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Self-Reported Weight Gain Following Smoking Cessation: A Function of Binge Eating Behavior

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Abstract

Objective—This study investigated patterns of self-reported weight gain following smoking cessation among overweight individuals with and without binge eating.

Method—Participants were 103 over-weight (BMI ≥ 25) community volunteers who completed a battery of questionnaires online. Key items queried smoking cessation history and weight gain in the year following cessation. Participants were classified as nonbinge eating over-weight (NBO, $n = 56$) or binge eating disorder (BED, $n = 47$).

Results—BED participants were significantly more likely to report weight gain in the year following smoking cessation than NBO participants. After controlling for current BMI, the amount of self-reported weight gain following smoking cessation differed significantly between groups, with the NBO group reporting an average gain of 5.0 kg and the BED group reporting 11.2-kg gain.

Discussion—Since many individuals resume smoking due to cessation-associated weight gain, these findings highlight the need for targeted interventions for overweight individuals particularly those who also binge eat.

Keywords

smoking; binge eating; overweight; weight gain

Introduction

Smoking cessation is associated with modest weight gain, with average gains of ~5 kg in the first year following smoking cessation.¹ This weight gain is generally attributed to a combination of metabolic changes and increased appetite and food intake following withdrawal from nicotine. Considerable individual differences in the amount of weight gain following smoking cessation have led to efforts to identify factors that are predictive of weight gain. Efforts to identify predictors of weight gain are important for various reasons including clinical observations that some individuals may resume smoking in response to weight gains. To date, research has identified several factors that appear to predict the amount of weight gain following smoking cessation including gender, initial body weight, length and frequency of smoking behaviors, and diet and physical activity.²

Little is known about patterns of weight gain following smoking cessation among individuals with disordered eating, although a few studies have investigated features of eating disorder (ED) pathology in relation to weight gain. One longitudinal study of weight gain among women during the course of smoking cessation found that among those who successfully quit smoking for at least 12 months, weight gain was associated with disinhibited eating and eating in response to negative affect.³ A laboratory study⁴ found that women with features of ED pathology were more likely to gain weight during short term (2 days) smoking abstinence than were women with lower ED risk or features. Such findings suggest the hypothesis that women with significant ED features may be at increased risk of weight gain following smoking cessation, and highlight the need for larger studies to examine weight gain during prolonged abstinence following smoking cessation. The current study investigated patterns of self-reported weight gain following smoking cessation among overweight individuals with and without binge eating. It was hypothesized that individuals with clinically significant binge eating would report more weight gain following smoking cessation than overweight individuals who deny binge eating.

Method

Participants

Participants were 103 overweight ($BMI \geq 25$) adult community volunteers who reported a smoking history. These participants were respondents to online advertisements requesting participation in a research study on eating and dieting. These participants were identified from a larger sample of 1,143 volunteers based on the criteria (described below) to create two study groups. Advertisements were placed on Craigslist internet classified ads and on Google banners, and contained a link to an external website with questionnaires. An attempt was made to sample from a variety of geographic regions by advertising on Craigslist in major cities throughout the United States (e.g., New York, Washington DC, Philadelphia, Boston, Baton Rouge, Tulsa, Austin, Oklahoma City, Seattle, San Francisco). The advertisement appeared as a Google banner when users entered the following keywords: “weight gain; body image; binge eating; compulsive eating; obesity; obesity epidemic; obesity test; obesity studies; obesity quiz; weight questionnaire; weight quiz; weight studies; eating test; eating questionnaire.” The study received IRB approval.

The overall study group was 17.5% male ($n = 18$) and 82.5% female ($n = 85$). The overall racial/ethnic distribution was: 82.5% ($n = 85$) Caucasian, 7.8% ($n = 8$) Hispanic, 1.9% ($n = 2$) African American, 1.9% ($n = 2$) Asian, and 5.8% ($n = 6$) reporting “other.” The mean age was 40.2 years ($SD = 10.8$) and the mean body mass index (BMI) was 34.6 kg m^{-2} ($SD = 8.4$). Analysis of zipcodes according the US Postal service geographic regions confirmed an adequate geographical distribution: 14.6% of the sample lived in the Northeast, 27.2% in the Midwest, 40.8% in the South and Mid-Atlantic region, and 17.5% from the Western United States.

