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**Development and validation of an instrument to measure
self-efficacy in weight loss**

Spahn, Joanne Masterson, M.S.

The University of Arizona, 1991

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DEVELOPMENT AND VALIDATION OF AN INSTRUMENT
TO MEASURE SELF-EFFICACY IN WEIGHT LOSS

By

Joanne Masterson Spahn

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A Thesis Submitted to the Faculty of the
DEPARTMENT OF NUTRITION AND FOOD SCIENCE
In Partial Fulfillment of the Requirements
for the Degree of
MASTER OF SCIENCE
In the Graduate College
THE UNIVERSITY OF ARIZONA

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STATEMENT BY AUTHOR

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APPROVAL BY THESIS DIRECTOR

This thesis has been approved on the date shown below:

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Date

DEDICATION

To my husband,

John Edward Spahn

ACKNOWLEDGMENTS

A number of people were instrumental in the completion of this research endeavor. Dr. Edward Sheehan has provided superb guidance throughout my graduate program. Dr. Lon Larson introduced me to the concept of theory based research and was a constant source of encouragement throughout the research process. Dr. Wanda Howell provided invaluable input which greatly enriched the quality of this project.

Special thanks go to my husband, John. Without his love and support, this project would not have been possible. His genuine interest and expertise on the computer made this research experience exciting. My children, Cindy and Christine, also deserve special recognition for being a constant source of joy.

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ABSTRACT

The objective of this study was to design a weight loss self-efficacy questionnaire which was multidimensional, with each dimension representing a specific type of relapse situation. The instrument developed contained 41 specific situations or emotional states which were considered to be high-risk for precipitating diet relapse. Two hundred thirty-six usable questionnaires were completed by individuals who attended a weight reduction class at one of eleven Air Force bases in the continental United States.

Exploratory principal component factor analysis using the varimax rotation method was employed to test for the presence of distinct dimensions of self-efficacy. Three distinct dimensions emerged, Negative Emotional, Urges and Temptations, and Party Situations, which accounted for approximately 56 percent of variance. Reliability coefficients ranged from 0.96 to 0.84. An instrument of this type has the potential for improving the effectiveness of weight reduction therapies by facilitating the targeting of intervention to the situations identified as being high-risk for a specific person.

The relationship between aggregate self-efficacy scores, demographic and history of dieting variables was assessed. Self-efficacy varied according to race, number of past diets and success of past dieting attempts.

CHAPTER I

INTRODUCTION

Overweight is a major public health problem in the United States. The second National Health and Nutrition Examination Survey (NHANES II) 1976-1980, measured heights, weights, triceps, and subscapular skinfold thickness in a sample of the US population and found that 26 percent of U.S. adults, or approximately 34 million people ages 20 to 70 years, are overweight. In terms of body mass index (weight in Kg/height in meters squared), men were termed overweight when their body weight index exceeded 27.8 and women were classified as overweight when their body weight index equaled or exceeded 27.3 (National Center for Health Statistics, 1981).

Van Itallie (1985) used data from NHANES II to provide information concerning the prevalence of hypertension (defined as systolic pressure $\geq$ 160 mm Hg. and/or diastolic pressure $\geq$ 95 mm Hg), hypercholesterolemia (defined as cholesterol $\geq$ 250 mg/dl) and diabetes (diagnosed using a two-hour oral glucose tolerance test) in overweight verses non-overweight Americans. He calculated that overweight Americans ages 20 to 45 years were 5.6 times more likely to have hypertension, 2.1 times more likely to have hypercholesterolemia and 3.8 times more likely to have diabetes than non-overweight Americans in the same age group. He

found the relative risk of these conditions in overweight individuals 20 to 45 years of age was substantially higher than in the overweight individuals aged 45 to 75 years. This finding is consistent with mortality data which suggests that being overweight early in one's adult life represents a greater health risk than a similar degree of overweight later in life.

Comparisons of various weight loss techniques including diet, exercise, drugs, and behavior modification have found that they all produce similar amounts of initial weight loss, aver-aging slightly over 12 pounds. Only one patient in five who completes a program can expect to lose 20 pounds or more (Wing and Jeffery, 1979). Available data suggest that behavior therapy produces the best maintenance of weight loss (Wing and Jeffery, 1979; Wilson and Brownell, 1980).

The majority of patients do not continue to lose weight after the end of treatment, and there is marked inter-individual variability in outcome (Wilson and Brownell, 1980). Research aimed at identifying outcome predictors has been unsuccessful. It is clear, however, that there is a need for development of specific maintenance strategies designed to prevent relapse and facilitate continued weight loss (Wilson and Brownell, 1980).

Wilson (1980) has suggested investigating the use of maintenance techniques and strategies which have proven

useful in the treatment of other forms of substance abuse. One construct, derived from Social Cognitive Theory (Bandura, 1977a), which has been shown to be relevant to numerous health related behaviors, is self-efficacy. Researchers have found self-efficacy to be predictive of health behavior specifically in smoking cessation (Condiotte and Lichtenstein, 1981; DiClemente, 1981; Velicer, DiClemente, Rossi and Prochaska, 1990), pain management (Manning and Wright, 1983; Kores, Murphy, Rosenthal, Elias and North, 1990), alcoholism (Miller, Ross, Emmerson and Todt, 1989), bulimia (Schneiber, O'Leary and Agras, 1987), obesity (Chambliss and Murray, 1979; Weinberg, Hughes, Critelli, England and Hackson, 1984; Jeffery, Bjornson-Benson, Rosenthal, Linquist, Kurth and Johnson, 1984), and cardiac rehabilitation (Ewart, Taylor, Reese, and Debusk, 1984).

Self-efficacy may be defined as an individual's perception of his/her capability to accomplish a specific task or certain level of performance (Bandura, 1982). According to this theory, given the proper skills and incentive, individuals who have a strong belief in their own ability to accomplish a task will be more highly motivated, will invest more effort in a task, and will be more resistant to relapse.

Self-efficacy has also been integrated into Marlatt and Gordon's (1985) cognitive-behavioral model of the relapse

process. According to this theoretical model, when an individual encounters a high-risk situation, self-efficacy functions as one of the immediate determinants of a lapse or relapse. If the individual has an effective cognitive or behavioral coping strategy when encountering a high-risk situation, this will increase self-efficacy and decrease the probability of relapse. If the individual does not have an effective coping response, this leads to decreased self-efficacy, thoughts about the positive attributes of the behavior being avoided, and an initial lapse in control. This initial lapse leads to feelings of guilt and failure and increases the probability of relapse.

Purpose of the Study

Knowledge acquisition is not the key to weight loss success. Many dieters know what to do, but just cannot follow through to achieve their goals. Social Cognitive Theory attempts to explore factors which mediate between knowledge acquisition and action. The theory proposes that self-referent thought focusing on self-efficacy affects an individual's motivation, behavior, and emotional reactions (Bandura, 1982). Individuals with high self-efficacy have greater motivation to accomplish a task and cope better in adverse circumstances than individuals with low self-efficacy.

According to Bandura, self-efficacy is task specific.

For instance, individuals with auto mechanics training, but no training in airplane mechanics, would feel more efficacious or more confident in their ability to fix a Volkswagon Rabbit than a Cessna Citation aircraft.

According to Social Cognitive Theory, numerous methods can be used to enhance an individual's self-efficacy and thus improve performance. In the area of weight reduction, researchers have found self-efficacy to be predictive and positively correlated to weight loss. Many of these researchers and other health behavior researchers have measured self-efficacy as a unidimensional construct (Chambliss and Murray, 1979; Weinberg et al., 1984; Jeffery et al., 1984; Manning and Wright, 1983; Schneiber et al., 1987). Frequently, subjects are asked to rate their confidence in their ability to behave in a certain manner in specific situations or emotional states considered to be adverse for adapting or maintaining specific health behaviors. The self-efficacy scores for all these situations are then averaged to determine an aggregate self-efficacy score. This score is correlated with the behavior of interest to determine if it has any predictive power.

The aim of this study is to determine if weight reduction self-efficacy can be measured as a multidimensional construct with each dimension representing a category of high-relapse risk situation. If self-efficacy is found to be a good predictor of an individual's ability

to cope in specific high-risk situations for relapse, it would facilitate more precise targeting of intervention. Self-efficacy measures made prior to or during a course of treatment could facilitate the design and implementation of more effective weight reduction programs.

Research Objective

The primary research objective of this study is to develop and validate a questionnaire to measure self-efficacy in weight loss which is multidimensional, with each dimension representing a specific type of relapse situation. The intended purpose of this questionnaire is to enable health professionals working in the area of weight reduction to obtain a multidimensional measure of a patient's self-efficacy in order to identify potential high-relapse risk situations. An instrument of this type has the potential for improving the long-term effectiveness of weight reduction programs by facilitating the targeting of intervention to the specific needs of a client.

Statement of Hypothesis

H1: Measures of weight loss self-efficacy are multidimensional with each dimension representing a specific type of high-risk situation. Self-efficacy scores on items associated with the same high-risk situation will be positively correlated.

Secondary Research Questions

1. Is there a significant difference in aggregate self-efficacy scores between individuals who reported themselves to be very successful verses not successful at all in past dieting attempts? If Bandura's theory holds true, individuals who feel they have been successful in the past should have higher self-efficacy scores.
2. Are aggregate self-efficacy scores related to the number of dieting attempts an individual has made? An individual who has been on multiple diets has most likely experienced some degree of failure at controlling inappropriate eating. This failure according to Bandura's theory should decrease weight control self-efficacy.
3. Is there a significant difference between normal weight and severely overweight individuals with regard to self-efficacy score?
4. Is there a significant difference between males and females with regard to self-efficacy scores?
5. Is there a significant difference in self-efficacy scores dependent upon marital status?
6. Is there a significant difference in self-efficacy scores dependent upon Air Force duty status?
7. Is there a significant difference in self-efficacy

scores dependent upon ethnic background?

8. Is there a significant difference in self-efficacy scores dependent on income.
9. Is there a significant difference in self-efficacy scores dependent upon education level completed.

Definitions

Body mass index: Weight in kilograms divided by height in meters squared.

High-risk situation: A situation which threatens an individual's dietary control.

Overweight: Defined using NHANES II criteria. Having a body mass index at the 85th to the 95th percentile of men and women ages 20 to 29 years.

Severely overweight: Defined using NHANES II criterion. Having a body mass index at or greater than the 95th percentile of men and women ages 20 to 29 years.

Self-efficacy: An individual's own belief in his/her capacity to accomplish a task or certain level of performance (Bandura, 1982).

CHAPTER 2

REVIEW OF THE LITERATURE

Mediation of Behavior Change

A comprehensive review of the literature on nutrition education strategies revealed that most emphasize dissemination of information (Whitehead, 1973). More recently, however, it has been clearly recognized that nutrition education must go beyond the short-term mastery of nutrition facts and must effectively change dietary attitudes and behaviors. Coates (1981) recommended that nutrition education research focus on variables which may mediate the relationship between increased nutrition knowledge, positive attitudes toward nutrition, and the actual consumption of nutritious foods.

Social Cognitive Theory, previously known as social learning theory (Bandura, 1977), provides this focus on factors which mediate between knowledge and behavior. It builds on behaviorism, which has been shown to be the theoretical basis of one of the most effective weight loss therapies designed for overweight individuals (Brownell, 1984; Stundard and Penick, 1979; Wing and Jeffery, 1979). While the behaviorist tradition explains behavior purely in

terms of environmental influences, Social Cognitive Theory incorporates a personal or cognitive component which, if manipulated as part of a weight reduction program, may lead to increased long-term program effectiveness.

