



# THE IMPACT OF BMI ON SMOKING RELAPSE IN A TEXT- MESSAGING CESSATION PROGRAM FOR YOUNG ADULTS



**smokefree.gov**



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# ACKNOWLEDGMENTS

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# SMOKING AND WEIGHT

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- Smoking and obesity are two of the leading causes of death.
- Historically, there is an inverse relationship between smoking and weight; however, for some diseases (e.g., heart disease) they are concurrent risk factors
  - 29.6% of smokers are obese (NHANES data).\*
- Some evidence shows that heavy smokers weigh more than light smokers.

\* LaRowe, T. L., Piper, M. E., Schlam, T. R., Fiore, M. C., & Baker, T. B. (2009). Obesity and smoking: comparing cessation treatment seekers with the general smoking population. *Obesity*, 17(6), 1301-1305.

# WEIGHT AND CESSATION

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- Concern about weight gain is often a barrier to quitting smoking.
  - Women, young adults, and overweight/obese smokers tend to be particularly concerned about weight gain.
- Smokers with weight concerns have been found to be less likely to access cessation resources.
- There is a need to better understand how weight and perceptions about weight influence cessation outcomes during quit attempts.

# STUDY PURPOSE

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- To examine associations between weight, weight perceptions, and smoking outcomes in a sample of young adults (18 to 29 years old) participating in a text-messaging program.
  - Young adults are a priority population for cessation because quitting smoking before the age of 30 is protective against smoking-related mortality and morbidity.
  - Mobile health (mHealth) interventions provide a unique opportunity to tailor content based on the specific needs of participants.

# METHODOLOGY

## SAMPLE

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- 4,027 smokers interested in quitting smoking between the ages of 18 and 29 participating in a three-arm randomized, controlled trial comparing the National Cancer Institute's Smokefree text program (SFTXT) to two modified versions of the program.

# METHODOLOGY

## DATA COLLECTION

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- Web-based, self-administered survey at baseline.
- Quit date set for 2 weeks after completion of baseline survey.
- Additional survey at 1 week after quit date (3 weeks), end of program (8 weeks), 3 months post-treatment (20 weeks), and 6 months post-treatment (32 weeks).
- Questions included smoking history, demographic characteristics, psychosocial characteristics, engagement with intervention, and smoking status.

# METHODOLOGY

## MEASURES

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- **Primary dependent measure:** End of program smoking status (“Have you smoked at all, even a puff, in the last 7 days?”).
  - Secondary dependent measures smoking status at 20 and 32 weeks.
- **Primary independent variables:**
  - BMI: Calculated using self-reported weight and height; categorized as underweight, normal, overweight, or obese.
  - Smoking expectancy about weight: “*Smoking cigarettes helps people keep their weight down*” (strongly agree/agree, neither agree nor disagree, strongly disagree/disagree).

# METHODOLOGY

## DATA COLLECTION

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- **Primary independent variables (cont.):**
  - Weight perception: *“Right now do you feel you are overweight, slightly overweight, just about the right weight for you, slightly underweight, or underweight?”*
- **Covariates:**
  - Age
  - Gender
  - Income
  - Daily smoker (y/n)
  - Study arm [confirmed no significant differences in baseline BMI by study arm ( $p=0.30$ )]

# METHODOLOGY

## ANALYSIS

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- Bivariate associations assessed between BMI categories, weight perceptions, and smoking expectancies about weight using chi-square tests.
- Multivariate logistic regression models were constructed to assess association between weight-related variables and smoking status, controlling for covariates.
- Non-responders were classified as smokers.
  - Findings for responders-only analysis were similar, so only the analysis for non-responders as smokers is reported.

# RESULTS

## DEMOGRAPHIC CHARACTERISTICS (N=4,027)

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	% (N)
<b>Gender</b>	
Male	29.8 (1,200)
Female	70.2 (2,825)
Age (mean, sd)	24.6 (3.3)
<b>Income</b>	
Less than \$35,000	57.3 (2,306)
Between \$35,000 and \$70,000	23.7 (954)
Over \$70,000	7.6 (306)
Refuse	11.4 (458)
<b>Daily smoker</b>	
Yes	80.3 (3,234)
No	19.7 (793)
<b>Study arm</b>	
1	32.6 (1,313)
2	34.8 (1,400)
3	32.6 (1,314)

- Underweight: 5.1% (205)
- Normal weight: 42.0% (1,690)
- Overweight: 24.6% (989)
- Obese: 28.4% (1143)

*Participants in different BMI categories differed with respect to age, gender, and income; however, they did not differ by study arm or % of daily smokers.*

