THE RELATIONSHIP BETWEEN SELF-REPORTED BULIMIC BEHAVIOR AND CARDIOVASCULAR REACTIVITY TO A WEIGHT STRESSOR

DISSERTATION

Presented to the Graduate Council of the
University of North Texas in Partial
Fulfillment of the Requirements

For the Degree of

DOCTOR OF PHILOSOPHY

By

Deborah K. Marcontell, B.S., M.S.

Denton, Texas

August, 1993

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This investigation sought to identify anxiety responses to weight measurement, assessed by verbal report and cardiovascular reactivity [CR] (systolic blood pressure, diastolic blood pressure, heart rate), which might differentiate females with either high or low self-reported bulimic behavior. Secondarily, the study attempted to examine specific autonomic nervous system (ANS) arousal patterns of each group over time.

The Bulimia Test (BULIT), Body Dissatisfaction Scale (BD), and a demographic questionnaire were administered to 105 undergraduate females at The University of North Texas. Based on BULIT scores, females were divided into high or low bulimic behavior groups. Of the 105 females screened, forty participated in the experiment which consisted of four phases: relaxation, anticipation of weight measurement, weight measurement, and recovery. Subjects had no prior knowledge of the weight stressor until presentation during the experiment.

Results showed that subjects' notion of ideal weight was substantially lower than measured weight. During weight measurement, all subjects reported increased anxiety although the high group reported significantly more anxiety. Contrary to prediction, no significant group differences in CR were found when repeated measures multivariate analysis of variance (MANOVA) was performed. Orthogonal polynomial trend analysis was done with pooled groups, resulting in significant within-subject trends for all cardiovascular measures. There was also a significant group by time of measurement interaction for heart rate during the weight measurement phase. Correlational analyses failed to produce significant results between verbal report of anxiety and CR. There was, however, a significant correlation between BULIT and BD scores.

It was concluded that heightened subjective anxiety during weight measurement could not be attributed to group differences in CR. Regarding ANS arousal patterns, mixed evidence of active and passive coping was seen. Nevertheless, both psychological and physiological measures supported an overvaluation of female thinness consistent with societal trends regardless of group membership. Implications of findings were discussed along with suggestions for future research.

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INTRODUCTION

It has long been recognized that "vomitoriums" were used in ancient Rome, but the eating disturbance known as bulimia nervosa did not begin to receive notoriety as a psychiatric disorder until the 1980s. Russell (1979) was the first to systematically study the disorder and coin it "bulimia nervosa" (Leon, Carroll, Chernyk, & Finn, 1985). His original diagnostic criteria included: powerful and intractable urges to overeat, avoidance of the fattening effects of food by inducing vomiting and/or abusing purgatives, and a morbid fear of being fat (Russell, 1979). In 1980, the American Psychiatric Association included bulimia nervosa in the Diagnostic and Statistical Manual of Mental Disorders, Third Edition (DSM-III) as an eating disturbance separate from anorexia nervosa (American Psychiatric Association, 1980; Beumont, 1988). Agras (1987) stated that in 1979, the Stanford Eating Disorders Clinic reported a maximum of ten bulimic cases occurring that year. In 1980, the number of cases began to rise and by 1987, 200 cases were seen at the Stanford Clinic.

The Definition of Bulimia

In order to understand what bulimia nervosa is, a working definition of the disorder must be given. The most recent definition, and that used by many of the investigators cited in this paper, is given by The Diagnostic and Statistical Manual of Mental Disorders, Third Edition, Revised, or DSM-III-R, (American Psychiatric Association, 1987). The defining criteria for diagnosis are:

A. Recurrent episodes of binge eating (rapid consumption of a large amount of food in a discrete period of time).

B. A feeling of lack of control over eating behavior during the eating binges.

C. The person regularly engages in either self-induced vomiting, use of laxatives or diuretics, strict dieting or fasting, or vigorous exercise in order to prevent weight gain.

D. A minimum average of two binge eating episodes a week for at least three months.

E. Persistent overconcern with body shape and weight (pp. 68-69)

In addition to diagnostic criteria, The American Psychiatric Association (1987) gives the following associated features:

1. depressed mood is routinely observed
2. patients are usually within normal weight range

3. patients are at risk for substance abuse or dependence in the form of alcohol, anxiolytics, and amphetamines (pp. 68-69)

Psychological and Behavioral Correlates

A vast amount of research has focused on the psychological and behavioral correlates of bulimia nervosa. Three such correlates were listed above as associated features of the disorder (American Psychiatric Association, 1987). Mention will be made here of those characteristics that have been consistently corroborated.

The association between depressive symptomatology and bulimia nervosa has been widely observed (Gross & Rosen, 1988; Hawkins & Clement, 1980; Leon, Carroll, Chernyk, & Finn, 1985; Prather & Williamson, 1988; Wolf & Crowther, 1983). It has also been shown that as severity of the disorder increases, so does degree of depression (Wilson & Lindholm, 1987). This has raised the question of whether a clinical mood disorder is present among bulimics. Research indicates, however, that bulimics typically do not meet the criteria for a major depressive episode (Johnson-Sabine, Wood, & Wakeling, 1984; Weiss & Ebert, 1983) and that their mood may be more accurately described as dysphoric (Johnson-Sabine, Wood, & Wakeling, 1984). What remains unclear, however, is whether the presence of altered mood is primary or secondary to bulimia. There is some preliminary evidence to suggest that the behavioral changes of bulimics

precede mood changes but further study is needed in this area (Johnson-Sabine, Wood, & Wakeling, 1984). Another feature of bulimia nervosa is low self-esteem (Gross & Rosen, 1988; Hawkins & Clement, 1980; Nagelberg, Hale, & Ware, 1984; Wolf & Crowther; 1983) which may be related to body dissatisfaction and image. Results of a recent survey on body image were published in the April, 1992 issue of Self, a popular woman's magazine. Of the 5,000 respondants, only seven percent reported body satisfaction, 94% admitted thinking about weight either constantly or frequently, and 84% described themselves as overweight. Despite lack of demographic data and possible selection bias, this survey nonetheless exemplifies the general negativity that many women have toward their bodies. Thus, it is not surprising that many bulimics report body dissatisfaction (Leon, Carroll, Chernyk, & Finn, 1985; Szekely, Raffeld, & Snodgrass, 1989; Wolf & Crowther, 1983; Willmulth, Leitenberg, Rosen, & Cado, 1988; Zakin, 1989) and negative body image (Rozin & Fallon, 1988; Thomas, 1989; Willmuth, Leitenberg, Rosen, & Cado, 1988).

Studies utilizing self-report scales have substantiated feelings of external locus of control in bulimics (Allerdissen, Florin, & Rost, 1981; Nagelberg, Hale, & Ware, 1984; Rost, Neuhaus, & Florin, 1982; Weiss & Ebert, 1983). Upon analysis, it was discovered that bulimics attribute more control to perceived superior others as well as to fate

(Allerdissen, Florin, & Rost, 1981; Weiss & Ebert, 1983). Johnson and Love (1985) conducted a study consisting of 800 women with binge eating episodes. Results indicated that the perceived degree to which the subject felt out of control regarding food consumption was the most powerful predictor of life impairment. These authors warn, however, that the range of bulimic behavior varied considerably, which weakened the results. Often accompanying external locus of control are feelings of helplessness (Rost, Neuhaus, & Florin, 1982; Torem, 1987; Weiss & Ebert, 1983). Ironically, the bulimic may feel a sense of control once purging has occurred, but purging actually increases feelings of helplessness (Johnson & Love, 1985; Sallas, 1985).

Additional characteristics associated with bulimia nervosa are dieting behavior (Vanderheyden, Fekken, & Boland, 1988; Wolf & Crowther, 1983), anxiety (Leitenberg, Gross, Peterson, & Rosen, 1984; Prather & Williamson, 1987; Weiss & Ebert, 1983; Steere, Butler, & Cooper, 1990), and increased risk of substance abuse or dependence (American Psychiatric Association, 1987; Leon, Carroll, Chernyk, & Finn, 1985). Furthermore, family history of substance abuse has been identified as a potential risk factor as well as a correlate (Leon, Carroll, Chernyk, & Finn, 1985).

In an attempt to categorize psychological and behavioral correlates of bulimia nervosa, Vanderheyden, Fekken, & Boland (1988) conducted a factor analytic study. The investigation

consisted of 158 college females who ranged from no eating disturbance through various degrees of binge eating to binge-vomiting. The binge-vomiters comprised 11.4% of the sample and binge-vomit status was verified by personal interview. Data anyalsis was performed using principal components factor analysis on 24 variables. The measures from which variables were gleaned included: the Binge Scale, Restraint Scale, and Eating Disorder Inventory to assess eating disturbance, the Negative Self-Image Scale, Hopkins Symptom Checklist to assess psychopathology, Jackson Social Desirability Scale to assess response style, and ancillary measures of height and weight. Six factors were chosen based on eigenvalues greater than one. A scree test pointed to four or five factors which were subjected to varimax rotation. Higher communalities and a more interpretable solution were obtained for five factors.

The first factor was labeled "binge-restraint dynamics" representing food reduction variables such as dietary restraint, dieting, and drive for thinness. Also loading heavily on this factor were: bulimia, food preoccupation, binge eating, negative self-image, body dissatisfaction, weight status, and interoceptive awareness. The second factor, as identified by Vanderheyden and her colleagues, was "psychopathology". This factor was loaded entirely by the Hopkins Symptom Checklist subscales. The third factor was termed "social dysfunction" and tapped feelings of

inadequacy, lack of control, interpersonal distrust, and low self-esteem. The fourth factor, "weight and body shape" reflected dissatisfaction with body size, shape, and weight. The final factor, "achievement", represented perfectionism and grade in current psychology course.

The authors argue that, for every dimension, associations between the factors and bulimia have been reported in the literature. However, the orthogonal nature of the factors opposes a unidimensional view of the disorder and supports the idea of heterogeneity among bulimics. In summary, the authors concluded that although five factors were identified for a university sample of various degrees of eating disturbance, some problems may reflect the university sample itself as opposed to comprising components of the disorder. Obviously then, conclusions about underlying elements of the disorder cannot be made and further research of this nature is needed.

Methodological Difficulties

A fundamental problem facing researchers investigating bulimia nervosa is the selection of inclusion criteria. Although recent studies use DSM-III-R criteria given above (American Psychiatric Association, 1987), many studies still report findings based on the third edition of the Diagnostic and Statistical Manual of Mental Disorders, or DSM-III (Wilson & Walsh, 1991). The third edition requires neither a minimum average of two binge episodes per week nor purging,

strict dieting, or vigorous exercise for diagnosis (American Psychiatric Association, 1980). These differences have significant implications for prevalence rates. A recent study pointed out this difficulty by explaining that higher prevalence rates have been reported in the past utilizing the less restrictive DSM-III criteria (Pyle, Neuman, Halvorson, & Mitchell, 1991). This complicates longitudinal tracking of the disorder and may result in either under or overestimation. It also makes comparisons across studies difficult, if not impossible (Nagelberg, Hale, & Ware, 1984).

Selection of inclusion criteria also affects studies investigating personality and/or behavioral correlates of bulimia nervosa. For example, one study (Willmuth, Leitenberg, Rosen, & Cado, 1988) which has been praised for its design (Wilson & Walsh, 1991), found significant differences between purging and non-purging bulimics on such dimensions as anxiety and body size distortion, with purging bulimics reporting greater instances of each. For this reason, coupled with the popular conception of bulimia nervosa as a binge/purge disorder as well as numerous studies describing subjects who purge, the forthcoming Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV) is likely to restrict the diagnosis of bulimia nervosa to those who binge and purge (Wilson & Walsh, 1991).

According to Wilson and Walsh (1991), specificinclusion criteria issues that have surfaced in light of DSM-IV

development are (a) whether to limit diagnosis to two binge episodes per week and (b) what is defined as a "large" amount of food. The DSM-IV Eating Disorders Work group noted that the twice weekly binge criterion was rather arbitrary and, based on preliminary data, whether bulimics binge once a week or more is independent of concommitant psychopathology and treatment outcome. In other words, frequency of binge was not as important as the presence of binge behavior. With respect to an operational definition of a "large" amount of food, guidelines will be provided in DSM-IV based on the work of Fairburn (1987). Overall, these guidelines should help clinicians make more reliable diagnoses and perhaps reduce error variance due to clinical judgement decisions in research.

Another source of methodological difficulty in bulimia research is reliance upon self-report measures (Nagelberg, Hale, & Ware, 1984; Pyle, Neuman, Halvorson,& Mitchell, 1991). Some researchers question the accuracy of data, arguing that response styles may be defensive or self-deprecatory resulting in under or over-reporting of the disorder, respectively. Differences in diagnosis have also been documented when self-report measures were compared to clinical interviews (Pyle, Halvorson, Neuman, & Mitchell, 1986). Fairburn and Beglin (1990) noted that studies relying upon self-report questionnaires to diagnosis bulimia nervosa found prevalence rates ranging from 3-19%. In contrast,

those using clinical interviews yielded rates ranging from 1-3%. Other criticisms of self-report questionnaires include: faulty sample selection, administration difficulties, low response rates, and lack of operationalized criteria (Pyle, Halvorson, Neuman, & Mitchell, 1986).

Demographic Characteristics of Bulimics

Although the aforementioned criteria and correlates give a symptomatic description of what bulimia nervosa consists of, it fails to provide a conceptual image of which individuals are most susceptible to the disorder. Bauer, Anderson, and Hyatt (1986) resolved this problem by compiling demographic characteristics of the typical bulimic. Of foremost importance was the finding that 90 to 95% of all reported bulimics are female. The mean age of female bulimics was identified as 23.5 years with the range spanning from approximately 18 to 35 years. The authors also found that most bulimics are unmarried and 77% come from an upper social class. Over half of these women are in school during the course of their disorder. Psychologically, researchers such as Fairburn and Cooper (1984) have pointed out that although the typical bulimic is of average body weight, there is an intense fear of becoming obese. In fact, these researchers discovered that 86% of the women they surveyed suffered from this fear and 55% were very aware of and sensitive to weight gain. Moreover, 23% had a persistent goal of acheiving weight loss. Other researchers have found

similar results (Inbody & Ellis, 1985; Laberg, Wilson, Eldredge, & Nordy, 1991; Steere, Butler, & Cooper, 1990).

In sum, individuals most likely to exhibit bulimic behavior and most susceptible to developing bulimia nervosa can be described as relatively young, single, female college students. Furthermore, evidence points to Caucasians as the racial group most vulnerable to thedisorder (Rucker & Cash, 1992). Psychologically, the most pervasive characteristic is a "morbid" fear of weight gain as first described by Russell (1979).