Coates (1981) summarized propositions upon which most behavior modification programs are based. These include:

1) Concern about antecedent behavior, because weight loss is the final result of a chain of events. Antecedent behavior may include such things as rate of eating, habitual food choices, and number of meals consumed per day.

2. Concern about the consequences of behavior and positive reinforcement led to the inclusion of monetary and social incentives in behavior modification programs.

Social Cognitive Theory expands upon the behaviorist tradition. It does this by recognizing the possible influence personal consideration of one's own capacity to carry out a specific behavior may have on motivation and ability to cope with high-risk situations.

Social Cognitive Theory

The social Cognitive Theory developed by Bandura (1977) recognizes the interaction between behavior, the person, and

the environment. The illustration below summarizes this interaction (Bandura, 1977).

An individual's skills and perception of the environment affect behavior. An individual's behavior can be influenced by his environment. For example, a friend offers a person a candy bar which prompts him to eat candy. An individual's behavior can also influence the environment. If the person rejects his friend's offer and requests that he no longer offer him snack foods and the friend respects the request, then the individual positively influenced his environment.

According to Social Cognitive Theory, an individual's interpretation of his environment is heavily influenced by the person's perceived competencies (self-efficacy), outcome expectations, values, beliefs, and physical state. These variables act as determinants of behavior. It is in this way that the person influences both the environment and behavior.

Self-Efficacy

Self-efficacy is a Social Cognitive Theory construct which can be defined as an individual's perception of his/her ability to execute a course of action required to

deal with a prospective situation. This course of action will usually involve the skillful integration of cognitive, social, and behavioral skills. Competent performance requires the ability to continually improvise and meld a multitude of subskills to compensate for ever-changing situations (Bandura, 1982).

Self-efficacy measurement is accomplished by assessing the variable use of subskills under different situational demands. For example, high-risk situations for an individual attempting to lose weight may include negative emotional states such as anger or frustration, interpersonal conflicts such as a disagreement with one's boss, or social situations such as an office party or holiday dinner (Rosenstock, 1985). A person may be able to forgo sweets in situations involving conflict but not be able to resist them in social situations. Social situations then represent high-risk situations for the individual.

A high-risk situation is defined as a situation which threatens an individual's dietary control. Identification of situations which are high-risk for a client during weight reduction therapy would be beneficial because it would allow the therapist to direct intervention to the specific needs of the client. In this case, coping skills and self-efficacy enhancement in social situations would need to be developed.

According to Social Cognitive Theory, efficacy

expectations are a major determinant of what activities an individual will perform, how much effort they will expend, and how long they will expend effort in difficult situations. The stronger the self-efficacy, the more likely an individual is to get involved and persist in the face of obstacles.

The following example is a illustration of self-efficacy as a task-specific construct which can facilitate or act as a barrier to positive behavior change. If an overweight individual receives instructions on how to prepare low fat meals, his perception of his cooking capabilities may influence his decision to attempt this type of meal preparation. If the person perceives himself as a good cook (has high self-efficacy) he may look at this as an opportunity to try something new and exert significant effort in that direction. If the individual considers himself a poor cook (has low self-efficacy), he may not even attempt to prepare this "special" type meal.

Outcome Expectancy

Outcome expectancy is another Social Cognitive Theory construct which is believed to influence behavior. Outcome expectancy may be defined as an individual's judgment of the likely consequence a behavior will produce (Bandura, 1986).

It is difficult to disassociate outcome expectancy from self-efficacy because the outcomes people expect depend to a

large extent on their judgment of how well they will perform. Since outcomes are contingent on performance, people rely more on self-efficacy to decide what course of action to take. For this reason, expected outcomes do not add much predictive power beyond that which is achieved using self-efficacy judgments. This observation has been confirmed by numerous controlled studies dealing with a variety of activities, including pain tolerance during childbirth (Manning and Wright, 1983) and smoking cessation (Goddard and Glasgow, 1985).

Measurement of Self-Efficacy

The measurement of self-efficacy typically entails providing an individual with a list of subskills required to meet a variety of situational demands and ordered according to increasing level of difficulty, complexity, or stressfulness. Tasks are specific to the behavior being examined. Adjacent to this list is a scale upon which individuals are asked to identify those tasks they believe they can or cannot do and indicate the degree of certainty that they can accomplish the task.

This method of efficacy measurement allows for the assessment of the three dimensions of self-efficacy specified by Bandura (1977a, 1977b, 1982). These dimensions are strength, magnitude, and generality. Each has different performance implications. Modification of the measurement

technique can be made based on the domains of functioning relevant to the researcher. The assessment technique is referred to as microanalytic methodology.

Strength refers to the degree of certainty people possess about their ability to perform a specific task. They rate the strength of their belief on a probability scale. According to Bandura and Adams (1977), strength of self-efficacy is computed by summing the expectancy scores across tasks and dividing the sum by the total number of performance tasks.

Strength of self-efficacy may have different effects during the skill acquisition and skill execution stages (Bandura, 1986). Individuals with high efficacy strength may not feel that they need to expend much effort in learning the skills necessary for task accomplishment. On the other hand, strong self-efficacy in execution of skills intensifies and sustains effort during difficult situations where self-doubt would have had the opposite effect. In the learning situation, however, self-doubt may increase attention to learning.

Magnitude refers to the level of task complexity or difficulty an individual feels capable of handling. It refers to the number of tasks a subject designates that he/she will be able to perform (Bandura and Adams, 1977). Results of efficacy assessment may indicate that an individual can handle only relatively simple tasks, or that

an individual feels capable of dealing with simple and moderately difficult tasks, but doubts his/her capacity to handle more complex situations. For example, a person on a low-fat diet can select low-fat dairy products which are labeled, but has difficulty selecting unlabeled (with regard to fat content) cuts of meat which are low in fat content. This individual may require skill training in addition to enhancement of self-efficacy.

Generality concerns the extent to which a task efficacy expectation relating to a particular situation is applicable to another situation. The following is an example of situational generalization. A person feels confident in his/her ability to avoid fried foods at home, but this confidence may or may not extend to his/her ability to avoid fried foods while traveling. Another example is the individual who has been able to stop smoking and as a result feels more confident in his/her ability to stop eating inappropriate foods.

According to Bandura (1986), the relationship between performance and self-efficacy can be quantified in a number of ways. First, correlations can be computed between aggregate scores of self-efficacy and performance attainments. Second, the congruence between self-efficacy score and performance of each individual task may be assessed by recording whether or not subjects feel capable of performing each task and computing the percent of

accurate correspondence between self-efficacy judgment and actual performance on a specific task. These techniques are examples of microanalytic methodology. Third, the probability of successful performance could be calculated as a function of perceived self-efficacy.

Sources of Self-Efficacy Information

According to Social Cognitive Theory, there are four sources of self-efficacy information. The first and most powerful is performance attainment. Success in performance heightens one's self-efficacy and repeated failures lower it. An individual who has successfully lost weight in the past will be more confident in his/her abilities to lose weight than someone who has tried to lose weight multiple times and failed each time.

The second source of efficacy information is vicarious experience. Observing one's peers performing and succeeding at a task can lead one to believe that he/she also possesses the capabilities needed to perform the task. Seeing peers invest a significant amount of effort into a task and fail can lower self-efficacy expectations.

The third source of efficacy information and the weakest in terms of creating enduring increases in self-efficacy is verbal persuasion. This method is frequently utilized in health counseling (Bandura, 1986). The diet therapist may try to verbally persuade patients that they

possess the capabilities needed to lose weight. If this verbiage is based in reality, it can have a positive effect on an individual's perception of his/her capabilities and act as a motivating factor. Raising unrealistic beliefs, however, invites failure and discredits the diet therapist.

The fourth source of efficacy information is a person's physiological state. Excessive anxiety or fear tends to impair performance and decrease self-efficacy. Hunger and fatigue may negatively effect an individual's weight reduction efforts.

One appealing quality of Social Cognitive Theory is that it offers strategies to increase coping skills. These strategies are based on the above sources of efficacy information. They include setting proximal subgoals, the achievement of which enhances self-efficacy. This has been demonstrated by research involving school children learning mathematics (Bandura and Schunk, 1981). Vicarious experience or observational learning entails observing the performance of peers. Modeling with guided performance is another method. This may suggest coping strategies to the individual and persuade him/her to feel that "if he/she can do it, so can I." Learning stress reduction techniques such as relaxation and the use of positive imagery are emotive modes of treatment which may also enhance self-efficacy. It has been recognized by nutrition researchers (Olson and Kelly, 1989; Kayman, 1989) that Social Cognitive Theory

offers numerous educational strategies which, if properly utilized, may increase the effectiveness of behavior change programs.

Self-Efficacy in Weight Loss

Several researchers have investigated the relationship between self-efficacy and weight loss. The first of these, Chambliss and Murray (1979) examined self-efficacy in relation to an individual's locus of control which was determined using Rotter's (1966) Locus of Control Scale.

Sixty-eight women participated in this study wherein self-efficacy was manipulated using a placebo medication. After two weeks of treatment a subgroup of subjects were told that the medication they had been taking was a placebo. Progress was attributed to the individual's own efforts, thus increasing the subjects self-efficacy. Another subgroup was given a lecture on drugs controlling metabolism as a major factor in weight loss. In this group, weight loss was attributed to the use of a drug. A third group, the control group, received no intervention. Analyses indicated that the internal/self-efficacy manipulated group was significantly more successful than the other groups.

The researchers concluded that a weight reduction program designed to increase self-efficacy had a significant positive effect on "internally" oriented subjects. Intuitively, this sounds rational since internally oriented

persons feel they have more control over their environment.

Jeffery et al. (1984) analyzed demographic, social, psychological, and behavioral variables as predictors of weight loss and maintenance. As a part of this research, feeling and situational self-efficacy were measured. The study was conducted over a two-year period in a group of 89 middle-aged men. Questionnaires which measured feeling and situational self-efficacy were administered at pretreatment, at the completion of a 15-week intervention program, and at one-year follow-up. Fifteen questions described emotional states such as happy, sad, angry, and fifteen questions described situations such as watching TV and visiting friends. Subjects indicated on a five-point scale how confident they felt in their ability to refrain from eating in each situation or mood.

These researchers found that aggregate scores of pretreatment feeling and situational self-efficacy were predictive and positively associated with initial and long-term weight loss. Pretreatment scores gave more consistent predictions than assessments made immediately after treatment and at one-year follow-up. Individuals with high self-efficacy lost more weight than those with low reported self-efficacy.

Weinberg et al. (1984) examined the effects of preexisting self-efficacy and manipulated self-efficacy on weight loss in 28 female and four male volunteers.

These researchers did not use the multifaceted assessment procedure typically used when measuring self-efficacy. Level of self-efficacy was assessed by asking subjects how many pounds they wanted to lose over the next two months. Individuals were then asked to rate on a scale of 0 to 100 how confident they were in their ability to lose this amount of weight in the next two months. Subjects were classified as either high or low in preexisting self-efficacy using a median split technique. Individuals at least 60 percent sure they could lose the desired weight were classified as having high self-efficacy. Those less than 50 percent sure they could lose the weight were classified as having low self-efficacy. Subjects were randomly divided into two groups. One group received self-efficacy manipulation via verbal persuasion and the other group received no self-efficacy manipulation.

It was found that individuals with high pretreatment self-efficacy lost more weight than those with low pretreatment self-efficacy (mean weight loss of 8 pounds verses three pounds). The results also indicated that subjects in the manipulated self-efficacy group lost more weight over time than those who did not experience self-efficacy manipulation (mean weight loss of seven pounds verses two pounds). This research suggested that manipulation of self-efficacy in individuals with low or high preexisting self-efficacy would be equally effective.

