

Sex Differences in Use of Smoking Cessation Services and Resources: A Real-World Study

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ABSTRACT

OBJECTIVES: Smoking cessation interventions with sex considerations have been found to effectively increase cessation rates. However, evidence is limited and weak. This study examined sex differences in the use of smoking cessation services or resources among Ontario adults.

METHODS: Data are from the Smokers' Panel, an ongoing online survey of Ontario adult smokers and recent quitters. The analysis included 1009 male and 1765 female participants. Bivariate analysis was used to examine differences in sociodemographic characteristics and smoking-related variables by use of cessation services/resources. Logistic regression was then used to identify sociodemographic characteristics and smoking-related variables associated with the use of cessation services/resources.

RESULTS: The analysis shows that there were significant sex differences in the use of individual interventions. Female participants were more likely to use nicotine patch (63% vs 58%; adjusted odds ratio, AOR: 1.39, 95% confidence interval [CI]: 1.16-1.67), varenicline (29% vs 24%; AOR: 1.37, 95% CI: 1.13-1.66), Smokers' Helpline phone (14% vs 10%; AOR: 1.39, 95% CI: 1.07-1.79), Smokers' Helpline online (27% vs 21%; AOR: 1.43, 95% CI: 1.18-1.74), self-help materials (23% vs 16%; AOR: 1.81, 95% CI: 1.46-2.26), and alternative methods (23% vs 19%; AOR: 1.40, 95% CI: 1.14-1.73) compared with male participants, after adjusting for covariates.

CONCLUSION: Consistent with other findings, the study shows sex differences in the use of smoking cessation services or resources among adult smokers. Women are more likely to use recommended cessation resources such as nicotine patch, varenicline, and Smokers' Helpline than men. Health professionals should use this increased willingness to help female smokers quit. However, men may be underserved and more men-specific interventions need to be developed and evaluated.

KEYWORDS: Smoking cessation, gender, treatment, policy, cross-sectional

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Introduction

Smoking is the most preventable cause of premature mortality and morbidity in Canada.¹ In 2016, more than 7.1 million people died worldwide from smoking.² Even though tobacco control efforts have been successful in lowering smoking rates overall, millions of people continue to smoke. In 2015, over 1.1 billion people smoked worldwide. In general, the prevalence of smoking is higher among men compared with women.³ The negative health effects of smoking affect men and women differently.⁴ Compared with male smokers, female smokers have a greater risk for specific cancers and coronary heart disease.⁴ Women who smoke have a higher risk of dying from a number of smoking-related health conditions such as lung cancer, oral cancer, and cardiovascular disease than their male-smoker counterparts, even after controlling for the level of tobacco exposure.⁵

Smoking cessation significantly reduces the risk of immediate and long-term health consequences and diseases caused by smoking.⁶ Smoking cessation is defined as sustained abstinence

from using cigarettes and/or other tobacco products for at least 6 months.⁷ It can be attained with or without assistance. Various methods of assistance can encourage, motivate, and support smokers to quit. These interventions can target at the population level (including legislations, policies, and mass media campaigns) or individual level (including pharmacotherapy and behavioral therapy).⁸

Smoking cessation rates vary depending on sex and type of intervention.⁴ In general, men experience more successful cessation with nicotine replacement therapy (NRT) than women. In 2 meta-analyses, women achieved lower abstinence rates than men when using NRT.^{9,10} Women often achieve less success on initial smoking cessation than men.¹¹ In general, women are more likely to benefit from non-nicotine or behavioral interventions.⁴ These sex differences may be explained by differences in genetics, hormones, nonpharmacological smoking motives (eg, smell and taste), negative affective states, concerns related to smoking cessation (eg, weight gain among women), and social support and social interactions.¹²