Demographic Biases in Subject Selection

Historically, investigators have centered on females in the study of bulmia nervosa. There are several possible reasons for this phenomenon. First, there is a preponderance of evidence revealing that females are more susceptible to developing eating disorders, or characteristics of such, that are males (Bauer, Anderson, & Hyatt, 1986; Fairburn & Beglin, 1990; Pyle, Neuman, Halvorson, & Mitchell, 1991; Rand & Kuldau,, 1992, Schmolling, 1988; Szekely, Raffeld, & Snodgrass, 1989). Second, some researchers have proposed that cultural pressure imposed upon females to assume an ideal standard of thinness as presented by the media plays a role in the etiology of eating disorders (Agras, 1987; Garner, Garfinkel, Schwartz, & Thompson, 1980; Pyle, Neuman, Halvorson, & Mitchell, 1991; Thomas, 1989; Wiseman, Gray, Mosimann, & Ahrens, 1992). Cross-cultural studies have shown

that societies identifying with a more Western view of attractiveness, which emphasizes thinness, are experiencing the emergence of eating disorders (Nasser, 1988). Before the countries adopted a more Western view of attractiveness, reports of eating disorders were relatively rare. Furthermore, females were found to be especially vulnerable to this change. A third possible reason for the focus on females is that eating disorders are more likely to occur among individuals preoccupied with weight and body shape. Such persons are typically female (Hsu, 1989).

Race is another source of bias in previous samples studied. The majority of investigations involving eating disorders have used Caucasian females as subjects (Thomas, 1989). This may be due, in part, to self-report evidence suggesting that white females possess greater bulimic behavior and body dissatisfaction than nonwhite females (Gray, Ford, & Kelly, 1987; Nevo, 1985; Rucker & Cash, 1992; Schmolling, 1989). However, contradictory results have been found in the limited number of available studies (Rand & Kuldau, 1992; Smith & Krejci, 1991; Thomas, 1989). Methodologically, a major problem of racial differences investigations has been inadequate samples of either white or nonwhite subjects, making comparisons difficult. Given this, it is not surprising that the issue remains debatable. Nevertheless, implications are that the development of eating disorders is more gender-related than race-related. Finally,

many eating disorder studies have utilized university samples for a variety of reasons. The most obvious advantage is the accessibility of subjects, especially for researchers associated with universities. More important, it has been established that university students more commonly engage in binge eating compared to nonstudents (Leon, Carroll, Chernyk, & Finn, 1985; Rand & Kuldau, 1992; Vanderheyden, Fekken, & Boland, 1988). For example, Hart and Ollendick (1985) found that from a sample of 234 female college students, 69% engaged in binge eating episodes compared to 41% of 139 nonstudent females. The authors caution, though, that less than half of the nonstudent females completed the questionnaires, suggesting a self-selection bias in favor of eating-disordered nonstudents. Another study found that from a sample of 141 female college students, 79% reported binge eating episodes (Nagelberg, Hale, & Ware, 1984). Hence, the incidence of bingeing on college campuses is high and more variance in severity of eating disturbance is also observed (Vanderheyden, Fekken, & Bolen, 1988). A third advantage of university samples has to do with the belief that eating disorders are more prevalent among young females of relatively high socioeconomic status [SES] (Schmolling, 1988). It is likely that university samples will be comprised of individuals possessing these demographic characteristics.

In conclusion, most studies of bulimia have not used samples representative of the general population. Instead, researchers have relied upon relatively young, Caucasian, female college students as subjects. This phenonmenon is probably due to evidence indicating that such females are the individuals most likely to display bulimic and related behaviors.

The Binge

Bauer, Anderson, and Hyatt (1986) revealed that the typical bulimic binge is comprised of approximately 3500 calories and, in some cases, may be repeated several times a day. Binge length has been established to range from several hours to over a day (Leon, Carroll, Chernyk, & Finn, 1985). Bauer and her colleagues describe common binge foods as high in carbohydrates, easy to swallow, and smooth in texture. The choice of easily ingested food reflects the fact that purging is often accomplished by way of vomiting and smooth textured foods are regurgitated more readily. However, bulimics who vomit regularly often become quite proficient, thereby precluding the need for induction of vomiting (e.g., placing fingers in throat, emetics). In addition, purging is not limited to vomiting. It has been recognized that laxatives, diuretics, emetics, and strenuous exercise are utilized to purge and control weight as well (American Psychiatric Association, 1980; American Psychiatric Association, 1987; Bauer, Anderson, & Hyatt, 1986).

With respect to the fact that binge food is often high in carbohydrates and/or composed of simple sugars, Agras (1987) has reported physiological research to account for the preference. Briefly, animals who are deprived of food for a short period of time begin to develop a preference for previously disliked sweet foods. A similar craving was observed in long term deprivation states as well. Such evidence implies that the restriction of food consumption through dietary control may actually increase physiological desire for the sweet foods chosen during a binge and function in a self-defeating manner.

Health Risks

Due to the observation that many bulimics binge and purge in excess of once per day (Agras, 1987; Bauer, Anderson, and Hyatt, 1986), there are certain health risks which may ensue. Agras (1987) identified seven such risks that include the following:

1. menstrual disturbances due to weight loss
2. dental cavities resulting from the consumption of simple sugars
3. tooth enamel loss due to repeated vomiting
4. low potassium levels as a result of repeated vomiting and/or the use of purgatives
5. cardiac arrythmias and renal damage due to insufficient intake of potassium

6. chronic hoarseness and bleeding esophageal lesions due to repeated vomiting

7. stomach rupture due to repeated vomiting

Anemia, urinary infections, epileptic seizures, and cardiovascular failure have also been associated with bulimia nervosa (Weiss & Ebert, 1983). Symptomatic complaints noted from self-report data include hypothermia, dizziness, headache, heart, chest, and back pain (Weiss & Ebert, 1983).

In contrast to their anorexic counterparts, Agras (1987) describes most bulimics as relatively "normal" in reference to weight and attractive in appearance. Thus, this population may be at risk medically, while not appearing so to the outside observer. Nevertheless, the majority of bulimics are in relatively good health without evidence of a serious medical and/or psychological disorder. This may partially account for the difficulty associated with identifying individuals exhibiting the disorder.

Thus far, bulimia nervosa has been explained in terms of its diagnostic criteria, associated features, and a profile of the typical bulimic along with her health risks. Although adequate for descriptive and diagnostic purposes, the above characterization fails to explain the developmental course of the disorder.

Theories of Etiology

There are currently four major theoretical explanations for the etiology of this eating disturbance.

Psychoanalytic Model

The psychoanalytic model for bulimia nervosa as presented by Schwartz (1988) espouses that it is a result of struggles between introjection and projection processes during the oral stage of development. Introjection refers to the absorption into the unconscious of attitudes and/or characteristics of, in the bulimic's case, her mother or primary caregiver. Projection, as defined by Corsini (1987), is the attribution of unacceptable feelings, thoughts, or behaviors within oneself to an external source. Thus, the bulimic is viewed as yearning for oral mothering and wanting to introject mother's attitudes, yet simultaneously having the need to eliminate that urge. The need to absolve desires for oral mothering occurs because the bulimic's mother is considered to be highly controlling and domineering. Consequently, struggles between gratifying the need for oral mothering and establishing differentiation ensue. This struggle is projected onto food.

Schwartz (1988) explains that the bulimic's failure to differentiate from her mother or primary caretaker during the oral stage of development results in a lack of ability to distinguish boundaries between internal and external stimuli. Subsequently, the body is used as a transitional object which is neither entirely objective nor subjective. When this occurs, energy is no longer available to create symbolic levels of consciousness. In other words, long lasting

objects, which Schwartz defines as people or events that satisfy an instinctual state, cannot be symbolized or mentally represented in their absence. This results in the bulimic resorting to her body as a means of transcending the diffuse mother-daughter boundaries. By bingeing, she is symbolically becoming one with her mother and gratifying her need for oral mothering. By purging, she is attempting to establish differentiation and rid herself of the dominant mother.

To summarize Schwartz's explanation of bulimia nervosa, it is the mother's need for control and dominance that is introjected into the bulimic's unconscious during the oral stage of development. This unconscious introjection interferes with the child's establishment of boundaries towards the end of the oral stage. Thus, the body must be utilized both as a method of gratifying internal need states such as desires for oral mothering, and coping with external circumstances such as a domineering and controlling mother. The bulimic's negative feelings about her mother are projected onto food, weight, and eating behavior because they are purported to be "unacceptable" and anxiety provoking to consciousness. In short, the function of bulimia nervosa is to keep negative feelings towards the controlling mother out of consciousness.

Schwartz (1988) acknowledges the need for investigation into the validity of this model as there have been few

empirical studies done at this time. Furthermore, Sohlberg, Rosmark, Norring, and Holmgren (1987) determined that psychotherapy based on the psychoanalytic model of bulimia nervosa in combination with a dietary regimen failed to be superior to control groups with either a history of various other treatment approaches or no treatment. Thus, there is currently little in the way of experimental evidence to support this model.

Cognitive-Behavioral Model

Clinicians have recognized the existence of many different cognitive components in the bulimic. Bauer, Anderson, and Hyatt (1986) specified five such components:

1. need for control
2. need for perfection, which when present with need for control, results in dichotomous thinking
3. need for approval
4. body dissatisfaction
5. low self-esteem

Fairburn (1988) claims that, from a clinical perspective, many important cognitive components appear to fluctuate in severity. One of the most prominent cognitions displayed by a bulimic is the almost phobic fear of becoming obese (Fairburn & Garner, 1986; Inbody & Ellis, 1985; Laberg, Wilson, Eldredge, & Nordy, 1991; Russell, 1979; Steere, Butler, & Cooper, 1990). According to Fairburn, this feeling

of "fatness" is intensified by bingeing episodes and associated with feelings of powerlessness over eating behavior. In contrast, when obesity fears are less intense, a more normal control over eating behavior is evidenced. It is in this manner that the experience of "feeling fat" fluctuates in intensity.

The "feeling fat" experience is also sensitive to mood. For example, when mood is depressed, the feeling intensifies. In addition, severity of eating disturbance often covaries with mood (Johnson-Sabine, Wood, & Wakeling, 1984; Wilson & Lindholm, 1987). Other bulimic researchers claim that the "feeling fat" phenomenon is actually a representation of other cognitive states such as anxiety, boredom, and/or depression (Fairburn, 1988). Therefore, cognitivists suspect that a variety of subjective experiences exist that relate to a bulimic's eating behavior.

The cognitive-behavioral model of bulimia nervosa as delineated by Fairburn (1988) asserts that particular cognitive states activate the binge cycle. Subsequently, an intense "feeling of fatness" occurs which, in turn, is extremely anxiety provoking. To relieve the anxiety, the bulimic is compelled to engage in vomiting and/or other purging methods. The purging serves to relieve not only anxiety, but the phobic fear of becoming obese as well. Consequently, purging functions as negative reinforcement in the form of phobic stimulus (i.e., obesity) avoidance. The

aspect of the cognitive-behavioral model which emphasizes anxiety was initially proposed by Rosen and Leitenberg and is known as the "Anxiety Model of Bulimia" (Rosen & Leitenberg, 1982).

Research by Thompson, Berg, and Shatford (1987) adds support for a cognitive-behavioral explanation of bulimia. These researchers compared three groups of women on the extent to which they used food as a coping mechanism and the degree to which they possessed cognitive distortions regarding food and weight. The groups were divided into those who were symptom-free, according to DSM-III-R criteria, those who were "bulimic-like" or possessed some but not all of the bulimic criteria, and those who met the criteria for diagnosis. The women were measured by various questionnaires and surveys to determine behaviors, attitudes, eating patterns, uses of food, and cognitive distortions. Results demonstrated that the symptom-free, bulimic-like, and bulimic groups differed in a linear fashion from low to high scores, respectively, on the use of food as a coping mechanism as well as number of cognitive distortions about food and weight. The bulimic group obtained the highest scores on dichotomous thinking, worry, magnification of negative events, personalization of events, and superstitious thinking.

These findings suggest that particular cognitive states bingeing and purging behavior and are indeed related to

bulimia. Earlier research conducted by Freeman, Beach, Davis, and Solyom (1985) revealed that dissatisfaction with body image as measured by a distorting video camera technique was the best predictor of relapse in bulimic patients, thus corroborating the role of cognitions in the development of bulimia. Fairburn (1988) warns, however, that systematic research utilizing the cognitive-behavioral paradigm is sparse and much remains untested. To date, research utilizing the anxiety model, in particular, has focused on treatment outcome.

Family Systems Model

The family systems model is based on the idea that family interactions resemble patterns of operations seen in machines and computers. Root, Fallon, and Friedrich (1986) explain that within a family system, there are limits under which the system operates. When the system receives positive feedback in reaction to stress, change occurs, allowing the system to operate at a higher level. When negative feedback is received, the system remains unchanged or homeostatic. Dysfunctional families maintain old styles of interaction which keep them homeostatic.

According to Root, Fallon, and Friedrich (1986) bulimic families use the symptomatic member's illness to divert attention away from a strained intrafamily relationship. In most cases, it is the spousal relationship which is strained. The entire system begins experiencing stress when the

daughter enters adolescence and would typically begin to differentiate herself from the family. In these families, however, there is overinvolvement or enmeshment between members due to diffuse boundaries of physical as well as psychological space. Instead of aiding the daughter to differentiate, which requires new interactional patterns, they remain homeostatic. Thus, the family's interactional patterns actually encourage symptoms.

Root, Fallon, and Friedrich (1986) posit that the function of bulimia nervosa in a family system differs depending upon family type. In the "perfect family", there are very rigid rules that govern behavior. Additionally, bulimic members of this family are typically high achievers relative to family standards. The family reputation is sacred and members are expected to think, act, and feel the "right" way. Appearance is also of utmost importance, as this family type appears "perfect" to outside observers. As a result, bulimia nervosa allows the bulimic to accomplish the following: (a) passive rebellion against the system (b) creation of a separate identity for herself (c) suppression of feelings by focusing on food (d) assertion of control over oneself in the midst of a controlling family.

A second family type, as discussed by Root, Fallon, and Friedrich (1986), is the "overprotective family" which is characterized by its nurturance of dependence and refusal to acknowledge needs for independence. Anger is seldom overtly

displayed in this family, so that passive-aggressive behaviors develop thereby hindering direct expressions of rebellion. Bulimic symptoms in this family serve as a means of passive rebellion and indirect expulsion of anger while simultaneously reaffirming dependence on the family.

The third family type discussed by Root and her colleagues (1986) is the "chaotic family". In opposition to the "perfect family" who has many rules, the chaotic family has virtually none. Organization and consistency are lacking, the availability and expression of love is unpredictable, and conflict resolution is usually forced by physical aggression and/or psychological intimidation. Bulimia nervosa within this family atmosphere serves as a safe way to express anger, a means of separating oneself from the abusive situation, and as a means of asserting consistency in the bulimic's life. It can, however, also function as an extension of abuse against oneself.

