Cigarette Smoking and Interest in Quitting Among Overweight and Obese Adults with Serious Mental Illness Enrolled in a Fitness Intervention

Kelly A. Aschbrenner, PhD[1], **Mary F. Brunette, MD**[2], **Raleigh McElvery**[3], **John A. Naslund, MPH**[1], **Emily Scherer, PhD**[4], **Sarah I. Pratt, PhD**[1], and **Stephen J. Bartels, MD, MS**[1]

[1]Dartmouth Centers for Health and Aging at the Geisel School of Medicine at Dartmouth

[2]Dartmouth Psychiatric Research Center

[3]Bowdoin College

[4]Department of Community and Family Medicine at the Geisel School of Medicine at Dartmouth

Abstract

This study explored cigarette smoking, health status, and interest in quitting among overweight and obese adults with serious mental illness enrolled in a fitness intervention. Baseline data from two studies of the In SHAPE fitness intervention were combined. A total of 341 overweight or obese adults with serious mental illness were assessed on smoking, interest in quitting, cardiovascular fitness, lipids, body mass index, readiness to change diet, and psychiatric symptoms. Thirty-six percent (n=122) of participants were categorized as current smokers. The majority of smokers (84%) were interested in quitting. Smokers were more likely to be younger, male, and less educated than non-smokers. Smokers had lower high-density lipoprotein cholesterol and were less ready to reduce dietary fat, after adjusting for age, gender, and education. Findings highlight the potential to address both fitness and smoking in order to reduce cardiovascular risk in individuals with serious mental illness.

Keywords

Serious mental illness; smoking; obesity; fitness; health promotion

Introduction

Preventable cardiovascular disease due to obesity and smoking is the leading cause of early mortality among individuals with serious mental illness (De Hert et al, 2009). An estimated 50-85% of adults with serious mental illness smoke cigarettes (McClave et al, 2010), which is at least three times higher than smoking rates in the general population (CDC, 2014). The

prevalence of obesity in individuals with serious mental illness is about twice as high as observed rates among individuals without mental illness (Scott et al, 2011). The fact that health risk behaviors tend to co-occur (Dickerson et al, 2013) creates the potential for addressing smoking and obesity simultaneously to dramatically reduce cardiovascular risk among individuals with serious mental illness. Studies of lifestyle interventions aimed at increasing both physical activity and healthy eating among individuals with serious mental illness have reported significant improvements in fitness and weight loss (Bartels et al, 2013; Daumit et al, 2011). Additionally, multiple studies have shown that this high-risk group can achieve tobacco abstinence using smoking cessation medications and therapy (Evins et al, 2014). However, few studies have examined combined weight management and smoking cessation interventions adapted for individuals with serious mental illness.

Little is known about the feasibility of simultaneously addressing more than one health risk behavior among individuals with serious mental illness. A common perception is that most individuals with serious mental illness would prefer to change one health behavior at a time. Few studies have investigated consumer preferences and readiness for concurrently tackling smoking and fitness. It is also unclear whether the health status of smokers in this population impairs their ability to engage in physical activity to lose weight. Smoking causes both immediate and long-standing effects on exercise and physical activity. The purpose of this investigation was to examine cigarette smoking, health status, and interest in quitting among overweight and obese adults with serious mental illness enrolled in a fitness intervention as an initial step toward exploring the feasibility of combined weight management and smoking cessation interventions for this high risk population.

Methods

These analyses used data from two studies of the In SHAPE intervention, which has been described in detail elsewhere (Bartels et al, 2013). In SHAPE consists of one year of weekly sessions with a fitness trainer plus a fitness club membership. The program is embedded within community mental health centers (CMHCs) and specifically designed to address fitness in individuals with serious mental illness. The studies in the current analysis were randomized controlled trials comparing participants receiving In SHAPE to an active comparison group receiving only a gym membership. The first RCT (RCT1) recruited participants receiving services from a CMHC in Concord, NH, enrolling 133 individuals between April 2007 and November 2008. The second RCT (RCT2) recruited participants from three CMHCs in Boston, MA, enrolling 211 participants between April 2008 and July 2011. Participants in each of the studies were recruited regardless of their smoking status.