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Sex influences on smoking cessation have sporadically been considered in the development of smoking cessation interventions. A limited number of smoking cessation interventions have been designed to support women in general, with most focusing on pregnant or postpartum women.¹¹ A systematic review (excluding pregnant and postpartum women) examined abstinence from smoking among women participating in cessation interventions developed specifically for women.¹³ Treatment models varied considerably comparing standard treatment offered to women with women-specific programs. In general, women expressed body image concerns such as weight gain during cessation attempts and hormonal fluctuations, and the menstrual cycle also appeared to have a strong influence on smoking cessation. Therefore, women-specific interventions addressed weight gain or body image concerns, or timed cessation attempts to their menstrual cycle, paired with pharmacotherapies and various counseling and behavioral therapies. Although most of the 39 studies found women-specific interventions resulted in abstinence from baseline through follow-up, overall outcomes of the studies were inconsistent.¹³

Similar to women-centered interventions, only a few men-centered cessation interventions have been developed and/or evaluated.¹⁴ A narrative review by Okoli et al¹⁵ examined smoking cessation programs aimed at men. A total of 11 studies were included addressing smoking cessation or reduction among male smokers from various backgrounds, occupations, and health statuses. However, only 2 studies included interventions tailored specifically to men. The first is a cohort study focusing on gay men with interventions including NRT, group treatment, and peer support. This study found behavioral counseling with pharmacotherapy was associated with cessation outcomes of 64%. The second study focused on expectant fathers with the intervention group exposed to a video focusing on health risks of secondhand smoke exposure, nicotine patch with telephone interview from general practitioner, and support material. The control group was only exposed to brochure with information about smoking cessation options. Smoking cessation was significantly higher in the intervention group (16.5%) compared with the control group (9.3%).¹⁵

Based on the body of evidence, there are limited cessation interventions developed specifically for either men or women. There are only a limited number of smoking cessation interventions targeting women and men.^{11,14} However, most of these interventions focus on subgroups of women and men. Therefore, more research is needed to develop effective sex-specific interventions to improve cessation outcomes. With empirical support for sex influences on smoking cessation now well established, there is need to design cessation interventions that are sex sensitive and specific.¹¹ To accomplish this, we must first understand the sex differences in the use of smoking cessation services and resources. Using the baseline data from the Smokers' Panel, an ongoing online survey of Ontario adult smokers and recent quitters administered by the Ontario

Tobacco Research Unit, this study explored sex differences in the use of smoking cessation services or resources.

Methods

Eligible participants were residents of Ontario, 18 years or older, and who were current smokers or recent quitters (had quit within the last 3 years). Participants were recruited by advertisements through Ontario smoking cessation services, such as Smokers' Helpline, the Smoking Treatment for Ontario Patients (STOP) program, Ontario Lung Association, Ottawa Heart Institute, Quit Contest programs, and public health units, and by word of mouth. In total, this analysis included 1008 male and 1765 female participants who answered the questions about use of cessation services and resources when trying to quit or reduce smoking.

Study sample

Individuals self-reported about ever use of smoking cessation services or resources by indicating whether they had previously used the following medications, resources, or methods to help them quit or reduce smoking: (1) have not used any medications, resources, or methods to help quit or reduce smoking; (2) stopped smoking suddenly (cold turkey); (3) Zyban or Wellbutrin (bupropion); (4) Champix (varenicline); (5) nicotine patch; (6) nicotine gum; (7) nicotine lozenge; (8) nicotine inhaler; (9) individual counseling; (10) group counseling; (11) advice from a health professional (doctor, dentist, pharmacist, or nurse); (12) self-help book or Web site; (13) Smokers' Helpline phone; (14) Smokers' Helpline text; (15) Smokers' Helpline online; (16) alternative treatments (eg, laser therapy, herbal remedies, hypnosis, acupuncture, e-cigarettes); (17) other mobile cessation application; (18) a public health unit/local program; and/or (19) other. Participants were also asked whether they were referred to the Smokers' Panel by a quit smoking organization with the following options: (1) was not referred by an organization; (2) Smokers' Helpline (phone/online/text); (3) driven to quit; (4) leave the pack behind; (5) nicotine dependency clinic/STOP Study; (6) Ontario Lung Association; (7) Ottawa Heart Institute; (8) public health unit; (9) Quit and Get Fit; (10) First Week Challenge Contest (Canadian Cancer Society/Smokers' Helpline); (11) Run to Quit (Canadian Cancer Society/Running Room); and (12) other. A total of 2773 participants were included in the study.

