



Research report

Can the reinforcing value of food be measured in bulimia nervosa? ☆

Janet Schebendach^{a,b,c,*}, Allegra Broft^{a,b,c}, Richard W. Foltin^{a,b,d}, B. Timothy Walsh^{a,b,c}^a New York State Psychiatric Institute, 1051 Riverside Drive, Unit 98, New York, NY 10032, USA^b Columbia College of Physicians and Surgeons, Columbia University, New York, NY 10032, USA^c Eating Disorders Research Unit, New York State Psychiatric Institute, USA^d Substance Use Research Division, USA

ARTICLE INFO

Article history:

Received 22 October 2012

Received in revised form 16 November 2012

Accepted 19 November 2012

Available online 23 November 2012

Keywords:

Bulimia nervosa

Progressive ratio task

Reinforcing value of food

ABSTRACT

Binge eating is a core clinical feature of bulimia nervosa (BN). Enhanced reinforcing value of food may play a role in this behavioral disturbance, but a systematic behavioral assessment of objective measures of the rewarding value of binge eating is lacking. The purpose of this study was to quantify the reinforcing value of food in BN patients as compared with normal controls. A progressive ratio (PR) computerized work task was completed under binge and non-binge instruction. The task consisted of 12 trials. The first trial required 50 keyboard taps to earn one portion of yogurt shake, and subsequent trials required progressive work increments of 200 taps for each additional portion. Completion of all 12 trials required 13,800 taps to earn 2100 ml of shake. The breakpoint, defined as the largest ratio completed before a participant stopped working, was the measure of reinforcing efficacy. Ten patients and 10 controls completed the experiment. Under binge instruction, patients completed more trials and taps, and had a higher breakpoint than controls. The non-binge instruction yielded opposite findings; compared to controls, patients completed fewer trials and taps, and had a lower breakpoint. These results support the feasibility and potential utility of a PR task to quantify the reinforcing value of food in patients with BN.

© 2012 Elsevier Ltd. All rights reserved.

Introduction

Binge eating, accompanied by inappropriate compensatory behavior to avoid weight gain, is a core clinical feature of bulimia nervosa (BN). Enhanced reinforcing value of food may play a role in this behavioral disturbance (Bohon & Stice, 2011), but an objective behavioral assessment of measures of reward is lacking in this patient population.

The field of behavioral economics provides methods by which to measure the reinforcing efficacy of motivated behaviors, like smoking (Bulik & Brinded, 1994; Epstein, Bulik, Perkins, Caggiula, & Rodefer, 1991), drug use (Comer et al., 1998; Stafford, LeSage, & Glowa, 1998), physical activity (Saelens & Epstein, 1999), and eating (Epstein & Leddy, 2006; Epstein, Leddy, Temple, & Faith, 2007; Lappalainen & Epstein, 1990; Raynor & Epstein, 2003; Saelens & Epstein, 1996) in a laboratory setting. In general, these laboratory paradigms quantify the reinforcing efficacy of a target behavior in terms of the amount of “work” an individual is willing to expend to access it (Hodos, 1961). Specifically, the progressive ratio (PR) task measures the reinforcing value of a motivated behavior by requiring the participant to expend progressively

increasing amounts of work to gain access to it (Roane, 2008). In humans, effort or “work” is often based on the number of taps on a computer keyboard. The PR breakpoint is defined as the number of responses completed for a reinforcer before the participant stops working for it; the more reinforcing a stimulus is, the higher the breakpoint (Hodos, 1961).

Human eating behavior can be measured during laboratory test meals and is related to two food attributes, hedonics and liking (Mitchell, Crow, Peterson, Wonderlich, & Crosby, 1998; Walsh & Boudreau, 2003). It has, however, been suggested that the reinforcing value of food may be a more powerful determinant of food intake than either food hedonics or liking (Epstein & Leddy, 2006).