One potential difficulty facing the researcher who wishes to develop an instrument measuring self-efficacy is that individuals' responses reflect their hopes rather than their true perceptions of efficacy. Weinberger and Agras (from O'Leary, 1985) had encountered this problem when they attempted to validate a "Weight Reduction Efficacy Questionnaire" designed to assess self-efficacy to reduce the caloric content of foods eaten, increase physical activity, and to use stimulus control techniques to reduce food intake. In order to reduce this phenomenon, Bandura (1982a), has recommended that self-efficacy measurements be conducted under situations that reduce social evaluative factors.

Self-efficacy and Other Health Behaviors

Self-efficacy theory has been applied to a number of diverse health related areas including cardiac rehabilitation, pain management, and smoking-cessation relapse. Ewart et al (1984), conducted a study that measured self-efficacy pertaining to a number of physical activities and postinfarction activity. They found that those patients with high self-efficacy scores exerted greater physical effort which led to higher attainments and, in turn, further enhanced self-efficacy.

Taylor, et al. (1985), examined the effect of social environment on self-efficacy of patients who experienced

uncomplicated myocardial infarctions. In this study they manipulated wives' beliefs in their husbands' efficacy. One group of wives observed their husbands' treadmill tests, another group observed their husbands' tests and then took a treadmill tests themselves, and the third group neither took nor observed the treadmill test. It was found that the wives' assessments of their husbands' efficacy increased with an increased level of involvement. Correlations between self-efficacy scores and cardiovascular capacity at three and six month follow-ups were best predicted by a combination of husbands' and wives' judgements of the husbands' cardiac capabilities.

Reese (from O'Leary, 1985), studied the effect of self-efficacy to manage cold-pressor pain and found that the strength of self-efficacy to tolerate pain was significantly correlated to pain threshold ($r = 0.60$) and pain tolerance ($r = 0.81$). Kores et al. (1990) found that higher self-efficacy scores after a behaviorally-oriented pain rehabilitation program were significantly related to increased pain tolerance.

Manning and Wright (1983) examined the effects of both perceived self-efficacy and outcome expectancy in the successful use of natural childbirth techniques. They found women with higher self-efficacy scores were less likely to request pain medication ($r = -0.47$) and tolerated pain longer before requesting medication ($r = .42$). In this

study self-efficacy proved to be a better predictor of pain tolerance than outcome expectancy. Outcome expectancy was defined as the importance of having a medication free delivery.

A number of researchers have examined the relationship between self-efficacy scores and relapse in smoking cessation programs and found that aggregate scores of self-efficacy were predictive of relapse (DiClemente, 1981; McIntyre, Lichtenstein and Mermelstein, 1983) and situational self-efficacy scores were predictive of the situation of relapse (Condiotte and Lichtenstein, 1981).

High-Risk Situations

Several researchers have studied relapse in weight reduction and have identified certain categories of high-risk situations. Cumming, Gordon and Marlatt (1980) conducted a study involving 311 subjects with addictive disorders to determine high-risk situations for relapse. Alcoholics, smokers, heroin addicts, gamblers, and overeaters were included in the study. The largest number of subjects were heroin addicts ($n = 129$) and a relatively small number were overeaters ($n = 29$), but the situations they identified as being high-risk were relatively consistent between addictive disorders. Among overeaters, these researchers determined that negative emotional states including such things as depression, frustration, and anger

accounted for 33 percent of all relapses. Twenty-eight percent of relapses were associated with positive interpersonal emotional states. Fourteen percent of relapses involved interpersonal conflict; 10 percent of relapses involved situations where an individual responded to social pressure; and 10 percent were associated with urges and temptations.

Rosenthal and Marx (1981) investigated determinants of relapse among 48 successful dieters and results were consistent with those obtained by Cummings et al. (1980). They found that 32 percent of relapses were associated with negative intrapersonal emotional states; another 32 percent were associated with positive interpersonal emotional states; 11 percent were associated with positive intrapersonal states; 10 percent were associated with interpersonal conflict; another 10 percent with social pressures; and 5 percent were associated with negative physical states.

Stunkard (1980) believes social factors should be considered as one of the most important influences on the prevalence of obesity. Leon and Chamberlin (1973) reported unsuccessful dieters were more prone to eat in response to positive and negative emotions than successful dieters. This was true especially among overweight females. Schlundt and Zimering (1988) found that overeating, involving extra servings or too many types of food at regular meals was a

problem among overweight individuals. These researchers also found that emotionally induced eating was a problem for overweight females. Wilson (1985) found that support from family and friends was a variable associated with long-term success in weight loss.

Instrument Validation

The purpose of assessing validity is to determine if the instrument developed actually measures what it is intended to measure. There are a variety of approaches which may be used to assess validity. These include assessment of construct, content, concurrent and predictive validity (Henerson, Morris and Fitz-Gibbon, 1978).

Construct validity establishes that an instrument This requires that the construct be clearly defined. An appeal to logic may be used to support validity if the construct being measured is easily defined and the instrument has been administered in an unbiased manner. Unbiased administration means that enough time is provided for respondents to complete the instrument and there is no pressure on subjects to respond in a particular manner.

A panel of qualified judges may be used to assess content validity. Judges, blind to research objectives, should be able to review the instrument being validated and identify the construct it is intended to measure. Another method of establishing construct validity is to correlate

results from the instrument being tested with results obtained using another instrument designed to measure the same or a related construct. If the two measurement are taken at approximately the same time, concurrent validity may be established.

The criterion-group method of validation is characterized by prediction to an outside criterion. In the case of measuring weight control self-efficacy, the instrument would be administered to a group of persons deemed to possess an abundance or deficiency of weight control self-efficacy. Demonstration that individual's judged to possess a high level of self-efficacy score high on the instrument and individuals judged to possess a low level of self-efficacy score low on the instrument helps to establish construct validity.

Principal component factor analysis is a powerful measure of construct validity (Kerlinger, 1986). This statistical technique reduces a large number of variables into a smaller number of factors by identifying which items are correlated or related in terms of what they measure. Principal component factor analysis empirically defines the underlying dimensions of a construct. For example, apriori it may be assumed that social situations and negative emotional states are categories of situations which effect an individual's weight control self-efficacy. Ten questionnaire items may be written to represent each of the

these two situations. Performance of principal component factor analysis would verify if these dimensions truly exist.

Content validity refers to whether the instrument adequately represents the universe of content represented by the construct being measured. For example, if measuring weight loss self-efficacy, content validity would be an assessment of whether the instrument adequately assessed all situations related to weight loss self-efficacy. Content validity is essentially a judgment made by the instrument designer or others knowledgeable about the construct being measured. Each item on the instrument must be evaluated for its relevance to the construct being measured and the sum contribution of all items must be evaluated to determine if they fully represent the universe of content represented by the construct of interest.

Earlier Attempts to Design Instruments to Measure Multiple Dimensions of Self-Efficacy

Other attempts have been made to develop a multidimensional instrument to measure self-efficacy with each dimension representing a high-risk situation. Researchers at the Addiction Research Foundation in Toronto developed an instrument to measure self-efficacy in alcohol-related situations. The questionnaire consisted of 100 questions. Respondents were asked to rate on a 100 point

scale divided into 20 point increments, how confident they would be in their ability to resist the urge to drink heavily in a specific situation. The situations listed on the questionnaire could be assigned to one of eight scales corresponding to the eight major intrapersonal and interpersonal determinants of relapse proposed by Marlatt and Gordon (1980). The instrument yielded an aggregate self-efficacy score and a self-efficacy score for each of the eight high-risk categories. Factor analysis revealed the instrument to be statistically unifactorial, but the subscales were reported as having high internal reliability (Miller et al., 1989). Clinical research on this instrument conducted by Annis and Davis (1988) has revealed positive correlations between self-efficacy scores on the Situational Confidence Questionnaire and control over drinking behavior.

Condiotte and Lichtenstein (1981) developed a Pretreatment Confidence Questionnaire using a list of 48 smoking situations reported by Best and Hakstian (1978). Respondents were asked to indicate on a 100 point probability scale, divided into 10 interval units, the probability that they would be able to resist the urge to smoke in a specific situation if they were trying to quit smoking without professional assistance. These authors used a cluster analytic procedure to identify seven clusters of high-risk situations for smokers. They found actual relapse situations to be associated with those clusters

which received low self-efficacy ratings. The cluster analytic procedure, however, may be inappropriate since it assumes the existence of multiple factors and forces items into orthogonal clusters.

Baer, Holt and Lichtenstein (1986) performed a principal components analysis on the same instrument using 226 end-of-treatment questionnaires. Principle component analysis differs from cluster analysis in that it allows variables to load on multiple factors. They identified three component factors with eigenvalues greater than one. The first factor accounted for 60 percent of measured variance, and all other factors accounted for less than 5 percent of scale variance. Rotating the three factor solution resulted in items loading significantly on all three factors. This indicated that the Pretreatment Confidence Questionnaire assessed a unifactorial or general trait of self-efficacy in resisting the urge to smoke.

DiClemente, Prochaska and Gibertini (1985) obtained similar results when they performed a varimax rotated principal components analysis on the 31-item self-efficacy scale they designed. Four components were identified, but the overlap of the item loadings were deemed too great to treat the components as independent. Only nine items loaded greater than 0.40 on a single factor. Self-efficacy, as measured by this instrument, was not multidimensional.

These researchers also performed Pearson correlations

between aggregate self-efficacy scores and demographic and smoking variables. Age, yearly income, and number of previous attempts to quit smoking were not found to be associated with self-efficacy. A small, but significant correlation ($r = .15$, $p < .01$) was found between smokers' self-efficacy scores and higher education levels.

Velicer et al. (1990) developed a 31-item instrument to measure self-efficacy. They applied principle components analysis and identified a three-component solution. After rotation, 13 items were deleted because of "poor differentiation, confused working or difficulty in interpretation." The retained 18 items, loaded on three factors labeled positive/social, negative/affective and habit/addictive. The 18 items were used in a structural analysis procedure aimed at developing a measurement model for the self-efficacy construct. A complex hierarchical model was developed and tested through the calculation of fit indices.

These researchers identified a response bias called extremity response style which creates a high degree of interitem correlation. This may result in the appearance of an artificial "general factor." They demonstrated that subjects at certain stages in the behavior change process, namely precontemplators and maintainers, tend to use this response style. A precontemplator was defined as someone who was currently involved in a certain behavior and had no

plan to quit and a maintainer was defined as someone who had quit a certain behavior for a minimum of six months. In short, a precontemplator may have a tendency to respond that he/she would not be likely to follow a diet in any situation while a maintainer would report dietary control in all situations. These authors believe that the recognition of this phenomenon is important when measuring variables associated with a dynamic process.

The purpose of the present study is to determine if weight loss self-efficacy has measurable dimensions which are associated with high-risk diet situations. Measurement of these dimensions could aid a clinician in targeting treatment to the needs of an individual patient and thus enhancing the long-term effectiveness of weight control therapy.

CHAPTER 3

METHODS AND PROCEDURES

Design of Study

This research was designed to develop and validate a multidimensional questionnaire to measure self-efficacy in weight reduction. Two hundred sixty-eight subjects attending an initial weight reduction class completed a self-administered questionnaire consisting of 41 items concerning self-efficacy, two items concerning dieting history, and nine items requesting demographic information. Principal component factor analysis was used to determine if weight reduction self-efficacy is a multidimensional construct. Characteristic differences in self-efficacy ratings according to gender, age, ethnic background, marital status, duty status, and weight were also explored.

Study Sample

The sample population for this study consisted of individuals attending initial weight reduction classes held at various Air Force bases. Subjects were either active duty Air Force personnel, retired military members, or dependents of military members.