Procedure

Participants completed the self-report questionnaires through the online data gathering website SurveyMonkey (<http://www.surveymonkey.com>). Survey Monkey is a research-based web server with secure 128-bit data encryption. Participants were required to affirm willingness to participate and to provide informed consent, prior to accessing the questionnaires. No personal identifying information was collected.

Assessments and Measures

Participants provided basic demographic information, including self-reported height and current weight, and completed a battery of self-report measures.

Smoking History and Status—The smoking history questionnaire assessed variables pertinent to the current study, including number of years smoked, age of smoking onset, highest smoking frequency and number of cigarettes per day, quit date (if applicable), number and length of quit attempts, and self-reported weight gain following smoking cessation. Self-reported weight gain was assessed categorically (i.e., whether participants gained any weight during the first year) as well as dimensionally (i.e., the amount of weight gain during the first year following smoking cessation).

Binge Eating Status—This was evaluated using the self-report Eating Disorder Examination Questionnaire (*EDE-Q5*), which has received empirical support for identifying binge eating in obese⁶ and community⁷ studies. The EDE-Q focuses on the previous 28 days and assesses the frequency of objective bulimic episodes (eating unusually large amounts of food while experiencing a subjective sense of loss of control, which corresponds to DSM-IV definition of binge eating), as well as the frequency of overeating and various purging behaviors (self-induced vomiting, laxative misuse, etc). Specific additional items measured the age of binge eating onset.

Creation of Study Groups

Participants were included if they had a self-reported BMI greater than 25, endorsed having regularly smoked cigarettes during their lifetime, and if they reported having successfully quit smoking for at least 1 year. Two study groups were created: nonbinge eating overweight (NBO) included participants who reported no binge eating, purging, or loss of control over eating, and binge eating disorder (BED) participants reported binge eating at least once per week over the past 4 weeks and denied any purgative behavior. The approach of defining BED with a once-weekly frequency criterion was used because research has consistently supported a broadening of the required frequency criterion from twice-weekly to once-weekly.⁸ It should be noted that the following exclusions were applied in generating the final sample: BMI < 25, never-smokers, presence of purging behaviors, and the presence of loss of control over eating for the NBO group.

Results

Of the 103 overweight (BMI ≥ 25) participants, 54.4% ($n = 56$) were categorized as NBO and 45.6% ($n = 47$) were categorized as BED. Chi-square tests of independence performed on the two study groups showed no significant differences for gender (χ^2 ($df = 1$, $N = 103$) = 0.17, $p = .68$) or ethnicity (White versus non-White) (χ^2 ($df = 1$, $N = 103$) = 1.33, $p = .25$).

A general linear model (GLM) analysis of variance (ANOVA) revealed that the NBO and BED groups did not differ significantly on age ($F(1,102) = 1.14$, $p = .29$, $\eta^2 = 0.011$), but did differ significantly on BMI ($F(1,102) = 7.82$, $p = .006$, $\eta^2 = 0.072$). The mean BMI for the NBO group was 32.5 (SD = 6.9), and the mean BMI for the BED group was 37.0 (SD = 9.3).

The NBO and BED groups were compared on specific features of smoking history. The groups did not differ on age of smoking onset ($M = 15.5$ years, SD = 3.1), age of smoking cessation ($M = 31.3$ years, SD = 8.2), duration of smoking ($M = 16.9$ years, SD = 9.8), highest frequency of smoking (i.e., cigarettes smoked per day) ($M = 18.9$, SD = 14.8), or length of time since the reported quit date ($M = 10.0$ years, SD = 8.7). Overall, the NBO and BED groups did not differ on smoking history variables.

The primary hypothesis tested was whether the NBO and BED groups differed in weight gain in the year following smoking cessation. Categorical responses to the question, “Did you gain any weight in the year after you quit smoking?” were compared using a chi-square analysis, which revealed significant differences between the NBO and BED groups, $\chi^2 = 5.89$, $p = .015$.

Within the NBO group, 53.6% ($n = 30$) of the participants reported weight gain in the year after cessation whereas within BED, 76.6% ($n = 36$) of the participants reported weight gain. The significant odds ratio indicated that individuals with BED were 2.84 times more likely to report weight gain in the year following smoking cessation (95% CI: 1.2–6.7, $p = .017$). Individuals with BED reported significantly more weight gain following smoking cessation ($M = 11.4$ kg, $SD = 11.2$) than did the participants classified as NBO ($M = 5.0$ kg, $SD = 6.9$), $F(1, 101) = 12.32$, $p < .001$, $\eta^2 = 0.109$. The finding remained significant even after controlling for current BMI: $F(1, 100) = 10.04$, $p = .002$, $\eta^2 = 0.091$.

