

## Stress, dietary restraint and food intake

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Received 18 October 1999; accepted 3 December 1999

### Abstract

**Objective:** The purpose of this study was to examine the associations between work stress and nutritional status in relation to dietary restraint in a community sample of adults.

**Methods:** The design included a cross-sectional and a longitudinal study element. Ninety staff members (58 women and 32 men) of a large department store were assessed on four occasions over a 6-month period with measures of diet, weight, and perceived stress. Work stress was indexed in terms of the hours of work over the past 7 days, which provided an objective indicator of demand. **Results:** Participants worked an average of 47 hours on the high-work-stress session compared with 32 hours on the low-work-stress session. The highest work-stress session was compared with the lowest work-stress session in

the longitudinal analyses, and the moderating effects of gender and restrained eating were examined. High-workload periods were associated with higher energy and saturated fat and sugar intake. There was a significant moderating effect of restrained eating, with a hyperphagic response to work stress in restrained eaters, compared with no effect in unrestrained eaters. **Conclusion:** The results indicate that the associations between restraint and stress-induced eating that have been observed in the laboratory extend to the real-life setting. They raise the possibility that restrained eaters are particularly vulnerable to adverse effects of stress on health, through influences on food intake. © 2000 Elsevier Science Inc. All rights reserved.

*Keywords:* Stress; Diet; Weight; Restraint

### Introduction

Studies of the associations between stress and eating have emerged in several different fields. In the health psychology literature, food choices have often been considered as one of a range of health-related behaviors that might be responsive to life stress or emotional well-being, either inadvertently or as a deliberate strategy for coping with stress [1,2]. Animal studies have investigated eating behavior as part of the overall psychobiological reaction to stress [3,4]. In research on eating disorders, stress is considered as a factor that might disturb food intake regulation, and is usually analyzed in relation to individual differences in weight or dietary restraint [5]. This has led to a range of different formulations of the effects of stress on eating behavior. Greeno and Wing [6], in their comprehensive review of the literature, distinguished studies drawing upon what they call a “general effects” model, which hypothesizes that stress

might impinge directly on appetite, from those based on an “individual differences” model, which identifies overeating in response to stress as a form of eating disturbance, exhibited by individuals who are attempting to control their food intake (restrained eaters).

The general effects model has been investigated most extensively in animal studies, with evidence both for stress-induced hyperphagia and hypophagia, but, as yet, no overarching explanatory framework exists to predict the direction of the effect [3]. In humans, a limited amount of research has identified cross-sectional associations between chronic stressors or self-reported emotional distress and dietary choice [7,8]. Several studies have also compared periods of high and low life stress, but with mixed results. McCann et al. [9] examined the effects of variation in workload on food intake and serum lipids with a small group of female office workers. The workers reported a higher energy intake and a higher percentage of energy as fat, in two high workload periods, compared with the normal work period. Using academic examinations as the stressor, Michaud et al. [10] also found higher energy intake in 24-hour food

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records from the day of the examination compared with 1 month later, among 15- to 19-year-old high school students. Similar results were reported from a study of dietary habits associated with exam time among university students [11]. One problem with these studies is that there were no nonstressed control groups to disconfound time and stress level. This makes it difficult to rule out the possibility that the dietary changes associated with the high stress periods were the result of different foods being available at the school or workplace (e.g., pizza being brought to the office during the high workload period), rather than the individual's choices in the low and high stress periods. In a study of examination stress, which included a control group, we found no overall nutritional difference between students taking examinations and others for whom there were no examinations scheduled at that time [12].

Two studies have used acute stressors and single meal intakes. Grunberg and Straub [13] measured snack intake in a laboratory study, inducing stress with a stressful film. Men's snack intake was lower in the stress than the control condition, whereas women's intake did not vary by condition, but the total intake in both conditions was extremely small. The other study compared the midday-meal intake on the day before a surgical operation with intake at a comparable time of day a few weeks later in 12 middle-aged men, and found no difference either in energy intake or dietary composition [14]; however, the small sample gave this study limited statistical power.

One explanation for the variation in results could be individual differences in stress-induced eating. The men in Bellisle et al.'s study showed considerable variation, ranging from one man eating 125% more on the pre-surgery day, to another who ate 53% less. Variability between individuals was also demonstrated in a study in which 158 married couples (average age 42 years) kept daily records of both stressful events and the amount of food eaten [15]. In the higher stress weeks there were increases in both eating "more than usual" and "less than usual," with individuals tending to be consistently either hyperphagic or hypophagic. In a recent self-report study, we found that hypophagic and hyperphagic responses to stress were reported equally often [16].

The individual differences model has also been examined extensively in many laboratory studies [17–22]. Typically, these focus on dietary restraint and use female college students as subjects. Food intake is usually measured in the artificial context of a bogus "taste test" in which participants are asked to taste and rate ice-creams or other highly palatable foods. The results of these studies have been remarkably consistent. Women who are restrained eaters show stress hyperphagia (i.e., they eat more in the high-stress than the low-stress condition), whereas nonrestrained women are either hypo-

phagic or do not change their food intake in response to stress [5,17–22]. There have been few attempts to generalize the laboratory findings on restraint and food intake to everyday eating behavior with normal foods, although two self-report studies both found that restrained eaters were more likely to report stress-hyperphagia than unrestrained eaters [16,23].

The present study was set up to evaluate associations between stress and daily food intake in relation to dietary restraint. Using a design similar to McCann et al. [9], periods of lower and higher workload were used to operationalize high and low work stress. Food intake and appetite were compared between the two time periods, with restrained eating included as a moderating variable.

On the basis of previous work, energy, fat, and sugar intakes were predicted to be greater in the high-work-stress periods, but the hyperphagic effect was predicted to be greater among workers with higher levels of restrained eating. Appetite was also assessed to determine whether changes in appetite mediated changes in food intake. Because men and women differ both in dietary restraint [24], and in the impact of work hours on stress symptoms [25], gender was included as a factor in the analyses

## Methods

### *Design and procedures*

Participants were recruited from the staff of a large department store in central London through invitations to take part in a study of work and stress. Staff who worked more than 20 hours a week, had worked in the store for more than 6 months, expected to continue working there over the next 6 months, and had no psychiatric conditions or chronic medical conditions were eligible to participate. Assessment sessions were scheduled over four time periods, early November, mid-December, mid-January, and early March.

There were 95 volunteers of whom 90 (58 women and 32 men) attended at least two assessment sessions and 71 (44 women and 27 men) completed all four sessions. At the first session, participants completed measures of eating style. On this and each subsequent session participants completed a 24-hour food recall with the help of a dietician and were weighed. Ratings of subjective stress and emotional well-being were also completed. The assessment sessions were carried out at the same time of day for each subject, although they varied in time of day across the whole sample.

The purpose of this study was to compare high- and low-work-stress periods within subjects. To maximize numbers, all participants who completed two or more sessions were included. Statistical comparisons were made between the 71 individuals who completed all four

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