The study was conducted at a convenient sample of Air Force bases located in different states: Davis-Monthan, AZ; Luke, AZ; Tinker, OK; Wright Patterson, OH; Andrews, D.C.,

Mather, CA; Lackland, TX; Carswell, TX; Offutt, NE; Vandenberg, CA; and March, CA.

At these bases, all individuals who attended initial weight reduction class during April, May, and the first two weeks in June 1991 were asked to participate in the study. As part of the usual patient check-in procedure, subjects' height and weight were measured using a calibrated balance scale. They were given a cover letter (Appendix A), a questionnaire (Appendix B), and were provided time to complete the questionnaire before the start of class.

Instrument Development

Instrument development began with a review of self-efficacy studies. The purpose was to determine how best to structure the self-efficacy questionnaire. As a result of this review, it was decided that subjects would be presented with a list of situations considered threatening to dietary control. They would be asked to indicate on an eleven point scale ranging from 0 to 10 how confident they were in their ability to follow their weight reduction diet goals in each of the listed situations. A rating of 0 indicated that it was virtually impossible for the subject to avoid inappropriate eating and a rating of 10 indicated that the subject was perfectly confident in his/her ability to maintain dietary control in the given situation.

An eleven point scale was used because it would

encourage response variability. This type of scale construction aids in identification of construct dimensions.

The list of threatening or high-risk situations was composed by the investigator, who has experience conducting weight loss programs. Relapse literature was reviewed to identify broad categories of situations which have been recognized as being high-risk for dieters. It was decided that specific problem situations would be listed which corresponded to the following high-risk categories: Negative emotional states, social situations, urges and temptations, negative physical states, interpersonal conflict, and situations where extra servings or food types are offered. Table 1 shows the structure of the resulting questionnaire.

Table 1
HIGH-RISK SITUATIONS
REPRESENTED ON THE WEIGHT CONTROL QUESTIONNAIRE

High-Risk Category	No. of Items
Negative emotional states	10
Negative physical states	3
Urges and temptations	9
Social situations	8
Interpersonal conflict	8
Extra servings or food types offered	<u>3</u>
TOTAL	41

Items constructed under negative emotional state involved situations in which an individual feels depressed, under stress, anxious, angry, frustrated, in a bad mood, nervous, worried, lonely, or is encountering an emotional crisis.

Negative physical states involved feeling tired, hungry or "physically not well." The category of "urges and temptations" included items which reflect cravings or temptations. Situations labeled social included some social aspects such as a party, visiting with friends or family, or eating out. Interpersonal conflict refers to situations involving other people which cause feelings such as embarrassment. Extra servings or food types offered refers to situations in which a person desires extra servings or larger portions.

Two questions were asked concerning history of dieting in an effort to validate the instrument. An individual who perceives that he/she has been successful at dieting in the past should have higher self-efficacy than an individual who feels he/she has been unsuccessful in losing weight in the past.

Nine demographic questions were asked concerning height, weight, age, sex, marital status, Air Force duty status, income, ethnic background, and education.

The questionnaire was reviewed for content face

validity and clarity of items by five dietitians, two faculty members, and two graduate students in Pharmacy Administration who are familiar with Bandura's self-efficacy construct. Minor revisions in item wording were made and the order of the items on the questionnaire was randomized.

Simultaneously, a similar questionnaire designed by the investigator listing thirty-six high-risk situations was pilot tested at Davis-Monthan Air Force Base. Fourteen individuals who attended initial weight reduction classes agreed to participate in the pilot study. They were asked to complete the questionnaire and to make a note beside any item which was unclear. After the thirty-six self-efficacy items, the following question was asked, "Are there any other situations not listed which cause you problems?". Only one individual described a situation not listed. He said not keeping his vow to exercise was a problem, but since this did not deal with dietary control, this situation was not added to the questionnaire.

Participants in the pilot study were instructed to seal their questionnaires in the business envelopes provided and to give them to their class instructor. Class instructors were asked to time how long it took participants to complete the questionnaires and to note any questions asked by participants. It took participants approximately ten minutes to complete the questionnaires and no questions were asked during the pilot test.

The final questionnaire was then sent through Air Force channels for approval. The questionnaire was approved as written and was assigned an Air Force control number to be typed on the front, bottom, lefthand corner of the first page of the survey.

Instrument Validation

Principal component factor analysis and a criterion-group study were used to assess construct validity. Principal component factor analysis was used to validate the existence of underlying dimensions of weight control self-efficacy. A criterion-group study was done by identifying a subset of respondents who should theoretically possess a low level of self-efficacy. Confirmation of this through use of the instrument being developed would aid in the establishment of construct validity.

Two questions were included in the questionnaire to define the subgroup of subjects who should theoretically possess low self-efficacy. One question asked how many weight reduction diets the respondent had been on in the past and the other asked the respondent how successful he/she felt in past dieting attempts. An individual who has been on multiple diets has most likely experienced some degree of failure at controlling inappropriate eating. This failure according to Bandura's theory should decrease weight control self-efficacy. Individuals who report having been

unsuccessful in past dieting attempts should theoretically have lower self-efficacy than those who report being very successful. Demonstration that individuals who should theoretically possess low self-efficacy score low on the instrument designed to measure self-efficacy aids in the defense of construct validity.

Data Collection

Direct distribution of questionnaires was selected over mail distribution to improve the rate of questionnaire return and to expedite the data collection process. Dietitians at 12 Air Force bases were contacted and asked if they would help to distribute questionnaires at their assigned facility. All agreed to help distribute questionnaires. Each participating base received two envelopes which contained the following: a list of the contents of each envelope, 45 questionnaires, 45 cover letters, 45 white business envelopes, 4 large envelopes addressed to the investigator, a letter to the dietitian (Appendix C) and two copies of procedures for questionnaire distribution (Appendix D).

Each individual completed the questionnaire before weight reduction class began and sealed the questionnaire in the white envelope provided. The class instructor collected the envelopes, put them in one of the large envelopes, and sent them to the investigator. The investigator called each

base twice during the data collection period to determine if dietitians had questions or problems and ensure that questionnaires were being distributed in the manner requested.

Data Analysis

Responses for each question were numerically coded. Data entry was done with an Epson Equity LT computer, using the text editor PC Write. The personal computer version of the SAS software program was employed to carry out data analysis functions.

Two new variables were created. One variable, body mass index (BMI) in metric units, was calculated from height and weight data. Individuals were then classified as within normal weight, overweight, or severely overweight using NHANES II criteria. The second variable created, aggregate self-efficacy score, was calculated by adding the numerical response given for each self-efficacy question.

Frequency distributions were tabulated for all of the variables. Analysis of variance and t-tests were used to assess the differences among levels of demographic and history of dieting variables and aggregate self-efficacy scores. Exploratory principal component factor analysis using the varimax, rotated factor matrix method was employed to test for the presence of distinct dimensions of weight reduction self-efficacy.

Principal component analysis is a statistical technique which reduces a large number of variables into fewer (independent) principal components or factors. The varimax method identifies linear combinations of variables which maximize the amount of variance explained by individual components. Numerous components are identified in order of decreasing ability to explain variance. The first component identified accounts for the most variance, followed by the second component which is independent of the first and accounts for a proportion of variance not accounted for by the first factor.

Factors retained for rotation were identified using a combination of criteria including scree plot output, minimum eigenvalues, criterion of substantive importance, and the criterion of interpretability and meaningfulness of trial factor rotations. Eigenvalues represent the amount of total variance described by a particular factor or component.

According to Kim and Mueller (1978) components should be considered for retention when the unrotated eigenvalue is greater than one, when the scree plot of eigenvalues begins to level off forming a straight line with an almost horizontal slope and when the proportion of total variance explained by the last factor is considered significant by the researcher. In this project, a factor which could explain five percent or more of total variance was considered to have substantive importance. A combination of

the above listed criteria were used in the present study to identify a reasonable and interpretable solution.

The ultimate goal of rotation in principal component analysis is to achieve the simplest possible factor structure. Varimax rotation was used because it gives clear separation of factors (Kim and Mueller, 1978). After rotation, a loading is calculated for each variable under each factor. This loading represents both a regression weight and a correlation coefficient. In accordance with Nunnally (1978), scales representing each dimension were composed of those items with factor loadings at or above 0.40 on one factor and lesser loadings on other factors. If an item loaded above 0.40 on two factors, assignment was made according to the factor with the highest loading. Cronbach's alpha was used to assess the internal consistency or reliability of the subdimensions identified through factor analysis in accordance with Nunnally (1978).

CHAPTER FOUR

RESULTS AND DISCUSSION

Response to the Questionnaire

Two hundred sixty-eight questionnaires were returned during the data collection period. Eleven of the twelve bases asked to participate in the study actually did so. At one Air Force Base, questionnaires were never distributed. Only three individuals refused to complete the questionnaire. Thirty-two questionnaires were excluded from analysis because the respondent did not answer one or more of the self-efficacy questions. A final sample of 236 questionnaires were included in the analysis.

Little difficulty was encountered by subjects in completing the questionnaire. Nine subjects left item 12, "You are drinking an alcoholic beverage," blank and six of these noted that they did not drink next to the question. Eight respondents did not answer the question about family income. Two respondents overlooked the last page of the questionnaire.

Demographic Information

Demographic information on the 236 individuals whose questionnaires were used in data analysis is summarized in Table 2. Males comprised 52 percent of the sample, the

average age was 37 years, and the majority of the persons surveyed were married (77%). Fifty-eight percent of the sample were active duty Air Force personnel, 30 percent were dependents of active duty members, 10 percent were retired and 2 percent were in either the National Guard or Reserves. The majority of the sample was white (70%), followed in number by African-Americans (15%) and Hispanics (8%). Twenty-four percent of respondents had completed high school, 59 percent had finished some college, and nine percent had a college degree. Fifty-six percent had an annual family income between \$10,000 to \$30,000 and 37.5 percent had an income greater than \$30,000 a year.

Primary Research Objective

The primary research objective of this study was to develop and validate a questionnaire to measure self-efficacy in weight loss which is multidimensional, with each dimension representing a specific type of relapse situation. The first step in this process was to calculate the mean score and standard deviation (SD) for each self-efficacy question on the questionnaire. Items with poor variability ($SD < 1$) or skewness (mean > 9 or < 2) would be deleted. An item in which most everyone reports perfect confidence in their ability to maintain dietary control or an item with little range of variance lacks discrimination value and should be dropped. In this study, no question met these

Table 2

DEMOGRAPHIC CHARACTERISTICS OF SUBJECTS
WHO ATTENDED A WEIGHT REDUCTION CLASS AT ONE OF
ELEVEN AIR FORCE BASES

Variable		No. of Subjects (%)
<hr/>		
Gender		
N = 236	Male	123 (52.1)
	Female	113 (47.9)
Age Ranges (Yrs.)		
N = 236	18-24	41 (17.4)
Mean = 36.7	25-29	55 (23.3)
SD = 13.6	30-39	62 (26.3)
Range = 18-81	40-49	34 (14.4)
	50-59	22 (9.3)
	60-69	17 (7.2)
	70+	5 (2.1)
Weight Status ¹		
N = 234	Normal	49 (20.8)
	Overweight	110 (46.6)
	Severly Overweight	77 (32.6)
Duty Status		
N = 236	Reserves	3 (1.3)
	National Guard	2 (0.8)
	Retired	23 (9.7)
	Dependent	71 (30.1)
	Active Duty	137 (58.1)

¹Weight status defined according to NHANES II criterion. Criterion is based on the percentile (U.S. men and women ages 20 to 29) at which an individual's body mass index (BMI) lies. BMI = Weight in kg/height in m². Normal weight = BMI less than 85th percentile. Overweight = BMI at the 85th percentile to the 95th percentile. Severly overweight = BMI greater than or equal to the 95th percentile.