Data analysis

Use of individual cessation service/resource (not mutually exclusive) was examined by sex. Use patterns of cessation services or resources were then classified to mutually exclusive 8 groups as follows: (1) no cessation service/resources (including those who never used any cessation services/resources or only used cold turkey method, and not referred by an organization); (2) quit contest only; (3) alternative method only or with quit

contest; (4) recommended behavioral therapy only; (5) recommended behavioral therapy with quit contest or alternative method; (6) pharmacotherapy only; (7) pharmacotherapy with quit contest or alternative method; and (8) pharmacotherapy and recommended behavioral therapy with contest or alternative method. Quit contest includes referrals from “Driven to Quit,” “First Week Challenge Contest,” “Leave the Pack Behind,” “Quit and Get Fit,” and “Run to Quit”; alternative methods include laser therapy, herbal remedies, hypnosis, acupuncture, and e-cigarettes; recommended behavioral therapy includes group or individual counseling, health professional advice, Smokers’ Helpline, quit programs, and self-help materials. Pharmacotherapy includes NRT, bupropion, and varenicline. Use of any cessation services or resources was categorized into 2 groups as “Yes” and “No.” If an individual was classified as “No,” then he or she has never used any cessation services or resources and has only attended quit contest. All other options were classified as “Yes.”

All analysis was conducted using SAS, version 9.4.¹⁶ Bivariate analysis was used to examine the sex differences in sociodemographic characteristics, smoking-related variables, and use of cessation services/resources, using a Mantel-Haenszel χ^2 test. Logistic regression was then used to examine sex differences in the use of cessation services/resources, adjusted for sociodemographic characteristics and smoking-related variables. Odds ratios and 95% confidence intervals were reported from logistic regression analysis. All P values were 2-sided, with an α of .05.

Results

Most participants were women (64%), received some postsecondary education (59%), were employed full- or part-time (57%), and had an annual household income less than Can\$80 000 (71%). Little over half (58%) of participants were current smokers at the time of the survey. Close to half (45%) of the participants perceived themselves as very addicted to cigarettes, 27% as somewhat addicted, and 28% as not at all addicted to cigarettes. Most (96%) participants had made at least 1 serious quit attempt in the past, with 30% making 1 to 2, 42% making 3 to 5, and 24% making 6 or more serious quit attempts. Less than 5% of participants had never made any serious quit attempt. Most (88%) participants rated their confidence in quitting or staying smoke-free as moderate or high. Only a small proportion (12%) of participants rated their confidence as low. Most (62%) participants completed the baseline survey between 2015 and 2016 (Table 1).

Female participants were more likely to be white (87% vs 80%) and more educated with postsecondary education (62% vs 56%) compared with male participants. However, women were less likely to be single (30% vs 35%), have multiple quit attempts (for more than 6 attempts, 22% vs 28%), and have high confidence in quitting or staying smoke-free (53% vs 59%) compared with men. There were no significant differences between male and female participants in age, employment, household income,

smoking status, self-perceived addiction to cigarettes, and in answering survey time (Table 1).

The large majority (95%) of participants used at least 1 cessation service or resource in the past. There was no significant difference in any use of cessation services or resources by sex (95% vs 94%). However, there were significant sex differences in the use of individual services or resources. Female participants were more likely to use nicotine patch (63% vs 58%), varenicline (29% vs 24%), Smokers’ Helpline phone (13% vs 10%), Smokers’ Helpline online (27% vs 21%), self-help materials (23% vs 16%), and alternative methods (23% vs 19%) compared with male participants. In terms of combination use of cessation services or resources, women were more likely to use all types of services or resources, including pharmacotherapy and recommended behavioral therapy with quit contest or alternative methods (59% vs 53%) than men (Table 2).