The current analytic sample consisted of baseline data from 341 participants from these studies for whom there was information on smoking status (99% of full sample). All participants were overweight or obese adults defined as body mass index (BMI) 25, and had serious mental illness defined by diagnosis of major depression, bipolar disorder, schizoaffective disorder, or schizophrenia (based on the Structured Clinical Interview for *DSM–IV*) causing at least moderate impairment in several functional domains. All participants provided written informed consent, and each study was approved by the Institutional Review Board at Dartmouth College and those specific to each site.

A tobacco use questionnaire developed for the In SHAPE studies was administered to participants in both studies. Participants were asked about their use of tobacco (in the form of cigarettes, pipes, cigars, chewing tobacco or snuff) in the past week. If they reported tobacco use within the past week, they were asked about the amount they usually consumed of each type of tobacco. We identified individuals as current smokers if they reported smoking at least 1 cigarette per day in the past week. Interest in quitting smoking, intent to quit, and desire for help with quitting were assessed using the same questionnaire. Participants who smoked were asked whether they were interested in stopping smoking. Those who said "yes" were then asked whether they "seriously intend to quit in the next month" and if they "would like help with quitting." We assessed substance use with an indicator variable that was coded 'yes' if any of the following: (1) respondent reported that they frequently used marijuana, cocaine (crack), heroin, or other drugs, OR (2) respondent reported that they drank more than 21 drinks per week.

Waist measurements and weight were obtained, and BMI was calculated. Lipids were measured using the CardioChek PA Analyzer, a portable testing system that produces reliable values for total cholesterol, LDL, HDL, and triglycerides using a multi-panel test strip and a small amount of blood acquired with a finger prick (Springer et al, 2010). We collected self-report data on comorbid health conditions assessed by the Charlson Comorbidity Index, which included 11 chronic diseases (e.g., diabetes, congestive heart failure, and chronic obstructive pulmonary disease)(Charlson et al, 1987). Cardiorespiratory fitness was assessed using the 6-Minute Walk Test (6-MWT), a reliable and valid measure of cardiovascular fitness in obese adults (Larsson et al, 2008). The short-form International Physical Activity Questionnaire (IPAQ) was used to assess self-reported vigorous activities (Faulkner et al, 2006). A modified version of the Weight Loss Behavior-Stage of Change Scale assessed participants' readiness to change dietary behaviors: fat intake, portion size, fruit and vegetable intake (Sutton et al, 2003). The 12-item Short Form Health Survey (SF-12) assessed subjective physical and mental health functioning (Ware et al, 1996). Self-reported depression was assessed with the Center for Epidemiologic Studies Depression (CES-D) Scale (Radloff, 1977).

Frequency distributions were used to describe participants' interest in quitting smoking at baseline. We compared smokers to non-smokers on demographic, health, and psychiatric measures. Demographic characteristics were compared with chi-square tests and independent sample t-tests. Logistic regression analysis determined the association of smoking status with health and mental health variables after adjusting for age, gender, education, and study. Wald chi-square statistics and p-values are reported. A two-sided alpha level of 0.05 was used for all testing. Analyses were performed using SPSS software, version 19.

Results

At baseline, 122 participants (36%) were categorized as current smokers. The proportion of participants categorized as smokers differed significantly between study sites (RCT1: N=63 (30%); RCT2: N=59 (45%); χ^2=7.94, df=1, p .05). Participants categorized as current smokers smoked an average of 16 cigarettes per day. Among the smokers, 102 (84%)

reported that they were interested in quitting smoking (12% = a little; 13% = somewhat; 16% = a lot; 42% = very). Among the 102 participants who were interested in quitting smoking, 36% indicated they intended to quit in the next month and 75% wanted help with quitting smoking. Rates of using other tobacco products in the past week were low (cigars = 3%; chewing tobacco = 1%). No one in the sample reported smoking a pipe or using snuff within the past week. Excessive substance use was reported by 10% (n=34) of participants in the overall sample. The proportion of excessive substance use differed significantly between smokers and non-smokers, with a greater proportion of smokers reporting excessive use than non-smokers (non-smokers: 7%; smokers: 15%; χ^2=5.53, df=1, p .05).