Table 2 (Continued)

DEMOGRAPHIC CHARACTERISTICS OF SUBJECTS
WHO ATTENDED A WEIGHT REDUCTION CLASS AT ONE OF
ELEVEN AIR FORCE BASES

Variable		No. of Subjects (%)
<hr/>		
Ranks of Active Duty Respondents N = 136	Officers	7 (5.1)
	Noncommissioned ²	71 (52.2)
	Airmen	58 (42.7)
Ethnic Background N = 235	African-American	35 (14.9)
	Hispanic	19 (8.1)
	American Indian	3 (1.3)
	White	166 (70.6)
	Oriental	2 (0.9)
	Other	10 (4.3)
Highest Education Level Completed N = 235	No formal education	0 (0.0)
	Some grade school	1 (0.4)
	Grade school	1 (0.4)
	Some high school	3 (1.3)
	High school	57 (24.3)
	Some college	139 (59.1)
	College	21 (8.9)
	Some graduate work	5 (2.1)
	Graduate degree	8 (3.4)
Marital Status N = 236	Never married	35 (14.8)
	Married living with spouse	169 (71.6)
	Married not living with spouse	13 (5.5)
	Divorced or legally separated	16 (6.8)
	Widowed	3 (1.3)

²Persons with the rank of Sergeant were included under the category of Airmen.

Table 2 (Continued)

DEMOGRAPHIC CHARACTERISTICS OF SUBJECTS
WHO ATTENDED A WEIGHT REDUCTION CLASS AT ONE OF
ELEVEN AIR FORCE BASES

Variable		No. of Subjects (%)
<hr/>		
Annual Family Income		
(Dollars)		
N = 232		
Less than	3,000	3 (1.3)
3,000 to	4,999	1 (0.4)
5,000 to	6,999	3 (1.3)
7,000 to	9,999	9 (3.9)
10,000 to	14,999	43 (18.5)
15,000 to	19,999	41 (17.7)
20,000 to	29,999	45 (19.4)
30,000 to	39,999	37 (15.0)
40,000 to	49,999	22 (9.5)
Over	50,000	28 (12.1)
<hr/>		

criteria. Mean scores varied between 5.2 and 8.0 and the lowest standard deviation calculated was 2.0. See Table 3 for the mean score and standard deviation for each item.

Two hundred thirty-six records contained no missing data within the first 41 items on the questionnaire and were therefore, usable for principal component analysis. According to Maxwell (1971), to obtain an adequately stable and significant solution, the rule of thumb is that the minimum sample size should contain 51 more cases than the number of variables being analyzed. Based on this criterion, the minimum sample size for this study should be 92. The present sample of 236 is more than adequate.

Principal component analysis without rotation was conducted on the data to establish an initial factor-variable correlation matrix. Next, data reduction was performed by factor retention. Finally, the retained factors were rotated to determine the terminal solution.

Examination of the unrotated correlation matrix revealed a first factor which accounted for 42 percent of variance, a second factor which accounted for 9 percent of variance, a third factor accounted for 5 percent, a fourth factor which accounted for 3.5 percent, and a fifth factor which accounted for approximately 3 percent of variance. Table 4 shows the eigenvalues and proportion of variance explained by the first ten factors. Figure 1 shows the scree plot of eigenvalues before rotation. This

Table 3

MEAN SCORE AND STANDARD DEVIATION OF SELF-EFFICACY
QUESTIONS FROM THE WEIGHT CONTROL QUESTIONNAIRE
COMPLETED BY SUBJECTS ATTENDING A WEIGHT REDUCTION
CLASS AT VARIOUS AIR FORCE BASES

Question No.	Situation Represented In Self-Efficacy Question	Mean	Std. Dev.
1	Feel stressed	5.6	2.8
2	Feel bored	5.2	3.0
3	Crave a menu item	6.0	2.8
4	Pamper yourself	6.5	2.7
5	Together with friends and there are lots of caloric foods	5.3	3.2
6	In a cafeteria	7.1	2.5
7	Feel embarrassed	7.5	2.4
8	Larger portion desired	6.3	2.5
9	Depressed	5.5	3.1
10	Feel tired	6.9	2.9
11	Go out with family or friends	6.1	2.7
12	Drinking	7.2	3.3
13	Feelings are hurt	7.2	2.9
14	Feel anxious	6.6	2.9
15	See someone eating	7.0	2.6
16	Having good time at party	6.2	2.8
17	Someone giving you a hard time	7.2	2.5
18	Emotional crisis	5.7	3.3
19	Craving something not on diet	5.4	2.7
20	Offered cake when visiting	6.4	2.8
21	Feel put down	7.2	2.8
22	Angry	6.5	3.0
23	Sweets are served	6.6	2.7
24	At happy hour with friends	6.9	3.0
25	Feel neglected	7.0	2.9
26	Feel frustrated	5.5	3.0
27	Tempted by food you see	7.4	2.5
28	With someone who is eating	6.4	2.8
29	Uncomfortable in a social situation	7.2	2.6
30	Bad mood	6.3	3.1
31	Watching TV and desire something to eat	5.4	2.9
32	Together with a friend to talk	8.0	2.0

Table 3 (Continued)

MEAN SCORE AND STANDARD DEVIATION OF SELF-EFFICACY
 QUESTIONS FROM THE WEIGHT CONTROL QUESTIONNAIRE
 COMPLETED BY SUBJECTS ATTENDING A WEIGHT REDUCTION
 CLASS AT VARIOUS AIR FORCE BASES

Question No.	Situation Represented In Self-Efficacy Question	Mean ¹	Std. Dev.
33	Feel unsupported	6.9	2.7
34	Feel nervous	6.3	2.9
35	Want a break	6.9	2.6
36	Tempted to have seconds	5.8	3.0
37	Feel lonely	6.8	3.1
38	Feel nagged	6.9	3.1
39	Very hungry	4.8	2.9
40	Worried	6.1	3.1
41	Not well physically	7.0	2.8

¹Mean score calculated by summing responses of each self-efficacy question for all subjects and then dividing by the number of subjects.

Table 4

EIGENVALUES AND THE PROPORTION OF VARIANCE EXPLAINED
BY EACH OF THE FIRST TEN FACTORS EXTRACTED BY UNROTATED
PRINCIPAL COMPONENTS ANALYSIS.

Factors	Eigenvalue ¹	% Variance Explained By Each Factor ²
1	17.29	42.2
2	3.72	9.1
3	2.06	5.0
4	1.42	3.5
5	1.17	2.8
6	1.14	2.8
7	0.89	2.2
8	0.86	2.1
9	0.84	2.0
10	0.78	1.9

¹Eigenvalues represent the amount of total variance described by a particular factor. Calculated by summing the square of each loading assigned to a particular factor.

²Calculated by dividing the eigenvalue by the number of variables analysed and multiplying the quotient by 100.

FIGURE 1

A scree plot representing unrotated eigenvalues of the first ten factors extracted by principal component analysis.

information, in part, was used to decide how many factors were to be retained for rotation.

Several criteria were used to determine how many factors to retain for rotation. According to the minimum eigenvalue of 1.0 criterion, the first six factors should be retained. The use of this criterion alone, however, may lead to the retention of too many factors (Velicer and Jackson, 1990). The second criterion calls for examination of the scree plot to determine when the eigenvalues begin to level off forming a straight line with an almost horizontal slope. Examination of the scree plot in Figure 1 shows this could occur after factor three or after factor four.

Another criterion was the retention of factors which explained five percent or more of total variance. If this criterion alone were used, the first three factors would be retained. Kim and Mueller (1978) recommend a combination of these criteria be used to identify a reasonable and interpretable solution. For this reason, varimax rotation was performed on a three, four, and five factor solution. The three factor solution was the most interpretable and thus is the one which has been retained. It accounts for 56 percent of the variance.

The retained factors were labeled (in order of extraction): Negative Emotional, Urges and Temptations, and Party Situation. Two of these, Negative Emotional and Urges and Temptations, represent situations considered during

questionnaire development. Table 5 delineates which questionnaire items loaded under each of the three factors, and indicates the item loadings. Appendix E contains the rotated factor pattern.

Only one item "You feel embarrassed in a situation." failed to achieve the loading criterion of 0.40. Three items had dual loadings (loadings greater than 0.40 on two factors). "You get together with friends and there are lots of high caloric foods served such as alcoholic beverages, chips, and dip." loaded under both the Urges and Temptations factor (.44950) and the Party situation factor (.62369). It is not difficult to see why this occurred since it alludes to both the party situation "get together with friends," and a temptation situation "there are lots of high calorie foods served such as alcoholic beverages, chips and dip." Any question which referred to alcohol loaded under the party factor as did this item. The party factor assignment was made on the basis of the higher loading factor. This item should be reworded to more accurately describe a single high-risk situation.

The second item to have dual loading was "You feel others are not supporting your efforts to lose weight." This item loaded under both Negative Emotional (0.53439) and under Urges and Temptations (0.46740). This item would seem logically to fit under the Negative Emotional factor. It is unclear why this item loaded under Urges and Temptations.

Table 5

ITEMS AND THEIR FACTOR LOADINGS FOR EACH OF THE THREE FACTORS IDENTIFIED BY EXPLORATORY PRINCIPAL COMPONENT ANALYSIS USING THE VARIMAX, ROTATED FACTOR METHOD. DATA ORIGINATED FROM QUESTIONNAIRES COMPLETED BY SUBJECTS WHO ATTENDED WEIGHT REDUCTION CLASS AT VARIOUS AIR FORCE BASES

Factors With Assigned Items	Factor Loading
Factor 1: Negative Emotional	
1. You are feeling stressed, there are too many demands on your time.	0.7208
2. You are bored.	0.4762
3. You are feeling very depressed.	0.6956
4. You are tired.	0.6832
5. Someone hurts your feelings.	0.7693
6. You are extremely anxious about something.	0.7282
7. You feel someone is intentionally giving you a hard time.	0.7166
8. You are undergoing an emotional crisis such as a family illness, death or divorce.	0.6949
9. Someone puts you down or is very critical of you.	0.7846
10. You are very angry with a person of significance in your life, i.e. spouse, friend.	0.7924
11. You feel neglected by someone.	0.7723
12. You are frustrated, you have done all you can and things are still going poorly.	0.7591

Table 5 (Continued)

ITEMS AND THEIR FACTOR LOADINGS FOR EACH OF THREE FACTORS IDENTIFIED BY EXPLORATORY PRINCIPAL COMPONENT ANALYSIS USING THE VARIMAX, ROTATED FACTOR METHOD. DATA ORIGINATED FROM QUESTIONNAIRES COMPLETED BY SUBJECTS WHO ATTENDED WEIGHT REDUCTION CLASS AT VARIOUS AIR FORCE BASES

Factors With Assigned Items	Factor Loading
13. You feel uncomfortable in a social situation.	0.5848
14. You are in a very bad mood.	0.7572
15. You feel others are not supporting your efforts to loss weight.	0.5344
16. You are nervous and tense.	0.7748
17. You are separated from family and friends.	0.5719
18. Someone is nagging you.	0.7095
19. You are worried.	0.8233
20. You do not feel well physically.	0.5953
Factor 2: Urges and Temptations	
1. You are in a restaurant and there is a high calorie menu item you have a craving for.	0.6721
2. You feel a need to pamper yourself.	0.4322
3. You are offered a variety of high and low calorie foods to select from in a cafeteria.	0.5067
4. You want a larger portion than you think you should have.	0.6307
5. You go out with friends or family.	0.5758

Table 5 (Continued)

