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Smoking-related Weight Control Expectancies among African American Light Smokers Enrolled in a Smoking Cessation Trial

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Abstract

Concern about weight gain following smoking cessation has been frequently described in the literature. However, little is known about smoking related weight expectancies among African American, light smokers (defined as ≤ 10 cigarettes per day [CPD] for >25 of last 30 days). Given the high rate of obesity among African Americans, concern about weight gain may be a significant barrier to cessation. The association of demographic, psychosocial and tobacco-related variables and smoking-related weight control expectancies were examined in 755 African American regular, light smokers enrolled in a smoking cessation trial (number of years smoked = 23.9 ± 11.9 ; CPD = 7.6 ± 3.2 ; age = 45.1 ± 10.7 ; BMI = 31 ± 8.1 ; 67% female). Overall, participants had minimal smoking-related weight control expectancies ($M = 3.7/10$, $SD \pm 3.4$); however, higher weight control expectancies were related to female gender, lower dietary fat intake and lower internal self-efficacy to refrain from smoking. Further, smoking-related weight control expectancies were not associated with cessation outcome at week-26. Findings suggest that weight control expectancies exist among some African American light smokers and are related to decreased self-efficacy to refrain from smoking. However, the relationship between smoking-related weight expectancies and health behaviors are complex and modest in magnitude.

Keywords

weight control; African American; light smoking; expectancies; urban; cessation

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1.0 Introduction

Reducing tobacco use among underserved populations is a national priority (USDHHS, 1998, 2000b). Despite an overall decline in cigarette smoking prevalence in the last few decades, smoking rates and associated morbidity remain unacceptably high for certain segments of the population including urban African Americans (CDC, 2007; 2005). Furthermore, smoking rates are not declining at a pace sufficient to meet the 2010 national health objective, which is to reduce the smoking rate among adults to $\leq 12\%$ (USDHHS, 2000a). Among reasons for the slow decline in smoking rates are documented differences in smoking patterns (USDHHS, 1998) and disparities in access to and effectiveness of cessation treatment across subpopulations of smokers (Lerman et al., 2004).

Although African Americans generally smoke fewer cigarettes per day and are more likely to attempt to quit smoking than European Americans, their cessation success rates are lower (Fiore et al., 1989; Giovino et al., 1994; NCI, 2000; Trinidad, Gilpin, White, & Pierce, 2005). After adjusting for employment status, blue/white collar employment type, education and income, African-American smokers are three times more likely to be daily light (i.e., ≤ 10 cigarettes per day) vs. heavier smokers (Novotny, Warner, Kendrick, & Remington, 1988). It is estimated that 53% of male and 62% of female African American smokers report smoking less than 10 cigarettes per day (CPD) (Giovino, 1993). Despite the popular perception that light smoking is safe and less likely to result in nicotine dependence, significant health risks have been associated with light smoking (Haiman et al., 2006), and quitting among light smokers has been demonstrated to be as difficult as for heavier smokers (Ahluwalia et al., 2006).

Compared to European Americans, African American smokers begin smoking later in life (Kabat, Morabia, & Wynder, 1991; Okuyemi, Ahluwalia, Richter, Mayo, & Resnicow, 2001), but have higher rates of heart disease (Liao, McGee, & Cooper, 1999; Rosenberg, Palmer, Rao, & Adams-Campbell, 1999), twice the rates of premature death attributable to cardiovascular disease, (CDC, 2003; 2004) and experience the highest incidence rates for all cancers combined (Haiman et al., 2006; Harris, Zang, & Anderson, 1993). Although the exact etiology of these tobacco-related health disparities is still under investigation, several factors are being explored including African American preference for mentholated and high tar/nicotine cigarettes, smoking topographic differences (e.g., inhale more deeply) and slower nicotine metabolism resulting in higher cotinine levels (Benowitz, 1996; Clark, Gautam, & Gerson, 1996; Kabat et al., 1991). Given the disproportionate burden of tobacco-related morbidity and mortality experienced by African Americans, it is critical to evaluate variables associated with smoking cessation among this high risk population (USDHHS, 1998).