Multiple adjusted logistic regression analyses showed that female participants were more likely to use nicotine patch (adjusted odds ratio, AOR: 1.39, 95% confidence interval [CI]: 1.16-1.67), varenicline (AOR: 1.37, 95% CI: 1.13-1.66), Smokers’ Helpline phone (AOR: 1.39, 95% CI: 1.07-1.79), Smokers’ Helpline online (AOR: 1.43, 95% CI: 1.18-1.74), self-help materials (AOR: 1.81, 95% CI: 1.46-2.26), and alternative methods (AOR: 1.40, 95% CI: 1.14-1.73), after controlling for age, race, education, marital status, employment, income, self-perceived addiction, confidence of quitting or staying smoke-free, smoking status, and number of previous quit attempts. Male participants were more likely to use nicotine gum than female participants in the crude analysis but was no longer significant in the adjusted analysis (AOR: 0.87, 95% CI: 0.74-1.02). Regarding combination use of cessation services or resources, female participants were more likely to use pharmacotherapy and recommended behavioral therapy with quit contest or alternative methods (AOR: 1.72, 95% CI: 1.18-2.51), compared with male participants. There was no sex difference in using other types of combination use of cessation services or resources (Table 3).

Discussion

This study shows that there are sex differences in use of smoking cessation services or resources among adult smokers in Ontario. After controlling for covariates, female participants were more likely to use nicotine patch, varenicline, a telephone helpline, an online helpline Web site, self-help materials, and alternative non-evidence-based methods. Although the relative rates of use of these services or resources were higher for female than male smokers, the absolute differences were not large.

Consistent with other research, women are more likely to seek assistance with quitting.¹⁷ This is important because only 20% of smokers report trying to quit with the help of professional assistance.⁷ Health professionals should use this increased willingness to accept assistance by female smokers to encourage female smokers to seek assistance to quit. Female

Table 1. Participant characteristics, overall and by sex, Smokers' Panel Baseline Survey, Ontario, Canada, 2013-2018.

| PARTICIPANT CHARACTERISTICS | OVERALL | MALE % (N) | FEMALE | P VALUE |
|--|--------------|---------------|--------------|---------|
| Overall | 100.0 (2773) | 100.0 (1008) | 100.0 (1765) | |
| Sociodemographics | | | | |
| Age, y | | | | .10 |
| 18-29 | 25.2 (699) | 25.0 (252) | 25.3 (447) | |
| 30-54 | 45.8 (1269) | 43.2 (435) | 47.3 (834) | |
| 55+ | 21.6 (598) | 23.9 (240) | 20.3 (358) | |
| Missing | 7.5 (207) | 8.0 (81) | 7.1 (126) | |
| Race | | | | <.0001 |
| White | 84.5 (2344) | 80.3 (809) | 87.0 (1535) | |
| Nonwhite | 15.5 (429) | 19.7 (199) | 13.0 (230) | |
| Marital status | | | | .0001 |
| Single | 31.5 (874) | 34.7 (350) | 29.7 (524) | |
| Married | 46.8 (1299) | 47.3 (477) | 46.6 (822) | |
| Divorced/separated/widowed | 21.7 (600) | 18.0 (181) | 23.7 (419) | |
| Education | | | | .0014 |
| High school or less | 40.6 (1126) | 44.5 (449) | 38.4 (677) | |
| Postsecondary | 59.4 (1647) | 55.5 (559) | 61.6 (1088) | |
| Employment | | | | 1.00 |
| Employed full- or part-time | 56.7 (1571) | 56.7 (571) | 56.7 (1000) | |
| Not currently working | 43.4 (1202) | 43.4 (437) | 43.3 (765) | |
| Household income, Can\$ | | | | .28 |
| <30 000 | 34.0 (940) | 32.9 (332) | 34.5 (608) | |
| 30 000-79 999 | 36.6 (1015) | 34.8 (351) | 37.6 (664) | |
| ≥80 000 | 20.6 (570) | 24.4 (246) | 18.4 (324) | |
| Missing | 8.9 (248) | 7.8 (79) | 9.6 (169) | |
| Smoking-related characteristics | | | | |
| Current smoking status | | | | 0.98 |
| Current daily smoker | 49.5 (1373) | 49.4 (498) | 49.6 (875) | |
| Current occasional smoker | 8.0 (221) | 8.2 (83) | 7.8 (138) | |
| Former smoker | 42.6 (1179) | 42.4 (427) | 42.7 (752) | |
| Self-perceived addiction to tobacco cigarettes | | | | 0.23 |
| Not at all addicted to cigarettes | 28.0 (774) | 29.1 (293) | 27.3 (482) | |
| Somewhat addicted to cigarettes | 27.2 (752) | 27.5 (277) | 27.0 (477) | |
| Very addicted to cigarettes | 44.8 (1237) | 43.5 (438) | 45.7 (806) | |