ITEMS AND THEIR FACTOR LOADINGS FOR EACH OF THE THREE FACTORS IDENTIFIED BY EXPLORATORY PRINCIPAL COMPONENT ANALYSIS USING THE VARIMAX, ROTATED FACTOR METHOD. DATA ORIGINATED FROM QUESTIONNAIRES COMPLETED BY SUBJECTS WHO ATTENDED WEIGHT REDUCTION CLASS AT VARIOUS AIR FORCE BASES

Factors With Assigned Items	Factor Loading
6. You see someone eating a food you like.	0.7053
7. You have a craving for something not on your diet.	0.6563
8. You go visiting and are offered a piece of pie or cake.	0.7210
9. You go to an event where sweets are served.	0.7173
10. You pass a vending machine, ice cream store or food establishment and something tempts you.	0.7092
11. You are with your spouse or friend who is eating ice cream or other high calorie food.	0.7753
12. You are watching TV and have a strong desire for something to eat.	0.5895
13. You get together with a friend to talk.	0.5983
14. You are working on something tedious and want a break.	0.5817
15. Your meal was excellent and you are tempted to have seconds.	0.7279
16. You feel very hungry.	0.6733

Table 5 (Continued)

ITEMS AND THEIR FACTOR LOADINGS FOR EACH OF THE THREE FACTORS IDENTIFIED BY EXPLORATORY PRINCIPAL COMPONENT ANALYSIS USING THE VARIMAX, ROTATED FACTOR METHOD. DATA ORIGINATED FROM QUESTIONNAIRES COMPLETED BY SUBJECTS WHO ATTENDED WEIGHT REDUCTION CLASS AT VARIOUS AIR FORCE BASES

Factors With Assigned Items	Factor Loading
Factor 3: Party Situations	
1. You get together with friends and there are lots of high calorie foods served such as alcoholic beverages, chips, and dips.	0.6237
2. You are drinking an alcoholic beverage.	0.8473
3. You are having a good time at a party or celebration.	0.6490
4. You go with a group of friends to a happy hour.	0.8419

Perhaps others are perceived as unsupportive because they urge the individual to eat or tempt them by eating high calorie foods in front of them. Factor assignment was made based on the factor with the highest loading.

The third item to have dual loading was "You are working on something tedious and want a break." This item loaded on negative emotional (0.42732) and urges and temptations (0.58171). This question may also be poorly worded. Someone who is working on something tedious may feel frustrated or bored and have the urge to eat. The question should be reworded to represent more clearly one situation. Factor assignment was again made based on the highest factor loading.

Twenty items loaded under Negative Emotional. These included feeling stressed, bored, depressed, tired, hurt, anxious, put down, angry, neglected, frustrated, uncomfortable in a social situation, in a bad mood, unsupported, nervous, lonely, nagged, worried, ill, like someone was giving them a hardtime, or like they were undergoing an emotional crisis. Tired and ill (not feeling well physically) are negative physical states which are frequently associated with negative emotional states such as depression so inclusion within this factor seemed logical.

Sixteen items loaded under the factor labeled Urges and Temptations. These reflected situations in which an individual craved a menu item or something not on his/her

diet. It included situations where the person was tempted when he/she saw or was with someone else eating, passed a food establishment, or was at an event where sweets or high calorie foods were offered. This factor also included situations in which an individual desired larger portions or seconds, was hungry, wanted to pamper him/herself or give him/herself a break. It included situations when an individual got together with a friend to talk or went out with family or friends.

Four items loaded under factor three, the party factor. This factor included all items related to the party situation. It included "You get together with friends and there are lots of high calorie foods served such as alcoholic beverages, chips and dip.", "You go with a group of friends to a happy hour.", "You are drinking an alcoholic beverage.", or "You are having a good time at a party or celebration."

These results clearly show that this instrument reflects weight reduction self-efficacy as a multidimensional construct with each dimension representing a different type of high-risk situation. Items did not demonstrate the overlap of component loadings experienced by researchers who developed and tested instruments to measure self-efficacy in smoking cessation (Baer et al., 1986; DiClemente et al., 1985). It may be appropriate to note that the varimax rotation method maximizes the variance

explained by each factor and is insensitive to variables loading under more than one factor. The small number of dual loaded variables indicates clear definition between factors. Two of the three variables which did dual load contained phrases which could logically fit into each of the factors under which the item loaded and clearly require rewording.

Table 6 contains the mean self-efficacy scores, and standard deviations calculated for each subscale using only those items that loaded on that dimension. Since the theoretical scale mean would be 5.0, the subscale means indicate a slight skew in the direction of high confidence. Table 7 reports the Cronbach's alpha for each dimension.

Cronbach's coefficient alpha is a measure of reliability which represents the expected correlation of a given instrument with another instrument of the same length which measures the same construct (Nunnally, 1978). It communicates the amount of measurement error which may be expected from using an instrument. Cronbach's coefficient alpha is a measure of internal consistency and as such is based on the average correlation among items. Longer instruments have higher reliability coefficients than shorter instruments. If a Cronbach's alpha is low, it indicates that either the instrument is too short or that the items have very little in common.

Table 6

MEAN AND STANDARD DEVIATION FOR EACH DIMENSION OF WEIGHT LOSS SELF-EFFICACY DEFINED BY PRINCIPAL COMPONENT ANALYSIS. ANALYSIS WAS CONDUCTED ON 236 QUESTIONNAIRES COMPLETED BY SUBJECTS WHO ATTENDED A WEIGHT REDUCTION CLASS AT ONE OF ELEVEN AIR FORCE BASES

Dimension	Mean	Std. Dev.
Negative Emotional	6.48	2.2
Urges and Temptations	6.38	1.9
Party Situations	6.40	2.5

Table 7

CRONBACH'S COEFFICIENT ALPHA
FOR EACH DIMENSION OF WEIGHT LOSS SELF-EFFICACY.
ANALYSIS WAS CONDUCTED ON 236 QUESTIONNAIRES
COMPLETED BY SUBJECTS WHO ATTENDED A WEIGHT
REDUCTION CLASS AT ONE OF ELEVEN AIR FORCE BASES.

Dimension	No. of Items	Cronbach's Coefficient Alpha ¹
Negative Emotional	20	.96
Urges and Temptations	16	.93
Party Situations	4	.84

¹A measure of internal reliability.

According to Nunnally (1978), a modest reliability of 0.60 or 0.50 is sufficient for early stages of research on predictor tests or hypothesized measures of a construct. In the present study, alpha coefficients ranged from 0.96 to 0.84 indicating high reliability. The highest alpha was found for the twenty-item Negative Emotional scale and the lowest for the four-item Party Situations scale. This reliability assessment of each subscale indicated that sampling of attributes for the three domains identified was adequate and there was homogeneity of items constituting each dimension. The Cronbach's alpha for the overall instrument was 0.96 indicating that all items work together to describe a general weight reduction self-efficacy construct.

Secondary Research Objectives

Secondary research objectives addressed the relationship between aggregate self-efficacy scores and demographic and history of dieting variables. Some of these hypotheses were tested in an effort to provide partial support for construct validity and others were explored to determine if there was any relationship between demographics and weight loss self-efficacy. DiClementi (1981) found no correlation between self-efficacy scores and demographic variables, and significant, but low correlation between self-efficacy scores and two smoking history

variables (age began smoking and cigarettes smoked per day prior to quitting).

Question 1: Is there a significant difference in aggregate self-efficacy score between persons who reported themselves to have been very successful verses not successful at all in past dieting attempts. Since performance attainment is a powerful source of efficacy information (Bandura, 1977), it was expected that individuals who judged themselves successful in past dieting attempts would have significantly higher self-efficacy scores than individuals who judged their past dieting attempts to be unsuccessful. On the questionnaire, a response option "somewhat successful" was included to filter out those individuals who were skeptical about their degree of dieting success.

A t-test was used to test the null hypothesis that no difference existed between very successful and unsuccessful dieters. This test revealed that there was a significant difference ($p = .0001$) in efficacy scores between these two groups (Table 8). Persons who reported themselves to have been very successful in past dieting attempts had significantly higher self-efficacy scores than those individuals who reported that they had not been successful at all. This finding is consistent with theoretically based expectations and provides partial support for the construct validity of this weight reduction

Table 8

SELF-EFFICACY SCORES AND PERCEIVED SUCCESS IN DIETING
ATTEMPTS OF SUBJECTS WHO ATTENDED A WEIGHT REDUCTION CLASS
AT ONE OF ELEVEN AIR FORCE BASES

Success Judgment	No.	Mean ¹	Std. Dev.
Very Successful	32	7.15	1.7
Not Successful at All	30	5.42	1.3

¹t(1, 60) = 19.97, p < .0001.

self-efficacy questionnaire.

Question 2: Are self-efficacy scores related to the number of dieting attempts an individual has made? An individual who has been on multiple diets has most likely experienced some degree of failure at controlling inappropriate eating. This failure according to Bandura's theory should decrease weight control self-efficacy. A one-way analysis of variance was conducted to determine if there was a significant difference in self-efficacy scores between individuals who had never dieted, had been on one to two diets, three to five diets or had been on innumerable diets. Mean self-efficacy scores and standard deviations are reported in Table 9. Scores were significantly different ($p < .0001$).

Question 3: Is there a significant difference between normal weight and severely overweight individuals with regard to self-efficacy score? It was expected that self-efficacy scores would be higher among normal weight individuals since intuitively one would think that these individuals would have better dietary control. This did not prove to be the case. A t-test was performed and no significant difference in aggregate self-efficacy scores between severely overweight and normal weight individuals was found ($t = .68, p < .50$).

This does not detract from construct validity however, because what was being measured was an individual's

Table 9

SELF-EFFICACY SCORES AND NUMBER OF PAST DIETING ATTEMPTS
MADE BY 236 SUBJECTS WHO ATTENDED A WEIGHT REDUCTION CLASS
AT ONE OF ELEVEN AIR FORCE BASES

No. of Diets	No.	Mean ¹	Std. Dev.
None	52	7.35 ^{c, d}	1.7
1 to 2	83	6.67 ^d	1.7
3 to 5	48	6.08 ^a	1.6
Innumerable	53	5.58 ^{a, b}	1.8

¹F(3, 232) = 10.54, p < .0001.

^aMeans are significantly different from 7.35 (p < .01).

^bMean is significantly different than 6.67 (p < .01).

^cMean is significantly different than 6.08 (p < .01).

^dMeans are significantly different from 5.58 (p < .01)

perceived ability, not his or her actual ability to avoid inappropriate eating in a given situation. A person may in fact control their eating well, but perceive their ability to do so as poor. An overweight person may not perceive that he/she has a problem with body weight, and therefore, would respond no differently than a normal weight individual. People's past dieting successes (performance attainments) or failures appear to be more directly related to confidence in their ability to control eating in high-risk situations than is body weight.

To explore this issue further, two groups who have been found to have different perceptions of overweight were compared. African-Americans and whites are reported to perceive weight status differently. Within the African-American culture overweight is more acceptable and less pressure is exerted on an individual to lose weight. A t-test was performed to determine if there was a significant difference in self-efficacy scores based on race. A significant difference was found [$t(1, 199) = 12.59, p < .0005$]].

A two-way ANOVA was then done to determine if there was an interaction between weight status and race in aggregate self-efficacy scores. If self-efficacy scores were related to perceived weight status, and African-Americans did not perceive overweight as much of a problem, it might be expected that there would be no significant difference in

self-efficacy scores. If self-efficacy scores were related to perceived weight status, and overweight was perceived as being a serious problem by whites, it would be expected that self-efficacy scores would be significantly lower for whites who were severely overweight than for whites of normal weight. This did not prove to be the case. There was no significant difference in self-efficacy scores among normal weight and severely overweight whites and among normal and severely overweight African-Americans [$F(3, 122) = 2.07$, $p < .11$]. Weight status seemed to have no effect on self-efficacy regardless of race. There was a large disparity in ANOVA cell sizes because the sample used in this study was predominantly white. This may be one reason no significant difference was found.

