

# Stress-Induced Binge Eating: A Behavior Analytic Approach to Assessment and Intervention

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Published online: 5 January 2011  
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**Abstract** Responses to acute or chronic stress may include behaviors, such as alcohol consumption, cigarette smoking, and altered eating patterns. In connection with the stress-eating relation, some researchers have suggested that certain stressors (e.g., psychological or emotional) may influence the direction (i.e., increase or decrease) of a person's eating response. In a recent study, Connors and Morse (*Int J Eat Disord* 13:1–11, 2006) indicated that the physical and psychological stress associated with sexual trauma could result in an increase in food intake and nonstandard eating patterns. In consequence, this study describes a multifaceted intervention for a 24-year-old woman who experienced chronic stress and received a diagnosis of Binge Eating Disorder (American Psychiatric Association (1994). *Diagnostic and statistical manual of mental disorders*. DSM-IV. Washington, DC: APA) following a series of unwanted sexual experiences. The behavior analytic intervention emphasized self-control, self-regulation, and physical activity. The treatment package resulted in a 19% reduction in the participant's body weight, a 96% reduction in binge eating, and long-term adherence to an exercise routine.

**Keywords** Stress-induced binge eating · Binge-eating disorder · Behavioral intervention · Non-standard eating

According to Sherwood (2001), stress can be defined as the generalized, nonspecific response of the body to any factor that overwhelms, or threatens to overwhelm, the body's

compensatory abilities to maintain homeostasis. A stress response may occur following exposure to chemical, physiological, physical, social, and psychological or emotional stimuli. Although the sequelae of stress may include a range of behavioral and physiologic changes, previous researchers (Torres and Nowson 2007; Connors and Morse 2006) have shown that specific forms of stress may result in altered eating patterns. Psychological stress, for instance, may set the occasion for acceleration in the consumption of energy and nutrient-dense foods that are high in sugar and fat content.

Recent research has shown that there is a direct link between the psychological stress associated with sexual assault and an increase in ingestive behavior taking the form of binge eating. More to the point, approximately 30% of women diagnosed with an eating disorder report a connection between unwanted sexual contact and nonstandard patterns of food consumption, including binge eating (Fischer et al. in press).

Binge Eating Disorder (American Psychiatric Association, 1994) is associated with recurrent episodes of overeating in the absence of detrimental compensatory behaviors, such as purging, dietary restraint, excessive exercise, or laxative and diuretic misuse. Community prevalence data suggest that 2–5% of the general population is affected (de Zwaan 2001). Binge eating is a health risk behavior associated with obesity, elevated triglyceride and high-density lipoprotein cholesterol levels, high blood pressure, and heart disease (Johnson et al. 2001). Furthermore, excessive eating is associated with negative emotions and self-statements, a sense of loss of self-control, and can be a behavioral outcome that exacerbates the trauma of victims of unwanted sexual contact.

From a behavior analytic perspective, Binge Eating Disorder (BED) involves a nonstandard pattern of eating that is learned, susceptible to the same conditioning

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mechanisms of all human behavior, and amenable to environmental modification. In consequence, it is our opinion that individuals with a diagnosis of BED require multidisciplinary (e.g., medical, therapeutic) supports in addition to access to behavior analytic interventions designed to emphasize self-control and health-promoting coping behaviors.

The purpose of this case study is to describe a multifaceted intervention for binge eating with an emphasis on self-control, preference assessment, matched stimuli, and relapse prevention.

## Method

### Participant

The participant in this study, Grace, was a 24-year-old woman whose body weight increased from 54.43 to 75.74 kg (i.e., a 39% increase) over the span of 18 months following a series of unwanted sexual experiences. A binge regularly involved ordering hamburgers, fries and a milkshake from a drive-through window, rapidly eating the food, and immediately repeating the process at a second fast food restaurant. Grace expressed preference for a behavioral intervention, granted consent for treatment, and secured permission from her primary care physician to participate in a weight reduction program.

### Operational Definition and Data Collection

The behavior of primary concern, binge eating, was defined as any instance of ingesting more than 1,500 calories within a two-hour interval. Additional dependent variables included daily body weight, frequency of binge eating, elapsed time between binge episodes, and the duration of exercise. Reliability data were collected on the hard measure (body weight) on four occasions during the study; inter-observer agreement was 100%.

### Design

A single subject A–B design (Hersen and Barlow 1976) was used to evaluate the effect of the treatment package. Baseline data were collected during the first (A) phase of the study, and the treatment package was introduced during the second (B) phase of the study. Despite the inherent limitations of this simple time series design, it was the most appropriate design given the sensitivity of the case.

### Procedure

A scatter plot analysis (Touchett et al. 1985) was conducted to identify the temporal distribution of binge eating.