(Continued)

Table 1. (Continued)

| PARTICIPANT CHARACTERISTICS | OVERALL | MALE % (N) | FEMALE | P VALUE |
|--|-------------|---------------|------------|---------------|
| Number of serious quit attempts in the past | | | | 0.0013 |
| 0 quit attempts | 4.4 (121) | 3.8 (38) | 4.7 (83) | |
| 1-2 quit attempts | 30.0 (831) | 28.2 (284) | 31.0 (547) | |
| 3-5 quit attempts | 41.8 (1160) | 40.5 (408) | 42.6 (752) | |
| ≥6 quit attempts | 23.9 (661) | 27.6 (278) | 21.7 (383) | |
| Confidence in quitting/staying smoke-free ^a | | | | 0.0008 |
| Low (score: 0-4) | 12.4 (345) | 10.2 (103) | 13.7 (242) | |
| Moderate (score: 5-7) | 32.2 (893) | 30.8 (310) | 33.0 (583) | |
| High (score: 8-10) | 55.4 (1535) | 59.0 (595) | 53.3 (940) | |
| Survey time | | | | 0.60 |
| 2013-2014 | 32.7 (907) | 32.8 (331) | 32.6 (576) | |
| 2015 | 22.8 (632) | 21.6 (218) | 23.5 (414) | |
| 2016 | 39.1 (1079) | 39.6 (399) | 38.5 (680) | |
| 2017-2018 | 5.6 (155) | 6.0 (60) | 5.4 (95) | |

^aConfidence in quitting/staying smoker-free was measured based on a scale of 0 to 10, where 0 represents “not at all confident” and 10 “extremely confident.” Bold values represent *P* values <0.05.

smokers were more likely to ever use pharmacotherapy and recommended behavioral therapy with quit contest or alternative method than male smokers, after adjusting for a number of factors. Cessation interventions have been found to be effective when combining pharmacotherapy and behavioral therapy; therefore, health professionals should routinely provide both strategic advice and pharmacotherapy to help female smokers quit.⁷ Even though evidence suggests female smokers face different stressors and barriers to quitting compared with male smokers, in this study female smokers were more likely to use some cessation services and resources than men. Surprisingly, female smokers were more likely to use nicotine patch than male smokers, even though previous studies have reported women are more likely to benefit from non-nicotine interventions.⁴ Therefore, more research is needed to determine how nicotine replacement therapy can be used to improve cessation rates among women.

More research is needed to determine how services and resources can be targeted to male smokers. In this study sample, 10% of participants only attended quit contests and did not use any other recommended cessation service or resource. In the future, providing quit contests may be an effective method to attract male smokers into the cessation system. In a recent study, multiple quit contests resulted in a significantly higher 6-month continuous abstinence rate compared with single contest; therefore, this resource may be effective in helping smokers quit smoking.¹⁸ Also, male smokers may be more successful in unaided quit attempts¹⁹ and should be encouraged to achieve cessation without assistance.