The comparisons between smokers and non-smokers on demographic and health characteristics are presented in Table 1. In models adjusted for age, gender, education level, and study, smokers had lower HDL cholesterol levels (χ^2=8.34, df=1, p .01) compared with non-smokers. Smokers were also significantly less ready to reduce their intake of dietary fat (χ^2=9.61, df=1, p .01). There were no differences between smokers and non-smokers in weight, BMI, waist circumference, cardiorespiratory fitness, physical activity, total cholesterol, LDL cholesterol, triglycerides, comorbid health conditions, subjective physical or mental health, or depressive symptoms.

Discussion

In this sample of overweight and obese individuals with serious mental illness enrolled in two studies of the In SHAPE fitness intervention, 36% were current smokers. In a recent behavioral weight management trial by Dickerson and colleagues (Dickerson et al, 2013), 44% of adults with serious mental illness were smokers based on a broad definition of smoking that included smoking any cigarettes within the past year. While the rates of smoking reported in these studies are twice as high as in the U.S. population, where the percentage of adult smokers has declined to 18% (CDC, 2014), they are lower than the estimated smoking rates of 50-85% among individuals with serious mental illness. It is possible that individuals with serious mental illness who are motivated to engage in an exercise program to improve their fitness are less likely to be current smokers. Despite the lower rates of smoking, our study underscores that smoking is common among overweight adults with serious mental illness.

When comparing the health status of smokers and non-smokers, we found very few differences. Smokers had lower levels of HDL cholesterol than non-smokers. Cigarette smoking lowers HDL cholesterol, further increasing the risk for developing coronary heart disease (Hausenloy et al, 2008). Surprisingly, there were no significant differences between smokers and non-smokers with respect to cardiovascular fitness at baseline. Fitness levels between smokers and non-smokers may have been similar because self-reported vigorous activity was low in both groups of overweight and obese individuals. Research indicates that, on average, obese individuals engage in very little vigorous physical activity (Archer et al). Thus, overweight and obese smokers with serious mental illness may be no more limited in their ability to participate in exercise when starting a fitness program than overweight and obese non-smokers with serious mental illness.

The majority (84%) of smokers in this sample were interested in quitting, and most (75%) of those participants wanted help doing so. Smoking cessation was not a primary target of the In SHAPE intervention, and cessation treatment is not typically included in weight management interventions for people with serious mental illness. Our data suggest this may be a missed opportunity to leverage participation in fitness interventions as a pathway to smoking cessation. Multi-behavioral interventions targeting fitness, nutrition, and smoking cessation may be particularly salient for individuals with serious mental illness, given the high rates of both obesity and smoking in this population. Future research should explore the potential for behavioral interventions adapted for individuals with serious mental illness that target both health behaviors simultaneously.

Limitations of this investigation stem from a common disadvantage of secondary data analyses: the data were collected for a different primary purpose. As a secondary interest, measures of smoking behaviors and intentions to quit were limited in breadth and depth. Future research on this topic should include more precise measures of smoking status, quit attempts, and use of cessation treatment. Finally, our sample consisted of overweight and obese individuals with serious mental illness who were motivated to participate in a fitness intervention. Consequently this investigation might not generalize to individuals with serious mental illness who are obese and smoke but are not engaged in health behavior change. These limitations notwithstanding, the relatively large sample of overweight and obese adults with serious mental illness provided a rare opportunity to examine smoking and interest in quitting in this high-risk population.

Conclusions

Smoking is common among overweight and obese adults with serious mental illness — even those who are motivated to exercise and lose weight. In this investigation, we found that the vast majority of smokers with serious mental illness enrolled in a fitness intervention were interested in stopping smoking, wanted help doing so, and did not differ significantly from non-smokers on most health indicators. These findings highlight the potential to simultaneously address obesity and smoking in order to dramatically reduce cardiovascular risk in individuals with serious mental illness. Further research is needed to develop and test such interventions for this vulnerable population.