Post cessation weight gain has frequently been described as a deterrent to cessation, especially among women (French & Jeffery, 1995; Perkins, 1994). Smoking for weight control has been associated with several variables including younger age, greater nicotine dependence, restrained eating (i.e., restricting eating in order to lose weight or prevent weight gain), and lower levels of self-efficacy to manage weight (Pinto et al., 1999). Although weight concern has been found to be a disincentive to cessation in several cross-sectional studies (Fletcher & Doll, 1969; Klesges, Somes et al., 1988; Loken, 1982; Ogden & Fox, 1994; Streater, Sargent, & Ward, 1989; Weekly, Klesges, & Reylea, 1992), prospective studies have yielded mixed results (French, Jeffery, Klesges, & Forster, 1995; Klesges, Brown et al., 1988; Meyers et al., 1997; French et al., 1995; French, Jeffery, Pirie, & McBride, 1992; Jeffery, Boles, Strycker, & Glasgow, 1997; Jeffery, Hennrikus, Lando, Murray, & Liu, 2000).

Although data suggest that African American women tend to gain substantially more weight than following cessation (Klesges et al., 1998; Sanchez-Johnson, 2005) and African American women are 60% more likely to become obese than European American women (Flegal, Carroll,

Ogden, & Johnson, 2002), few studies have examined whether racial/ethnic minority groups are prone to weight concern or utilize smoking as a weight control practice (Johnsen, MacKirnan, Spring, Pingitore, & Sommerfeld, 2002; Sanchez-Johnsen, Spring, Sommerfeld, & Fitzgibbon, 2005). Although it has long been thought that members of the African American community were protected against unhealthy weight-related behaviors given their acceptance of a larger body size (Flynn & Fitzgibbon, 1998), recent evidence suggests African American women may also experience weight concern (Befort, Thomas, Daley, Rhode, & Ahluwalia, 2006; Johnsen et al., 2002), body dissatisfaction, unhealthy weight loss behaviors, and eating disorders (Gilbert & Warburton, 2003). This recent data may suggest that postcessation weight gain may be a concern and could be a potential barrier to smoking cessation (Pomerleau, Zucker, & Stewart, 2001; Sánchez-Johnsen, 2005).

In the current study, we proposed to evaluate smoking-related weight expectancies among African American light smokers enrolled in a smoking cessation trial to determine whether weight control expectancies predicted cessation outcomes following a smoking cessation intervention. Given that prior substance abuse literature has shown that positive expectancies are associated with higher levels of substance use (Brown, Goldman, Inn, & Anderson, 1980) and that more dependent smokers tend to hold more positive expectancies about the consequences of smoking (e.g., weight control) than do less dependent smokers (Copeland & Carney, 2003; Rohsenow, Colby, Martin, & Monti, 2005), we hypothesized that our sample of light smokers would hold limited weight control expectancies but that those reporting higher levels of dependence would hold higher weight control expectancies.

2.0 Methods

2.1 Study Design

The present analyses are based on data collected in a 2×2, randomized clinical trial entitled “Kick It at Swope-II” (KIS-II), designed to examine the efficacy of nicotine replacement (NRT vs. placebo) and counseling (motivational interviewing vs. health education) on quitting among 755 African American light smokers (i.e., ≤ 10 CPD for 25 of last 30 days). Participants provided written informed consent and study procedures were approved and monitored by the University of Kansas Medical Center’s human subjects committee.

Eligible individuals self-identified themselves as either ‘African American or black’, were at least 18 years of age, smoked 10 or fewer cigarettes a day for at least 6 months prior to enrollment, smoked at least 25 of the last 30 days, were interested in quitting in the next 2 weeks, spoke English and had a permanent home address and working telephone. Participants were excluded if they had a contraindication for nicotine gum (i.e., jaw problems, irregular heartbeat, recent myocardial infarction or stroke), used other pharmacotherapy for smoking cessation in the last 30 days, used other forms of tobacco within the last 30 days, were pregnant or planning to become pregnant within the next 6 months, were breast feeding or were planning to move out of the local area within the next 6 months. Individuals demonstrating marked inappropriate affect or behavior were excluded from the study inclusion.