Empirical research to support this model is derived from Baker, Minuchen, and Rosman's work (1978) on families possessing children with psychosomatic illnesses. The authors argue that, within psychosomatic illness, the symptom is a direct, as opposed to indirect, expression of feeling. The objective of this study was to demonstrate the idea that a symptomatic child relieves tension from other family conflicts. The type of families compared were those composed of children diagnosed with either asthma, anorexia, brittle

diabetes, or well-controlled diabetes. It was hypothesized that if one measured the level of free fatty acids in the blood and found an elevation, this would be indicative of biological changes associated with emotional arousal. What the investigators found was that whenever a symptomatic child entered the room where family issues were being discussed, the child's free fatty acid level increased as the parents' levels decreased. Thus, the child appeared to assume the parents' emotional arousal state. Furthermore, children from symptomatic families were more often included in discussion of family issues than children from non-symptomatic families. In the control group, issues were discussed primarily between the parents only. Baker and his research associates concluded that symptomatic children were victims of triangulation, which refers to two members of a family system siding against a third member to relieve conflict, most often spousal. To date, however, this type of research has not been performed with bulimics as family systems investigations have focused more on treatment outcome.

Social-Psychological Model

According to Bauer, Anderson, and Hyatt (1986), television, magazines, and movies present women labeled as "beautiful" and "attractive" as very thin. This standard is quite different from the women presented approximately 35 years ago who were of larger body size. Bauer and her colleagues believe that problems arise when women who

actively attempt to meet the current ideal do not take personal body frame and/or natural weight setpoint into consideration. Consequently, meeting the current ideal may be biologically difficult and psychologically frustrating for many women. The issue is further complicated by the relatively consistent finding that bulimics overestimate their actual body size (Powers, Schulman, Gleghorn, & Prange, 1987; Ruff & Barios, 1986; Whitehouse, Freeman, & Annadale, 1985; Willmuth, Leitenberg, Rosen, Fondacaro, & Gross, 1985). Ironically, even if the bulimic attains the social ideal of body size, she may not be able to recognize that in herself.

Atchley and Heeger (1984) espouse that, in the past, women received social pressure to look as attractive as possible in order to find a husband. Today, however, additional pressure is placed upon women to achieve professional success without sacrificing attractiveness or femininity. According to Atchley and Heeger, food may come to symbolize an area that a woman feels she can assert control over since she has little control over societal demands placed upon her. Indeed, as noted earlier, research has demonstrated that bulimics display a greater external locus of control when compared to non-bulimics (Allerdissen, Florin, & Rost, 1981; Rost, Neuhaus, & Florin, 1982).

Research emanating from the social-psychological model has focused on explaining the greater prevalence of this disorder in the 1980s. Agras and Kirkley (cited in Agras,

1987) posit that the greater social pressure on women to attain a thin body shape, in conjunction with the increasing use and number of dietary methods to achieve this goal, has contributed to the development of bulimia. A study which demonstrates the "thinner body shape" trend found that beauty contestant's weights, when controlled for height, have decreased from 1960 to 1979 (Garner, Garfinkel, Schwartz, and Thompson 1980). More recently, Wiseman, Gray, Mosiman, and Ahrens (1992) evaluated this trend by examining the measurements of Playboy magazine centerfolds and Miss America beauty contestants from 1979 to 1988. Upon anaylsis, the average weights for these women were 13-19% lower than expected for age. Furthermore, when popular women's magazines were examined, results showed that diet and exercise articles significantly increased from 1959 to 1988. The authors concluded that the evidence points to an overvaluation of thinness. In contrast, census reports reveal that the average weight of women in the general population, when controlled for height, has increased six pounds over the last 20 years (The Bureau of Census Report, cited in Agras, 1987). Hence, the actual weights of females are becoming further removed from the ideal. Implications are that women have to lose more weight to meet ideal social standards and may attempt to function at a weight below their biological setpoint. When this occurs, Agras argues, chronic hunger may lead to binge/purge cycles. In this manner, the

bulimic may consume large quantities of food while remaining relatively thin.

The Role of Body Dissatisfaction

Body dissatisfaction has been purported to play a key role in the etiology of eating disorders and some authors have identified it as a potential risk factor in the development of such (Crowther & Chernyk, 1984; Wolf & Crowther, 1983). Additionally, body dissatisfaction has been identified as a motivational factor in dieting (Miller, Coffman, & Linke, 1980). In turn, dieting has been associated with the development of eating disorders (Striegal-Moore, Silberstein, & Rodin, 1986; Rosen, Tacy, & Howell, 1990; Vanderheyden, Fekken, & Boland, 1988).

Comparative studies have been done among females possessing clinical and nonclinical eating disorders, females exhibiting symptoms of eating disorders not sufficient to warrant psychiatric diagnosis, and female control groups unconcerned with weight. The results of these studies are, for the most part, consistent. Individuals concerned with weight (i.e., those who diet and/or binge) report greater body dissatisfaction than individuals who are not concerned with weight and do not binge (Schein, 1988). A comparative study which examined females who required hospitalization for anorexia with bulimic symptoms, females who required hospitalization for bulimia, and females with identical diagnoses yet not requiring hospitalization, revealed that

inpatients reported greater body dissatisfaction than outpatients (Kennedy & Garfinkel, 1989).

With respect to gender, females are generally more dissatisfied with the appearance of their bodies than are males (Szekely, Raffield, & Snodgrass, 1989; Thompson & Psaltis, 1988). Zakin (1989) assessed 66 undergraduate females on eating behavior and body satisfaction along with other variables. Results yielded a strong negative correlation (r = -.72, p < .01) between body satisfaction and bulimic behavior. Furthermore, severity of eating disturbance has been found to correlate highly with degree of body dissatisfaction (Thompson & Psaltis, 1988; Wolf & Crowther, 1983).

The overall importance of body dissatisfaction as a contributor to bulimia nervosa is such that the DSM-IV Eating Disorders Work Group debated over whether or not to include it as a requirement for diagnosis. The final decision was a recommendation to emphasize it in text (Wilson & Walsh, 1991).

The Role of Anxiety

Weiss and Ebert (1983) found via self-report questionnaires that female bulimics suffer from a great deal of psychological distress. More specifically, when compared to non-bulimic controls, bulimics rated themselves higher on anxiety. Similar findings have been reported elsewhere (Herzog, 1984; Leitenberg, Gross, Peterson, & Rosen, 1984).

Steere, Butler, and Cooper (1990) have proposed three reasons for the prevalence of anxiety symptoms in bulimics. The first explanation is that bulimia nervosa may be secondary to a general anxiety disorder. The second is that bulimia may be maintained or worsened by anxiety. Lastly, the presence of anxiety may be secondary to bulimia nervosa and concerns about weight and body shape. To investigate the aforementioned hypotheses, the authors compared mental state profiles of subjects diagnosed with bulimia nervosa to mental state profiles of subjects diagnosed with generalized anxiety disorder. Results indicated that anxiety symptoms experienced by bulimics were clearly related to eating disturbance as well as concerns about weight and body shape. In contrast, the subjects with generalized anxiety disorder reported symptoms of anxiety that were not associated with other disturbances. Thus, results confirmed the hypothesis that bulimics have marked anxiety which is secondary to bulimia and its associated features.

Despite consistent acknowledgement of anxiety in bulimics, there is controversy over its contribution to the disorder. Keck and Fiebert (1986) assert that bulimia serves to provide an "obsession" to aid an individual in avoiding existential anxiety. These researchers believe that, functionally, a bulimic's obsession with food, body weight, and body shape is a means of escaping examination of other areas of one's life. Furthermore, the goals of the disorder

(i.e., losing weight, attaining ideal weight) provide an avenue for procuring approval and acceptance. In sum, bulimia is a mechanism for coping with life stressors.

Another hypothesis regarding the role of anxiety in bulimia has to do with maintenence of the disorder. Steere, Butler, and Cooper (1990) claim that considerable evidence supports the idea that anxiety significantly contributes to the maintenence of bulimia. Initial support is gleaned from studies which describe features of bulimia and note the presence of marked anxiety symptoms which perpetuate psychological distress. Additional support is given by bulimics reporting pre-binge anxiety. Third, there are studies which suggest that phenelzine, a monoamine oxidase inhibitor, may be beneficial to some bulimics through an anxiolytic action thereby reducing binge/purge behavior. Finally, as described earlier, Rosen and Leitenberg (1982) proposed the anxiety model of bulimia in which anxiety is the motivating factor for purging. Case studies support the validity of the model (Steere, Butler, & Cooper, 1990). There has also been a limited number of pychophysiological studies which partially support the model.

An early psychophysiological study was conducted by Leitenberg, Gross, Peterson, and Rosen (1984). These investigators used heart rate in addition to subjective ratings of anxiety to track changes in anxiety following ingestion of a relatively large meal or snack in bulimic

females. Response prevention was used wherein bulimics were not allowed to purge after eating. Physiological and psychological data was collected prior to meal ingestion and every 6 minutes thereafter. Not surprisingly, bulimics reported significant increases in anxiety and urges to vomit as eating progressed. This decreased once subjects stopped eating despite the fact that they were not allowed to purge. Leitenberg and his associates found no significant effect for heart rate. Thus, the psychological data partially supported the anxiety model of bulimia whereas the physiological data did not. A major limitation of this study, however, was that there were only 5 subjects. The authors explain that this particular sample may not have been "heart rate responders" that would physiologically reflect subjective anxiety.

Another study utilizing physiological measures was done by Williamson, Goreczny, Davis, Ruggiero, & McKenzie (1988). This study consisted of 48 females in four groups of 12. All groups were given a test meal except one group of normal controls. The groups were labeled as bulimic, obese, normals, and normals who did not eat a test meal. Heart rate, forearm electromyogram, peripheral vasomotor response, skin temperature, and skin resistance were used to assess physiological changes in response to the test meal when subjects were not allowed to purge. The results showed physiological changes in the bulimic group which represented increased sympathetic arousal in response to eating. Heart

rate and forearm electromyogram, however, were the only physiological indicators which were significantly different in the expected direction for the bulimic group when compared to the other groups. Thus, overall, this study provides mixed support for the anxiety model of bulimia. Williamson and his colleagues state that a limitation of the study is the lack of subjective measures. The authors believe that subjective ratings of anxiety would clarify whether the bulimics in their study perceived greater anxiety than the other groups in response to the test meals.

The preceding studies illustrate that the methodology in examining anxiety responses in bulimics is complicated. It appears, though, that both physiological and psychological measures are important to discern what is taking place. Overall, there have been relatively few studies utilizing both types of measurement with an adequate design.

Summary

At this point, it should be clear that bulimia is a serious disorder that is prevalent among relatively young, Caucasian females often found within a university population. Associated features of the disorder include both psychological and medical symptoms. Psychologically, these females suffer from depression, anxiety, body dissatisfaction, and low self-esteem. Medical risks include anatomical and chemical complications from repeated vomiting despite an often "normal" appearance in terms of weight.

Regarding etiology, several major models have been put forth. These models have yet to be evaluated at length and most studies have focused on treatment outcome emanating from a particular model. Thus, there is relatively little in the way of empirical support for given models compared to the vast amount of research done on correlates of bulimia. Nevertheless, a common thread throughout all the models is the central role of anxiety. From the psychoanalytic standpoint, anxiety over the bulimic's feelings toward a controlling mother are to be kept out of awareness. From a cognitive-behavioral model, anxiety is elicited from certain cognitions as well as after a binge. Subsequently, post-binge anxiety is a major contributor to purging. The family systems model asserts that there is anxiety surrounding family dynamics which create a symptomatic family member. Finally, the sociological stance is that there is a societal emphasis on thinness. For some women, not achieving this ideal is anxiety provoking.

Traditional research examining the role of anxiety in bulimia has been deficient with respect to the use of physiological measures. Of those studies that have included physiological measures, the methodology has been flawed. There is, however, an extensive literature utilizing physiological measurement to study emotional experience in other contexts. The use of physiological measurement to study emotion is relatively new and began to pick up momentum

in the early 1980s. It is interesting to note that this is approximately the same time that bulimia began to receive more attention as a distinct disorder.

Physiological Measurement of Emotion

In an important study of emotion, Eckman, Levenson, and Fresen (1983) differentiated not only between positive and negative emotions, but also among negative emotions utilizing physiological arousal measurements. Their study targeted six emotions, four of which were considered negative (disgust, fear, anger, and sadness). Emotion was elicited by two tasks. One involved producing emotional facial expressions and the other consisted of reliving past emotional experiences. Heart rate was found to distinguish between positive and negative emotions by significantly increasing in the presence of anger, fear, or sadness. Skin temperature also varied as a function of negative emotions. An earlier study by Schwartz, Weinberger, and Singer (1981) also found large differences in heart rate and blood pressure as a function of different emotions. These studies exemplify the fact that there is emotion-specific activity in the autonomic nervous system (ANS) which can be measured. This is in opposition to earlier contentions of ANS activity reflecting only general levels of arousal. In recent years, it has become widely accepted that the sympathetic and parasympathetic subsystems of the ANS are capable of fine regulation of peripheral organs (Schwartz, 1986).

Difficulties With Physiological Measures of ANS Arousal

One difficulty with the utilization of physiological measures in social psychological research is the concept of valid measurement (Lader, 1975). In other words, what is actually being measured? A subject's physiological state can change on the basis of an unfamiliar laboratory situation alone. This does not, however, mean that physiological measurement used in the labortory is invalid. Instead, a researcher must be aware of possible artifacts which could enter into the experimental situation and decide whether baseline measurements will suffice for the purpose of the study (Lader, 1975; Obrist, 1981). A suggestion for procuring more accurate physiological measurements is to relax subjects before baseline measures are taken (Lader, 1975). The process does not have to be lengthy and can be achieved by providing reassurance and/or giving simple verbal instructions to relax (Lader, 1975). Relaxation periods vary according to different types of studies, but 5 to 15 minutes has been deemed adequate for most studies (Pickering & Blank, 1986).

Another difficulty with physiological assessment is research demonstrating a lack of correlation between physiological measures (Lader, 1975). In considering this problem, some researchers have suggested that intraindividual correlations should be emphasized over interindividual correlations (Blascovich & Kelsey, 1990). For example,

Lazarus, Speisman, and Mordkoff (1963) found higher correlations within subjects than between subjects utilizing electrodermal activity (EDA) and heart rate (HR). Matthews and Lader (1971) also found strong intraindividual correlations using EDA and HR (r = .80 and .72, r = -.63 and .90, $p < .05$, respectively between conditions).

A major concern with physiological measurement is that bodily systems have primary physiological functions to serve which can potentially contaminate experimental manipulations (Lader, 1975; Lovallo, 1989; Obrist, 1981). Thus, physiological responses cannot be considered to simply reflect emotional or psychological states (Lovallo, 1989; Obrist, 1981). Problems can be minimized, however, by taking precautions during procedures and carefully considering the form of physiological evaluation (Lader, 1975).

Blascovich and Kelsey (1990) offer the following recommendations to yield greater accuracy when using physiological measures in social psychological research. First, they recommend that the experimental situation be kept relatively simple and free from complicated procedures so as to avoid elicitation of opposing psychophysiological responses. Additionally, multiple physiological measures should be used due to differential patterns of responding which may occur as a function of both individual differences and environment. Ideally, this includes measures representing varying degrees of control from the sympathetic

and parasympathetic subsystems of the ANS to ascertain which subsystem is dominant in a particular pattern of reactivity. Third, these investigators suggest the use of either continuous or repeated measurement to increase accuracy and examine changes over time. With repeated measurement in particular, within-subjects comparisons usually provide more power than between-group comparisons of absolute levels due to large individual differences of responsivity that may occur. Finally, Blascovich and Kelsey caution researchers to control for subject activities which may mediate physiological processes. One way this can be done is through provision of oral and/or written instructions addressing such things as consumption of beverages, foods, and drugs such as nicotine, alcohol, and caffiene. Furthermore, random scheduling of subjects aids in diminishing the contaminating effects of individual schedules for behaviors such as eating and sleeping.

