

Knowledge and Beliefs Regarding the Tar and Nicotine Content of Regular, Light, and Ultralight Cigarettes among Adult Smokers

Brian C. Castrucci
Assistant Division Director
Division of Maternal, Child and Family Health
Philadelphia Department of Public Health

Karen K. Gerlach
Senior Program Officer
The Robert Wood Johnson Foundation

Please address all correspondence regarding this article to:

Karen K. Gerlach, Ph.D., M.P.H.

Senior Program Officer

The Robert Wood Johnson Foundation

Route 1 and College Road East

Princeton, New Jersey 08543

Telephone: 609/627-5917

Email: kgerlach@rwjf.org

**Knowledge and Beliefs Regarding the Tar and Nicotine Content of Regular, Light, and
Ultralight Cigarettes among Adult Smokers**

ABSTRACT

Objective(s). This study explored smokers' knowledge and beliefs about the tar and nicotine content of regular, light and ultralight cigarettes. *Design.* Cross sectional. *Setting.* Nationally representative telephone survey. *Subjects.* A national probability sample of 2,297 current smokers surveyed by telephone between June 12 and July 2, 2000. *Results.* Nearly all smokers were aware that cigarettes contained tar and nicotine and believed that both substances were harmful to health. When asked how switching to regular cigarettes would impact their tar and nicotine intake, 63.0% of light and 73.0% of ultralight smokers reported that switching would increase their intake of tar, and more than 50% of these same smokers reported that it would increase their intake of nicotine. If they were to learn that light and ultralight cigarettes had the same amount of tar as regular cigarettes, nearly 80% of light smokers would switch to ultralights and 80% of ultralight smokers would continue to smoke ultralights. *Conclusions.* These findings reveal that smokers of light and ultralight cigarettes believe that they are reducing their tar and nicotine intake by smoking their current strength of cigarette instead of smoking regular cigarettes. If significant progress on reducing smoking in the U.S. is to be achieved, it will be important to reduce the confusion among smokers regarding the exposure to tar and nicotine of various strengths of cigarettes. Elimination of the use of the terms "light" and "ultralight" in the names and descriptors of cigarettes may help to reduce the confusion among smokers.

INTRODUCTION

When the health hazards of smoking cigarettes became widely known in the 1950s and 1960s, cigarette companies began to introduce low-tar cigarettes to the market. These cigarettes were marketed as lower in tar and nicotine than regular cigarettes (1), and their market share increased significantly (2,3). In 2002, the latest year for which data are available, 84.9% of the cigarettes sold in the United States had machine-measured tar yields of 15 mg or less, classifying them as “light” cigarettes (4). Within this category, cigarettes with yields of 6 mg or less are considered “ultralight” cigarettes (1).

The use of the terms “light” and “ultralight” has been shown to provide the consumer with some level of assurance of reduced amounts of tar (5-7), yet studies have shown that those who smoke these cigarettes obtain similar levels of tar and nicotine as smokers of regular cigarettes (8-14).

The purpose of this study was to examine current smokers’ knowledge of the tar and nicotine content of regular, light, and ultralight cigarettes. This study also sought to understand how smokers assessed the impact that switching to a different strength of cigarette would have on their tar and nicotine yields and whether they would alter their smoking behavior if they were to learn that all cigarettes had similar tar yields. Additionally, this analysis explores the attitudes of smokers about the addictiveness of regular, light, and ultralight cigarettes.

METHODS

Description of Data Source, Sample Size, and Response Rate

The National Study of Smokers’ Perceptions of Light and Ultra-Light Cigarettes was the source of data for these analyses. The survey was based on a national probability sample of current and former smokers. Data were collected between June 12 and July 2, 2000.

The survey was administered by computer-assisted telephone interviewing of current and former smokers who were asked about their knowledge, attitudes, and beliefs regarding cigarettes marketed as having reduced tar and nicotine. The instrument was evaluated using 40 to 60 minute interviews with respondents, and pilot tested prior to implementation. The length of the final interview was 20 to 25 minutes.