In this sample, a higher number of women used several recommended cessation services such as nicotine patch, varenicline, and Smokers' Helpline, except for nicotine gum, compared with men, which may imply that currently available cessation interventions may not appeal to men. The literature has indicated that male smoking behavior and cessation are poorly understood, and factors related to male smoking and cessation require further research.¹⁵ Masculine images have often been used by tobacco companies to attract young men. Other studies have found sex differences in patterns and motives for smoking with men reporting smoking because of “tension reduction/relaxation,” “stimulation,” and “social smoking” compared with women.¹⁵ With men having different psychosocial needs, interventions specifically addressing this need to be developed. Based on the narrative review, smoking cessation interventions studied among men show moderate efficacy and effectiveness, specifically interventions that include both behavioral counseling and pharmacotherapy.¹⁵ However, this review only included 2 studies that examined men-specific interventions in different subgroups of men.

In this study sample, more women are white, divorced, separated, or widowed, have a postsecondary education, and zero serious smoking quit attempts in the past compared with men. However, fewer women have high confidence in quitting or staying smoke-free than men. Evidence suggests race, marital status, education, number of quit attempts, and confidence in quitting are associated with smoking cessation.²⁰⁻²⁴ To reduce the influence of these variables, all variables are controlled for in the logistic regression.

Table 2. Smoking cessation services/resources ever used by participants, overall and by sex, Smokers' Panel Baseline Survey, Ontario, Canada, 2013-2018.

| PARTICIPANT CHARACTERISTICS | OVERALL | MALE % (N) | FEMALE | P VALUE |
|---|--------------|---------------|--------------|------------------|
| Use of any cessation services/resources | | | | .18 |
| Yes | 94.7 (2627) | 94.0 (947) | 95.2 (1680) | |
| No | 5.3 (146) | 6.1 (61) | 4.2 (85) | |
| Use of individual cessation service/resource (all that apply) | 100.0 (2773) | 100.0 (1008) | 100.0 (1765) | |
| Pharmacotherapy ^a | | | | |
| Nicotine patch | 61.0 (1692) | 57.6 (581) | 63.0 (1111) | .0059 |
| Nicotine gum | 44.6 (1238) | 47.2 (476) | 43.2 (762) | .039 |
| Nicotine lozenge | 20.2 (561) | 21.2 (213) | 19.7 (348) | .37 |
| Nicotine inhaler | 23.2 (644) | 24.0 (242) | 22.8 (402) | .46 |
| Varenicline (Champix) | 27.2 (753) | 24.2 (244) | 28.8 (509) | .0083 |
| Bupropion (Zyban) | 25.9 (717) | 25.2 (254) | 26.2 (463) | .55 |
| Individual counseling | 14.3 (397) | 12.8 (129) | 15.2 (268) | .084 |
| Group counseling | 7.9 (218) | 8.8 (89) | 7.3 (129) | .15 |
| Smokers' Helpline phone | 12.3 (341) | 10.2 (103) | 13.5 (238) | .012 |
| Smokers' Helpline text | 4.3 (118) | 3.8 (38) | 4.5 (80) | .34 |
| Smokers' Helpline online | 24.6 (681) | 20.8 (210) | 26.7 (471) | .0006 |
| Health professional advice ^b | 24.0 (662) | 23.6 (238) | 24.1 (426) | .78 |
| Quit program from a public health unit | 16.9 (469) | 16.0 (161) | 17.5 (308) | .32 |
| Quit program from a study or organization | 15.6 (431) | 15.7 (158) | 15.5 (273) | .88 |
| Self-help materials ^c | 19.7 (545) | 16.2 (163) | 23.4 (413) | <.0001 |
| Alternative method ^d | 21.2 (588) | 18.5 (186) | 22.8 (402) | .0079 |
| Quit contest ^e | 39.0 (1080) | 39.7 (400) | 38.5 (680) | .57 |
| Mobile quit app | 2.5 (69) | 2.2 (22) | 2.7 (47) | .43 |
| Use patterns of cessation services/resources | | | | .0052 |
| No use of cessation services/resources | 5.3 (146) | 6.1 (61) | 4.8 (85) | |
| Quit contest ^e only | 10.0 (277) | 11.5 (116) | 9.1 (161) | |
| Alternative method ^d only or with quit contest ^e | 0.9 (26) | 1.3 (13) | 0.7 (13) | |
| Recommended behavioral therapy ^a only | 4.4 (122) | 4.1 (42) | 4.5 (80) | |
| Recommended behavioral therapy ^a with quit contest ^e or alternative method ^d | 2.5 (69) | 2.1 (21) | 2.7 (48) | |
| Pharmacotherapy ^f only | 6.1 (170) | 6.3 (63) | 6.1 (107) | |
| Pharmacotherapy ^f with quit contest ^e or alternative method ^d | 14.2 (392) | 16.0 (161) | 13.1 (231) | |
| Pharmacotherapy ^f and recommended behavioral therapy ^a or with quit contest ^e or alternative method ^d | 56.7 (1571) | 52.7 (531) | 58.9 (1040) | |