Laboratory studies demonstrate that when asked to binge eat, patients with BN consume binge quantities of food at single-item and multi-item meals (Kaye et al., 1992; Kissileff, Walsh, Kral, & Cassidy, 1986; LaChaussee, Kissileff, Walsh, & Hadigan, 1992; Walsh, Kissileff, Cassidy, & Dantzie, 1989a; Walsh, Kissileff, & Hadigan, 1989b). The purpose of the current study was to determine if patients with BN were willing to work at a PR task in order to obtain a binge quantity of food during a single-item laboratory test meal. We hypothesized that: (1) Both BN and NC subjects would perform more total work and achieve a higher breakpoint under binge vs. non-binge instruction; and (2) under binge instruction, BN subjects would work harder (more total work and a higher breakpoint) than NC subjects to obtain a larger quantity of food.

* Acknowledgements: This study was supported by a research Grant (R21 MH065024) from the National Institutes of Mental Health.

* Corresponding author.

E-mail address: js2202@columbia.edu (J. Schebendach).

Methods

Participants

Patients meeting the *Diagnostic and Statistical Manual of Mental Disorders, 4th edition* (American Psychiatric Association, 1994) criteria for BN, and healthy normal controls, were recruited to participate in a laboratory study conducted by the Eating Disorders Research Unit at the NYSPI, Columbia University Medical Center from October 2005 to March 2008. All BN participants were female outpatients between the ages of 18 and 45 years. Exclusion criteria included co-morbid substance abuse or a DSM-IV Axis I psychiatric diagnosis other than depression. Controls were matched on age, gender, and BMI. The New York State Psychiatric Institute (NYSPI)/Columbia University Department of Psychiatry Institutional Review Board approved this study. Written informed consent was obtained from participants prior to study.

Progressive ratio (PR) computer task

The PR computer task consisted of 12 trials, and work consisted of finger presses on a computer keyboard. The work required in the first trial was 50 keyboard presses to earn a 175 ml portion of a strawberry yogurt shake; an additional 200 keyboard presses were required to complete each subsequent trial and earn an additional 175 ml aliquot of shake. Thus, the first completed trial required 50 keyboard presses and the remaining trials required 250 presses, then 450, 650, 850, 1050, 1250, 1450, 1650, 1850, 2050, and 2250 responses. To earn the maximum amount of shake (2100 ml), the participant had to complete 12 trials and perform 13,800 keyboard presses within a 60-min period. The breakpoint, defined as the largest ratio completed before a participant stopped working, was the primary measure of reinforcing efficacy.

Study sessions

All studies were conducted in the Biological Studies Unit (BSU) at the NYSPI. Studies were scheduled over a 4-day period within 1 week as follows: acclimation day (Tuesday), day off (Wednesday), study day 1 (Thursday), and study day 2 (Friday).

Acclimation day

Acclimation day had several purposes: to train subjects on the PR computer task; to familiarize subjects with the BSU setting and with the instruction to binge (BN) or overeat (NC); and to determine if a BN subject was able to binge and purge in the laboratory setting. BN subjects who could successfully binge and purge in the laboratory proceeded to the experimental study days 1 and 2. Those who could not were not studied further.

Subjects arrived at 10:00 am, and, after an overnight fast, a standardized research breakfast (300 kcal/1256 kJ) was provided. Immediately after breakfast, participants practiced the identical PR task used on the experimental study days. Before starting the PR task, participants were given a 2 fl oz serving of yogurt shake to taste. A clear plastic glass that contained a 175 ml visual reference portion was also provided and the subject was instructed to "Imagine that you are working for the number of yogurt shake portions you would like drink this afternoon." During the PR task, a computer screen image of a pitcher, initially empty, increased in its content of shake with each completed PR trial. In addition, a 175 ml aliquot of shake was also pumped into an actual pitcher, placed to the left of the computer screen, after the completion of each PR trial. After completion of the PR computer task, the pitcher of shake was removed. Participants then remained in a private room in the BSU until 3 pm. During the interim, they could read,