Physiological Measurement of Anxiety and Validity of Verbal Report

Groen (1975) claims that, among the variety of emotions, anxiety has been the most extensively researched. Many anxiety theorists posit that anxiety is precipitated by some perception of threat induced by an internal or external stimulus (Lazarus & Averill, cited in Schalling, Cronholm, & Asberg, 1975). Regardless of whether or not the origin of threat is apparent to the individual, there follows

physiological disturbance which is manifested in autonomic over-arousal (Groen, 1975; Schalling, Cronholm, & Asberg, 1975). Thus, when measuring physiological changes during anxiety, one actually is measuring changes in arousal (Groen, 1975). Groen explains, however, that the association between arousal and anxiety is so close that autonomic changes may still be used to measure degree of anxiety.

As an adjunct to physiological measurement, anxiety theorists argue that anxiety may also be assessed verbally (Eysenck, 1975; Groen, 1975) via verbal report and/or 38self-report questionnaires. Upon examining the degree of correlation between physiological measures and verbal report, Thayer (1970) found evidence for the superiority of heart rate (HR) and electrodermal activity (EDA) over other measures. His study revealed that HR and EDA correlated better with verbal report both individually (r = .33, p < .05; and r = .29, ns, respectively) and as a summed composite (r = .62, p < .01) than either finger blood volume (r = .01, ns) or muscle action potentials (r = .15, ns) which are other measures of arousal. Thayer's findings were consistent with his previous research and he concluded that controlled self-report of arousal is useful and valid. He further concluded that HR and EDA were the best combination in correlation with verbal report as well as physiological arousal to obtain valid information on an individual's autonomic state utilizing different bodily systems.

The Cardiovascular System

Recently, psychophysiological researchers have targeted the autonomic nervous system for study, with much attention focused on cardiovascular activity (Blascovich & Kelsey, 1990). Due to the intricacy and complexity of the human cardiovascular system, a comprehensive presentation is beyond the scope of this paper. It is, however, necessary for researchers to understand fundamental principles of the cardiovascular system in order to accurately interpret given cardiovascular measurements (Blascovich and Kelsey, 1990). Thus, an adequate yet necessarily brief account will be given. Detailed reviews are available elsewhere for the interested reader (Larsen, Schneiderman, & Pasin, 1986; Papillo & Shapiro, 1990; Schneiderman, Weiss, & Kaufman, 1989).

The cardiovascular system is a closed system responsible for the flow and distribution of blood throughout the body (Blascovich & Kelsey, 1990; Larsen, Schneiderman, & Pasin, 1986). Any change in the energy needs of body tissue activates a complex chain of rapid adjustments within the system which includes mechanical, neural, and humoral components (Papillo & Shapiro, 1990; Rushmer, 1989). Taken together, these mechanisms function to modify the system in terms of blood quantity and/or distribution so that metabolic homeostasis is achieved (Papillo & Shapiro, 1990).

Anatomy

The cardiovascular system consists of the heart and vasculature (Papillo & Shapiro, 1990). The heart functions as a muscular pump to provide the energy required to distribute blood throughout the circulatory system (Larsen, Schneiderman, & Pasin, 1986; Papillo & Shapiro, 1990; Rushmer, 1989). The heart itself is divided into four chambers functioning as dual, vertical pumps comprised each of an atrium, or upper chamber, and a ventricle, which is a lower chamber (Blascovich & Kelsey, 1990). The vasculature is comprised of an enormous network of blood vessels which can be categorized as: arteries, arterioles, veins, venules, and capillaries (Papillo & Shapiro, 1990). The arteries (large tubes) and arterioles (small tubes) carry blood to body tissues while the veins (large vessels) and venules (small vessels) carry blood back toward the heart (Blascovich & Kelsey, 1990; Papillo & Shaprio, 1990). The thin capillaries serve as a means of allowing oxygen and nutrient exchange between the blood and tissues. Capillaries receive no neural stimulation and thereby do not have a direct role in the regulation of blood flow (Papillo & Shapiro, 1990). Initially, oxygen deficient blood is received by the right atrium before passing it on to the right ventricle which pumps blood to the lungs via the pulmonary artery (Blascovich & Kelsey, 1990; Larsen, Schneiderman, & Pasin, 1986).

Subsequently, the left atrium receives oxygenated blood from the pulmonary vein, passes it on to the left ventricle which then pumps it to the rest of the body through the aorta (Blascovich & Kelsey, 1990; Larsen, Schneiderman, & Pasin, 1986).

Cardiac Cycle

There are four structures which constitute the cardiac conduction system and are responsible for the rhythmic contraction and relaxation of the heart. These structures are the sinoatrial (SA) node, the atrioventricular (AV) node, the bundle of His, and the Purkinje system (Larsen, Schneiderman, & Pasin, 1986). The cardiac cycle is initiated by the SA node which consists of specialized myocardial cells that serve as the heart pacemaker (Rushmer, 1989). The SA node sends waves of excitation to the atria by depolarization, which is neuronal firing (Blascovich & Kelsey, 1990; Rushmer, 1989). Next, the atria and AV node depolarize and the atria contract. Depolarization spreadsthrough the bundle of His and Purkinje network, to the ventricles. Once this occurs, the ventricles contract, thereby forcing blood from the ventricles into the pulmonary artery and the aorta (Blascovich & Kelsey, 1990; Larsen, Schneiderman, & Pasin, 1989). A rest period follows the cycle before the next one begins allowing, repolarization to occur. The phase of the cycle comprised of depolarization,

contraction, and ejection of blood is called systole. The rest period is termed diastole (Blascovich & Kelsey, 1990). Blascovich and Kelsey (1990) note that once blood leaves the heart, it flows as a pulse wave through arteries which begin to diminish in diameter until the capillaries are reached. Resistance to flow increases as diameter decreases. Blood eventually passes through the capillaries to exchange nutrients for metabolic waste products. Finally, blood flows through veins of increasing diameter en route to the heart.

Measurement of Cardiovascular Activity

With respect to cardiovascular activity, two of the most widely used measurement techniques are heart rate and blood pressure (Groen, 1975). Heart rate is considered a highly sensitive measure as well as one of the simplest to obtain (Wilson, Lovallo, & Pincomb, 1989). As alluded to earlier, however, both of these measures are mediated by multiple factors and must be interpreted cautiously (Lovallo, 1989).

Heart rate (HR)

HR describes the chronotropic performance of the heart, or the rate at which it beats (Blascovich & Kelsey, 1990). Basmajian (1983) explains that the number of times the heart beats per minute is regulated by the sinoatrial (SA) node located in the wall of the right atrium. Impulses created by the SA node establish HR with changes in rate determined by the combination of parasympathetic innervation from the vagus nerve to decrease HR and sympathetic fiber stimulation of SA

nodal, atrial myocardium, and ventricular myocardium to increase HR. The release of acetylcholine from the vagus nerve at the SA nodal cells produces a decrease in depolarization of cells resulting in decreased HR, which is called a negative chronotropic effect (Papillo & Shapiro, 1990; Rushmer, 1989). Conversely, a positive chronotropic effect, or HR increase, is accomplished through the release of norepinephrine from the cardiac sympathetic nerves (Blascovich & Kelsey, 1990; Papillo & Shapiro, 1990; Rushmer, 1989). Although the parasympathetic nervous system (PNS) and sympathetic nervous system (SNS) interact to influence HR, the PNS is usually dominant but can be altered by SNS variations (Blascovich & Kelsey, 1990).

As mentioned earlier, one cannot assume that all physiological measures uniquely assess the experimental manipulation in question due to their role in bodily functions. Investigators must therefore ensure that no demands of a physiological nature, other than experimental procedures, are placed on a subject. Once subjects are considered to be physiologically neutral, such as sitting quietly, the assumption can then be made that psychological elements are entering into the experimental picture as changes in arousal occur (Lader, 1975).

Blood Pressure (BP)

One of the major factors influencing the flow of blood through the circulatory system is pressure and, in turn,

blood pressure is partially regulated by the resistance it encounters as it passes through arteries (Papillo & Shapiro, 1990). Vascular resistance is inversely related to blood vessel diameter so that vasoconstriction (decreased blood vessel diameter) increases resistance and vasodilation (increased blood vessel diameter) decreases resistance (Blascovich & Kelsey, 1990). Blood pressure refers to the force exerted by blood against the walls of blood vessels (Papillo & Shapiro, 1990). The maximum pressure, which is influenced by vascular resistance and blood volume of the arterial system during each heartbeat, is called systolic blood pressure [SBP] (Blascovich & Kelsey, 1990; Papillo & Shapiro, 1990). The minimum pressure, influenced by vascular resistance and HR, is termed diastolic blood pressure [DBP] (Blascovich & Kelsey, 1990; Papillo & Shapiro, 1990). HR's effect on DBP is by regulation of time spent in diastole with high HR corresponding to less time in diastole. Consequently, less time is permitted for blood to move from the arterial side to the venous side of the heart, which serves to produce greater blood volume in the arteries during diastole, resulting in elevated DBP (Blascovich & Kelsey, 1990).

According to Blascovich and Kelsey (1990), neural regulation of vascular tone is achieved through the SNS alone. Vasocontriction is the result of norepinephrine release from sympathetic nerves and circulating epinephrine

released by the adrenal medulla. These neurotransmitters stimulate alpha-adrenergic receptors on vascular smooth muscle thereby inducing vasoconstriction. Blascovich and Kelsey report that, in contrast, vasodilation can be produced by any of the following:

1. decreased alpha-adrenergic stimulation resulting in vascular smooth muscle relaxation
2. excitation of peripheral beta-adrenergic receptors by circulating epinephrine
3. excitation of cholinergic receptors by sympathetic nerves
4. alterations in metabolic processes

It should therefore be apparent that blood pressure is mediated by a number of vascular, myocardial, neural, and humoral processes (Obrist, 1981).

The most accurate recordings of blood pressure involve invasive procedures. However, due to ethical considerations, noninvasive methods are typically used instead. The most common noninvasive method is the ausculatory technique (Papillo & Shapiro, 1990). This technique involves placing a blood pressure cuff securely around the upper arm. The cuff is then inflated until occlusion of the underlying brachial artery occurs. Subsequently, pressure is gradually reduced at a rate of 2-3 millimeters of mercury (mm Hg) per second (Papillo and Shapiro, 1990; Thomas, 1977). Blood pressure is established upon detection of pulsatile sounds called

Korotokoff-sounds (K-sounds) via a microphone or stethoscope (Blascovich & Kelsey, 1990). It is recommended that the same arm be used for repeated measurements and that the arm be raised to heart level (Thomas, 1977).

Papillo and Shapiro (1990) explain that K-sounds are produced when pressure pulse waves pass through the artery below the cuff. At the point of occlusion, no K-sounds are produced due to the interruption of blood flow. As the cuff gradually deflates, though, there is a point at which the pressure pulse wave will force itself through the artery. It is this first penetration of the K-sound which constitutes systolic blood pressure (SBP). As the cuff continues deflation, there is a series of K-sounds which increase in auditory volume then decrease until none are detected. Cessation occurs because the deflated cuff no longer applies counterpressure to the brachial artery. Diastolic blood pressure (DBP) is determined by either the first K-sound which is muffled (Kirkendall, Burton, Epstein, & Fries, 1967) or cessation of K-sounds (Kirkendall, Feinlieb, Fries, & Mark, 1981). A relatively young, healthy adult has a SBP ranging from 100 to 120 mm Hg and a DBP ranging from 60 to 80 mm Hg. The upper limits of the normal range are reported at 140 systolic and 100 diastolic (Thomas, 1977).

To assess cardiovascular reactivity in a laboratory setting, Pickering and Blank (1989) advise multiple measurements via an automatic or semiautomatic device. In

fact, many investigators obtain several BP measurements then compute the mean to represent a singular measurement (Manuck, Kasprowicz, Monroe, Larkin, & Kaplan, 1989; Pickering & Blank, 1989). The rationale for this practice is that a single BP readout at a discrete point in time may mean little given the enormous variability of BP (Pickering & Blank, 1989). On the other hand, repeated measurements often inducesubject discomfort associated with prolonged periods of cuff inflation. For this reason, experts recommend taking repeated measurements at approximately 1 1/2 minute intervals. A minimum of 30 seconds must be allotted between cuff inflations to allow normal blood flow to resume (Papillo & Shapiro, 1990). Another important consideration in blood pressure measurement is the size of the cuff (Papillo & Shapiro, 1990; Thomas, 1977). Inaccurate measurement may result when a cuff is either too large or too small by producing uneven pressure on tissue which compresses the brachial artery. For an average-sized adult, a cuff approximately 12-14 cm in width and 30 cm in length is advised (Papillo & Shapiro, 1990; Thomas, 1977).

Theories of Psychophysiological Arousal

Experts in social psychological research recommend that investigators identify an arousal construct derived from psychophysiological theories of arousal that correspond to psychophysiological measurement (Blascovich & Kelsey, 1990). This helps to ensure the appropriate use of

psychophysiological measures. Furthermore, it provides an operational definition of arousal and facilitates interpretation of results.

Warranting mention at this juncture is Lacey's (1967) concept of situational stereotypy, also known as stimulus-response specificity (Schneiderman & McCabe, 1989). This concept refers to the phenonmenon of certain situations eliciting stereotypic patterns of physiological response (Schneiderman & McCabe, 1989). The importance of situational stereotypy is that it indicates the directional as well as intensity facets of behavior as reflected by ANS responding, and that electrodermal, cardiac, and vascular measures are not interchangeable, unidimensional indices of arousal as traditional "fight-flight" theorists claim (Blascovich & Kelsey, 1990).

Lacey's (1967) initial findings set the stage for subsequent research into situational stereotypy utilizing different types of tasks. From research that followed, Schneiderman and McCabe (1989) distinguished between two types of general physiological reactivity to stressful stimuli along with their respective components. The first type involves defensive reactions, active coping, and active avoidance. This kind of responding is physiologically characterized by: increased BP (primarily SBP), skeletal muscle vasodilation, increased HR, increased cardiac output, increased beta-adrenergic activity, and decreased vagal tone.

It reflects an organisms attempt at appropriate coping in response to aversive stimuli. Defensive reactions and responses in animals (Adams, Bacelli, Mancia, & Zanchetti, 1968) and during active avoidance conditioning (Langer, Obrist, & McCubbin, 1979). Defensive or active coping reactivity has also been exhibited by humans engaged in mental tasks such as mental arithmetic (Williams, Bittker, Buchsbaum, & Wynne, 1975; Williams, Lane, Kuhn, Melosh, White, & Schanberg, 1982). The human studies are admittedly less aversive than the animal studies but they do involve active coping (Schneiderman & McCabe, 1989).

