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Smoking for weight control and its associations with eating disorder symptomatology

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Abstract

Objective—This study examined interrelationships between cigarette smoking for weight control and eating disorder symptoms in a community sample of adult female smokers.

Method—Participants were 107 female smokers who completed a battery of questionnaires, including the Eating Disorder Examination – Questionnaire (EDE-Q). Key items measured weight-control smoking, including smoking to prevent overeating, smoking to undo the effects of overeating, and smoking to feel less hungry. Smokers who endorsed smoking in an attempt to control weight were compared to those who denied such behaviors on EDE-Q scores and frequency of binge eating and purging.

Results—A substantial proportion of participants reported weight-control smoking. Participants who endorsed weight-control smoking reported elevations on eating disorder symptoms as measured by the EDE-Q. Compensatory smoking was related to the frequency of binge eating.

Discussion—The findings have implications for clinicians working with eating disorder patients; for some individuals, cigarette smoking may be used as an attempt to compensate for overeating.

Individuals with full syndrome and subthreshold eating disorders may engage in multiple extreme behaviors in efforts to lose weight (1, 2). Purging methods (including self-induced vomiting, laxative misuse, and diuretic misuse) (3) and non-purging methods (such as excessive exercise, use of diet pills, and dietary restriction) vary in the degree to which they are effective in managing weight or preventing weight gain following binge eating. It has been noted that individuals with eating disorders engage in these behaviors despite the ineffectiveness in managing weight; rather it is the *belief* that the behavior effectively controls weight that maintains its occurrence. Importantly, these behaviors are continued despite deleterious effects on overall health.

Multiple findings from the cigarette smoking literature suggest that a subset of smokers initiate (4, 5) or continue smoking (6, 7) because of a belief that smoking is an effective strategy to manage weight. Smoking rate and frequency have been linked with weight concerns and the subjective belief in the effectiveness of smoking as a weight control

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measure (8, 9). Although smoking cessation is associated with weight gain (10), the average amount of weight gain is very modest (11).

There is some evidence to suggest that smokers who are especially concerned about their weight have magnified beliefs in the ability of smoking to suppress weight – i.e., as in the case of purgative behaviors in eating disorders, individuals believe smoking to be much more effective at controlling weight than it actually is (4, 8). Consequently, smokers who are especially weight-concerned are less likely to report a desire to quit. However, missing from the literature on weight control smoking is an examination of whether for some individuals, smoking may have taken on properties similar to that of purging and non-purging compensatory behaviors.

The objective of this study was to examine, within a group of current smokers, the extent to which smoking serves as a tool for weight management and/or a compensatory behavior in response to overeating. Community volunteers completed an online questionnaire and reported current smoking behaviors along with a series of questions designed to examine whether they smoked to manage weight. In addition, participants completed questionnaires examining eating disorder psychopathology. Since all measures were self-reported and lack validation with behavioral or biological measures, the primary aims of this study were to generate and examine hypotheses about the interrelationships among these variables. The primary hypothesis was that female smokers who reported smoking for weight control would report elevated levels of eating disorder psychopathology.

Method

Participants

Participants were 107 adult female community volunteers who completed an online survey pertaining to health behaviors. Data reported here were gathered between June 2009 and February 2010. Volunteers were recruited via advertisements posted in the “volunteers” section of Craigslist postings in a variety of United States cities. The advertisements varied in text, seeking volunteers to respond to questionnaires on “health behaviors,” “dieting,” “dieting and weight,” and/or “weight control.” To ensure geographic distribution, participants were asked to provide their residential zip code. Analysis based on U.S. Postal Service classifications demonstrated that geographic variability was achieved: in the current sample, 24.3% of participants were from the South, 29.9% from the Northeast, 27.1% from the Midwest, and 18.7% from the West. The study received IRB approval and participants were required to provide informed consent (via a checkbox) prior to entering the survey portion of the website. The racial/ethnic distribution was: 81.3% (n=87) Caucasian, 4.7% (n=5) Hispanic, 3.7% (n=4) African American, 2.8% (n=3) Asian, and 7.5% (n=8) reporting “other.” The mean age was 31.6 years (SD=10.6) and the mean body mass index (BMI) was 29.0 (SD=8.5, range 17.5 – 63.6). The distribution of BMI was: 5% (n=5) underweight (BMI<18.5), 38% (n=41) normal weight (18.5 BMI<25), 18% (n=19) overweight (25 BMI<30), and 39% (n=42) obese (BMI ≥ 30).

The final study sample was drawn from a larger sample of 1141 male and female participants. To be included in the current study, participants had to report being a current smoker (i.e., responded yes to the questions, “In your entire life, have you smoked at least 100 cigarettes?” and “Do you currently smoke?”) and had to complete all of the key questionnaire items (described below). A total of 19 men were current smokers and completed the questionnaire; however since this number was insufficient to draw comparisons by gender, the current study focused exclusively on women. The mean number of cigarettes smoked per day was 11.6 (SD=9.4) and the mean length of time that participants reported smoking was 16.1 years (SD=10.9).