Completed interviews were obtained from 2,297 current smokers and 1,233 former smokers (former smokers quit within the past 25 years). Only current smokers are included in these analyses. The overall response rate for the survey was 55%.

Measures

Two questions were asked to determine the strength of the cigarettes that each respondent currently smoked. First, respondents were asked, “Is the kind of cigarette you smoke a regular, light, or ultralight brand?” Respondents providing an answer other than “regular,” “light,” or ultralight were asked, “If you had to categorize the strength of your brand into one of the following three categories, would you say it is...” with the possible responses limited to “regular,” “light,” or “ultralight.”

Statistical Analysis

Chi-square tests were used to detect differences in beliefs and attitudes between smokers of different cigarette strengths. Analyses separately compared regular smokers to light smokers, regular smokers to ultralight smokers, and light smokers to ultralight smokers. Data were weighted before performing statistical analyses. Data were analyzed using SAS® and SUDAAN® software to compute point estimates and standard errors, respectively.

RESULTS

Of the 2,297 current smokers surveyed, 43.3% currently smoked regular strength cigarettes, 44.0% smoked light cigarettes, and 12.7% smoked ultralight cigarettes (Table 1). The demographic characteristics of current smokers of different strengths of cigarettes varied. Whites comprised a majority of smokers of all types of cigarettes, yet they accounted for a larger proportion of those smoking light and ultralight cigarettes than regular cigarettes. The proportion of regular smokers who were black was significantly greater than the proportion of light and ultralight smokers who were black. There was little difference in the proportion of smokers of each type of cigarette that were Hispanic. However, Hispanics comprised twice the proportion of ultralight smokers than did blacks.

Females comprised a greater proportion of those who smoked ultralight cigarettes. Light cigarette smokers were nearly equally divided among males and females, but males made up a greater percentage of regular smokers than did females.

A greater proportion of smokers of regular cigarettes did not complete high school (22.4%) compared to smokers of light (16.6%) and ultralight cigarettes (13.4%). In addition, a greater proportion of those who smoked ultralight (48.1%) and light (44.6%) cigarettes had completed at least some college compared to smokers of regular cigarettes (35.9%).

Smokers of regular and light cigarettes tended to be younger than smokers of ultralight cigarettes. The proportion of regular smokers between the ages of 18 and 35 was approximately 18 percentage points greater than the proportion of ultralight smokers in the same age range, and the proportion of light smokers in this age range was more than 22 percentage points greater than the proportion of ultralight smokers. A larger proportion of smokers of ultralight cigarettes were over the age of 50 (36.8%) compared to smokers of regular (23.5%) and light (23.2%) cigarettes.

Ultralight smokers reported longer smoking histories than smokers of regular and light cigarettes. Nearly 80% of ultralight smokers reported smoking for longer than 15 years, while 68.9% of regular smokers and 62.0% of light smokers reported having smoked for a similar duration.

Nearly all smokers, regardless of the strength of the cigarettes they smoked, reported having heard that cigarettes contain tar and nicotine (Table 2). More than 95% of respondents indicated that they believed tar to be harmful to health, while 92% of respondents believed that nicotine is harmful to health. Smokers were asked to compare the amounts of tar and nicotine in regular cigarettes versus light cigarettes. Greater proportions of light (62.6%) and ultralight (71.9%) smokers compared to smokers of regular cigarettes (48.9%) believed that light cigarettes have less tar than regular cigarettes. The findings were similar when smokers were asked about nicotine content. The belief that light cigarettes have less nicotine than regular cigarettes was most commonly held by ultralight smokers (63.5%) followed by light smokers (58.4%) and regular smokers (51.2%).

Two-thirds of those who smoked ultralight cigarettes reported switching from one type of cigarette to another to reduce their tar intake, and more than half reported switching to reduce nicotine (Table 2). Less than 20% of current smokers of regular cigarettes reported switching brands to reduce tar or nicotine. When asked how switching to regular cigarettes would impact their tar and nicotine intake, 63.0% of light and 73.0% of ultralight smokers reported that switching would increase their intake of tar, and more than 50% of these same smokers reported that it would increase their intake of nicotine. Smokers of regular cigarettes were asked how switching to light cigarettes might impact on their intake of tar and nicotine. Approximately

one-third believed that such a switch would decrease their tar and nicotine intake, and similar proportions believed that intake would either stay the same or increase.