The second type of reactivity pattern that Schneiderman and McCabe (1989) specify involves aversive vigilance, inhibitory coping, and passive avoidance. This pattern of responding is characterized by: increased BP (primarily DBP), skeletal muscle vasoconstriction, decreased HR, increased peripheral resistance, increased alpha-adrenergic activity, and increase vagal tone. In opposition to the first category, it reflects the unavailability of appropriate coping responses in aversive situations. Such reactivity has been shown in animals immediately prior to instrumental avoidance conditioning (Anderson & Tosheff, 1973) and in anticipation of fighting (Adams, Bacelli, Mancia, & Zanchetti, 1968). This same kind of reactivity has been demonstrated with humans as well (Williams, Lane, Kuhn, Melosh, White, & Schanberg, 1982).

A limitation of research reporting these dichotomous patterns of reactivity is that data are based primarily on animal experiments utilizing aversive stimuli and elicitation of the SNS (Schneiderman & McCabe, 1989). Hence, generalizability of these categories to humans may constitute a problem. For example, studies with human subjects do not result in the exhibition of all characteristics when the pattern involves aversive vigilance, inhibitory coping, and/or passive avoidance (Williams et. al, 1982). This pattern is further complicated by the fact that, when higher levels of SNS activity are induced, mixed patterns of reactivity occur (Scheiderman & McCabe, 1989). The opposing pattern of reactivity involving defensive reactions, active coping, and active avoidance presents less of a problem. It has been shown that due to the variability of reactivity that may occur on a continuum of intensity, full exhibition of defensive or active coping responses can be elicited in humans (Schneiderman & McCabe, 1989).

In summary, further study of human psychophysiological arousal is needed to clarify what is occuring physiologically during periods of stress. Although two patterns of reactivity were presented here which envelop many types of physiological responses, there are many psychophysiological theorists who have investigated more specific patterns of human responding (Fowles, 1980; Graham & Clifton, 1966; Lacey, 1967; Obrist, 1981; Pribram & McGuinness, 1975; Tucker

& Williamson, 1984). Due to the exploratory nature of this study, however, it was premature to speculate on more specific patterns of reactivity than the dichotomous categories provide. Psychophysiologists suggest that, in such cases, interpretation of results may be based on specific theories and later tested in an a priori fashion (Blascovich & Kelsey, 1990).

Present Study

Previous studies examining the role of anxiety in bulimia nervosa have done so primarily to validate the anxiety model of etiology which focuses on the elicitation of anxiety following binge eating. There is a lack of research investigating elicitation of anxiety during events/situations related to the disorder such as weight measurement. Furthermore, there is a lack of research examining the psychophysiology of the bulimic's fear regarding weight gain and obesity. Given that weight preoccupation and fear of weight gain are hallmark features of the disorder, research looking at the role of anxiety in initiating, maintaining, and/or exacerbating bulimia nervosa in such a context is warranted.

In regard to clinical application, the present study attempted to give health care providers information which would be useful in identifying individuals at risk for bulimia nervosa. More specifically, this investigation sought to identify anxiety responses to weight measurement as

assessed by verbal report and cardiovascular reactivity which might differentiate females with extremely low and high scores, respectively, on bulimic behavior as measured by the Bulimia Test (BULIT). The rationale for utilizing weight measurement to elicit anxiety relates to the bulimic's preoccupation with weight (Laberg, Wilson, Eldredge, & Nordy, 1990), fear of weight gain (Inbody & Ellis, 1985; Laberg, Wislon, Eldredge, & Nordy, 1991; Steere, Butler, & Cooper, 1990), and anxiety associated with such (Steere, Butler, & Cooper, 1990). There is also a need for health care providers to possess a relevant context in which to screen females who may be at risk. Although demographic characteristics, diagnostic criteria, and assessment instruments exist, these are not part of a routine medical examination. Routine medical care typically includes the measurement of weight and provides the clinician with the opportunity to inquire about feelings associated with weight measurement. If verbal report could be relied upon to accurately reflect psychological and physiological characteristics which are associated with bulimic behavior, perhaps more individuals could receive intervention before development and/or progression of the disorder. This has important ramifications given that most individuals with bulimia nervosa remain undetected and do not receive treatment (Nagelberg, Hale, & Ware, 1984; Rand & Kuldau, 1992). Of those that do receive treatment, recovery rates

are relatively low (Keller, Herzog, Lavori, Bradburn, & Mahoney, 1992; Kerr, Skok, & McLaughlin, 1991). Thus, another purpose of the present study was to investigate the relationship between levels of physiological arousal during weight measurement and self-reported state anxiety during weight measurement.

The secondary purpose of this study was exploratory research of specific ANS arousal patterns in females with either high or low bulimic behavior. Such an endeavor was unprecedented although there is evidence of decreased resting levels of plasma norepinephrine and reduced rise in plasma norepinephrine upon standing in bulimics (Fava, Copeland, Schweiger, & Herzog, 1989; Kennedy & Helsgrave, 1989). There is also research demonstrating increased alpha-adrenergic receptor sensitivity in bulimics (Buckholtz, George, & Davies, 1988; Heufelder, Warnhoff, & Pirke, 1985). A more recent study found decreased SNS activity in bulimics only after a 30 day abstinence from binge/purge behavior (Kaye, Gwirtsman, George, Jimerson, Ebert, & Lake, 1990). Functionally, however, no differences have been shown between bulimics and controls in plasma norepinephrine levels, blood pressure, or heart rate in response to aerobic and anaerobic exercise (Pirke, Eckert, Ofers, Goebl, Spyra, Schweiger, Tuschl, and Fichter, 1989). Furthermore, it has not been determined, however, whether neurochemical changes precede, accompany, or follow the behavioral changes associated with

the disorder. Therefore, it remains unclear whether neurochemical alterations are a potential risk factor for the development of bulimia nervosa or whether it is a neurochemical result of repeated binge/purge cycles.

Regarding inclusion criteria, the present study did not attempt to diagnose individuals, thereby avoiding such issues as which inclusion criteria or operational definitions to select. Self-report measures were used, however, thus bringing into question accuracy of data. In an attempt to minimize difficulties associated with self-report, standardized administration of all measures was performed and basis for sample selection was explicitly specified. Additionally, subjects returned questionnaires to the investigator immediately after completion, thereby diminishing the problem of low response rates. Only females were recruited for the investigation due to their particular vulnerability to bulimia. Since the development of eating disorders appears to be more gender-related than race-related, no exclusions on the basis of race were made. Finally, given the significance of body dissatisfaction in the etiology and maintenance of bulimia, it was chosen as a covariate.

CHAPTER II

METHOD

Subjects

Subjects were 40 undergraduate females recruited from introductory psychology courses at the University of North Texas during the summer of 1992. No restrictions were placed on race, age, or year in college (i.e., freshman, sophomore, etc.). Subjects were offered extra course credit in the form of bonus points for participation in the study. Feedback was given upon request for the following: 1) hypotheses 2) findings 3) a particular subject's performance on questionnaires and the relationship of assessment responses to physiological arousal.

Instruments

Blood Pressure (BP) and Heartrate (HR)

Systolic blood pressure (SBP), diastolic blood pressure (DBP), and heart rate (HR) were assessed by a JS&A Digital Sphygmomanometer, Model 410C. The instrument has a measurement range of 20-270 mmHg and a pressure accuracy of +/- 4 mmHg. A manual pump generated pressurization and an automatic constant-air-release valve system allowed rapid air exhaust. K-sounds were detected via the Riva-Roci method utilizing a ceramic microphone. An LCD readout of SBP, DBP, and HR was produced.

Weight

Weight was measured by a Sunbeam Eye-level Remote Diaplay scale (Model F96B6454H). The readout was produced by an invisible beam traveling from the scale to the remote. The machine measures in .2 kg increments up to 136 kgs. Weight can also be converted into pounds, as was done for this study.

The Bulimia Test (BULIT)

The BULIT (see Smith & Thelin, 1984) is a self-report measure designed to assess behaviors and feelings associated with bulimia in both clinical and nonclinical populations (Smith & Thelin, 1984). It has been shown to possess construct validity (r = .93, p < .0001, point-biserial correlation with the Binge Scale) as well as test-retest reliability (r = .87,p < .0001). The BULIT is comprised of 36 items presented as questions or statements with a multiple choice format for responses. There are seven areas evaluated: binging behavior and fear of losing control over eating; post-binge feelings; vomiting behavior; preferences for binge food; diurectic and laxative use; weight fluctuations; and menstrual cycle patterns. Scoring is on a Likert scale of 1 to 5 for each item with a score of 1 representing responses in an asymptomatic direction and a score of 5 representing responses in a highly symptomatic direction. Responses were combined to produce an overall score.

The Body Dissatisfaction scale (BD)

The BD is a nine item subscale of the popular Eating Disorder Inventory (see Garner & Olmstead, 1984). The items are presented as statements with a multiple choice format for responses. The BD assesses degree of body dissatisfaction with specific parts of the body that have been correlated with maturity at puberty (e.g., hips, breasts, thighs, buttocks, abdomen) and are considered too large (Garner & Olmstead, 1984). It has been demonstrated to possess internal consistency (Cronbach's alpha > .80) and criterion validity (r = .44, p < .001, with clinician's ratings in anorexics). It has also been shown to possess discriminant validity in distinguishing between feelings about maturational body areas as described above, and nonmaturational areas (Garner & Olmsted, 1984). Five items are scored on a six-point Likert scale with a score of 1 representing extreme dissatisfaction and a score of 6 signifying extreme satisfaction. Middle scores, 3-4, represent either some degree of dissatisfaction or some degree of satisfaction, respectively. Neutral scores are not provided. Four items are reverse scored.

The State-Trait Anxiety Inventory (STAI)

The STAI is a brief self-report measure of state anxiety (A-state) and trait anxiety (A-trait) (Speilberger, 1975). Both scales have been demonstrated to be valid and reliable

(Speilberger, Gorsuch, & Lushene, 1970). For the purposes of this study, only the STAI A-state scale was used.

The STAI A-state scale (see Speilberger, Gorsuch, & Lushene, 1978) is comprised of 20 statements describing feelings of anxiety at a given moment in time on a continuum of increasing intensity (Speilberger, 1975). Subjects respond to each item on a 4-point Likert scale which includes the following choices: "not at all," "somewhat," "moderately so," or "very much so." Speilberger states that when used in research, the STAI A-state scale may be administered with instructions to concentrate on a particular time frame such as the experimental phase of the study. Responses were combined to produce a composite score with low scores reflecting calmness, intermediate scores reflecting tension, and high scores indicating fearfulness approaching panic.

Marlowe-Crowne Social Desirability Scale (MC)

The MC (see Crowne & Marlowe, 1964)) is a 33 item, true-false inventory. It was designed to assess the extent to which a subject will endorse culturally sanctioned attributes about oneself that are likely to be false (e.g., "I have never intensely disliked anyone") as well as deny unacceptable attributes that are likely to be true (e.g., "I like to gossip at times). An underlying need for approval is believed to motivate high scorers (Crowne and Marlowe, 1964).

The responses are scored by giving one point for every answer keyed in the socially desirable direction. Thus,

scores range from 0 to 33 with high scores indicating a socially desirable response set and high need for approval. Regarding psychometric properties, the MC has been shown to have good internal consistency, Kuder-Richarson 20 formula, r = .88, and test-retest reliability over a one-month interval, r = .88 (Crowne and Marlowe, 1964). The MC moderately correlates with the Edwards Social Desirability Scale (r = .56). The absence of a stronger relationship is reportedly due to the lack of questions tapping into psychopathology on the MC (Crowne and Marlowe, 1964).

Self-Deception Questionnaire (SDQ)

The SDQ (see Sackheim & Gur, 1978) was developed to measure the degree to which subjects deny statements that are considered psychologically threatening yet assumed universally true (Sackheim and Gur, 1978). The questionnaire consists of 20 items that are scored on a seven-point Likert scale (e.g., "Do you ever feel guilty?", "Have you ever thought you wanted to kill somebody?"). A score of "1" indicates denial of the question. A score of "7" indicates extreme endorsement of the question. Middle scores reflect varying degrees of disagreement or agreement with the question. Scores for each item are added for a composite score. Composite scores range from 20 to 140 with low scores indicating a high degree of self-deception. Internal consistency for the SDQ ranges from .70 to .80 and test-retest reliability over a 4-week interval is .81

(Sabourin, Bourgeois, Gendreau, and Morval, 1989). Gur and Sackheim (1979) also provide evidence of construct validity. More recently, additional evidence has supported the validity of the SDQ (Linden, Paulhaus, and Dobson, 1986; Paulhaus, 1984).

Procedures

For recruitment and the initial phase of the study, the investigator visited undergraduate psychology classes to solicit volunteers to take the BULIT and BD after first providing: a brief explanation of the purpose of the study; what would take place during the experiment; and subject rights in regard to participation as well as confidentiality. The investigator stated that subjects would be randomly selected to participate in the second phase of the study. Volunteers were given an assessment packet consisting of: a numbered index card, informed consent sheet (see Appendix A), demographic form (see Appendix B), BULIT, and BD. Confidentiality was preserved by assigning a number to each packet so that no names appeared on test forms or computer input. Numbered index cards were given so that subjects could receive confidential feedback upon request.

The initial assessment phase proceeded in the following manner volunteers signed the informed consent sheet and then completed the demographic form, BULIT, and BD (see Appendix C). As subjects returned assessment packets to the investigator, they were given a set of written instructions

(see Appendix D) to follow in case they were invited to the second phase of the study. The instructions directed subjects not to smoke one hour prior to testing and not to consume caffeine or alcohol for eight hours prior to testing. The screening phase took approximately 20 minutes to complete. Scheduling of subjects for the experimental phase was done by phone at which time subjects were reminded of the written pre-test instructions.

For the experimental phase of the study, subjects were asked upon arrival if they had heard anything about the experimental procedure from previous subjects. In addition, all subjects were questioned as to whether or not they had followed the written instructions provided during the screening phase. Assessment was conducted according to standardized verbal instructions (see Appendix E) and proceeded in the following order (see Appendix F):

1. SDQ and MC administration per standard instructions
2. Relaxation phase
    a. instructed subject to sit in chair and close eyes
    b. played relaxation tape (music) for 5 minutes
3. STAI A-state Scale administration per manual instructions

4. Baseline phase
    a. requested subject to stand
    b. placed cuff on left arm over brachial artery
    c. instructed subject to relax and temporarily eliminate movement
    d. waited one minute and then obtained first, second, and third measurements of SBP, DBP, and HR at one minute intervals
5. Anticipation phase
    a. announced weight measurement paired with presentation of the scale (moved scale from hidden corner into subject's line of vision)
    b. obtained SBP, DBP, and HR measurements as outlined in #4d
6. Weight measurement phase
    a. requested subject to step onto the scale
    b. obtained SBP, DBP, and HR measurements as outlined in #4d
    c. recorded weight without subject's awareness
7. STAI A-state Scale administration per manual instructions after instructions to sit except that subjects were asked to rate the scale according to how they felt during weight measurement

8. Recovery Phase

Requested subject to stand and obtained SBP, DBP, and HR measurements as outlined in #4d

Phase two took approximately 45 minutes per subject. Upon completion, subjects received a debriefing to explain why deception was used (weight measurement not explained during consent) and to ascertain the presence of any concerns or discomfort. To decrease chance variation of physiological measurement, each set of measurements for a given testing phase was averaged. Subsequently, a single measurement was entered for data analysis. For example, the three SBP measurements procured in the Baseline phase of testing were averaged and entered as one measurement of SBP.

