



Prevalence of Weight Concerns and Obesity Among Smokers Calling a Quitline

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Background: Cessation-related weight gain and weight concerns are common among smokers and have a negative impact on quitting. Obese smokers tend to gain more than the average amount of weight and also have lower quit rates. This article describes the prevalence of obesity and weight concerns among smokers calling a state quitline in the United States. *Results:* Among 3972 smokers using a state quitline, 33.3% were obese, 30.2% overweight, 33.3% normal weight and 3.2% underweight; a total of 60.6% were concerned about cessation-related weight gain. Compared with non-obese callers, obese callers were more likely to be female, Hispanic, non-White and heavier smokers. *Conclusions:* This is the first study to report data on body weight and weight concerns of smokers calling a national quitline. Given the lower quit rates among obese and weight-concerned smokers, and the burden of smoking and obesity, there is an opportunity to develop new treatment approaches for this at-risk population.

Keywords: smoking, obesity, quitlines, weight concerns

Obesity and smoking are the leading causes of preventable morbidity and mortality worldwide (Burke, Bertoni, Shea, et al., 2008; Chiolero, Jacot-Sadowski, Faeh, Paccaud, & Cornuz, 2007; Chiolero, Wietlisbach, Ruffieux, Paccaud, & Cornuz, 2006; Mokdad, Marks, Stroup, & Gerberding, 2004; Stunkard & Albaum, 1981; Wadden & Stunkard, 2002). About 41% of American adults either smoke or are obese (Healton, Vallone, McCausland, Xiao, & Green, 2006) and approximately 9 million (4.7%) are obese smokers (Freedman, Sigurdson, Rajaraman, Doody, Linet, & Ron, 2006; Healton et al., 2006). Cigarette smoking and obesity are independently associated with increased societal and healthcare costs due to lost productivity and increased health care expenditures (Dall, Zhang, Chen et al., 2007) and the presence of both, increases the odds of cancer, diabetes and cardiovascular disease mortality (Freedman et al., 2006; Jonsson, Hedblad, Engstrom, Nilsson, Berglund, & Janson, 2002). For example, very obese smokers (BMI > 35) have a 3.5 to 5.2-fold increase in

mortality compared to normal weight individuals who never smoked (Freedman et al., 2006). Although quitting smoking significantly reduces these health risks, weight gain after quitting (Copeland, Martin, Geiselman, Rash, & Kendzor., 2006; Williamson, Madans, Anda, Kleinman, Giovino, & Byers, 1991) poses additional health risks (Cohen, Klesges, Summerville, & Meyers, 1989; Klesges, Klem, & Klesges, 1992; Pomerleau & Saules, 2007).

While effective cessation treatments are available, weight gain and concern about cessation-related weight gain are common among smokers (Clark, Hurt, Croghan et al., 2006) and have a negative impact on motivation and ability to quit. Furthermore, some groups are at risk for larger than average weight gain after quitting smoking, specifically women, African Americans, and obese, weight concerned and heavy smokers (Froom, Melamed, & Benbassat, 1998; Klesges, Winders, Meyers et al. 1997; Klesges, Ward, Ray, Cutter, Jacobs, & Wagenknecht, 1998; Levine, Kalarchian,

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Courcoulas, Wisinski, & Marcus, 2007; Sanchez-Johnsen, 2005; Swan, Javitz, Jack, Curry, & McAfee, 2004; Vander Weg, Klesges, & Ward, 2000). Thus, among smokers who are overweight or obese, postcessation weight gain may pose particular health problems and increase the likelihood that they fail to quit smoking. Given the potential challenges overweight and obese smokers have quitting and the frequency with which smokers, in general, contact free national telephone quitlines each year (Fiore, Jaen, Baker et al., 2008) we sought to: (1) assess the feasibility of asking weight-related questions during enrolment with a quitline, (2) determine if quitlines are reaching obese smokers and (3) describe smoking-related weight gain concerns among quitline users.

Methods

For the past 5 years, the Oklahoma Tobacco Help Line (OKHL) has served approximately 75,000 tobacco users in the state of Oklahoma, averaging over 1200 enrolments per month in the quitline. The OKHL provides incoming and outgoing phone counselling, mailed support materials and nicotine replacement medications for eligible callers. For this study, we added four questions to the standard demographic information collected during registration with the OKHL to determine height, weight and level of weight concerns. From March through June 2008, all adult smokers (18 and older) who called the OKHL were asked the following additional questions:

- How tall are you?
- How much do you weigh?
- On a scale of 0 to 100 where 0 = *Not at all concerned* and 100 = *Very concerned*, how concerned are you about gaining weight after quitting? (WC1)
- On a scale of 0 to 100 where 0 = *Not at all concerned* and 100 = *Very concerned*, how concerned would you be if quitting smoking caused you to permanently gain 10 pounds? (WC2)

We calculated body mass index (BMI) as weight in pounds divided by the square of height in inches multiplied by a conversion factor of 703. We classified individuals as very obese, obese, overweight, normal weight and underweight according to standard BMI cut-points of greater than 35, 30–35, 25–29.9, 18.5–24.9 and < 18.5, respectively (Freedman et al., 2006; Stunkard & Wadden, 1993). Individuals were considered to have significant weight concerns (WC3) if they rated either of the two weight concerns questions (WC1 or WC2) as 50 or greater (Perkins, Marcus, Levine et al., 2001).