Frequency distribution data was then examined. It showed that 34.3 percent of the African-Americans surveyed never dieted before, while only 16.9 percent of whites had never dieted before. The reason that African-Americans had higher self-efficacy scores could relate to the fact that they have dieted less, and therefore, experience less diet failures. This area requires further research.

Question 4: Is there a significant difference between males and females with regard to self-efficacy scores? A t-test was done and no significant difference was found ($t = 3.4$, $p < .0008$).

Question 5: Is there a significant difference in self-

efficacy scores dependent upon marital status? A t-test was conducted comparing aggregate self-efficacy scores of married persons (living with or without their spouse) with aggregate self-efficacy scores of single persons (including divorced, separated and widowed persons). No difference was found ($t = -1.4$, $p < .16$).

Question 6: Is there a significant difference in self-efficacy scores dependent upon Air Force duty status? A t-test was performed comparing Active Duty Air Force personnel with all others including Reserves, and Air National Guard personnel, retired and dependent persons. There was no significant difference in self-efficacy scores ($t = .03$, $p < .98$).

Question 7: Is there a significant difference in self-efficacy scores according to ethnic background? A one-way ANOVA was performed comparing self-efficacy scores of whites, African-Americans and all others surveyed (Hispanics, Orientals, and others). The mean self-efficacy score for each group is reported in Table 10. The F-value was 6.03 ($df = 2, 232$, $p = .0028$). A Scheffe' post hoc comparison ($p = .01$) showed that African-American self-efficacy scores were significantly higher than scores of whites, but not significantly higher than scores derived from the other ethnic groups surveyed (Hispanic, American Indian, Oriental and other).

Question 8: Is there a significant difference in self-

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efficacy scores dependent upon income? Three levels of net family income for 1990 were compared (under \$14,999, between \$15,000 and \$29,999, and over \$30,000) using one-way analysis of variance. There was no significant difference in aggregate self-efficacy score based on income [$F(2, 229) = 1.01, p < 0.36$].

Question 9: Is there a significant difference in self-efficacy scores dependent upon education level completed. Three groups were compared using one-way analysis of variance. One group contained all individuals who had some grade school or had completed grade school and who had some high school or completed high school. Another group contained all individuals who reported having some college education. A third group reported completing college, some graduate work or having a graduate degree. Analysis revealed no relationship between education and aggregate self-efficacy score [$F(2, 232) = 1.71, p < .18$].

CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS

Identification of Dimensions of Weight Loss Self-Efficacy

The hypothesis of this investigation stated that measures of weight loss self-efficacy is a multi-dimensional with each dimension representing a specific type of high-risk situation. In addition, self-efficacy scores on items associated with the same high-risk situation will be correlated.

An instrument was developed which listed 41 specific situations or emotional states which were considered to be high-risk for precipitating diet relapse. Two hundred thirty-six usable questionnaires were completed by individuals who attended a weight reduction class at one of eleven Air Force bases in the continental United States.

Exploratory principal component analysis using the varimax, rotated factor matrix method was employed to test for the presence of distinct dimensions of weight reduction self-efficacy. Three distinct and highly reliable dimensions were identified. They were labeled Negative Emotional, Urges and Temptations and Party Situations. Loading of an attribute onto a specific dimension expresses a correlational relationship. Results support the primary hypothesis of this study.

Self-Efficacy and Subject Characteristics

Secondary research objectives addressed the relationship between aggregate self-efficacy scores and demographic and diet history variables. Self-efficacy varied according to race, number of past diets and success of past dieting attempts. African-Americans were found to have higher self-efficacy than whites. Two diet history variables were found to be related to weight loss self-efficacy. Individuals who judged themselves successful in past dieting attempt had significantly higher self-efficacy scores than individuals who judged their past dieting attempts to be unsuccessful. Subject's weight loss self-efficacy decreased the more weight reductions diets they reportedly followed.

Assessment of Validity

The purpose of assessing validity is to determine if the instrument developed actually measures what it is intended to measure. In the case of psychometric measures construct validity is crucial. Does the instrument developed measure weight loss self-efficacy? Numerous studies need to be done on an instrument to firmly establish construct validity.

In this study, preliminary steps were taken to assess validity. Principle component factor analysis supported a

multidimensional conceptualization of weight loss self-efficacy.

A criterion-group study was utilized. Individuals who report having been unsuccessful in past dieting attempts should theoretically have lower self-efficacy than those who report being very successful. A comparison of two groups found that those individuals who judged themselves successful dieters in the past had significantly higher self-efficacy scores than individuals who judged their past dieting attempts to have been unsuccessful.

An individual who has been on multiple diets has most likely experienced some degree of failure at controlling inappropriate eating. This failure should theoretically decrease an individual's self-efficacy. It was found that individuals who had never dieted had significantly higher self-efficacy scores than individuals who had followed three to five diets or an innumerable number of diets. Subjects who had followed one or two diets had significantly higher self-efficacy than subjects who had followed innumerable diets. These findings support construct validity.

An attempt was made to build content validity into the questionnaire through selection of items based on a thorough review of the literature referring to relapse situations. The questionnaire was then reviewed for appropriateness and completeness by experts knowledgeable about self-efficacy and weight reduction.

Subjects were given adequate time to complete the questionnaire. There was no identifying information on the questionnaire. Subject were told that their questionnaires would not be reviewed by anyone but the researcher. Subjects sealed their questionnaires in envelopes before handing them in. These steps were taken to prevent response bias. Measurement of self-efficacy is most accurate when individuals know their responses will not be made known (Bandura, 1982a).

Significance of Findings

This study supports the concept of weight loss self-efficacy as a multidimensional construct. This could have important clinical implications. If self-efficacy measurements were predictive of actual relapse situations, pretreatment measurements of self-efficacy could facilitate the targeting of treatment to a specific individual's high-risk situations. For example, if an individual had low self-efficacy in party situations, weight reduction treatment would be aimed at increasing skills in dealing with this type of situation and increasing the individual's weight control self-efficacy in party situations.

Limitations of the Study

A convenient sample of Air Force medical care beneficiaries was used in this study which limits generalizability of results. Subjects were predominantly

white with a middle income. Approximately 58 percent were active duty Air Force members. Active duty Air Force members are required to meet Air Force weight standards and their weight is checked twice a year to ensure compliance. If found overweight, members are enrolled in the Air Force Weight Management Program. Non-compliance with a specific weight loss regimen results in punitive action which may be as severe as job loss. This pressure could result in the alteration of an individual's weight control self-efficacy.

Recommendations for Future Research

Initial examination of the psychometric properties of this weight loss self-efficacy questionnaire support continued use and revision of the instrument. The instrument could be revised and retested in the following ways:

a. One item, "You feel embarrassed in a situation." should be dropped since it failed to load significantly under any factor.

b. Three items should be reworded so that they more clearly represented a single high-risk situation.

c. The addition of more items concerning party situations may help to increase reliability. It would be interesting to explore the degree to which alcohol is a determinant of inappropriate eating as opposed to simply a celebration or party situation.

d. In an effort to shorten the Negative Emotional and the Urges and Temptations subscales, items with loadings less than 0.600 could be dropped and the instrument retested to assess the impact on reliability. This criterion level for loading would result in the maintenance of items most powerfully correlated to each of the two subscales. The Negative Emotional subscale would be reduced to 15 items and the Urges and Temptations subscale would be reduced to 10 items.

Additional studies need to be done to further test validity.

a. Discriminant validity of each subscale should be tested to determine if a low self-efficacy score in a particular dimension is predictive of actual relapse situation.

b. Research should be conducted to determine if this instrument aids in predicting which individuals are most likely to relapse following weight reduction training.

c. Future research could be conducted to explore the source of racial differences in self-efficacy.

APPENDIX A

QUESTIONNAIRE COVER LETTER

26 March 1991

Dear Dieter,

I am a graduate dietetics student at the University of Arizona in Tucson. I am doing research involving identification of situations which present difficulties for individuals in their efforts to loss weight and maintain weight loss. The ultimate goal of this research is to improve the quality of dietary counselling provided by the Air Force.

The questionnaire used in the study asks how confident you feel in your ability to stick to your diet or refrain from inappropriate eating in a variety of different situations. It also asks a few short questions about yourself.

You do not have to participate in the study if you don't want to, but if you do I would ask that you fill out the questionnaire as honestly as possible. Take special care to be sure that your answers reflect a true assessment of your ability to refrain from inappropriate eating and not what you hope or wish your ability to be. Please do not discuss your answers with those near you.

I will protect your privacy by not requesting any identification on your survey and by providing an envelop for you to seal your questionnaire in when you have completed it. No individual at your Air Force Base will be shown your completed questionnaire.

I will assume that if you fill out this questionnaire, you have consented to be a participant in this study. If you have any questions and would like to talk to me you may reach me at 602-721-8257.

Thank you for your help.

Joanne M. Spahn, Capt, USAF, BSC
AFIT Student

APPENDIX B

WEIGHT CONTROL QUESTIONNAIRE

WEIGHT CONTROL QUESTIONNAIRE

Below is a list of situations which could be labeled "high risk" for influencing you to slip or abandon your weight control efforts. Please read each item and rate on a scale of 0 to 10 the confidence you have in your ability to avoid inappropriate eating in the given situation. A rating of 0 means that it is virtually impossible for you to avoid inappropriate eating and a rating of 10 means you are perfectly confident in your ability to maintain dietary control in the given situation. Please circle only one number for each item.

IN EACH OF THE FOLLOWING SITUATIONS, HOW CONFIDENT ARE YOU THAT YOU CAN FOLLOW YOUR WEIGHT REDUCTION DIET GOALS.

SITUATION	Not Confident										Very Confident
1. You are feeling very stressed, there are too many demands on your time.	0	1	2	3	4	5	6	7	8	9	10
2. You are bored.	0	1	2	3	4	5	6	7	8	9	10
3. You are in a restaurant and there is a high calorie menu item you have a craving for.	0	1	2	3	4	5	6	7	8	9	10
4. You feel a need to pamper yourself.	0	1	2	3	4	5	6	7	8	9	10
5. You get together with friends and there are lots of high calorie foods served such as alcoholic beverages, chips, and dip.	0	1	2	3	4	5	6	7	8	9	10
6. You are offered a variety of high and low calorie foods to select from in a cafeteria.	0	1	2	3	4	5	6	7	8	9	10

IN EACH OF THE FOLLOWING SITUATIONS, HOW CONFIDENT ARE YOU THAT YOU CAN FOLLOW YOUR WEIGHT REDUCTION DIET GOALS.

SITUATION	Not Confident					Very Confident				
7. You feel embarrassed in a situation.	0	1	2	3	4	5	6	7	8	9 10
8. You want a larger portion than you think you should have.	0	1	2	3	4	5	6	7	8	9 10
9. You are feeling very depressed.	0	1	2	3	4	5	6	7	8	9 10
10. You are tired.	0	1	2	3	4	5	6	7	8	9 10
11. You go out with friends or family.	0	1	2	3	4	5	6	7	8	9 10
12. You are drinking an alcoholic beverage.	0	1	2	3	4	5	6	7	8	9 10
13. Someone hurts your feelings.	0	1	2	3	4	5	6	7	8	9 10
14. You are extremely anxious about something.	0	1	2	3	4	5	6	7	8	9 10
15. You see someone eating a food you like.	0	1	2	3	4	5	6	7	8	9 10
16. You are having a good time at a party or celebration.	0	1	2	3	4	5	6	7	8	9 10
17. You feel someone is intentionally giving you a hard time.	0	1	2	3	4	5	6	7	8	9 10
18. You are undergoing an emotional crisis such as a family illness, death or divorce.	0	1	2	3	4	5	6	7	8	9 10
19. You have a craving for something not on your diet.	0	1	2	3	4	5	6	7	8	9 10

IN EACH OF THE FOLLOWING SITUATIONS, HOW CONFIDENT ARE YOU THAT YOU CAN FOLLOW YOUR WEIGHT REDUCTION DIET GOALS.