Hypotheses

It was first hypothesized that, upon weight measurement, females with high bulimic behavior as measured by the BULIT, would demonstrate significantly higher patterns of cardiovascular reactivity as assessed by SBP and HR when compared to females with low bulimic behavior.

Second, with respect to the within-subjects dimension, it was predicted that females in the high group would show a quadratic trend over time with scores in SBP and HR rising to a peak during weight measurement then dropping during the recovery phase of the experiment. Both hypotheses were congruent with the defensive reaction, active coping, and active avoidance pattern of cardiovascular reactivity to

stress. It was believed that active coping would be exhibited based upon the idea that bingeing and/or bingeing and purging is an active means of coping with anxiety as put forth by the anxiety model of bulimia (Rosen & Leitenberg, 1982). Despite the fact that bulimics have been shown to use escape-avoidance to cope with anxiety (Neckowitz & Morrison, 1991; Shatford & Evans, 1986), it was believed that subjects in the high group would be forced to actively cope with the anxiety provoking stimulus (i.e., weight stressor) unless they refused further participation in the study.

Third, upon weight measurement, it was expected that self-reported state anxiety, assessed by the STAI A-state, would significantly increase for females with high bulimic behavior relative to self-reported anxiety of females with low bulimic behavior. Finally, it was predicted that post-weight measurements of SBP and HR would be significantly lower than SBP and HR during weight measurement for females with high bulimic behavior.

Regarding assessment instruments, other binge assessment scales have been found to positively correlate with the BD (Garner & Olmsted, 1984). Thus, a positive correlation was expected between the BULIT and BD. Second, positive correlations were predicted between initial STAI, A-state scores and baseline SBP and HR readouts, as well as post-weight STAI scores and SBP and HR readouts during weight measurement.

CHAPTER III

RESULTS

Preliminary Analyses and Descriptive Statistics

A total of 105 females were screened with the demographic questionnaire, BULIT, and BD. Subjects were then categorized into relatively high or low bulimic behavior based on BULIT scores. The low group consisted of scores equal to or less than 56. The high group was comprised of scores equal to or greater than 72. Of the subjects selected for the experimental phase, one refused to participate and one did not show up for her appointment. Three subjects did not complete the experimental phase due to mechanical difficulties when obtaining cardiovascular measurements. No subjects were excluded for either prior knowledge of experimental procedures or failure to follow pre-test instructions. Thus, out of 105 females screened, 40 participated in the experimental phase. Subjects used in data analyses completed all phases of the experiment, and no subject voiced concern or discomfort with the procedures.

A total of 32 females admitted consumption of some form of medication on a regular basis. Seventeen reported birth control use, six reported ingestion over-the-counter medications for pain and/or sinus relief, and three acknowledged use of prescription medication for pain and/or

sinus relief. Two subjects indicated antidepressant use, one reported estrogen therapy, and one reported regular use of prescription diet pills. One subject used insulin regularly and one took a thyroid supplement (i.e., Levothrioxine).

Of the experimental phase group, 30% belonged to a minority group. More specifically, three subjects were Asian, six subjects were African American, and three subjects were Hispanic. The remaining 28 subjects were Caucasian. Three subjects, all of whom were Caucasian, had been previously diagnosed with an eating disorder by a healthcare professional. One subject reported having been diagnosed with anorexia and bulimia. Two subjects reported having been diagnosed with compulsive overeating accompanied by bulimia. The mean age of the experimental group was 23.7 (*SD* = 7.5). The average number of years of college education was 3.6 (*SD* = 1.1). A descriptive summary of remaining demographic data pertaining to height and weight is presented in Table 1. The average measured weight was only slightly greater than subjects' reported weight. Subjects' notion of ideal weight, however, was substantially less than measured weight, $t(38) = 8.04$, $p < .001$.

On a six point Likert scale of happiness with weight, two subjects reported that they were "very happy", eight reported that they were "quite happy", and seven reported that they were "somewhat happy" with their weight. In the

remaining three categories of "somewhat unhappy", "quite unhappy", and "very unhappy", seven subjects endorsed each category. Thus, a total of 17 subjects indicated some degree of happiness with their reported weight and 21 related some amount of unhappiness.

Table 1

Height and Weight Data of Forty College Females

	M	SD	Range
Height (inches)	63.7	3.1	52-70
Reported Weight (RW)	133.4	22.3	93-181
Months at RW	14.9	17.3	1-96
Reported Ideal Weight	117.7	11.6	95-140
Measured Weight	137.6	24.1	93-189

Table 2 provides summary data for the other self-report measures. Additionally, it was noted that the mode score on BD was 27 (5 subjects) which indicates maximum dissatisfaction with one's body. Out of the screening sample, seven subjects obtained a BD score of 27. BULIT scores for these females ranged from 84-120 which constitutes high bulimic behavior, as defined by this study. The STAI 2 (after weight measurement) mean score corresponds to a percentile rank of 86. This is clinically significant and indicates a substantial degree of subjective anxiety for all

subjects, on average, during weight measurement regardless of group membership. Additional comparisons were made to assess differences in scores as a function of group membership. A descriptive summary of these differences is shown in Table 3.

Table 2

Results of Self-Report Measures of Forty College Females

	M	SD	Range
BULIT	69.0	25.5	39-119
BD	13.2	9.1	0-27
STAI 1	35.0	8.7	23-58
STAI 2	44.8	14.1	22-74
MC	14.8	6.0	4-27
SDQ	71.5	17.3	39-108

Note. BULIT = Bulimia Test; BD = Body Dissatisfaction; STAI 1 = Speilberger State-Trait Anxiety Inventory, A-State Scale Time 1, after relaxation; STAI 2 = Speilberger State-Trait Anxiety Inventory, A-State Scale Time 2, after weight measurement; MC = Marlowe-Crown Social Desirability Scale; SDQ = Self-Deception Questionnaire.

First, BULIT scores were significantly higher for females in the high bulimic behavior group as were BD scores, $t(38) = -12.41$, $p < .001$, and $t(38) = -5.56$, $p < .001$,

respectively. Second, the STAI, A-state scale scores were significantly higher at both baseline and post-weight admininstration for subjects in the high bulimic behavior group, $t(38) = -2.77$, $p < .01$ and $t(38) = -4.91$, $p < .001$, respectively. The high bulimic behavior group scored significantly lower than the low group on the MC, $t(38) = 3.10$, $p < .005$, indicating less bias for a socially desirable response-set from females with high bulimic behavior. Finally, the high bulimic behavior group scored substantially higher on the SDQ than did subjects in the low group,

Table 3

Self-Report Scores of High and Low Bulimic Behavior Groups

	Low Group (n = 20)			High Group (n = 20)		
	M	SD	Range	M	SD	Range
BULIT	46.4	4.8	39-56	91.5	15.5	72-119
BD	7.2	6.7	0-20	19.5	7.0	7-27
MC	17.4	6.0	4-27	12.1	4.8	5-23
SDQ	63.6	16.4	39-96	79.5	14.5	48-108
STAI 1	31.5	8.1	23-34	38.5	7.8	34-58
STAI 2	36.1	9.3	22-40	53.4	12.6	38-74

Note. BULIT = Bulimia Test; BD = Body Dissatisfaction; MC = Marlowe-Crowne Personal Reaction Inventory; SDQ = Self-Deception Questionnaire.

$t(38) = -3.23$, $p < .0001$, signifying less self-deception. Regarding cardiovascular measurement, Table 4 shows a descriptive summary over time for the experimental sample.

Table 4

Cardiovascular Measurements of Forty College Females Over Time

	M	SD	Range
SBP B	105.4	8.7	87.0-127.3
SBP A	104.5	8.2	85.7-125.3
SBP W	105.5	9.1	88.0-130.7
SBP R	102.8	7.8	81.0-127.7
DBP B	77.6	7.1	63.3- 91.3
DBP A	77.9	9.5	58.3-112.3
DBP W	80.5	7.3	61.0- 93.3
DBP R	78.1	7.2	64.7- 94.0
HR B	85.0	12.5	58.3-114.3
HR A	87.6	13.0	67.7-121.7
HR W	89.2	14.3	65.0-128.7
HR R	87.7	13.7	65.0-130.0

Note. SBP = Systolic Blood Pressure; DBP = Diastolic Blood Pressure; HR = Heart Rate; B = Baseline; A = Anticipaton; W = Weight Measurement; R = Recovery.

The standard deviations for SBP and DBP are relatively close while heart rate standard deviations reflect more variability. This is not unusual in the measurement of heart rate (Pickering & Blanck, 1989).

Major Analyses

As previously mentioned, data analysis revealed that the high and low bulimic behavior groups were significantly different with respect to BULIT scores. A significant difference on this dimension was needed to make subsequent analyses meaningful. In addition, positive Pearson Product-Moment correlations were found between the BULIT and BD for both the screening and experimental groups, r = .61 (p < .001) and r = .73 (p < .001), respectively.

Contrary to the hypothesis that females with high bulimic behavior would demonstrate significantly more cardiovascular reactivity as assessed by SBP and HR when compared to females with low bulimic behavior, there was no significant between-subjects effect as indicated by repeated measures multivariate analysis of variance (MANOVA), T^2 = .12, $F(3,36)$ = 1.47, ns. Observed power, however, was only .36. In addition, there was no main group by time of measurement interaction, T^2 = .46, $F(9,30)$ = 1.53, ns. A significant within-subjects effect was found, however, for all cardiovascular measures (T^2 = 2.24, $F(9,30)$ = 7.45, p < .001). Repeated measures multivariate analysis of

covariance (MANCOVA) was performed to evaluate the effect of BD, MC, and the SDQ on cardiovascular measurements. Results showed no significant relationship between the set of dependent variables and covariates, $\underline{T}^2$ = .24, approximate $\underline{F}(9,95)$ = .86, ns.

Figures 1, 2, and 3 present a graphic representation of cardiovascular reactivity for high and low bulimic behavior groups as well as for the entire experimental sample over baseline, anticipation, weight measurement, and recovery phases of the experiment. Orthogonal polynomial trend analysis was performed simultaneously on SBP, DBP, and HR scores to identify the best mathematical form, or trend, of the data. It was expected that a significant quadratic trend would be present for the high bulimic behavior group with SBP and HR increasing until the weight measurement phase. The recovery phase was predicted to yield significantly lower SBP and HR scores. These hypotheses were partially corroborated and significant trends were found for all measurements with the high and low bulimic behavior groups combined. The groups were pooled because no significant between-subjects effect was previously demonstrated. Table 5 displays the results.

As Table 5 shows, only HR demonstrated a significant quadratic trend. Linear trends were present for SBP and HR. The linear SBP trend, however, was downward over time. Cubic trends were significant for both SBP and DBP with elevations

Figure 1

Mean Systolic Blood Pressure of High and Low Bulimic Behavior Groups Over Baseline, Anticipation, Weight Measurement, and Recovery Phases

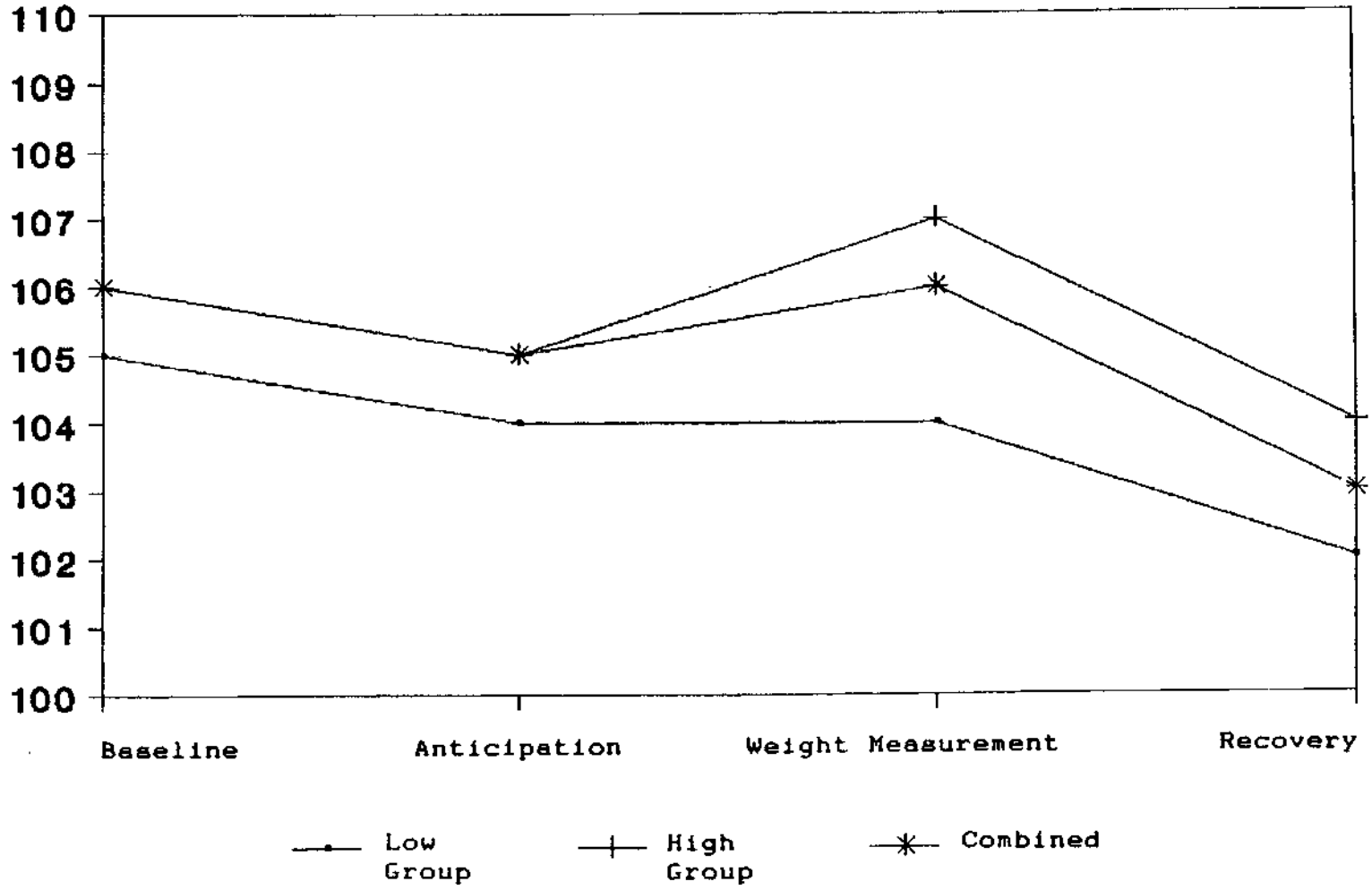


Figure 2

Mean Diastolic Blood Preasure of High and Low Bulimic Behavior Groups Over Baseline, Anticipation, Weight Measurement, and Recovery Phases