# RESULTS

## BMI CATEGORY AND SMOKING STATUS

BMI category	% responding they smoked within the past 7 days		
	End of program (8 weeks)	20 weeks	32 weeks
Underweight	74.2% (152)	78.1% (160)	75.6% (155)
Normal	68.2% (1,152)	72.0% (1,217)	72.7% (1,228)
Overweight	64.8% (641)	70.0% (692)	69.9% (691)
Obese	60.7% (694)	63.5% (726)	65.4% (748)
Total	65.5% (2,639)	69.4% (2,795)	70.1% (2,822)

- Controlling for covariates, BMI remained a significant predictor of smoking relapse at 8 weeks: obese participants had **0.72 lower odds (95% CI: 0.62, 0.85) of reporting smoking** than those of normal weight.
  - Week 20 assessment: OR: 0.69, 95% CI: 0.59, 0.82
  - Week 32 assessment: OR: 0.73, 95% CI: 0.62, 0.86

# RESULTS

## WEIGHT-RELATED PERCEPTIONS BY BMI CATEGORY (N=4014)

	Total	Underweight (n=205)	Normal weight (n=1690)	Overweight (n=987)	Obese (n=1142)	p- value
Weight perceptions						
Slightly underweight/ underweight	12.3% (493)	64.9% (133)	20.4% (344)	1.5% (15)	0.10 (1)	<0.01
Just about the right weight	24.7% (992)	21.5% (44)	45.7% (772)	15.5% (153)	2.0% (23)	
Slightly overweight	31.5% (1,266)	8.3% (17)	30.1% (508)	54.1% (534)	18.1% (207)	
Overweight	31.6% (1273)	5.4% (11)	3.9% (66)	28.9% (285)	79.8% (911)	
Smoking expectancies about weight: “Smoking cigarettes helps people keep their weight down”						
Strongly agree/agree	35.9 (1,442)	41.2% (84)	40.6% (684)	35.7% (352)	28.3% (322)	<0.01
Neither agree nor disagree	29.3% (1,174)	35.8% (73)	30.5% (514)	30.0% (295)	25.6% (292)	
Strongly disagree/disagree	34.8% (1,398)	23.0% (47)	28.9% (488)	34.3% (338)	46.1% (525)	

# RESULTS

## WEIGHT PERCEPTIONS AND SMOKING STATUS

Multivariate logistic regression model of weight perception on end of treatment likelihood of smoking\*

	Odds Ratio (95% CI)	p-value
Weight perception (ref: just about the right weight)		
Overweight	1.22 (0.95, 1.56)	0.03
Slightly overweight	1.21 (1.00, 1.47)	
Slightly underweight/underweight	1.43 (1.11, 1.84)	

\*Controlling for gender, age, income, study arm, daily smoking, and BMI

*Odds of reporting smoking, comparing those who rated themselves as slightly underweight/underweight to those who perceived themselves to be just about the right weight, persisted over time*

**Week 20:** OR: 1.38, 95% CI: 1.06, 1.80

**Week 32:** OR: 1.33, 95% CI: 1.02, 1.73

# RESULTS

## SMOKING EXPECTANCIES ABOUT WEIGHT AND SMOKING STATUS

Multivariate logistic regression model of smoking expectancy of weight on end-of-treatment likelihood of smoking\*

	Odds Ratio (95% CI)	p-value
Smoking expectancy about weight (ref: Strongly agree/agree)		
Neither agree nor disagree	1.14 (0.96, 1.34)	0.23
Strongly disagree/disagree	1.00 (0.86, 1.17)	

\*Controlling for gender, age, income, study arm, daily smoking, and BMI

# CONCLUSION

## SUMMARY OF FINDINGS

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- Overweight smokers were less likely to report smoking at the end of program compared to normal-weight smokers, and this difference persisted over time.
- Smokers who perceived themselves to be underweight/slightly underweight were more likely to report smoking at the end of treatment.
- No associations exist between smoking expectancies about weight and smoking status.

# CONCLUSION

## LIMITATIONS

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- Convenience sample
  - Not generalizable to all smokers 18 to 29 years old.
  - Self-reported data (BMI, smoking status) prone to reporting bias.
- Non-response rates for smoking status ranged from 28.5% to 35.5%.
  - However, findings of responders only mirrored findings of non-responders as smokers; outcomes examined over multiple follow-ups and associations persisted.

# CONCLUSION

## IMPLICATIONS

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- Weight-related concerns are a factor that can be tailored within a smoking cessation program.
  - Increase users' knowledge of what to expect in terms of weight change when quitting.
  - Emphasize that the health benefits of quitting outweigh the potential risks for weight gain.
- Multiple behavior change programs may improve smoking cessation outcomes.
  - Substantial number of smokers in this study were overweight or obese.
  - There may be an opportunity to encourage adoption of healthy eating and increased physical activity to facilitate weight loss along with smoking cessation content.

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# Questions?

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