Smokers were recruited using clinic, media and community outreach efforts. Of the 1933 people screened, 1012 were eligible for the study and were invited to participate. Eligible participants (n=1012) were older (44.7 vs. 42.2 years, $P<0.001$) and smoked fewer cigarettes per day (7.5 vs. 13.3, $P<0.001$) than those who were ineligible (n = 921). Of those eligible, women (78.5% women vs. 67.8% men, $P<0.0001$) and those smoking fewer cigarettes per day (7.4 vs. 7.8, $P<0.05$) were more likely to return for the randomization visit. Enrollment continued until 755 participants were randomized.

At the randomization visit, all participants completed a battery of assessments and were randomly assigned to receive an 8-week supply of either active 2mg nicotine gum or placebo. Participants were also assigned randomly to receive either motivational interviewing (MI) or health education (HE) counseling (three in-person visits [randomization, week 1, week 8] and three sessions administered via telephone [week 3, week 6, week 16]). Each of these visits consisted of brief (~20 minutes) counseling sessions. Study promotional items were given to participants for every visit completed (e.g., tote bag, magnet) as well as Wal-Mart vouchers: \$40 at baseline and at week 26 and \$20 each for weeks 1,3,6,8, and 16.

2.2 Measures

All questionnaire items were read to, or along with, the participants by a trained research assistant. Baseline measures assessed demographic and health-related information, smoking behaviors, psychosocial variables and biological measurements. Nicotine dependence measures in the current analyses included the six-item Fagerstrom Test of Nicotine Dependence (FTND) (Heatherton, Kozlowski, Frecker, & Fagerstrom, 1991) and the one-item “time to first cigarette” question (“How soon after you wake up do you smoke your first cigarette?”) (Heatherton et al., 1991). A high correlation has been found between participants who endorse smoking a cigarette within five minutes of waking and overall nicotine dependence as determined by the FTND. However, this item may be a better measure of dependence among light smokers given the inclusion of CPD in the scoring algorithm of the FTND (Okuyemi et al., 2007). Psychosocial measures included the 10-item Center for Epidemiological Studies-Depression scale (CES-D) (Irwin, Artin, & Oxman, 1999), a motivation and confidence to quit smoking scale (measured on a 10-point continuum ranging from ‘Not at all motivated/confident to ‘Extremely motivated/confident’) (Resnicow, Wallace et al., 2000) and the Smoking Self-Efficacy Questionnaire (SEQ-12), (Etter, Bergman, Humair, & Perneger) a 12-item survey designed to assess self-efficacy to refrain from smoking.

Smoking-related weight control expectancies were measured using the Weight Control subscale of a modified version of the Smoking Consequences Questionnaire-Adult (SCQ-A) (Jeffries et al., 2004), previously validated among our sample of African American light smokers (Bronars et al., 2006; Thomas et al., In Press). In brief, the SCQ was developed to measure anticipated positive and negative consequences of smoking, both immediate and delayed. The modified, 3-item, Weight Control subscale of the SCQ-A rates the likelihood of occurrence of the following: “Smoking helps me control my weight”; “Cigarettes keep me from eating more than I should”; and “Smoking keeps my weight down”. Items are rated on a 0–10 scale from 0 = “not at all likely” to 10 = “extremely likely” and averaged to form a Weight Control subscale score.

Weight-related variables used in the current analyses included perceived weight status (Resnicow, Yaroch et al., 2000) rated on a 5-point scale from “very overweight” to “very underweight”; current weight control efforts (National Center for Health Statistics, 1994) rated on a 5-point scale from “trying to lose weight” to “trying to gain weight”; dietary fat consumption during the past year rated from high to low (Thompson et al., 1998), fruit and vegetable intake (number of servings of each per day) (Block, Thompson, Hartman, Larkin, & Guire, 1992), walking for exercise (number of times during the past 2 weeks) (Rauh, Hovell, Hofstetter, Sallis, & Gleghorn, 1992), and BMI (calculated using measurements taken with a balance beam scale and height rod).

The primary outcome variable for the study was cotinine-verified 7-day abstinence at week 26, defined as having smoked no cigarettes-not even a puff-during the previous 7 days. To confirm self-reported cessation, salivary cotinine was assessed at week 26. A salivary cotinine cut-off of ≤ 20 mg/ml was used to verify abstinence at 26 weeks (SRNT, 2002).