Three-quarters of light smokers reported that they would switch to ultralight cigarettes if they were to learn that light cigarettes had the same amount of tar as regular cigarettes (Figure 1). Eighty percent of ultralight smokers reported that they would continue to smoke ultralights if they were to learn that ultralight cigarettes had the same amount of tar as regular cigarettes. Among light and ultralight smokers, 8.5% and 13.5%, respectively, stated that they would stop smoking if they were to learn that their current brand had the same amount of tar as regular cigarettes.

More than 98% of all smokers stated that cigarettes can be addictive (Table 3). The vast majority of smokers believed that light cigarettes were as addictive as regular cigarettes and that ultralight cigarettes were as addictive as light cigarettes. However, 16.0% of regular smokers, 12.1% of light smokers, and 19.2% of ultralight smokers believed that light cigarettes were less addictive than regular cigarettes, and 20.9% of regular smokers, 17.9% of light smokers, and 15.4% of ultralight smokers believed that ultralight cigarettes were less addictive than light cigarettes.

DISCUSSION

Significant demographic differences were found among smokers of the different strengths of cigarettes. Compared to smokers of regular cigarettes, more smokers of light and ultralight cigarettes were white and female. This is consistent with shifts in tobacco marketing in the 1970s that promoted light cigarettes to women (15,16). Smokers of light and ultralight cigarettes had more years of education than smokers of regular cigarettes. Smokers of ultralight cigarettes reported longer smoking histories than smokers of regular or light cigarettes. They were also

more likely to report that they had ever switched the type of cigarette that they smoked to reduce tar or nicotine. These findings suggest that ultralight cigarettes are likely not the first strength of cigarette for most smokers but that they may become more appealing to those who have smoked for a substantial period of time.

There was nearly universal awareness of the presence of tar and nicotine in cigarettes among all smokers surveyed. Interestingly, nearly all smokers believed that both tar and nicotine are harmful to health. This widely held belief that nicotine causes harm may be one reason that so few smokers who are trying to quit report using nicotine replacement therapy (17,18,19).

More than half of all smokers felt that light cigarettes had less nicotine than regular cigarettes, and a majority of light and ultralight smokers believed that their nicotine intake would increase if they switched to regular cigarettes. Yet, less than 20% of all smokers felt that light cigarettes were less addictive than regular cigarettes. These inconsistent findings suggest that smokers may not have a clear understanding of nicotine and its effects and that they may not realize that nicotine is the addictive substance in cigarettes.

The findings in the current study reveal that smokers of light and ultralight cigarettes believe they are reducing their tar and nicotine intake by smoking their current strength instead of smoking regular cigarettes. Previous research has found that holding these beliefs is associated with also believing that these cigarettes are safer (20). Curiously, when smokers of light and ultralight cigarettes were asked what they would do if they were told that their cigarettes had the same amount of tar as regular cigarettes, nearly 80% of light smokers said they would switch to ultralights and a similar proportion of ultralight smokers said they would continue to smoke ultralights. This finding suggests that these smokers may strongly believe that

lower tar, particularly ultralight, products do provide some safety and that these beliefs are tightly held by those who use these products even in the face of contradictory evidence.

Despite the wealth of scientific information regarding the health hazards of cigarettes and the lack of benefit from smoking light or ultralight cigarettes, the findings from this study suggest that smokers do not have a clear understanding of the content of cigarettes nor do they understand that there are no significant differences in yield by type of cigarette smoked. This survey was conducted prior to the 2001 release of the seminal scientific report on the health impacts of light and ultralight cigarettes by the National Cancer Institute (1). Therefore, it is possible that smokers now have a greater understanding of tar and nicotine yields of various types of cigarettes than they reported in this survey.