write, or sleep, but were asked not to eat or drink anything except water; compliance was monitored via closed circuit TV. At 3 pm, participants were seated at a table and provided with an empty glass and a full pitcher of yogurt shake. Although subjects may have worked for less than a full pitcher of shake during the actual PR task, on acclimation day (only) they were provided with the maximum amount they could possibly earn (2100 ml for 12 completed PR trials) and were instructed as follows: "Today we want you to let yourself go and drink as much as you can. In other words, binge. If you are someone who does not binge, we want you to let yourself go and drink as much as you can. In other words, overeat." The pitcher was removed at 3:30 pm, but subjects remained in the BSU for additional 30-min before discharge (4 pm). Access to a private bathroom was permitted throughout the afternoon session.

Study days 1 and 2

Subjects arrived at 10:00 am, after an overnight fast, and a standardized research breakfast (300 kcal/1256 kJ) was provided. After breakfast, subjects remained in a private room in the BSU until they performed the PR computer task later that afternoon. During the interim, they could read, write, or sleep, but were asked not to eat or drink anything except water; compliance was monitored via closed circuit TV.

Subjects began the PR task at 2 pm. Before starting, they were given a 2 fl oz portion of the yogurt shake to taste. A 175 ml visual reference portion was provided, and the participant was then given either a binge instruction ("Today we want you to work for the number of yogurt shake portions that you can binge on. If you are someone who does not binge, we want you to work for the number of yogurt shake portions that you can overeat on.") or a non-binge instruction ("Today we want you to work for the number of yogurt shake portions that you can drink comfortably, without restricting or bingeing."). The order of the binge and non-binge days was counter balanced across subjects. The PR computer task was identical to that used on acclimation day. During the task, a pitcher image on the computer screen allowed subjects to visualize the amount of shake earned during the session, and the actual pitcher, initially empty, filled with a 175 ml aliquot shake upon completion of each PR trial.

After completion of the PR task, participants remained in a private room in the BSU. At 3 pm, participants were provided with yogurt shake. As distinct from acclimation day, only the amount of shake that was actually earned (i.e., 175 ml per completed trial) was provided. Prior to drinking the shake, participants were provided with the appropriate binge instruction ("Today we want you to let yourself go and drink as much as you can. In other words, binge. If you are someone who does not binge, we want you to let yourself go and drink as much as you can. In other words, overeat.") or non-binge instruction ("Today we want you to drink comfortably, without restricting or bingeing."). The pitcher was removed at 3:30 pm, but subjects remained in the BSU for additional 30 min before discharge. Access to a private bathroom was permitted throughout the afternoon session.

Instruments

Eating Disorder Examination (Fairburn & Cooper, 1993)

The Eating Disorders Examination, administered by a trained research assistant, was used to determine the energy content of a typical binge, as well as the frequency of binge and purge episodes.

Visual analogue scales

Immediately before starting the PR computer task on binge instruction day, participants completed visual analogue scale (VAS) ratings in response to the following questions: "How tense or anxious do you feel right now?"; "How hungry are you right

متن کامل مقاله

دریافت فوری ←

ISIArticles

مرجع مقالات تخصصی ایران

- ✓ امکان دانلود نسخه تمام متن مقالات انگلیسی
- ✓ امکان دانلود نسخه ترجمه شده مقالات
- ✓ پذیرش سفارش ترجمه تخصصی
- ✓ امکان جستجو در آرشیو جامعی از صدها موضوع و هزاران مقاله
- ✓ امکان دانلود رایگان ۲ صفحه اول هر مقاله
- ✓ امکان پرداخت اینترنتی با کلیه کارت های عضو شتاب
- ✓ دانلود فوری مقاله پس از پرداخت آنلاین
- ✓ پشتیبانی کامل خرید با بهره مندی از سیستم هوشمند رهگیری سفارشات