2.3 Data Analysis

Surveys were double-data entered in Access and exported into SAS v.9.1.

2.3.a. Participant Characteristics—Descriptive statistics were used to summarize participant demographic, tobacco-related and psychosocial characteristics. Categorical variables were analyzed using frequencies and percentages and continuous variables were summarized using means and standard deviations. For these analyses, two items were used as proxy measures of “weight concern”: self-perceived weight status as “overweight” and “currently trying to lose weight”. Therefore, in the current analyses, the original 5 response categories to perceived weight status (Resnicow, Yaroch et al., 2000) were collapsed into overweight (“a little overweight” and “very overweight”) and not overweight (“very underweight,” “a little underweight,” and “weight is just right”) and current weight control efforts (National Center for Health Statistics, 1994) were categorized as “trying to lose weight” vs. “not trying to lose weight” (the latter category formed by collapsing “not trying to do anything,” “stay the same weight,” and “gain weight”).

2.3.b. Smoking-Related Weight Expectancies—Two-sample t tests and Pearson correlation coefficients were used to examine the association between participant demographic, tobacco-related and psychosocial characteristics and weight control expectancies scores. Stepwise linear regression modeling was used to analyze the association of baseline characteristics and weight control expectancies. Univariate analysis were first conducted to identify significant associations at $P < 0.05$. Based upon these analyses, the final model included: gender, CPD, nicotine dependence, depression, self-efficacy (internal), confidence to quit, BMI, dietary fat consumption, and number of fruit and vegetable servings per day.

2.3.c. Weight Control Expectancies on Week-26 Cessation Outcome—Multiple logistic regression (MLR) was used to examine whether baseline weight control expectancies were associated with verified smoking cessation at week-26 (intent to treat) ($P < .05$). Models were fit with and without the following potential confounds: age, education, employment status, marital status, FTND, time to first cigarette, income, and BMI.

3.0 Results

3.1 Participants

As Table 1 indicates, participants were primarily lower-income, middle aged females who smoked 7.6 CPD (SD=3.2), had smoked for an average of 23.9 (SD=11.9) years and had made approximately three quit attempts (3.3, SD=6.63) in the past year. Although FTND scores corresponded to lower rates of nicotine dependence (2.9, SD=1.8), time to first cigarette <30 minutes, was reported by 64% of the sample. Average BMI for the sample was 30.6 (SD=8.1), 64% perceived themselves as “overweight”, and 54% reported that they were currently “trying to lose weight”.

3.2 Smoking-Related Weight Expectancies

The first purpose of this study was to evaluate smoking-related weight control expectancies among our sample. As we hypothesized, we found limited weight expectancies; that is, an average mean score of 3.70 (SD = 3.37) out of a possible score of 0 to 10.

3.3 Variables Associated with Weight Expectancies

In our univariate analyses, weight control expectancies were positively correlated with females gender ($P < .01$), depression ($r = .11$; $P < .01$), CPD ($r = .09$; $P = .01$) and low dietary fat consumption ($P = .036$) and were negatively correlated with BMI ($r = -.08$; $P = .03$), confidence

to quit ($r = -.09$; $P = .01$), internal self-efficacy to refrain from smoking ($r = -.13$; $P < .001$), and fruit ($r = -.08$; $P = .02$) and vegetable ($r = -.08$; $P = .02$) consumption. As hypothesized, those with higher nicotine dependence ($r = .12$; $P < .001$) reported more smoking-related weight expectancies.

In the final linear regression model, smoking-related weight expectancies were related to female gender, lower dietary fat intake, and lower internal self-efficacy to refrain from smoking. The overall variance accounted for by this model was only 6%. Given the small correlations, we did not test for interactions.

3.4 Weight Control Expectancies on Week 26 Cessation Outcome

MLR analyses revealed that smoking-related weight control expectancies were not associated with cotinine-verified smoking cessation at week 26, with or without controlling for potential confounds.