^aRecommended behavioral therapy, including individual or group counseling, health professional advice, Smokers' Helpline, quit programs, and self-help materials.

^bHealth professional advice, including advice by a physician, nurse, dentist, or pharmacist.

^cSelf-help materials, including self-help books, Web sites, or a phone app.

^dAlternative cessation methods, including acupuncture, hypnosis, laser therapy, herbal remedies, and e-cigarettes for quitting.

^eQuit contests, including "Driven to Quit," "First Week Challenge Contest," "Leave the Pack Behind," "Quit and Get Fit," and "Run to Quit."

^fPharmacotherapy, including nicotine replacement therapy, bupropion, and varenicline.

Bold values represent *P* values <0.05.

Table 3. Logistic regression of ever use of smoking cessation services/resources by sex (female vs male), Smokers' Panel Baseline Survey, Ontario, Canada, 2013-2018.

| OUTCOME | CRUDE | ADJUSTED ^a |
|---|----------------------------|----------------------------|
| | OR (95% CI) | OR (95% CI) |
| Use of any cessation services/resources | | |
| Yes vs no | 1.27 (0.91-1.79) | 1.27 (0.88-1.83) |
| Use of individual cessation service/resource | | |
| Nicotine patch: yes vs no | 1.25 (1.06-1.46)** | 1.39 (1.16-1.67)*** |
| Nicotine gum: yes vs no | 0.85 (0.73-0.99)* | 0.87 (0.74-1.02) |
| Nicotine lozenge: yes vs no | 0.92 (0.76-1.1) | 0.96 (0.78-1.18) |
| Nicotine inhaler: yes vs no | 0.93 (0.78-1.12) | 0.95 (0.78-1.15) |
| Varenicline (Champix): yes vs no | 1.27 (1.06-1.52)** | 1.37 (1.13-1.66)** |
| Bupropion (Zyban): yes vs no | 1.06 (0.88-1.26) | 1.12 (0.92-1.37) |
| Individual counseling: yes vs no | 1.22 (0.97-1.53) | 1.26 (0.99-1.60) |
| Group counseling: yes vs no | 0.81 (0.61-1.08) | 0.87 (0.64-1.17) |
| Smokers' Helpline phone: yes vs no | 1.37 (1.07-1.75)** | 1.39 (1.07-1.79)* |
| Smokers' Helpline text: yes vs no | 1.21 (0.82-1.80) | 1.21 (0.81-1.82) |
| Smokers' Helpline online: yes vs no | 1.38 (1.15-1.66)*** | 1.43 (1.18-1.74)*** |
| Health professional advice ^b : yes vs no | 1.03 (0.86-1.23) | 1.09 (0.90-1.32) |
| Quit program from a public health unit: yes vs no | 1.11 (0.90-1.37) | 1.14 (0.91-1.42) |
| Quit program from a study or organization: yes vs no | 0.98 (0.80-1.22) | 1.03 (0.80-1.32) |
| Self-help materials ^c : yes vs no | 1.66 (1.35-2.04)*** | 1.81 (1.46-2.26)*** |
| Alternative method ^d : yes vs no | 1.30 (1.07-1.58)** | 1.40 (1.14-1.73)** |
| Quit contest ^e : yes vs no | 0.95 (0.81-1.12) | 0.91 (0.74-1.11) |
| Mobile quit app: yes vs no | 1.23 (0.74-2.05) | 1.31 (0.77-2.24) |
| Use patterns of cessation services/resources | | |
| No use of cessation services/resources | 1.00 | 1.00 |
| Quit contest ^e only | 1.00 (0.66-1.50) | 0.98 (0.64-1.50) |
| Alternative method ^d only or with quit contest ^e | 0.72 (0.31-1.66) | 0.68 (0.29-1.69) |
| Recommended behavioral therapy ^f only | 1.37 (0.83-2.25) | 1.40 (0.84-2.35) |
| Recommended behavioral therapy ^f with quit contest ^e or alternative method ^d | 1.64 (0.89-3.02) | 1.59 (0.85-2.99) |
| Pharmacotherapy ^g only | 1.22 (0.78-1.92) | 1.44 (0.89-2.32) |
| Pharmacotherapy ^g with quit contest ^e or alternative method ^d | 1.03 (0.70-1.51) | 1.02 (0.67-1.53) |
| Pharmacotherapy ^g and recommended behavioral therapy ^f or with quit contest ^e or alternative method ^d | 1.41 (1.00-1.99)* | 1.72 (1.18-2.51)** |