We used *t*-test and chi-square analyses for group comparisons. Since underweight individuals represented only 3% of the participants, we considered adding them to the normal weight group for comparisons. However, analyses revealed significant differences between the groups. Compared with normal weight participants,

underweight participants were more likely to be female (62.2% vs. 76.6%, $p < .01$), less likely to smoke for more than 10 years (82.8% vs. 75.8%, $p < .05$) and less likely to have weight concerns (44.7% vs. 21.1%, $p < .0001$). We therefore excluded the underweight population from group comparisons of the three weight groups shown in Table 1 (obese, overweight, normal weight). Note, however, that we repeated the analyses with the full sample (combining the underweight and normal weight participants) in three-way comparisons and found no differences from the findings reported here.

Results

Among the 4,384 tobacco users who called the OKHL during the 4-month study period, a total of 4,060 (92.6%) consented to being asked the additional four questions and 3,972 (90.6%) answered all four. One third of OKHL callers were obese (14.9% very obese, 18.4% obese), 30.2% were overweight, 33.3% were normal weight and 3.2% underweight ($n = 128$); 60.6% had concerns about cessation-related weight gain. As shown in Table 1, obese callers were more likely to be Hispanic ($p < .05$), non-White ($p < .05$) and female ($p < .01$), and more likely to have smoking-related weight concerns (WC 3) compared with overweight and normal weight individuals ($p < .001$).

Compared with obese and overweight individuals, normal weight participants were more likely to be uninsured ($p < .05$), less likely to be married ($p < .05$), smoked fewer cigarettes per day ($p < .05$), were less likely to smoke for 10 years or more ($p < .001$) and less likely to have weight concerns ($p < .001$). In all three groups, more participants met the weight concerns criteria of ≥ 50 on the first item (how concerned are you about gaining weight after quitting) than the second weight concerns item (how concerned would you be if you were to permanently gain 10 pounds after quitting).

Discussion

To our knowledge, this is the first study to present prevalence data on weight categories of people calling a state quitline. One third of callers were obese, with increased representation of Hispanics, African Americans and women and 30.2% were overweight. According to the 2007 Behavioral Risk Factor Surveillance Survey weighted estimates for the state of Oklahoma, 25.7% of residents were current smokers and among smokers, 27.0% were obese and 32.7% were overweight (Centers for Disease Control and Prevention, 2007). This study thus confirms that the Oklahoma state quitline is reaching this high-risk population at rates consistent with population prevalence. Results also indicate that 60.6% of quitline callers have significant concerns about postcessation weight gain, an important finding since smoking-specific weight concern has been shown to be associated with higher smoking relapse (Copeland et al.,

Table 1
Characteristics of Smokers Calling the Oklahoma Helpline ($N = 3,844^1$)

	Obese	Overweight	Normal weight ¹
BMI	30+	25–29	19–24
N (%)	1321 (34.4%)	1199 (31.2%)	1324 (34.4%)
BMI: Mean (<i>SD</i>)	35.6 (5.6)	26.8 (1.3)	22.3 (1.4)
Range BMI	30–60	25–29	20–24
Age: Mean (<i>SD</i>)	41.0 (12.1)	42.2 (12.7)	40.3 (13.5)
Range age	18–76	18–79	18–80
Ethnicity*			
% Hispanic	4.5%	2.3%	2.5%
Race*			
% White	77.4%	81.8%	82.8%
% African–American	8.6%	6.4%	5.9%
% American–ndian	9.7%	9.3%	8.9%
% Other ²	4.2%	2.5%	2.4%
Gender**			
% Female	66.3%	57.0%	60.8%
Other demographics			
% Uninsured*	48.9%	49.8%	55.4%
% Married*	46.8%	41.6%	36.5%
% < high school	59.4%	58.9%	58.5%
Cigarettes/day**	24.5 (12.5)	24.0 (12.0)	22.9 (11.5)
Mean (<i>SD</i>) range	0–100	0–80	0–100
% smoke 25+ cpd*	38.5%	37.5%	33.4%
Duration of smoking (% smoking 10 + years)***	87.7%	88.4%	83.2%
WC1 How concerned are you about gaining weight after quitting? (% scoring 50+ on 0–100 scale) ³	74.9%	59.6%	39.0%
WC2**How concerned would you be if you permanently gained 10 pounds postquit? (% scoring 50+ on 0–100 scale) ³	55.4%	41.4%	29.4%
WC3***% with weight concerns (scoring 50+ on either) ³	78.4%	62.6%	46.3%