Within the BED group, participants reporting two or more episodes per week were more likely to report weight gain than those with fewer binge episodes (i.e., once weekly) ($OR = 5.63$, $p = .042$; 95% CI = 1.1–29.8). Participants reporting twice-weekly binge episodes reported more weight gain ($M = 14.2$ kg, $SD = 11.1$) than those with less frequent (once-weekly) binge eating ($M = 8.9$ kg, $SD = 10.9$), although this trend difference did not reach statistical significance, $F(1, 45) = 2.70$, $p = .10$. Considered continuously, there was a significant but small correlation between the frequency of binge episodes and the amount of weight gain, $r(101) = 0.28$, $p < .01$.

Exploratory analyses were conducted to examine the temporal relationships between smoking onset, binge eating onset, and smoking cessation within the BED group. The majority of participants (57.4%) reported smoking initiation prior to the onset of binge eating, 38.3% reported binge eating before smoking, and 4.3% reported simultaneous onset (i.e., same age). A separate analysis investigated the temporal ordering of smoking cessation and binge eating onset; 76.9% of participants reported binge eating prior to smoking cessation, whereas 20.5% reported binge eating onset following smoking cessation, and 2.6% reported simultaneous smoking cessation and binge eating onset.

Discussion

This study found that overweight former smokers who report regular current binge eating were nearly three times as likely to report weight gain in the year after smoking cessation than were overweight former smokers who denied binge eating. This finding is consistent with laboratory findings⁴ showing that individuals with features of ED eat more during nicotine withdrawal than do individuals without significant ED features. The finding of increased weight gain following smoking cessation reported by overweight individuals who binge eat is consistent with the hypothesis that for some individuals, cigarette smoking may be a means to suppress urges to binge eat.⁹ Although our study did not examine the frequency of binge eating before or during smoking cessation, the reported pattern of weight gain following cessation is suggestive of elevated food intake within the BED group. This hypothesis is further supported by the observed significant relationship between the frequency of binge episodes and weight gain.

Previous research has reported that on average, individuals experience ~5 kg weight gain in the 12 months following smoking cessation,¹ which is similar to the reported weight gain experienced by the NBO group in the current study. Research from the smoking cessation literature has determined that although there is a slight metabolic advantage of cigarette smoking, the weight gain following smoking cessation is generally attributable to increased food intake.¹ The differences between the NBO group and the BED group in self-reported weight gain is consistent with the hypothesis that the BED group experienced increased eating or increased caloric intake following smoking cessation. It could be that for some former smokers, binge eating has replaced smoking as a coping strategy; indeed it has been suggested that both binge eating¹⁰ and smoking¹¹ serve as a temporary escape from negative affect.

Future research will need to examine the extent to which binge eating and smoking are used for various functions—e.g., as an escape from awareness or in response to negative emotions¹²—to determine whether some individuals “replace” cigarette smoking with binge eating following smoking cessation. Our exploratory analyses suggest that ~20% of the individuals with BED experienced the onset of binge eating following smoking cessation. Therefore future research should also examine the possibility of the emergence of binge eating following smoking cessation, as well as the frequency of binge eating before and during the smoking cessation process. Alternatively, it has been suggested that for some individuals with EDs, smoking may serve as an inappropriate compensatory behavior, intended to prevent weight gain due to binge eating.⁴ If smoking is an inappropriate compensatory behavior for overeating, the cessation of smoking would predict weight gain in that the compensatory function has been eliminated.

Strengths of this study include the use of a community sample and the method of anonymous data collection which may have improved participants’ candor, especially as it pertains to disordered eating.¹³ Limitations include reliance on self-report and retrospective recall biases. Future research will be needed to examine prospectively the rate and patterns of weight gain among overweight individuals undergoing smoking cessation as a function of binge eating and ED status and history. Since many individuals resume smoking due to cessation-associated weight gain, these findings might suggest the need for targeted interventions for overweight individuals. Combined treatments to address smoking cessation and binge behaviors may be warranted.

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