The misunderstanding of the realities of smoking may be influenced in part by the use of terms such as light and ultralight, which imply safety (20), and may be impacting on decisions regarding quitting smoking. If significant progress on reducing smoking in the U.S. is to be achieved, it will be important to reduce the confusion among smokers regarding the exposure to tar and nicotine of various strengths of cigarettes. Given the enormous advertising budgets of tobacco companies for their products (4), it is unlikely that public health messages will ever be able to compete with advertising messages to address this confusion. Elimination of the use of the terms “light” and “ultralight” and other related terms in the names and descriptors of cigarettes would help to reduce the confusion among smokers.

WHAT THIS PAPER ADDS

“Light” and “ultralight” cigarettes comprise the majority of cigarette sales in the United States. The use of the terms “light” and “ultralight” has been shown to provide the consumer with some level of assurance of reduced amounts of tar, yet studies have shown that those who smoke these cigarettes obtain similar levels of tar and nicotine as smokers of regular cigarettes. While previous studies have explored aspects of smokers’ knowledge about “light” and “ultralight” cigarettes, these previous studies have not sought to understand how smokers assessed the impact that switching to a different strength of cigarette would have on their tar and nicotine yields and whether they would alter their smoking behavior if they were to learn that all cigarettes had similar tar yields.

Two-thirds of those who smoked ultralight cigarettes reported switching from one type of cigarette to another to reduce their tar intake, and more than half reported switching to reduce nicotine. Three-quarters of light smokers reported that they would switch to ultralight cigarettes if they were to learn that light cigarettes had the same amount of tar as regular cigarettes. Among light and ultralight smokers, 8.5% and 13.5%, respectively, stated that they would stop smoking if they were to learn that their current brand had the same amount of tar as regular cigarettes. These data reveal the confusion among smokers regarding the exposure to tar and nicotine of various strengths of cigarettes. Elimination of the use of the terms “light” and “ultralight” and other related terms in the names and descriptors of cigarettes would help to reduce the confusion among smokers.

REFERENCES

1. National Cancer Institute. Risks Associated with Smoking Cigarettes with Low Machine-Measured Yields of Tar and Nicotine. Smoking and Tobacco Control Monograph No. 13. Bethesda, MD: U.S. Department of Health and Human Services, National Institutes of Health, National Cancer Institute, NIH Pub. No. 02-5074, October 2001.
2. Hoffman D, Djordjevic MV, Hoffman I. The changing cigarette. *Prev Med* 1997;26:427-34.
3. Thun MJ, Lally CA, Flannery JT, et al. Cigarette smoking and changes in the histopathology of lung cancer. *J Natl Cancer Inst* 1997;89:1580-6.
4. FTC 2004 <http://www.ftc.gov/reports/cigarette/041022cigaretterpt.pdf>. Accessed on March 4, 2005
5. Pollay RW, Dewhirst T. The dark side of marketing seemingly light cigarettes: successful images and failed fact. *Tob Control* 2002;11:i18-i31.
6. Kozlowski LT, Pillitteri JL. Beliefs about "light" and "ultralight" cigarettes and efforts to change those beliefs: an overview of early efforts and published research." *Tob Control*. 2001;10 Suppl 1:i12-6.
7. Cummings KM, Hyland A, Bansal MA, et al. What do Marlboro Lights smokers know about low-tar cigarettes? *Nic Tob Res*. 2004;6:S323-31.
8. Rickert WS, Robinson JC, Young JC, Collinshaw NE, Bray DF. A comparison of the yields of tar, nicotine, and carbon monoxide of 36 brands of Canadian cigarettes tested under three conditions. *Prev Med* 1983;12:682-94.
9. Zancy JP, Stitzer ML, Yingling JE. Cigarette filter vent blocking: effects on smoking topography and carbon monoxide exposure. *Pharmacol Biochem Behav* 1986;25:1245-52.
10. Kozlowski LT, Sweeney CT, Pillitteri JL. Blocking cigarette filter vents with lips more than doubles carbon monoxide intake from ultra-low tar cigarettes. *Exp Clin Psychopharmacol* 1996;4:1-5.
11. Kozlowski LT, Pillitteri JL, Sweeney CT. Misuse of light cigarettes by means of vent blocking. *J of Sub Abuse* 1994;6:333-336.
12. Cohen JB. Smokers' knowledge and understanding of advertised tar numbers: health policy implications. *Am J Public Health* 1996;86:18-24.
13. Scherer G. Smoking behaviour and compensation: a review of the literature. *Psychopharmacology* 1999;145:1-20.