That is, the relationship between time of day and binge eating was carefully evaluated. Subsequently, a descriptive assessment (Stickney and Miltenberger 1999) was completed to acquire information regarding the potential function of binge eating (e.g., whether binge eating appeared to function as a stress attenuating response). Next, five food-related preference assessments were performed. The first assessment was designed to determine Grace's favored taste sensations during a binge. The five basic taste sensations (i.e., sweet, bitter, sour, salty, and savory) were evaluated. The second assessment examined the temperature preference of foods consumed during a binge. The temperature categories considered were hot, lukewarm, room temperature, chilled, and cold. The third preference assessment was conducted to identify preferred food textures (e.g., soft chewy, hard chewy, crunchy, smooth, thin liquid, and a variation of textures). In brief, the taste, temperature, and texture preference assessments were designed in an attempt to identify the specific source of immediate and automatic reinforcement produced by Grace's binge eating behavior. A fourth food preference assessment was completed to determine the satiety index (Holt et al. 1995) of various foods. More specifically, foods with high protein and fiber as well as high water content were evaluated for their affect on Grace's sense of satiation and their impact on her inter-meal/snack intervals. Next, a fifth preference assessment was conducted to determine the most reinforcing parameter of a binge. To conclude the assessment phase, the Physical Activity Readiness Questionnaire (Department of National Health and Welfare 1978) was used to assess Grace's preparedness for an exercise regimen, and finally, an exercise assessment was conducted to identify preferred forms of physical exercise that emphasized large muscle dynamic motion.

At the conclusion of the assessment stage, the results were summarized, and it was determined that: (1) Grace's eating behavior was most problematic between the hours of 3:00 and 5:00 PM (while alone in her car) and 9:00 and 10:00 PM (while alone in her bedroom); (2) Grace's bingeing was preceded by intense hunger cues followed by immoderate eating to attenuate food cravings and stress; (3) when Grace binged, she preferred sweet and salty foods (taste preference) that were either warm or chilled (temperature preference); (4) her preferred food textures were soft chewy and crunchy; (5) foods that were high in fiber (e.g., popcorn) or very spicy (e.g., hot salsa) scored high on the satiety index; (6) the quantity of food consumed was the most important parameter of reinforcement, (7) Grace was not at risk if she exercised; and (8) her preferred form of activity was jogging.

Following the assessment phase, a treatment protocol was designed based on assessment results and included four fundamental components. First, Grace was required to

**Table 1** Dependent Variables Associated with Binge Eating

Phase	Body weight	Binge frequency	Inter-response time	Exercise duration
Baseline	75.7 kgs	30–60 per month	12–24 h	0
6 Months	68.0 kgs	15–30 per month	24–48 h	4.5 h per week
12 Months	59.8 kgs	1 per month	30 days	7 h per week
18 Months	61.1 kgs	1 per month	30 days	7 h per week

monitor, on a daily basis, her body weight and ingestive behavior (i.e., total salt, sugar, fat, and caloric intake). She was also required to collect data on the frequency of binge eating, the time between bouts of binge eating, and the duration of her exercise sessions. Next, with the assistance of a clinician, Grace was instructed how to identify substitute foods (with low salt, sugar, fat, and caloric content) that “matched” the multi-sensory consequences (i.e., taste, temperature, and texture) of the foods she favored (Piazza et al. 2000). The third component of the treatment package included an exercise routine chosen by Grace. Finally, weekly phone calls and monthly meetings with the clinician were scheduled for ongoing support.

## Results and Discussion

Table 1 shows the critical dependent variables including body weight, the frequency of episodes of binge eating, the time between binges, and exercise duration. Data are provided for baseline and the 6-, 12-, and 18-month review. Table 1 shows that Grace’s baseline body weight was 75.7 kgs at the start of the study, and she binged 30–60 times per month. Moreover, the binge eating inter-response time was between 12 and 24 h. Grace did not exercise during baseline. Six months post-intervention, Grace’s body weight was 68.0 kgs (a 10% reduction), the range of binge eating episodes was 15–30 per month, and the inter-response time was 24–48 h. Moreover, she exercised, on average, 4.5 h per week. By month 12, Grace’s body weight reduced to 59.8 kgs (21% reduction), binge eating occurred once per month, the inter-response time was about 30 days, and Grace exercised 7 h per week. During the 18-month follow-up, Grace’s body weight was 61.2 kgs representing a 2% increase from the 12-month mark but a 19% reduction from her baseline weight. Binge eating occurred once per month, the inter-response time was about 30 days, and Grace exercised for 7 h per week. The reduction in binge eating episodes, from 30 to one episode per month, represents a 96% decrease in the health risk behavior.

Based on the assessment results, it was apparent that food quantity was a highly preferred parameter. Therefore, Grace’s intervention did not involve controlling this variable. Rather, the intervention focused on the identification and

consumption of foods (low in salt, sugar, fat, and calories) that matched the multi-sensory stimulation that Grace received during an episode of binge eating. Grace’s matched food choices during a binge, along with the balance of the treatment package, resulted in a 14.5-kg weight loss (19% loss of body weight) which was sustained over an 18-month period.

It is possible that the selection and consumption of matched foods served as an appropriate coping strategy for Grace since her choice-making behavior was both goal-directed and motivated by her desire to affect her food craving and overall level of stress (Troop 1999). Ultimately, Grace’s episodes of binge eating decreased from at least once daily to once per month. It should also be noted that Grace’s progress during this study occurred in the absence of any pharmacological intervention, and her treatment package emphasized both self-regulation and self-control. At the end of this study, Grace routinely made healthy food choices, refrained from binge eating for long periods of time, and engaged in physical activities including running, strength training at her local athletic club, and Bikram yoga at a neighboring studio.

Although this study did not demonstrate a functional relation between independent and dependent variables, the study illustrates a unique application of behavior analytic evidence-based procedures, including preference assessment and the use of matched stimuli. Moreover, the adjunct procedures employed, including self-monitoring, choice making, and telephone and personal meetings, were associated with a 14.5-kg weight loss, sustained lifestyle changes, and a 96% reduction in a serious health risk behavior.

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