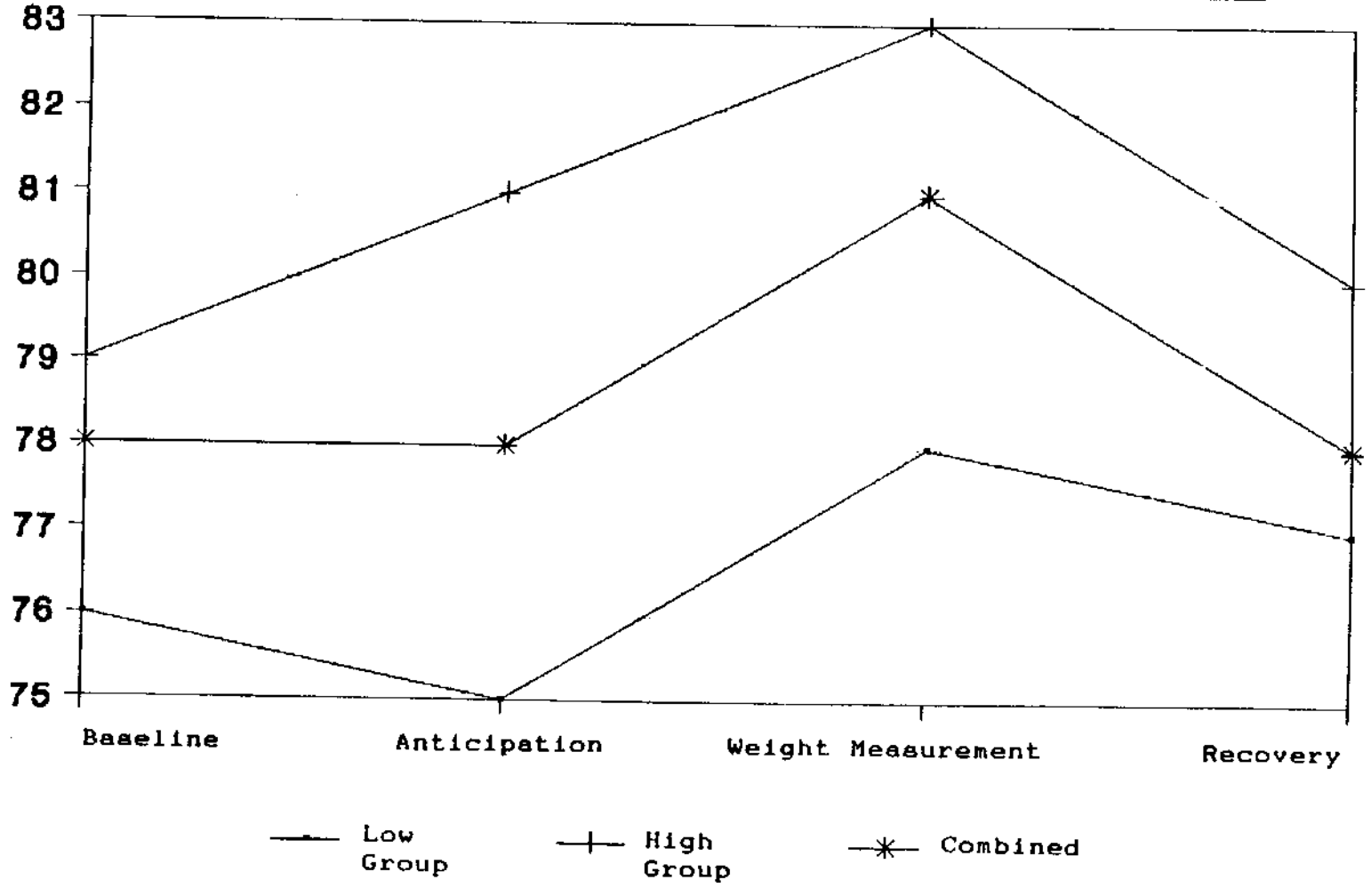
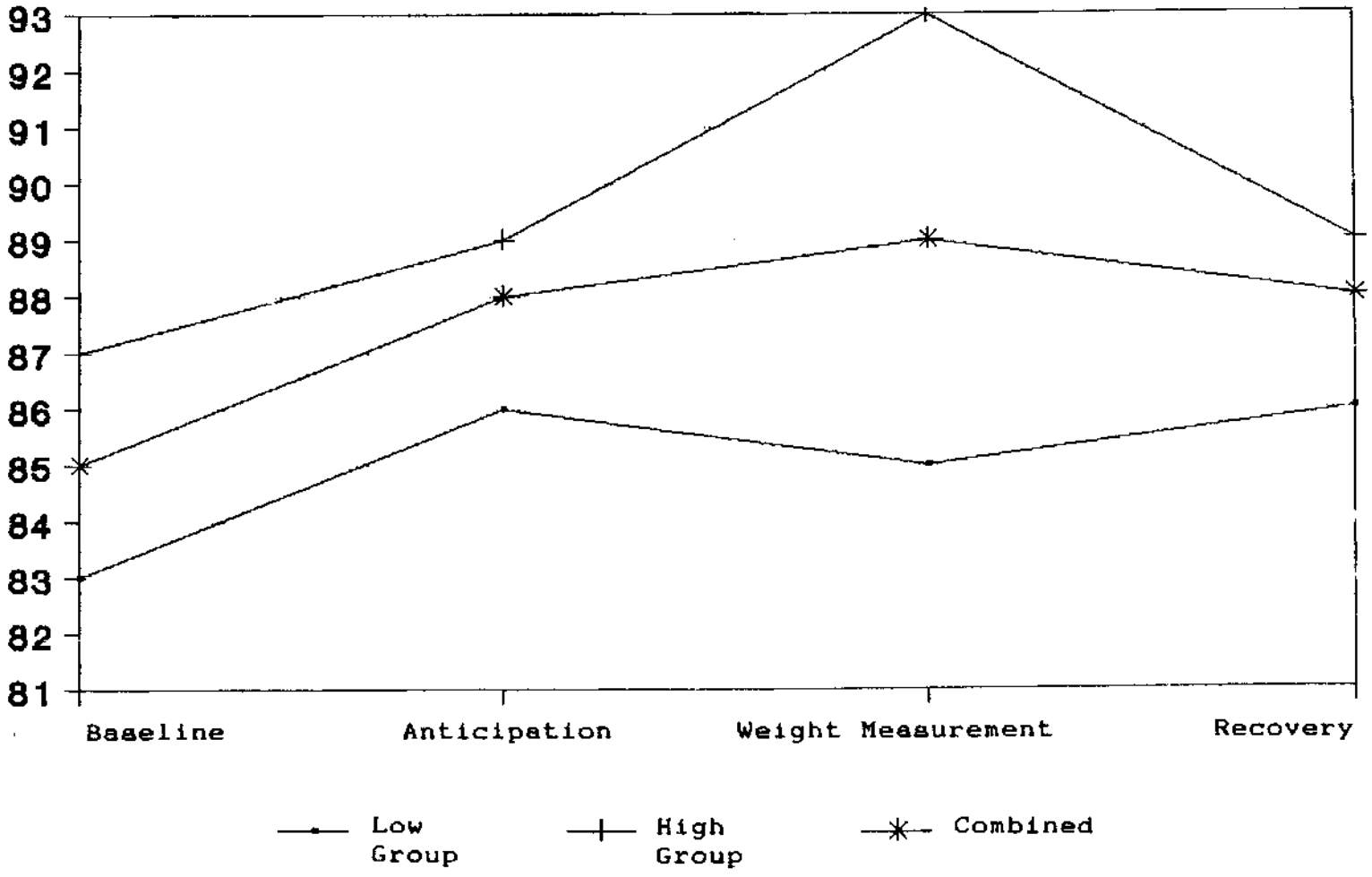


Figure 3

Mean Heart Rate of High and Low Bulimic Behavior Groups Over Baseline, Anticipation, Weight Measurement, and Recovery Phases



during weight measurement. When univariate F-tests were computed for the trends, the HR cubic trend reflected a significant group by time of measurement interaction, $F(1,38) = 5.79$, $p < .05$, wherein the high bulimic behavior group displayed increased HR and the low bulimic behavior

Table 5

Trend Analysis Results of Cardiovascular Reactivity Over Baseline, Anticipation, Weight Measurement, and Recovery Phases for Forty College Females

SBP		DBP		HR	
Trend	F	Trend	F	Trend	F
Linear	9.11***	Linear	2.65	Linear	9.72***
Quad	1.80	Quad	3.84	Quad	7.19**
Cubic	5.33*	Cubic	5.35*	Cubic	.57

Note. SBP = Systolic Blood Pressure; DBP = Diastolic Blood Pressure; HR = Heart Rate; Quad = Quadratic.

*$p < .05$.

**$p < .01$.

***$p < .005$.

group displayed decreased HR in response to weight measurement. This is easily seen in Figure 3. Significantly higher HR for the high bulimic behavior group during weight measurement was expected although no interactions were predicted. Pearson Product-Moment Correlations were calculated to assess the relationships between STAI, A-state baseline administration and baseline cardiovascular measures as well as STAI, A-state post-weight administration and cardiovascular reactivity during weight measurement. It was predicted that there would be a significant positive correlation between baseline A-state scores and baseline readings of SBP and HR. A positive correlation between post-weight A-state scores and SBP and HR during weight measurement was also predicted. These hypotheses were not supported and no significant correlations were found between any of the physiological measures and the STAI, A-state scale.

CHAPTER IV

DISCUSSION

Major Findings

The primary purpose of this investigation was to identify objective and subjective anxiety responses as assessed by cardiovascular activity and verbal report, respectively, which would differentiate females reporting high and low bulimic behavior. Also, this study sought to examine the relationship between cardiovascular arousal and self-report of anxiety. The failure of cardiovascular reactivity to differentiate between the high and low bulimic behavior groups is congruent with results reported in a similar study by Cattanach, Malley, and Rodin (1988). Cattanach and her colleagues used SBP, DBP, HR, and several questionnaires to explore differences in physiological and psychological reactivity to four stressful tasks in eating disordered females and controls. The stressors included an interpersonal conflict vignette, a slide version of the Stroop Test, speech preparation and delivery, and a social interaction vignette. The authors postulated that bulimics would display more psychological and physiological reactivity to the stressors. Results showed that the stressors were successful in eliciting cardiovascular responsivity and negative mood states, but failed to differentiate the groups.

The eating disordered females, however, reported a greater desire to binge. The authors thereby concluded that differences between the groups in desire to binge could not be attributed to cardiovascular reactivity differences to the given stressors. Likewise, the type of stressor used in this study, weight measurement, was successful in eliciting cardiovascular reactivity in high and low bulimic behavior subjects but failed to differentiate the groups. Greater anxiety, however, was reported by the high group as a function of weight measurement. Thus, similar to the Cattanach et. al. study, the higher anxiety reported here by subjects in response to the weight stressor cannot be attributed to cardiovascular reactivity differences between the groups.

One possible explanation for the lack of between-subjects effect is that the groups were chosen based on a continuum of low to high bulimic behavior. A "continuum of risk" is how some researchers have conceptualized the probable development of eating disorders (Garner, Olmstead, & Garfinkel, 1983; Garner, Olmstead, Polivy, & Garfinkel, 1984). Despite the significant difference between groups on BULIT scores, it may be that pronounced differences in physiological reactivity are not present until diagnostic degrees of eating disturbance are achieved and compared to controls. Only three subjects in this study had been previously diagnosed with an eating disorder by a healthcare

professional and status of the diagnosis during experimental procedures is unknown. In other words, the heterogeneity of eating disturbance may have weakened the results. In addition, the observed power of the between-subjects effects at the .05 level was only .36. This may also account, in part, for a lack of between-group differences.

Nevertheless, a significant within-subjects effect was demonstrated over time for the experimental sample with heightened DBP, HR and subjective anxiety ratings during the weight measurement phase of the study. Moreover, the average ideal weight a subject cited was substantially lower than their reported and measured weight. Thus, regardless of eating patterns, many females in this sample experienced considerable anxiety as a direct result of weight measurement. Furthermore, subjective anxiety ratings in response to the weight stressor differentiated the high and low BULIT groups. These findings are compatible with research emphasizing a cultural overvaluation of female thinness (Garner, Garfinkel, Schwartz, & Thompson, 1980; Nasser, 1988; Wiseman, Gray, Mosimann, & Ahrens, 1992) and dissatisfaction with weight (Leon, Carroll, Chernyk, & Finn, 1985; Miller, Coffman, Linke, 1980). These results are also congruent with more recent investigations examining weight attitudes. For instance, Kishchuk, Gagnon, Belisle, and Laurendeau (1992) randomly surveyed 17,468 males and females in Quebec, Canada to explore the effects of actual and/or

desired weight insufficiency (i.e., weighing and/or wanting to weigh an amount less than recommended for height). The authors discovered a high prevalence of both actual and desired weight insufficiency. Moreover, respondents endorsing actual and/or desired weight insufficiency tended to be relatively young females manifesting a great deal of psychological distress. The most important factor, in terms of psychological distress, was desired underweight status. In another study, Garfinkel (1992) reviewed literature describing body weight and shape attitudes. He concluded that although bulimics are known to consistently display excessive concern with body weight and shape, restrained eaters (i.e., dieters) and normal controls also report a high frequency of such. Garfinkel argues that dietary restraint is common among females and suspects that it may be associated with underlying weight and shape concerns. He therefore recommends evaluating the presence or absence of dietary restraint in studies examining weight and shape preoccupation as data based on "control groups" with members practicing dietary restraint may be misleading.

The group by time of measurement interaction for the HR cubic trend is not surprising when the original hypothesis of group differences in cardiovascular reactivity to a weight stressor is considered. Although the hypothesis was not upheld, this interaction partially reflects the same premise of different cardiovascular responses to weight measurement

based on group membership. At this time, to offer an explanation of why the low bulimic behavior group exhibited a general decline in reactivity would be speculative. It is interesting to note, however, that during the DBP anticipation phase, there was also a divergence of the groups although not to a statistically significant extent.

The lack of significant correlation between cardiovascular reactivity and self-report of anxiety at baseline and weight phases of measurement suggests that perhaps cardiovascular measurement, as obtained here, is not appropriate for this type of research. SDQ results argued against high levels of self-deception associated with denial and lowered physiological arousal. Furthermore, MANCOVA results showed no significant effect of MC or BD on the dependent variables, ruling out biased response-sets or significant influences of body dissatisfaction. Physiologically, it is possible that a number of subjects may not have been "cardiac responders" to the extent of exhibiting cardiovascular reactivity proportional to subjective ratings of anxiety. Such an occurrence is known as individual response stereotypy (Blascovich & Kelsey, 1990). If this occurred in numerous subjects, it would certainly cloud present results. Given the degree of cardiovascular reactivity on the graphic presentations of trends, however, this seems unlikely. Suggestions to improve subsequent studies in this area are presented later.