14. Henningfield JE, Kozlowski LT, Benowitz NL. A proposal to develop meaningful labeling for cigarettes. *JAMA* 1994;272:312-4.
15. Philip Morris, Virginia Slims introduces the low tar cigarette made just for women , 1978 (PM 1005064182).
16. Philip Morris, Project Magic, June 1985. (PM 2501008130).
17. Bansal MA, Cummings KM, Hyland, A, et al. Stop-smoking medications: Who uses them, who misuses them, and who is misinformed about them? *Nic Tob Res.* 2004;6: S289–S302.
18. Etter JF, Perneger TV. Attitudes toward nicotine replacement therapy in smokers and ex-smokers in the general public. *Clin Pharm Therapeutics.* 2001;69, 175–183.
19. Cummings KM, Hyland A, Giovino GA. Are smokers adequately informed about the health risks of smoking and medicinal nicotine? *Tob Control.* 2004; 6: S333–S340.
20. Shiffman S, Pillitteri JL, Burton SL, Rohay JM, Gitchell JG. Smokers’ beliefs about light and “Ultra Light” cigarettes. *Tob Control.* 2001;10:i17-i23.

Table 1. Demographics of Current Smokers of Regular, Light, and Ultralight Cigarettes

	Regular	Light	Ultralight	P-value
Total	43.4± 1.11	44.0 ± 1.11	12.7 ± 0.72	----
Race/Ethnicity				
White	67.5±1.65	83.0±1.27	85.7±2.18	0.0000
Black	18.2±1.34	6.1±0.81	4.0±1.27	
Hispanic	10.3±1.20	7.9±1.01	8.4±1.81	
Other	4.0±0.47	3.0±0.38	1.9±0.53	
Gender				
Male	62.8±1.60	51.1±1.66	41.6±3.07	0.0000
Female	37.2±1.60	48.9±1.66	58.4±3.07	
Education				
Less than high school	22.4±1.49	16.6±1.30	13.4±2.15	0.0001
High school	39.1±1.68	35.7±1.60	33.9±2.91	
Vocation, trade, business	2.7±0.58	3.1±0.53	4.7±1.22	
Some college or more	35.9±1.67	44.6±1.65	48.1±3.03	
Age				
18-35	38.1±1.72	42.4±1.68	20.8±2.50	0.0000
36-50	38.4±1.71	34.3±1.60	42.2±3.08	
51-65	17.1±1.31	14.3±1.15	26.1±2.71	
>65	6.4±1.10	8.9±1.29	10.7±2.40	
Number of Years of Smoking				
1-5	12.5±1.23	12.9±1.15	5.1±1.32	0.0000
6-10	10.7±1.07	14.1±1.17	6.5±1.55	
11-15	7.9±0.92	11.0±1.00	8.6±1.78	
>15	68.9±1.65	62.0±1.65	79.8±2.51	