Note: * $p < .05$; ** $p < .01$; *** $p < .001$ (comparing obese vs. overweight vs. normal weight)

¹ = Excludes underweight group ($n = 128$)

² = Other races include Asian, Pacific Islander

³ = Overall per cent classified as having weight concerns = 59.5% (WC1), 42.5% (WC2), 62.9% (WC3)

2006; Jeffery, Hennrikus, Lando, Murray, & Liu, 2000; Klesges et al., 1997). Our findings also indicate an association between increased body weight and increased cessation-related weight concerns. Similarly, female gender and greater tobacco dependency, distinguishing features of obese smokers, have been shown to be associated with weight concerns and poor outcomes. Underweight individuals were least likely to have concerns about gaining weight postquit. Although others have used these two weight concerns questions for screening purposes (Perkins, Marcus, Levine et al., 2001), simply asking the first question may provide sufficient sensitivity since the second question picks up fewer than 4% additional smokers with weight concerns. Future research is needed to determine if there are more sensitive and specific measures to identify individuals at risk for weight-related relapse.

In conclusion, this study demonstrates that height, weight and smoking-related weight concerns questions can be asked during routine assessment of quitline

callers, and that obese smokers do call quitlines for help quitting tobacco. Further research is needed to confirm that similar utilisation and weight concern patterns are seen in a larger sample of quitlines provided by states, health plans and employer groups, and to determine if there is a differential cessation treatment effect of quitlines as a function of body weight and degree of weight gain concerns. If negative differential treatment effects are found, new approaches to quitline services that help quitters address their concerns about weight should be developed and tested. In addition, further work to determine if deleterious cessation-associated weight gain can be avoided without undermining cessation success is warranted.

Conclusion

Research indicates that obesity and fear of gaining weight with quitting are each associated with lower motivation to quit smoking and less success quitting. There are no studies that document whether or not obese smokers are

seeking help via national quitlines and no studies that report the level of cessation-related weight concerns among quitline callers. Given the magnitude of the personal, societal and economic burden of smoking and obesity and the tendency for obese smokers to gain more than the average amount of weight after quitting, understanding the prevalence of obesity and weight concerns in smokers seeking treatment via a national quitline is essential for developing innovative treatment approaches for this high-risk population.

Author note

This research was conducted at Free & Clear, Inc.