4.0 Discussion

Results indicate that our sample of African American light smokers (7.6 CPD) do not hold strong beliefs about the weight control properties of smoking. In fact, our mean score (i.e., 3.7) was lower than those of college-aged smokers (weight control [WC] score = 4.41; 11.2 CPD) (Brandon & Baker, 1991), heavy smokers selected from a community sample (WC score = 4.36; 26.6 CPD) (Copeland, Brandon, & Quinn, 1995), smokers seeking cessation treatment (WC score = 4.92; 28.0 CPD) (Copeland et al., 1995) and African American heavy smokers enrolled in a cessation trial (WC score = 4.31; CPD = 20) (Jeffries et al., 2004).

Consistent with prior literature, individuals with higher weight control expectancies were more likely to evidence other tobacco-related risk factors, such as increased dependence, CPD and decreased self-efficacy to refrain from smoking or to quit. Further, our results are consistent with prior studies which did not find a significant association between weight concern and smoking cessation success (Borrelli & Mermelstein, 1998; Glasgow, Strycker, Eakin, Boles, & Whitlock, 1999; Jeffery et al., 1997; Pomerleau et al., 2001). Although the literature is notably discrepant on the association of postcessation weight gain concerns and smoking cessation success, Jeffery and colleagues (Jeffery et al., 2000) attempted to reconcile conflicting reports of weight concerns and cessation by noting two possible explanations for the discrepancies in the literature: 1) the strong correlation between nicotine addiction and weight concerns, and 2) differing measures used as proxy measures of weight concerns (i.e., general measures of weight concern vs. cessation-specific weight concerns). As Jeffery hypothesized, weight expectancies were significantly correlated with nicotine dependence. However, we did not find a significant impact of weight expectancies on cessation both when nicotine dependence was controlled and when it was not. Second, as Jeffery hypothesized, we found that our general measures of weight concern (e.g., self-perceived weight status as overweight and trying to lose weight) were positively correlated with smoking-related weight expectancies but that neither variable was associated with cessation. Our results indicate that the relationships among weight concern, smoking-related weight expectancies and cessation success are complex.

It is possible that two parallel processes must exist in order for a significant relationship to emerge between weight control expectancy and cessation: a strong desire to control weight and a strong belief about the weight control benefits of smoking. In our sample, neither factor was present: overall, participants had low weight control expectancies and evidenced few weight control behaviors despite over 60% recognizing their overweight status. This mirrors the general acceptance of larger body sizes within African American communities and could explain the lack of association between weight expectancy and smoking cessation.

Consistent with previous research, females enrolled in our smoking cessation trial were more likely to endorse weight control expectancies than men (Camp, Klesges, & Relyea, 1993; Pirie, Murray, & Luepker, 1991). Prior research has found females to be more likely to endorse smoking as a weight control strategy (Camp et al., 1993) and are more likely to expect to gain “a lot of weight” post-cessation (Pirie et al., 1992). Further, dietary restraint occurs more frequently in women and may distinguish a subset of women who are particularly vulnerable to smoking to control appetite and weight. Also consistent with prior studies, in our sample of predominantly obese individuals (i.e., average BMI = 30.6 [SD = 8.1]), lower BMI was associated with higher weight control expectancies (Newman, Sontag, & Salvato, 2006). We might explain this association with the hypothesis that an individual of higher weight or one that is unconcerned with weight may tolerate the 5 to 10 pound weight gain associated with cessation better than a smaller person or one who is more weight conscious.

4.1 Study Limitations

Several limitations exist - first, the cross-sectional nature of the design prevents causal interpretations. Second, our results may only apply to African American light smokers enrolled in treatment. Smokers enrolled in smoking cessation treatment may differ from smokers not seeking treatment in the realm of both general weight concerns and concerns specific to post-cessation weight gain (Sanchez-Johnsen et al., 2005). It is also important to note that, although statistically significant, the associations in our sample between weight control expectancy and tobacco-related risk factors were small and weight control expectancies do not appear to be strong contributors to tobacco-related risk factors among African American light smokers. However, these findings may suggest that light smokers who present for smoking cessation may benefit from counseling related to controlling weight gain following cessation.