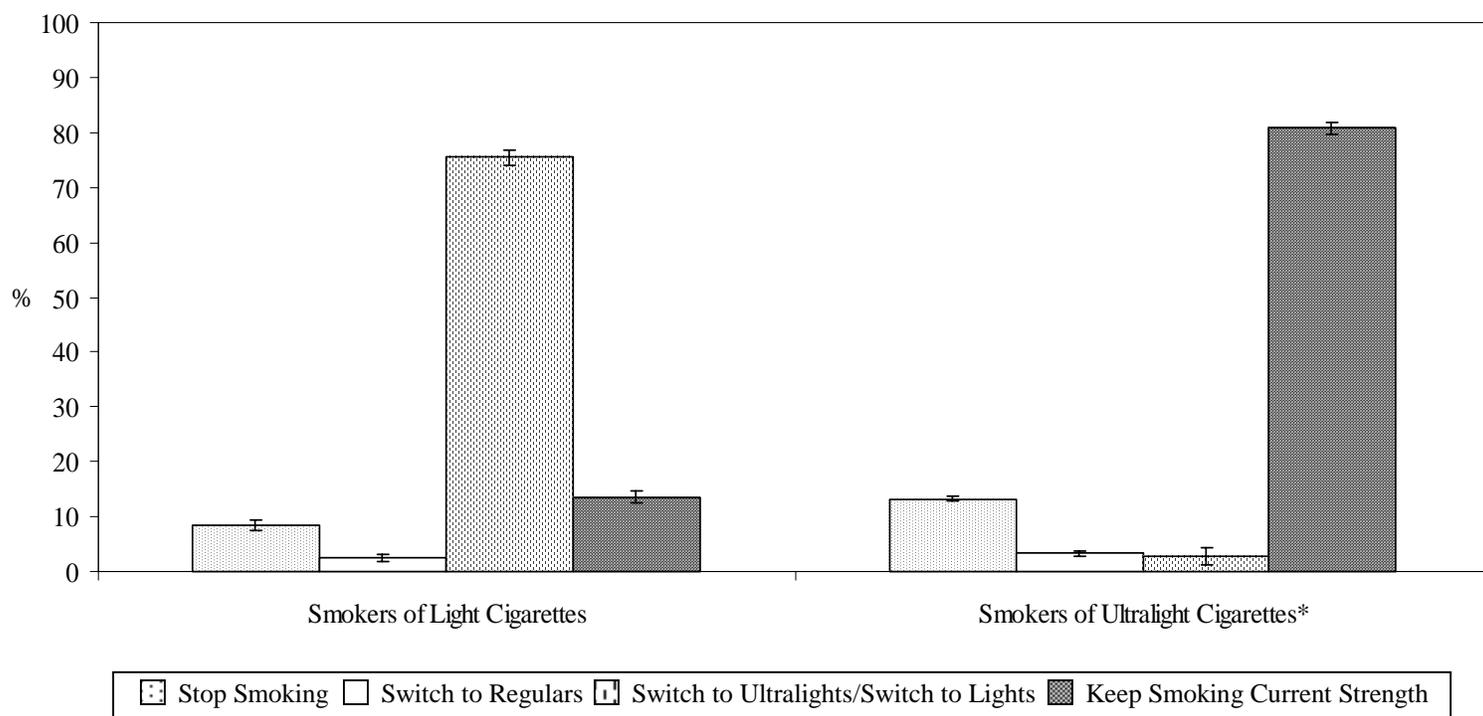
Table 2. Knowledge of Tar and Nicotine in Cigarettes among Smokers of Regular, Light, and Ultralight Cigarettes

