a four month interval to measure their self-concept and the self-care behaviors. Two routine blood sample tests were used to measure their glycerated hemoglobin for metabolic control levels.

It was hypothesized that after training, and compared with the control group, the children who attended the camp would 1) have better self-concepts, 2) perform more self-care behaviors, and 3) show improved metabolic control. The author also hypothesized that children who began the study with better self-concepts would improve more. The data analyses failed, however, to support those hypotheses.

All the children initially registered positive self-concepts, performed many self-care behaviors, and showed fair to good metabolic control. The experimental group demonstrated no significant improvements when evaluated after training. It was concluded, therefore, that the additional self-care training did not affect the self-concept, self-care behavior, or metabolic control of the children, regardless of their initial self-concept level. Total number of children and family size, however, were predictors of metabolic control for all subjects.

Further research is needed with children from more diverse backgrounds who have varying levels of self-concept, self-care performance, and metabolic control. Research to identify the factors that do affect diabetic children's self-concept, self-care performance, and metabolic control also is necessary, as is investigation of different types of training programs.