Another study limitation pertains to the measurement of weight control expectancies alone. Measuring additional relevant constructs, such as general weight concerns, smoking specific weight concerns, and pathological eating could have furthered our understanding of how weight control issues might impede cessation. Further, our use of a modified SCQ-A, abbreviated the original 5-item SCQ weight concern subscale by eliminating 2 items: “Smoking controls my appetite” and “Cigarettes keep me from overeating”. We do not know if these two items may have been endorsed by our sample. In addition, the study sample was limited to African Americans, precluding cross-cultural comparisons between African American light smokers and light smokers of other races. Finally, we did not test for interactions given the small effect size found in univariate analyses. Therefore, it is possible that more complex relationships between variables exist, but were not uncovered in this study given the restricted range in weight expectancy scores.

Despite these limitations, this study suggests that, even though weight control expectancies do not predict smoking cessation outcome among this sample, weight control expectancies do exist among African American female smokers and are related to decreased self-efficacy to refrain from smoking. Thus, attending to the beliefs that African American light smokers hold regarding the weight control properties of smoking, especially among women, and how this is related to their self-efficacy to quit may facilitate increased self-efficacy, especially in cases where these individuals may be able to increase other activities (i.e., eating fruits and vegetables, walking for exercise) that may help manage their weight during a quit attempt.

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Table 1

Characteristics of study participants and bivariate analyses of the relationships between participant characteristics and smoking-related weight control expectancies (t-tests and Pearson correlations)

Variable	Mean (SD)	Statistic	P-value
Age, years (SD)	45.1 (10.67)	0.06	0.11
Gender:			<0.01
Female, %	66.8%	4.13 (3.48)	
Male, %	33.2%	2.82 (2.94)	
Monthly income:			0.62
<\$1,800, %	58.7%	3.65 (3.28)	
≥\$1,800, %	41.3%	3.78 (3.5)	
Education:			0.39
< high school graduate, %	16.5%	3.93 (3.29)	
≥ high school graduate, %	83.5%	3.66 (3.39)	
# Cigarettes/day, mean (SD)	7.6 (3.20)	0.09	0.01
Duration of smoking, years, mean(SD)	23.9 (11.95)	0.12	0.88
Nicotine dependence (FTND ^c score)	2.9 (1.8)	0.12	<0.001
# Quit attempts/past year	3.26 (6.63)	−0.005	0.87
Depression (CES-D, ^b 10-item)	3.5 (2.57)	0.11	0.002
Self-Efficacy (Internal), mean (SD)	15.30 (5.44)	−0.13	<0.001
Self-Efficacy (External), mean (SD)	13.84 (6.17)	−0.05	0.14
Motivation to quit (0–10), mean (SD)	9.0 (1.66)	0.04	0.25
Confidence to quit (0–10), mean (SD)	7.1 (2.57)	−0.09	0.01
BMI ^a (kg/m ²), total sample, mean (SD)	30.6 (8.1)	−0.08	0.03
Self-Perception as Overweight			0.08
Yes, %	63.7%	3.86 (3.51)	
No, %	36.3%	3.42 (3.10)	
Trying to lose weight			0.15
Yes, %	53.6%	3.86 (3.45)	
No, %	46.4%	3.51 (3.27)	
Walk for exercise/past 2 wks			0.69
Yes, %	45.9%	3.57 (3.46)	
No, %	54.1%	3.67 (3.20)	
Dietary Fat Intake/last 12 mos: %			0.036
Low, %	18.27%	4.35 (3.45)	
Medium, %	46.0%	3.64 (3.33)	
High, %	35.7%	3.44 (3.34)	
Vegetable servings/day	1.24 (.97)	−0.08	0.02
Fruit servings/day	0.83 (.98)	−0.08	0.02

^a Note: BMI—Body Mass Index

^b CES-D—Center for Epidemiological Studies-Depression

^c FTND—Fagerstrom Test for Nicotine Dependence

Table 2

Multiple linear regression model on variables associated with baseline smoking-related weight control expectancies

Variable	Estimate (β)	SE	t-test	p value
Gender	1.25	0.26	4.87	<.0001
Dietary Fat Intake:				
Medium	-0.79	0.33	-2.40	0.01
High	-1.13	0.35	-3.27	0.001
Self-efficacy to refrain from smoking (Internal)	-0.07	0.02	-3.28	0.001

^aNote: Model $R^2 = .059$