	Regular	Light	Ultralight	P-value		
				Regular v. Light	Regular v. Ultralight	Light v. Ultralight
<u>Tar</u>						
“Have you ever heard that cigarettes contain a substance named tar?”						
Yes	94.3±0.79	97.1±0.67	97.1±0.98	0.0063	0.0241	0.9817
No	5.7±0.79	2.9±0.67	2.9±0.98			
“Do you believe TAR is harmful to your health?” ¹						
Yes	95.6±0.86	97.5±0.54	95.9±1.36	0.0600	0.8554	0.2690
No	4.4±0.86	2.5±0.54	4.1±1.36			
“Which of the following do you think is true – a light cigarette has more tar than a regular one, a light cigarette has less tar, or a light cigarette has the same amount of tar as a regular?”						
Lights have more	3.4±0.63	1.5±0.41	1.1±0.81	0.0000	0.0000	0.0370
Lights have less	48.1±1.81	62.2±1.65	71.2±2.82			
Lights have same	47.1±1.80	35.3±1.63	26.3±3.01			
Depends on the cigarette	1.4±0.44	1.0±0.30	1.4±0.70			
“Thinking of your entire life – Have you ever switched from one type of cigarette to another, just to reduce the amount of tar?” ¹						
Yes	19.2±1.40	44.3±1.68	66.9±2.92	0.0000	0.0000	0.0000
No	80.8±1.40	55.7±1.68	33.1±2.92			
“If you switched to [light/regular] cigarettes, how do you think this would affect your daily intake of tar?” ²						
Increase	31.3±1.69	63.0±1.63	73.0±2.74	0.0000	0.0000	0.0213
Decrease	30.8±1.67	9.6±0.99	7.0±1.46			
Remain the same	36.9±1.74	26.9±1.49	19.7±2.49			
Depends on cigarettes	1.0±0.41	0.5±0.23	0.3±0.31			
<u>Nicotine</u>						
“Have you ever heard that cigarettes contain a substance named nicotine ?”						
Yes	97.5±0.59	98.5±0.57	98.6±0.88	0.1921	0.2955	0.9683
No	2.5±0.59	1.5±0.57	1.4±0.88			
“Do you believe that nicotine is harmful to your health?” ³						
Yes	92.0±1.04	92.2±0.88	92.0±1.71	0.9051	0.9962	0.9289
No	8.0±1.04	7.8±0.88	8.0±1.71			
“Which of the following do you think is true – a light cigarette has more nicotine than a regular one, a light cigarette has less nicotine, or a light cigarette has the same amount of nicotine as a regular?”						
Lights have more	3.6±0.65	1.4±0.55	1.0±0.50	0.0042	0.0002	0.3972
Lights have less	50.6±1.80	57.8±1.67	63.1±3.03			
Lights have same	45.1±1.79	40.0±1.65	35.5±3.01			
Depends on the cigarette	0.7±0.28	0.8±0.31	0.4±0.45			
“Thinking of your entire life – Have you ever switched from one type of cigarette to another, just to reduce the amount of nicotine?” ³						
Yes	16.4±1.27	36.5±1.62	58.1±3.01	0.0000	0.0000	0.0000
No	83.6±1.27	63.5±1.62	41.3±3.01			
“If you switched to [light/regular] cigarettes, how do you think this would affect your daily intake of nicotine?” ²						
Increase	29.8±1.63	50.2±1.69	59.6±3.05	0.0000	0.0000	0.0598
Decrease	30.1±1.65	13.5±1.15	11.7±1.99			
Remain the same	39.6±.74	35.6±1.61	28.1±2.83			
Depends on cigarettes	0.5±0.25	0.8±0.28	0.6±0.41			

Notes:

1. Only asked of those respondents who reported having heard of tar.
2. Regular smokers were asked about switching to light cigarettes, while light/ultralight smokers were asked about switching to regular cigarettes.
3. Only asked of those respondents who reported having heard of nicotine.

Figure 1. Smoking Intentions if Current Cigarette Smoked has the Same Amount of Tar as a Regular Cigarette



Notes:

* $p < 0.0001$, comparing the distribution of options between smokers of light and ultralight cigarettes.

Question wording was: "If [light/ultralight] cigarettes have the same amount of tar as regulars, you would..."

Table 3. Beliefs Regarding the Addictiveness of Cigarettes among Smokers of Regular, Light, and Ultralight Cigarettes

	Regular	Light	Ultralight	P-value		
				Regular v. Light	Regular v. Ultralight	Light v. Ultralight
“Do you believe cigarettes can be addictive?”						
Yes	98.3±0.51	98.5±0.44	98.6±0.63	0.7031	0.6761	0.9175
No	1.7±0.51	1.5±0.44	1.4±0.63			
“Do you believe that light cigarettes are more addictive, as addictive, or less addictive than regular cigarettes?” ¹						
More addictive	11.4±1.13	4.4±0.66	4.4±1.23	0.0000	0.0002	0.0437
As addictive	72.6±1.63	83.5±1.28	76.4±2.72			
Less addictive	16.0±1.36	12.1±1.15	19.2±2.56			
“Do you believe that ultralight cigarettes are more addictive, as addictive, or less addictive than light cigarettes?” ¹						
More addictive	10.6±1.14	6.4±0.83	5.9±1.53	0.0021	0.0035	0.5844
As addictive	68.6±1.73	75.7±1.49	78.7±2.60			
Less addictive	20.9±1.52	17.9±1.34	15.4±2.28			

Notes:

1. Only asked of those who believed smoking was addictive.