The secondary purpose of this study was to explore specific ANS response patterns as indicated by significant data trends. The significant SBP linear trend was downward, suggesting a lack of heightened reactivity to the weight stressor. As depicted in the graphs, however, there was enough increase in SBP to also produce a significant cubic trend. The greater F value and significance level of the SBP linear trend suggests that it was more robust and less likely to have been produced by chance than the cubic trend. For DBP, the only significant trend was cubic. When change from baseline to weight measurement was evaluated, the mean difference was -.025 (*SD* = 6.0) for SBP and 2.90 (*SD* = 4.5) for DBP. These are significant differences, $t(39) = 2.88$, $p < .01$, and show an average decreased difference score for SBP and increased difference score for DBP. HR produced both a significant upward linear trend and a quadratic trend. The linear trend suggests heightened reactivity over time to the weight stressor. The quadratic trend indicates that the reactivity decreased in the recovery phase as expected. Again, the greater F value and significance level for HR linear trend suggests that it was more robust and less likely to have been produced by chance than the quadratic trend.

The significant trends were unexpected in that signs of mixed coping patterns emerged. It was predicted that an active coping pattern would be found based on a defensive response to the weight stressor. This pattern is

characterized by elevated SBP and HR reactivity to a stressor. Passive coping is marked by heightened DBP and decreased HR. The present study produced increased SBP, DBP and HR. There is a body of evidence reporting bulimics as characterized by a passive or avoidant coping style in which problems and problem situations are not confronted (Katzman & Wolchik, 1985; Keck & Fiebert, 1986; Neckowitz & Morrison, 1991; Soukup, Beiler, & Terrell, 1990). There is also evidence which indicates a lack of set coping style for bulimics or deficits in coping skills (Cattanach & Rodin, 1988; Weisberg, Norman, & Herzog, 1987). This sample, however, included a variety of eating disturbances and did not attempt to evaluate coping style other than by cardiovascular measurement. Hence, no conclusions can be drawn from this study in support of either active or passive coping style.

Other Findings

The hypothesis that the BULIT would positively correlate with BD was confirmed. This finding is congruent with other research positively correlating BD with eating disturbance inventories (Garner & Olmstead, 1984). It is noteworthy, however, that the correlation for the experimental sample was stronger than for the screening sample. It seems to suggest that more or less disturbed eating patterns are associated with a relatively proportional degree of body dissatisfaction or satisfaction, respectively. Of course, no inferences can

be made based on correlational data, but it seems that when intermediate degrees of eating disturbance were included in this study (i.e., screening sample), there was more variance with respect to body dissatisfaction.

Limitations and Future Research

One limitation of the present study was the arbitrary means of dividing subjects into relatively high and low bulimic behavior groups. Although the groups were statistically different according to BULIT scores, they may not have been clinically different enough to demonstrate differences in cardiovascular reactivity, if such differences exist. Future studies might benefit from using diagnostic samples and controls for comparison. Also, between-subjects power was low for this study. Future studies would benefit from increasing group sample size in addition to improving homogeneity.

Another consideration, as mentioned earlier, is that the cardiovascular measures procured here may not be the measures of choice for this type of investigation. Cattanach, Malley, and Rodin (1988) used distinct, more homogenous groups in a similar study yet still failed to find significant group differences in cardiovascular reactivity. Thayer (1970) asserts that EDA and HR are the best measures in combination to assess the relationship between physiological measures and subjective anxiety. Other psychophysiologists explain that utilizing a cardiovascular measure such as HR which is

controlled by both PNS and SNS influences coupled with a measure such as EDA which is controlled primarily by SNS influence allows more interpretative statements about effects of neural systems on reactivity (Blascovich & Kelsey, 1990). Given the mixed results of this investigation and literature on passive coping in bulimics, one could hypothesize more specific arousal patterns such as defensive response, rejection of environmental stimuli, and cardiac-somatic coupling associated with passive coping (see Graham & Clifton, 1966; Lacey, 1967; and Obrist, 1981, respectively, for a review). Psychophysiological measures designed to identify the appropriate responses could then be utilized.

Blascovich and Kelsey (1990) recommend that, if exclusive cardiovascular measurement is desired, pulse transit time (PTT) and/or preejection period (PEP) could be added to HR measures to facilitate interpretation as to which neural systems are influencing reactivity. The authors explain that both are inotropic measures. In particular, PTT is the time between electrocardiogram R-waves and the arrival of a pulse wave at a peripheral site. PEP is a systolic time period extending from the onset of ventricular depolarization to onset of ventricular ejection. Thus, with the increases in HR reported here, minimal or no change in PTT or PEP would indicate PNS withdrawal while decreases in PTT or PEP would reflect SNS activation.

It should be clear from the preceeding discussion that future studies could benefit from selecting more homogeneous groups for comparison with a greater number of subjects in each group. For homogeneity, selecting diagnostic groups of eating disordered individuals and a corresponding control group is one possibility. Assessing dietary restraint would also control for systematic influences. Additionally, incorporating more precise cardiovascular measures or measures reflecting the activity of different bodily systems would increase the interpretability of results.

In retrospect, this initial attempt at examining cardiovascular patterns of ANS responding and self-reports of anxiety in response to a weight stressor met with promising results. Regarding the confirmatory aspects of this study, both objective and subjective anxiety responses to weight measurement were identified, although some unexpected trends emerged. From the exploratory standpoint, the present evidence is mixed as cardiovascular markers of both active and passive coping were present. Thus, future studies could be aimed at further investigating these patterns and improving methodology to delineate which neural systems are influencing changes in response. Evaluating subjects' coping style via self-report would also provide helpful information and facilitate the distinction between active and passive coping in response to weight measurement.

APPENDIX A

INFORMED CONSENT

APPENDIX A

INFORMED CONSENT

Purpose: The purpose of this study is to examine emotional responses in relation to eating patterns and feelings about one's body in college females.

Procedures: The procedures are in two phases. The first phase occurs in your classroom where you will be asked to answer some brief questions about yourself. Next, you will be requested to complete two questionnaires covering different topics. The topics include eating patterns and feelings about your body. Subjects will then be randomly invited to participate in the second phase. Upon beginning the second phase, you will be asked if you have heard anything about the study from previous subjects. Requests will also be made for measurement of physiological responses at various times during your participation. A third questionnaire will be administered during the second phase which will cover your emotional responses.

Benefits and Risks: For participation, you will receive extra credit points toward your grade in the psychology course you are now taking. You might also be glad to know that you will be providing helpful information to professionals interested in issues involving women's eating patterns and/or body satisfaction. The risk to you during participation is that you may feel nervous or become bored. None of the physiological measures present any known risk to you although you may feel minimal discomfort from the cuff of a blood pressure monitor on your arm.

Confidentiality and Participation: The information that you provide will be kept confidential and your name will not appear on any test materials. Please be advised, however, that you will be given the names and addresses of local mental health clinics in the event you believe that you need professional help for an eating disturbance. Your participation in this study is strictly voluntary and if you want to stop at any time, you may do so without penalty. If you have questions about the study, rights related to it, or simply want feedback about your test performance, please contact me, Deborah Marcontell, at (817) 565-3286. If you prefer to write, the address is the University of North Texas, Psychology Department, Denton, TX 76203.

Agreement to Participate: I have read or heard clear explanation of the purpose of the study, procedures, benefits, and risks to me. I understand that I may withdraw my consent at any time without prejudice or penalty. With my understanding of this and satisfactory answers to my questions, I voluntarily consent to the procedures designated above.

SIGNED:_____DATE:_____

Phone No:_____

WITNESS:_____DATE:_____

APPENDIX B

DEMOGRAPHIC QUESTIONNAIRE

APPENDIX B

DEMOGRAPHIC QUESTIONNAIRE

Year in college: 1 2 3 4 5+ Age_____

Race: Asian Black Caucasian Hispanic Other

Present weight_____(lbs) Height_____

How long have you weighed this weight?_____(months)

How happy are you with your current weight?

1	2	3	4	5	6
very happy	quite happy	somewhat happy	somewhat unhappy	quite unhappy	very unhappy

What do you consider your ideal weight?_____(lbs)

Have you ever been diagnosed as having an eating disorder by a healthcare professional?_____

If you have been diagnosed as having an eating disorder, what was the name of it? When were you diagnosed?

_____

Do you presently have high blood pressure?_____

What medications do you take on a regular basis?

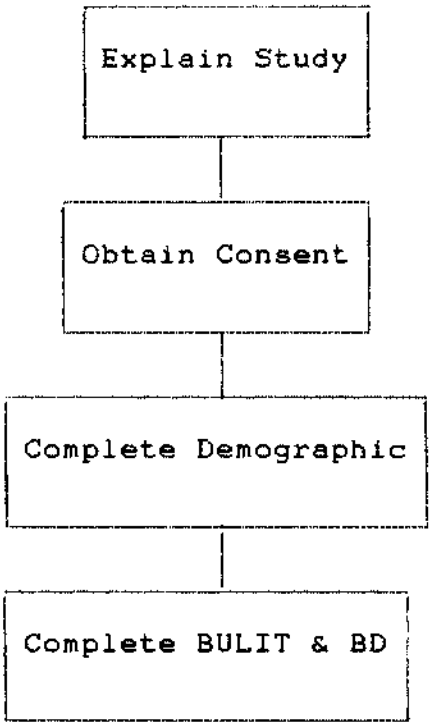
_____

APPENDIX C

PHASE ONE OF PROCEDURES: SCREENING

APPENDIX C

PHASE ONE OF PROCEDURES: SCREENING



APPENDIX D

WRITTEN INSTRUCTIONS FOR PHASE TWO SUBJECTS

APPENDIX D

WRITTEN INSTRUCTIONS FOR PHASE TWO SUBJECTS

1. Do not consume caffiene or alcohol 8 hours immediately prior to testing.

2. Do not smoke 1 hour immediately prior to testing.

APPENDIX E

STANDARDIZED VERBAL INSTRUCTIONS FOR PHASE TWO

APPENDIX E

STANDARDIZED VERBAL INSTRUCTIONS FOR PHASE TWO

Before we get started, I want you to know that I will be happy to answer any of your questions after we have finished.

The first thing that we are going to do is relaxation. I would like you to close your eyes and adjust your body so that you are comfortable in the chair. In a moment I will start a relaxation tape that will play for 5 minutes. During that time, I want you to simply relax.

Okay, you can open your eyes and slowly stand up. Please give me your left arm so that I can put this blood pressure cuff on it. Good. Now, rest your arm right here, be still, and relax. (measure) We're going to wait half a minute, then take another measurement. (measure) Okay, good. Stay as you are and we're going to do it again.

Now I need you to fill out this questionnaire after reading the directions at the top.

Okay, if you will please stand up again (pause as subject stands), I need to take three more measurements then I will weigh you (as scale presented).

Go ahead and step onto the scale.

Okay, you can step off the scale and sit down. I have another copy of the same questionnaire for you to complete but this time I want you to answer according to how you felt when you were being weighed.

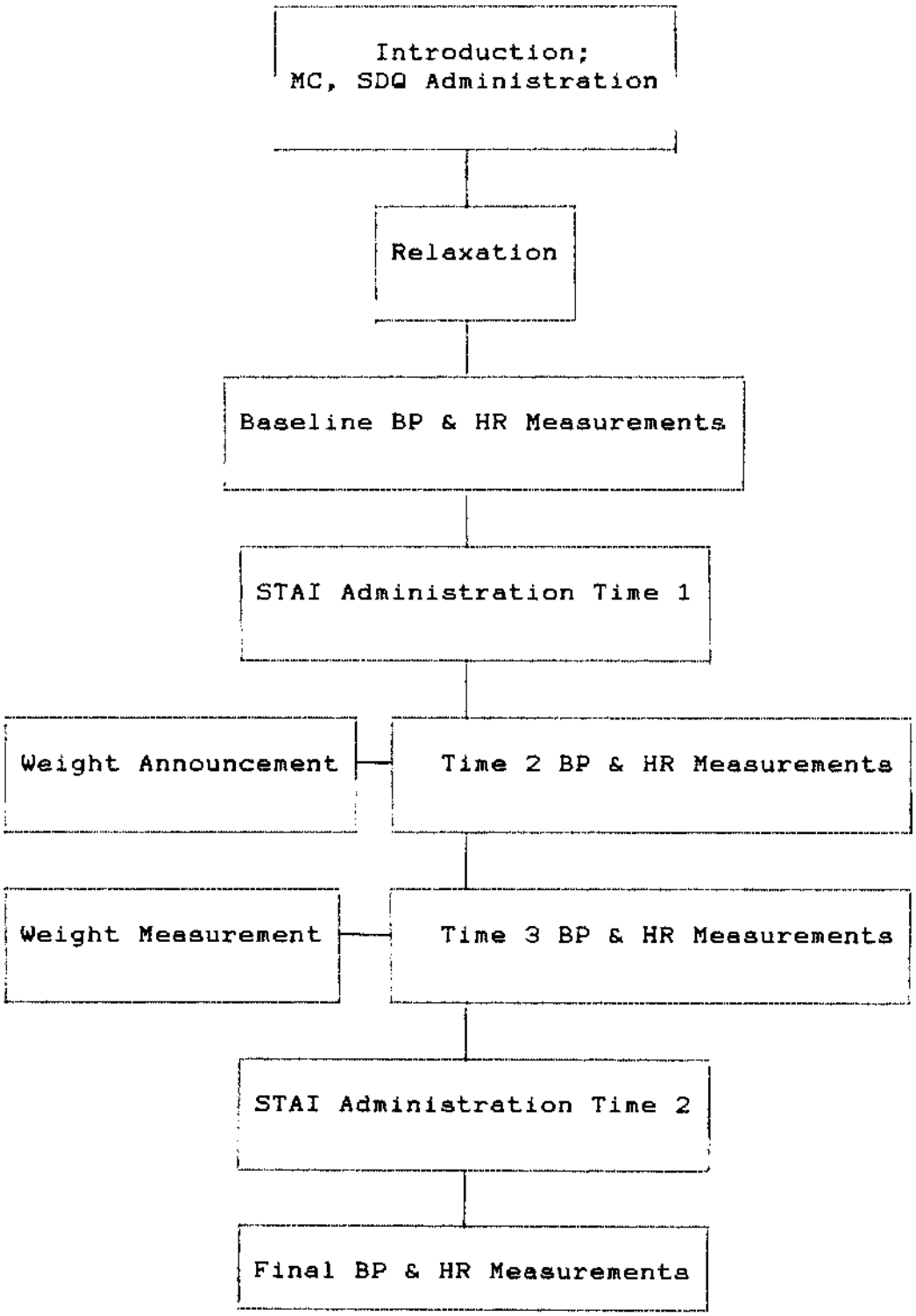
Alright, we are almost done. I need you to slowly stand up again and put your arm on the rest. Please be still and relax while I take the last measurements.

APPENDIX F

PHASE TWO OF PROCEDURES: EXPERIMENT

APPENDIX F

PHASE TWO OF PROCEDURES: EXPERIMENT



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