Abbreviations: OR, odds ratio; CI, confidence interval.

^aAdjusted for age, race (white vs nonwhite), marital status (single, married, separated/divorced/widowed), education (some postsecondary vs high school or less), household income (<Can\$30 000, Can\$30 000-Can\$79 999, Can\$80 000+, and missing), employment (currently employed vs not employed), self-perceived addiction (not at all, somewhat, very addicted), confidence of quitting or staying smoke-free (low, moderate, high), number of previous quit attempts (0, 1-2, 3-5, 6+), current smoking status (daily, occasional, former smokers), and survey years (2013-2014, 2015, 2016, 2017-2018).

^bHealth professional advice, including advice by a physician, nurse, dentist or pharmacist.

^cSelf-help materials, including self-help books, Web sites, or a phone app.

^dAlternative cessation methods, including acupuncture, hypnosis, laser therapy, herbal remedies, and e-cigarettes for quitting.

^eQuit contests, including "Driven to Quit," "First Week Challenge Contest," "Leave the Pack Behind," "Quit and Get Fit," and "Run to Quit."

^fRecommended behavioral therapy, including individual or group counseling, health professional advice, Smokers' Helpline, quit programs, and self-help materials.

^gPharmacotherapy, including nicotine replacement therapy, bupropion, and varenicline.

* $P < .05$; ** $P < .01$; *** $P < .001$.

Bold values represent P values <0.05 .

There are several limitations in this study. The study sample was nonrandom, all measures were self-reported, and questions were asked retrospectively. Because the sample is taken from participants who are more likely to have used cessation services than nonpanelists, findings from this study are not generalizable. Recent evidence suggests prevalence of smoking differs between rural and urban women. In the 2007–2014 US National Survey on Drug Use and Health, smoking trends significantly declined among rural men, urban men, and urban women. However, smoking prevalence remained unchanged for rural women.²⁵ Therefore, future studies must control for geographical locations. Nevertheless, the findings about the sex differences in use of smoking cessation services or resources among adult smokers in Ontario are important. Health professionals need to be aware of these sex differences when referring smokers to professional assistance. More research needs to be conducted to examine the effect of sex on smoking cessation outcomes and sex-specific interventions.

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Author Contributions

MC, BZ, RS and PS conceived the analysis and assisted with data collection and survey design. BZ and NJ conducted data analysis. BZ and NJ drafted the article. All authors contributed to interpretation and editing of the manuscript.

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