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References

- Burke, G.L., Bertoni, A.G., Shea, S. Tracy, R., Watson, K.E., & Blumenthal, R.S. (2008). The impact of obesity on cardiovascular disease risk factors and subclinical vascular disease: The Multi-Ethnic Study of Atherosclerosis. *Archives of Internal Medicine, 168*, 928–935.
- Centers for Disease Control and Prevention. (2007). *Behavioral risk factor surveillance system survey data (BRFSS) 2007*. Retrieved December 5, 2008, from <http://www.cdc.gov/brfss/index.htm>
- Chiolero, A., Jacot-Sadowski, I., Faeh, D., Paccaud, F., & Cornuz, J. (2007). Association of cigarettes smoked daily with obesity in a general adult population. *Obesity Research, 15*, 1311–1318.
- Chiolero, A., Wietlisbach, V., Ruffieux, C., Paccaud, F., & Cornuz, J. (2006). Clustering of risk behaviors with cigarette consumption: A population-based survey. *Preventive Medicine, 42*, 348–353.
- Clark, M.M., Hurt, R.D., Croghan, I.T., Patten, C.A., Novotny, P., & Sloan, J.A. (2006). The prevalence of weight concerns in a smoking abstinence clinical trial. *Addictive Behaviors, 31*, 1144–1152.
- Cohen, R., Klesges, R.C., Summerville, M., & Meyers, A.W. (1989). A developmental analysis of the influence of body weight on the sociometry of children. *Addictive Behaviors, 14*, 473–476.
- Copeland, A.L., Martin, P.D., Geiselman, P.J., Rash, C.J., & Kendzor, D.E. (2006). Smoking cessation for weight-concerned women: Group vs. individually tailored, dietary, and weight-control follow-up sessions. *Addictive Behaviors, 31*, 115–127.
- Dall, T.M., Zhang, Y., Chen, Y.J., Wagner, R.C., Hogan, P.F., & Fagan, N.K. (2007). Cost associated with being overweight and with obesity, high alcohol consumption, and tobacco use within the military health system's TRICARE prime-enrolled population. *American Journal of Health Promotion, 22*, 120–139.
- Fiore, M.C., Jaen, C.R., Baker, T.B., Bailey, W.C., Benowitz, N.L., & Curry, S.J. (2008). *Treating tobacco use and dependence: 2008 Update. Clinical Practice Guideline*. Rockville, MD: US Department of Health and Human Services/Public Health Service.
- Freedman, D.M., Sigurdson, A.J., Rajaraman, P., Doody, M.M., Linet, M.S., Ron, E. (2006). The mortality risk of smoking and obesity combined. *American Journal of Preventive Medicine, 31*, 355–362.
- Froom, P., Melamed, S., & Benbassat, J. (1998). Smoking cessation and weight gain. *Journal of Family Practice, 46*, 460–464.
- Healton, C.G., Vallone, D., McCausland, K.L., Xiao, H., & Green, M.P. (2006). Smoking, obesity, and their co-occurrence in the United States: Cross-sectional analysis. *British Medical Journal, 333*, 25–26.
- Jeffery, R.W., Hennrikus, D.J., Lando, H.A., Murray, D.M., Liu, J.W. (2000). Reconciling conflicting findings regarding postcessation weight concerns and success in smoking cessation. *Health Psychology, 19*, 242–246.
- Jonsson, S., Hedblad, B., Engstrom, G., Nilsson, P., Berglund, G., & Janson, L. (2002). Influence of obesity on cardiovascular risk. Twenty-three-year follow-up of 22,025 men from an urban Swedish population. *International Journal of Obesity, 26*, 1046.
- Klesges, R.C., Klem, M.L., & Klesges, L.M. (1992). The relationship between changes in body weight and changes in psychosocial functioning. *Appetite, 19*, 145–153.
- Klesges, R.C., Ward, K.D., Ray, J.W., Cutter, G., Jacobs, D.R.J., Wagenknecht, L.E. (1998). The prospective relationships between smoking and weight in a young, biracial cohort: The Coronary Artery Risk Development in Young Adults Study *Journal of Consulting and Clinical Psychology, 66*, 987–993.
- Klesges, R.C., Winders, S., Meyers, A., Eck, L., Ward, K., & Hultquist, C. (1997). How much weight gain occurs following smoking cessation? A comparison of weight gain using both continuous and point prevalence abstinence. *Journal of Consulting and Clinical Psychology, 65*, 286–291.
- Levine, M.D., Kalarchian, M.A., Courcoulas, A.P., Wisinski, M.S.C., & Marcus, M.D. (2007). History of smoking and postcessation weight gain among weight loss surgery candidates. *Addictive Behaviors, 32*, 2365–2371.
- Mokdad, A.H., Marks, J.S., Stroup, D.F., & Gerberding, J.L. (2004). Actual causes of death in the United States. *Journal of the American Medical Association, 291*, 1238–1245.
- Perkins, K.A., Marcus, M., Levine, M., D'Amico, D., Miller, A., Broge, M. et al. (2001). Cognitive-behavioral therapy to reduce weight concerns improves smoking cessation outcome in weight-concerned women. *Journal of Consulting and Clinical Psychology, 69*, 604–613.
- Pomerleau, C.S., & Saules, K. (2007). Body image, body satisfaction, and eating patterns in normal-weight and

- overweight/obese women current smokers and never-smokers. *Addictive Behaviors*, 32, 2329–2334.
- Sanchez-Johnsen, L.A.P. (2005). Smoking cessation, obesity and weight concerns in black women: A call to action for culturally competent interventions. *Journal of the National Medical Association*, 97, 1630–1638.
- Stunkard, A.J., & Albaum, J.M. (1981). The accuracy of self-reported weights. *American Journal of Clinical Nutrition*, 34, 1593–1599.
- Stunkard, A.J., & Wadden, T.A. (1993). *Obesity: Theory* (2nd ed.). New York: Raven Press.
- Swan, G.E., Javitz, H.S., Jack, L.M., Curry, S.J., & McAfee, T.A. (2004). Heterogeneity in 12-month outcome among female and male smokers. *Addiction*, 99, 237–250.
- Vander Weg, M.W., Klesges, R.C., & Ward, K.D. (2000). Differences in resting energy expenditure between black and white smokers: Implications for postcessation weight gain. *European Journal of Clinical Nutrition*, 54, 895–899.
- Wadden, T.A., & Stunkard, A.J. (2002). *Handbook of obesity treatment*. New York: Guilford Press.
- Williamson, D.F., Madans, J., Anda, R.F., Kleinman, J.C., Giovino, G.A., & Byers, T. (1991). Smoking cessation and severity of weight gain in a national cohort. *New England Journal of Medicine*, 324, 739–745.
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