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. Participants who completed the questionnaire could choose to enter a drawing for a 1 in 20 chance to a \$50 gift certificate.

Assessments and Measures

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

Smoking Status and Smoking for Weight Control—Historical and current smoking behaviors were assessed. Using a skip logic rule embedded in the questionnaire, participants who reported current smoking were directed to respond to the following questions: “*When you are dieting to lose weight, do you smoke more?*” “*When you overeat, do you smoke more afterward?*” “*When you overeat, do you smoke more to try to undo the effects of eating that much?*” “*Do you smoke to feel less hungry?*” and “*Do you smoke to prevent overeating?*” Response options were “yes,” “no,” and “not applicable” to permit responses from individuals who denied dieting for weight loss and/or overeating behaviors. For the purposes of the current analysis, responses of “not applicable” were assigned a response of “no” because such a response would indicate the absence of the behavior. An open-ended question evaluated the frequency of smoking for weight control in the previous 4 weeks: “Over the past four weeks (28 days), on how many days have you smoked cigarettes as a means of controlling your shape or weight?”

The *Eating Disorder Examination-Questionnaire* (EDE-Q; (12)), is the self-report version of the Eating Disorder Examination interview (13) which focuses on the previous 28 days and assesses features of eating disorder psychopathology including frequency of different forms of overeating including objective bulimic episodes (OBEs; defined as eating unusually large amounts of food while experiencing a sense of loss of control over the eating) and purging (e.g., via self-induced vomiting, laxative misuse, diuretic misuse). The EDE-Q also generates four scales (dietary restraint, eating concerns, weight concerns, and shape concerns) and an overall global score reflecting eating disorder psychopathology. The EDE-Q has received psychometric support, including good convergence with the EDE Interview in studies with diverse subject groups and good test-retest reliability(14–17).

Data analysis

Responses to individual weight-control smoking items were examined for frequency distributions within the sample. Using a series of MANOVAs, participants who endorsed weight-control smoking were compared to those who denied weight-control smoking on EDE-Q subscales. Correlation tests were used to examine relationships between weight-control smoking and smoking frequency, eating disorder behaviors and features, and BMI. Finally, as an exploratory test, compensatory smoking groups were compared on the frequency of binge eating and purging behaviors, and BMI, using univariate ANOVA.

Results

The distribution of participants endorsing various smoking-for-weight-control or compensatory smoking behaviors was as follows: over half of the participants reported smoking more when dieting (55.1%, $n = 59$) and smoking to suppress hunger (54.2%, $n =$

58). Forty-three percent ($n = 46$) reported smoking more after overeating, and 43.0% ($n = 46$) reported smoking to prevent overeating. In addition, a substantial minority (25.2%, $n = 27$) of the sample endorsed smoking more in order to undo the effects of overeating – i.e., compensatory smoking for weight control.

To examine the associations between specific weight-control-smoking behaviors and eating disorder features, a series of MANOVAs was conducted. In each MANOVA, participants endorsing the specific smoking-for-weight-control item were compared to participants who denied smoking for weight control on each of the EDEQ subscales. Significant MANOVAs were followed up with univariate ANOVAs. Table 1 provides the test statistics and means for the significant comparisons.

Correlation Analysis

Correlation tests were conducted to examine the relationship between smoking for weight control (i.e., responses to the item “Over the past four weeks (28 days), on how many days have you smoked cigarettes as a means of controlling your shape or weight?”) to smoking frequency, EDE-Q subscales, the frequency of binge eating and purging, and BMI. Results found that weight control smoking was associated with smoking frequency overall ($r = .37$, $p < .001$), frequency of binge eating ($r = .19$, $p = .046$), EDEQ restraint ($r = .35$, $p < .001$), EDEQ eating concern ($r = .28$, $p = .004$), EDEQ shape concern ($r = .34$, $p < .001$), EDEQ weight concern ($r = .34$, $p < .001$), and EDEQ global score ($r = .37$, $p < .001$). Frequency of smoking for weight control was not significantly related to purging behaviors ($r = .18$, $p = .058$) or BMI ($r = -.05$, $p = .614$).

Exploratory Analysis

As a final test, groups defined by compensatory smoking (i.e., smoking more to undo the effects of overeating) were compared on self-reported binge eating and purging frequency. Purging frequency was defined as the number of times over the past 28 days that participants reported self-induced vomiting, laxative use, or diuretic use for weight control. Results indicated a highly significant effect for group on binge eating, $F(1, 105) = 13.806$, $p < .001$, with the group that engaged in compensatory smoking reporting significantly more objective binge episodes ($M = 7.2$, $sd = 10.4$) than the group that denied compensatory smoking ($M = 2.03$, $sd = 4.05$). A similar pattern was observed for purging frequency. The compensatory smoking group reported an average of 7.9 ($sd = 15.8$) purging episodes in the previous 28 days, compared to the non-compensatory group which reported a mean of 3.2 ($sd = 8.1$) episodes. The comparison of the groups on purging frequency approached significance, $F(1, 105) = 3.924$, $p = .05$. The groups did not differ on BMI ($F(1, 105) = 0.01$, $p = .94$).