Acknowledgments

References

Archer E, Hand GA, Hébert JR, Lau EY, Wang X, Shook RP, Fayad R, Lavie CJ, Blair SN. Validation of a Novel Protocol for Calculating Estimated Energy Requirements and Average Daily Physical Activity Ratio for the US Population: 2005-2006. Mayo Clinic Proceedings. 88:1398–1407. [PubMed: 24290113]

Bartels SJ, Pratt SI, Aschbrenner KA, Barre LK, Jue K, Wolfe RS, Xie H, McHugo G, Santos M, Williams GE, Naslund JA, Mueser KT. Clinically significant improved fitness and weight loss

among overweight persons with serious mental illness. Psychiatric services (Washington, D.C.). 2013; 64:729–36.

CDC. The Health Consequences of Smoking—50 Years of Progress: A Report of the Surgeon General. C. f. D. C. a. P. Department of Health and Human Services, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health; Atlanta, GA.: 2014.

Charlson ME, Pompei P, Ales KL, MacKenzie CR. A new method of classifying prognostic comorbidity in longitudinal studies: development and validation. Journal of chronic diseases. 1987; 40:373–83. [PubMed: 3558716]

Daumit GL, Dalcin AT, Jerome GJ, Young DR, Charleston J, Crum RM, Anthony C, Hayes JH, McCarron PB, Khaykin E, Appel LJ. A behavioral weight-loss intervention for persons with serious mental illness in psychiatric rehabilitation centers. International journal of obesity (2005). 2011; 35:1114–23. [PubMed: 21042323]

De Hert M, Dekker JM, Wood D, Kahl KG, Holt RI, Moller HJ. Cardiovascular disease and diabetes in people with severe mental illness position statement from the European Psychiatric Association (EPA), supported by the European Association for the Study of Diabetes (EASD) and the European Society of Cardiology (ESC). European psychiatry : the journal of the Association of European Psychiatrists. 2009; 24:412–24. [PubMed: 19682863]

Dickerson FB, Yu A, Dalcin A, Jerome GJ, Gennusa JV 3rd, Charleston J, Crum RM, Campbell L, Oefinger M, Appel LJ, Daumit GL. Cigarette Smoking and Health Characteristics in Individuals With Serious Mental Illness Enrolled in a Behavioral Weight Loss Trial. Journal of dual diagnosis. 2013; 9:39–46. [PubMed: 24072987]

Evins AE, Cather C, Pratt SA, Pachas GN, Hoeppner SS, Goff DC, Achtyes ED, Ayer D, Schoenfeld DA. Maintenance treatment with varenicline for smoking cessation in patients with schizophrenia and bipolar disorder: a randomized clinical trial. JAMA : the journal of the American Medical Association. 2014; 311:145–54. [PubMed: 24399553]

Faulkner G, Cohn T, Remington G. Validation of a physical activity assessment tool for individuals with schizophrenia. Schizophrenia research. 2006; 82:225–31. [PubMed: 16360305]

Hausenloy DJ, Yellon DM. Targeting residual cardiovascular risk: raising high-density lipoprotein cholesterol levels. Heart (British Cardiac Society). 2008; 94:706–14. [PubMed: 18480348]

Larsson UE, Reynisdottir S. The six-minute walk test in outpatients with obesity: reproducibility and known group validity. Physiotherapy research international : the journal for researchers and clinicians in physical therapy. 2008; 13:84–93. [PubMed: 18446882]

McClave AK, McKnight-Eily LR, Davis SP, Dube SR. Smoking characteristics of adults with selected lifetime mental illnesses: results from the 2007 National Health Interview Survey. American journal of public health. 2010; 100:2464–72. [PubMed: 20966369]

Radloff LS. The CES-D Scale: A self-report depression scale for research in the general population. Applied Psychological Measurement. 1977; 1:385–401.

Scott D, Happell B. The high prevalence of poor physical health and unhealthy lifestyle behaviours in individuals with severe mental illness. Issues in mental health nursing. 2011; 32:589–97. [PubMed: 21859410]

Springer, L.; Murphy, R.; Enright, M.; LaDuca, F. Cardiocheck technical bulletin: clinical performance verification of the CardioCheck PA test system. .). Polymer Technology Systems, Inc.; Indianapolis, IN: 2010.