SITUATION	Not Confident										Very Confident									
20. You go visiting and are offered a piece of pie or cake.	0	1	2	3	4	5	6	7	8	9	10									
21. Someone puts you down or is very critical of you.	0	1	2	3	4	5	6	7	8	9	10									
22. You are very angry with a person of significance in your life, IE. spouse, friend.	0	1	2	3	4	5	6	7	8	9	10									
23. You go to an event where sweets are served.	0	1	2	3	4	5	6	7	8	9	10									
24. You go with a group of friends to a happy hour.	0	1	2	3	4	5	6	7	8	9	10									
25. You feel neglected by someone.	0	1	2	3	4	5	6	7	8	9	10									
26. You are frustrated, you have done all you can and things are still going poorly.	0	1	2	3	4	5	6	7	8	9	10									
27. You pass a vending machine, ice cream store or food establishment and something tempts you.	0	1	2	3	4	5	6	7	8	9	10									
28. You are with your spouse or friend who is eating ice cream or other high calorie food.	0	1	2	3	4	5	6	7	8	9	10									
29. You feel uncomfortable in a social situation.	0	1	2	3	4	5	6	7	8	9	10									

IN EACH OF THE FOLLOWING SITUATIONS, HOW CONFIDENT ARE YOU THAT YOU CAN FOLLOW YOUR WEIGHT REDUCTION DIET GOALS.

SITUATION	Not Confident					Very Confident				
30. You are in a very bad mood.	0	1	2	3	4	5	6	7	8	9 10
31. You are watching TV and have a strong desire for something to eat.	0	1	2	3	4	5	6	7	8	9 10
32. You get together with a friend to talk.	0	1	2	3	4	5	6	7	8	9 10
33. You feel others are not supporting your efforts to loss weight.	0	1	2	3	4	5	6	7	8	9 10
34. You are nervous and tense.	0	1	2	3	4	5	6	7	8	9 10
35. You are working on something tedious and want a break.	0	1	2	3	4	5	6	7	8	9 10
36. Your meal was excellent and you are tempted to have seconds.	0	1	2	3	4	5	6	7	8	9 10
37. You are separated from family and friends.	0	1	2	3	4	5	6	7	8	9 10
38. Someone is nagging you.	0	1	2	3	4	5	6	7	8	9 10
39. You feel very hungry.	0	1	2	3	4	5	6	7	8	9 10
40. You are worried.	0	1	2	3	4	5	6	7	8	9 10
41. You do not feel well physically.	0	1	2	3	4	5	6	7	8	9 10

I would appreciate it if you could give me a little information about yourself.

42. Please circle the number which best indicates the number of weight reduction diets you have been on in the past.

1. NONE
2. 1 OR 2
3. 3 OR 5
4. INNUMERABLE

43. Please circle the number which best describes in general, how successful you feel you were in past dieting attempts.

1. NOT APPLICABLE, I HAVE NEVER DIETED BEFORE
2. VERY SUCCESSFUL
3. SOMEWHAT SUCCESSFUL
4. NOT SUCCESSFUL AT ALL

44. Your sex. (circle number of your answer)

1. MALE
2. FEMALE

45. Your height. _____

46. Your current weight. _____ POUNDS

47. Your present marital status. (Circle number)

1. NEVER MARRIED
2. MARRIED LIVING WITH SPOUSE
3. MARRIED NOT LIVING WITH SPOUSE
4. DIVORCED OR LEGALLY SEPARATED
5. WIDOWED

48. Your present age: _____ YEARS

49. Are you presently: (Circle number)

1. ACTIVE DUTY. . . YOUR RANK _____
2. IN THE RESERVES. . . YOUR RANK _____
3. IN THE NATIONAL GUARD. . . YOUR RANK _____
4. RETIRED
5. A DEPENDENT

ONLY ONE MORE PAGE TO GO!

50. What was your approximate net family income from all sources, before taxes, in 1990? (Circle number)

1. LESS THAN \$3000
2. 3,000 TO 4,999
3. 5,000 TO 6,999
4. 7,000 TO 9,999
5. 10,000 TO 14,999
6. 15,000 TO 19,999
7. 20,000 TO 29,999
8. 30,000 TO 39,999
9. 40,000 TO 49,000
10. OVER \$50,000

51. Which of the following best describes your racial or ethnic identification? (Circle number)

1. AFRICAN-AMERICAN
2. HISPANIC
3. AMERICAN INDIAN
4. WHITE
5. ORIENTAL
6. OTHER--SPECIFY _____

51. Which is the highest level of education that you have completed? (Circle number)

1. NO FORMAL EDUCATION
2. SOME GRADE SCHOOL
3. COMPLETED GRADE SCHOOL
4. SOME HIGH SCHOOL
5. COMPLETED HIGH SCHOOL
6. SOME COLLEGE
7. COMPLETED COLLEGE
8. SOME GRADUATE WORK
9. A GRADUATE DEGREE

When you are done, just seal your questionnaire in the white envelope provided and give it to the instructor of your class.

MANY THANKS!

APPENDIX C

INTRODUCTORY LETTER TO THE DIETITIAN

29 March 1991

Dear Major --,

Thank you very much for your assistance with my research project. I am attempting to design and validate a multidimensional instrument which can measure weight loss self-efficacy with each dimension representing a specific type of relapse situation. Self-efficacy is defined as an individual's own belief in his/her capacity to accomplish a task at a certain level of performance. It is proposed that measures of situational self-efficacy can facilitate the identification of situations in which a particular person is at high risk for relapse. If so, this would permit targeting of weight reduction therapy to specific high-relapse-risk situations which are pertinent to a particular patient.

Enclosed are, I hope, are all the materials you will need to assist with my study. I have also included a page outlining procedures for distributing the questionnaire. I would appreciate it if you would send the completed questionnaires back to me after each class. This will make data entry into the computer a little more manageable on my end.

If you don't have enough questionnaires and cover letters for everyone in the last class which will be involved in the study, I think it would be easiest if you would make a few extra copies of the cover letter and questionnaire so that all individuals in a single class have an opportunity to participate. Otherwise, I think those without a questionnaire may get anxious about the class beginning a little late. It takes a weight reduction class approximately ten minutes to complete the questionnaire.

If you have any questions, don't hesitate to call. I put all the necessary phone information on the procedures page. Thank you very much for your help.

Sincerely,

JOANNE M. SPAHN, Capt, USAF, BSC
AFIT Student

APPENDIX D

PROCEDURES FOR QUESTIONNAIRE DISTRIBUTION

PROCEDURES FOR QUESTIONNAIRE DISTRIBUTION

1. Ask each individual, active duty, dependent or retired, attending your weight reduction class if they would be willing to participate in a research project.

"A student from the University of Arizona is doing a study aimed at improving the quality of diet counseling provided by the Air Force. Participation would involve filling out a questionnaire. This letter discusses the study (hand them the cover letter). Would you be willing to participate?"

2. Provide all patients with a copy of the cover letter requesting their participation.

3. If an individual agrees to participate, provide him or her with a questionnaire along with a white business envelope. Tell them to seal the questionnaire in the envelope after they have completed it.

4. Please note the number of individuals who decline to participate in the study and write the number on the outside of the envelope you send the questionnaires back to me in.

5. Persons need to fill out the entire questionnaire prior to the diet instruction since the instruction may affect their responses.

6. Before class begins, collect the white envelopes and put them in one of the large envelopes enclosed and send them back to me.

7. Thank the individuals for participating in the study.

8. Please send the envelope filled with completed questionnaires back to me after each class. Send them via inter-base mail to:

Captain Joanne M. Spahn
c/o Lt. Joanne Hare
836th Medical Group/SGF
Davis-Monthan AFB, Az 85707-5300

9. If you have any questions you can reach me through the Davis-Monthan autovon operator. That number is 361-1110. Ask them to put through a local Tucson call. My number is 721-8257. The commercial area code is 602. If I am not home leave a message on the answering machine. If you need a question answered immediately, Lt Hare or

Ms. Cathy McGuire at Davis-Monthan may be able to answer your question. They helped with my initial pilot study. Their autovon number is 361-4057 or 361-5634.

APPENDIX E

ROTATED FACTOR PATTERN

Rotated Factor Pattern

	FACTOR1	FACTOR2	FACTOR3
STRESS	<u>0.72079</u>	0.18001	0.18969
BORED	<u>0.47621</u>	0.34328	0.18664
MENUCRAV	0.09874	<u>0.67210</u>	0.19376
PAMPER	0.27615	<u>0.43216</u>	0.27061
TOGETHER	0.20011	0.44950	<u>0.62369</u>
CAFERERA	0.24074	<u>0.50666</u>	0.13833
EMBARRAS	0.39898	0.38684	0.13418
PORTION	0.25485	<u>0.63071</u>	0.15352
DEPRESSD	<u>0.69563</u>	0.31446	0.09631
TIRED	<u>0.68318</u>	0.27998	-0.13386
GOOUT	0.23061	<u>0.57575</u>	0.29741
ALCOHOL	0.08032	0.07064	<u>0.84734</u>
HURTFEEL	<u>0.76925</u>	0.19539	0.15765
ANXIOUS	<u>0.72823</u>	0.19703	0.05721
SEEEAT	0.23574	<u>0.70530</u>	0.02486
PARTY	0.17847	0.38642	<u>0.64896</u>
HARDTIME	<u>0.71661</u>	0.25554	0.01839
CRISIS	<u>0.69486</u>	0.01049	0.26481
CRAVING	0.22645	<u>0.65632</u>	0.16236
VISITING	0.23617	<u>0.72099</u>	0.10767
PUTDOWN	<u>0.78456</u>	0.16895	0.16182
ANGRY	<u>0.79236</u>	0.21139	0.11150
SWEETS	0.26671	<u>0.71729</u>	0.12367
HAPPYOUR	0.09786	0.24551	<u>0.84188</u>
NEGLECT	<u>0.77228</u>	0.21878	0.13913
FRUSTRAT	<u>0.75911</u>	0.27971	0.13482
TEMPT	0.21017	<u>0.70921</u>	0.11955
WITHEAT	0.14138	<u>0.77533</u>	0.08664
UNCOMSOC	<u>0.58480</u>	0.29453	0.25968
BADMOOD	<u>0.75719</u>	0.25029	0.07308
TV	0.38669	<u>0.58950</u>	0.09959
TALK	0.35699	<u>0.59834</u>	0.00551
SUPPORT	<u>0.53439</u>	0.46740	-0.04850
NERVOUS	<u>0.77484</u>	0.26495	0.12519
TEDIOUS	0.42732	<u>0.58171</u>	0.05433
SECONDS	0.16608	<u>0.72789</u>	0.10387
SEPERATE	<u>0.57189</u>	0.28361	0.24433
NAGGING	<u>0.70947</u>	0.37005	-0.02255
HUNGRY	0.21653	<u>0.67330</u>	0.19496
WORRIED	<u>0.82333</u>	0.25238	0.02318
FELLWELL	<u>0.59527</u>	0.32145	-0.07840

Variance explained by each factor

FACTOR1	FACTOR2	FACTOR3
11.236462	8.776161	3.064616

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