Discussion

Results from this community survey found that a significant proportion of the adult female smokers in this sample reported cigarette smoking for weight control. Approximately 25% of the sample reported smoking more in an effort to counteract the effects of overeating. This ‘compensatory’ smoking was related to the frequency of binge eating, marginally related to purging behaviors, and related to scores on the EDEQ eating, shape and weight concern subscales and global scores. Importantly, compensatory smoking was unrelated to BMI, suggesting that it is an ineffective means of weight control. Additional forms of weight control smoking – smoking to feel less hungry and smoking to prevent overeating – were associated with all EDEQ subscales. Therefore it seems that cigarette smoking is used by some female smokers as an aid to restrict intake, and also as a means to compensate for overeating. As in the case of compensatory behaviors seen in bulimia nervosa, it seems that some individuals engage in smoking behaviors due to a belief that cigarette smoking will

help undo the effects of overeating or binge eating. Also as in the case of bulimia, these behaviors are upheld without evidence that they are effective in achieving weight control and despite harmful health consequences.

Several strengths and limitations are noted for context in interpreting the findings. 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 (18). Limitations include reliance on self-report and lack of biological measures (e.g., carbon monoxide levels) to confirm smoking status and BMI. However, research has shown that self-reported smoking (19) and BMI (20) are adequate proxies for measured values. Furthermore, the key items used to evaluate smoking for weight control have not been subjected to psychometric validation; future research is needed to confirm the relationship of these self-reported questionnaire items to actual behaviors. It should be noted that this sample's scores on the EDE-Q subscales and global score were much higher than those reported in other community samples (e.g., (17, 21)). It could be that the method of participant recruitment – Craigslist's advertisements seeking volunteers to complete a questionnaire on health behaviors, dieting, and/or weight – could have selectively appealed to a group of participants with elevated eating psychopathology. In addition, this convenience sample drawn from the internet is unlikely to be fully representative of the population of female smokers. Additional research with male smokers, and with samples with and without clinically significant eating disorder pathology, is needed.

Despite these limitations, the current findings are important for clinicians and researchers working with patients with eating disorders. Since some individuals with eating disorders may be using cigarette smoking as a means to compensate for overeating and/or to assist in efforts to restrict intake, it will be important to monitor and address smoking behaviors in treatment. Additional research is needed to examine smokers' perceptions of how smoking might assist with weight management; such knowledge would be useful in treatment planning and in challenging distorted beliefs about the ability of smoking to suppress weight or to compensate for overeating. In addition, future research with clinical eating disorder samples will be necessary to examine the interrelationships between clinical levels of binge eating, purging, severe restriction, and smoking behaviors.

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Table 1

Descriptive, multivariate, and univariate tests for EDE subscale items across weight control smoking groups

Smoke to undo the effects of overeating		F(4, 102)=5.088, p=.001 Hotelling's Trace = .200					
		Yes (n=27)		No (n=80)			
		M	sd	M	sd	F (1, 105)	p
EDE-Q Restraint		2.90	(1.6)	2.52	(1.8)	0.97	.313
EDE-Q Eating Concern		3.04	(1.8)	1.63	(1.4)	17.15	.000
EDE-Q Shape Concern		4.77	(1.4)	3.89	(1.7)	5.61	.020
EDE-Q Weight Concern		4.13	(1.5)	3.21	(1.7)	6.46	.013
Total EDE-Q		3.71	(1.3)	2.81	(1.5)	7.78	.006
Smoke to prevent overeating		F(4, 102)=4.130, p=.004 Hotelling's Trace = .162					
		Yes (n=46)		No (n=61)		F (1, 105)	
		M	sd	M	sd		
EDE-Q Restraint		3.17	(1.7)	2.20	(1.6)	8.79	.004
EDE-Q Eating Concern		2.57	(1.7)	1.55	(1.5)	11.05	.001
EDE-Q Shape Concern		4.70	(1.4)	3.67	(1.8)	10.43	.002
EDE-Q Weight Concern		4.10	(1.5)	2.95	(1.6)	14.21	.000
Total EDE-Q		3.63	(1.3)	2.59	(1.4)	14.48	.000
Smoke to feel less hungry		F(4, 102) = 2.705, p=.034 Hotelling's Trace = .106					
		Yes (n=58)		No (n=49)		F (1, 105)	
		M	sd	M	sd		
EDE-Q Restraint		2.93	(1.8)	2.24	(1.7)	4.36	.039
EDE-Q Eating Concern		2.36	(1.7)	1.55	(1.5)	6.67	.011
EDE-Q Shape Concern		4.59	(1.4)	3.55	(1.8)	11.03	.001
EDE-Q Weight Concern		3.88	(1.5)	2.93	(1.7)	9.45	.003
Total EDE-Q		3.44	(1.4)	2.56	(1.5)	9.91	.002
Smoke more after overeating		F (4, 102) = 1.448, p=.224 Hotelling's Trace = .057					
Smoke more when dieting		F (4, 102) = 2.351, p=.059 Hotelling's Trace = .092					