Sutton K, Logue E, Jarjoura D, Baughman K, Smucker W, Capers C. Assessing dietary and exercise stage of change to optimize weight loss interventions. Obesity research. 2003; 11:641–52. [PubMed: 12740454]

Ware J Jr. Kosinski M, Keller SD. A 12-Item Short-Form Health Survey: construction of scales and preliminary tests of reliability and validity. Medical care. 1996; 34:220–33. [PubMed: 8628042]

Table 1

Comparison of Smokers and Non-Smokers on Demographic and Health Characteristics at Baseline

Characteristic	Total sample (N=341) % or M±SD	Non-smokers (N=219) % or M±SD	Smokers (N=122) % or M±SD	Test statistic	df	p
Demographic						
Age (mean±SD years)	43.9±11.3	45.4±11.8	41.9±10.3	t=2.88	339	.01
Gender						
Male	45	38	54	X^2=8.23	1	.01
Female	55	62	46			
Race						
White	68	67	71	X^2=.72	2	ns
Black	21	22	20			
Other	11	11	9			
Diagnosis						
Schizophrenia	47	45	49	X^2=1.32	2	ns
Bipolar disorder	30	33	27			
Major depression	23	22	24			
Education						
Less than high school	15	11	23	X^2=6.32	2	.05
Completed high school	31	29	34			
Post-HS education	54	60	43			
Physical Health [a]						
Weight	233.8±53.9	235.2±57.0	232.0±49.6	X^2=2.04	1	ns
BMI[b]	37.1±8.1	37.7±8.5	36.3±7.6	X^2=1.40	1	ns
Waist circumference	46.8±7.1	46.9±7.3	46.7±6.9	X^2=.45	1	ns
Cardiorespiratory fitness	1377.2±313.6	1354.3±325.8	1407.6±295.0	X^2=.03	1	ns
Vigorous physical activity	174.4±858.5	121.6±686.0	245.9±1046.6	X^2=.65	1	ns
SF-12 physical component[c]	45.4±10.1	45.0±10.2	46.0±9.9	X^2=1.07	1	ns
Comorbid health conditions						
0 chronic diseases	49	47	51	X^2=.68		ns
1 chronic disease	32	34	29	X^2=.06		ns
2 or more chronic diseases	19	19	20	X^2=.17		ns
Total cholesterol	183.7±47.0	186.5±46.4	180.0±47.8	X^2=.78	1	ns
LDL cholesterol	108.9±38.8	111.8±38.4	104.7±39.3	X^2=1.25	1	ns
HDL cholesterol	42.0±15.7	45.0±15.8	38.1±14.8	X^2=8.34	1	.01
Triglycerides	174.2±118.6	166.6±112.8	184.1±125.4	X^2=.58	1	ns
Readiness to change dietary behaviors[d]						

	Total sample (N=341)	Non-smokers (N=219)	Smokers (N=122)			
Characteristic	% or M±SD	% or M±SD	% or M±SD	Test statistic	df	p
Reduce portion size	3.0±.9	3.1±.9	2.8±1.0	X^2=3.07	1	ns
Reduce dietary fat	3.2±1.1	3.4±1.0	2.9±1.1	X^2=9.16	1	.01
Increase fruits & vegetables	2.9±1.2	3.0±1.2	2.7±1.2	X^2=3.31	1	ns
Mental Health [a]						
Depressive symptoms [e]	22.6±13.0	22.3±13.2	22.9±12.7	X^2=.02	1	ns
SF-12 mental component [c]	41.2±12.9	41.8±13.1	40.5±12.6	X^2=.20	1	ns

[a] p-values are based on logistic regressions adjusted for age, sex, education, and study.

[b] Body mass index is the weight in kilograms divided by the square of the height in meters.

[c] Possible scores range from 0 to 100, with higher scores indicating better health functioning.

[d] Possible scores range from 1 to 5, with higher scores indicating greater readiness to change.

[e] Possible scores range from 0 to 60, with higher scores indicating greater depressive symptoms.