



Receipt of direct tobacco mail/email coupons and coupon redemption: Demographic and socioeconomic disparities among adult smokers in the United States



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ABSTRACT

A key marketing strategy used by tobacco companies to lower tobacco product prices is the distribution of tobacco coupons via direct marketing channels such as mail or email. We analyzed data on adult smokers from Wave 1 of the Population Assessment of Tobacco and Health (PATH) Study ($n = 10,994$) to examine the prevalence and correlates of coupon receipt via both channels, and associations with cigarette coupon redemption. Overall, 22% and 32% of smokers received tobacco coupons via email and mail, respectively, and 22% redeemed cigarette coupons. White, 25–44 year old, female, sexual minority, and more nicotine dependent smokers were more likely to receive coupons via both channels and to redeem coupons, as were smokers with mid-levels education (GED to associate degree) and those unable to pay important bills (OR_{email receipt} = 1.37, 95% CI 1.22–1.54; OR_{mail receipt} = 1.38, 95% CI 1.24–1.55; and OR_{coupon redemption} = 1.44, 95% CI 1.26–1.64). Smokers who received coupons via mail only or via both channels, had three times (OR = 2.97, 95% CI 2.31–3.83) and five times (OR = 4.56, 95% CI 3.61–5.76) higher odds to redeem cigarette coupons compared to those who received them via email only. Major demographic and socioeconomic disparities exist in receipt and redemption of direct email/mail tobacco coupons among US smokers. Cigarette coupons received via direct mail are more likely to be redeemed than coupons received via email. Restrictions on tobacco coupon redemption, implemented jointly with increasing access to affordable cessation resources, may incentivize smokers vulnerable to tobacco marketing tactics to quit.

1. Background

High cigarette prices are an effective measure to curtail smoking behavior (Chaloupka et al., 2011; Jha and Chaloupka, 2000). Cigarette price increases are associated with lower odds of smoking initiation, lower cigarette consumption (Cavazos-Rehg et al., 2014; Gallus et al., 2006) and increased smoking cessation (Stevens et al., 2017). Tobacco industry marketing efforts, however, may undermine the public health effects of upholding high cigarette prices. Tobacco companies' advertising and promotional expenditures reach an estimated \$8 billion annually, of which the largest single category is price discounts, primarily for cigarettes (Federal Trade Commission, 2017). In the wake of marketing restrictions on tobacco products following the 1998 Master Settlement Agreement (MSA) (Master Settlement Agreement, 1998),

tobacco companies have shifted focus towards direct marketing channels to reach consumers directly through the mail or the web (Brock et al., 2015; Czaplowski and Olson, 2003; Lewis et al., 2004b; Seidenberg and Jo, 2017). Despite all tobacco control measures taken thus far, the tobacco industry continues to show an interest in establishing reward programs and promotions for their combustible products (Kress, 2018), and efforts to push tobacco coupons through other direct digital channels such as apps (Seidenberg and Jo, 2017).

The use of direct marketing channels by the tobacco industry is particularly worrying as it allows companies to connect directly with smokers and to personalize promotional materials (Lewis and Ling, 2016). Moreover, tobacco coupons are a form of product advertising through which tobacco companies cultivate positive industry perceptions and brand loyalty (Lewis and Ling, 2016). Evidence indicates that

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tobacco companies have extensive direct mailing lists, used to distribute coupons and giveaways tailored to the consumer's brand and lifestyle preferences (Czaplewski and Olson, 2003; Lewis et al., 2004b). Whereas direct mail delivery of coupons has long been used by the tobacco industry (Lewis and Ling, 2016), direct email delivery is evolving and no study to date has estimated its prevalence or correlates.

Marketing strategies that offer discounts for tobacco products impact mainly price sensitive consumers who seek out ways to reduce their cigarette expenditures (Hyland et al., 2005). As such, particularly following tax increases, price sensitive smokers engage in a variety of price-minimization strategies made available to them by the tobacco industry, including the redemption of coupons (Choi and Boyle, 2018; Hyland et al., 2005; Xu et al., 2013). In the US, approximately 12% of adult nonsmokers, and 35% to 49% of adult smokers receive direct marketing coupons and price promotions, primarily for cigarettes (Choi et al., 2013; Choi et al., 2018a; Choi et al., 2018b; Lewis et al., 2004a), and nearly 20% to 40% of adults smokers redeem coupons when purchasing tobacco products (Choi et al., 2013; Lewis et al., 2004a; Lewis et al., 2015; Xu et al., 2013). Rates of coupon redemption for cigarettes are staggering high at 70%–80% among adult smokers who receive direct mail from tobacco companies (Choi et al., 2013; Lewis et al., 2015). These strategies may circumvent price and tax increases of tobacco products, undermine the effect of price-based tobacco control measures, and contribute to sustaining or widening tobacco use disparities in the U.S. and worldwide. Indeed, evidence points to negative effects of tobacco coupons on smoking behavior of both smokers and non-smokers (Choi and Forster, 2014; Choi et al., 2018a; Soneji et al., 2014). As such, smokers who use tobacco coupons hold more positive views of the tobacco industry (Choi et al., 2013) and are less likely to quit (Choi et al., 2019; Choi and Forster, 2014; Choi et al., 2018a). Among youth and adult non-smokers, exposure to tobacco coupons is associated with initiation and progression to smoking (Choi et al., 2019; Choi and Forster, 2014; Choi et al., 2018a).

Despite this evidence, the issue of direct marketing price promotions remains understudied. First, only three studies used nationally representative data on adults (Choi et al., 2019; Choi et al., 2018a; Xu et al., 2013) and only one study used nationally representative data on youth (Rose et al., 2018) to examine correlates of receiving tobacco coupons. None of these studies, however, examined the prevalence or correlates of coupon redemption. Second, studies on tobacco price promotions reporting characteristics associated with direct mail coupon receipt neglect to consider characteristics associated with other channels of receipt (i.e., email). Lastly, no study has examined how different channels of coupon receipt relate to coupon redemption. In this study, we use nationally representative data on US adult smokers to examine characteristics of smokers who receive and redeem tobacco coupons. Building on previous research, we consider a broader set of socioeconomic indicators and examine their association to coupon receipt via two direct marketing channels (email vs. mail), and to coupon redemption, and how channel of coupon receipt (email, mail, or both) relates to coupon redemption when buying cigarettes.

2. Methods

2.1. Sample and data

We analyzed data from Wave 1 of the Population Assessment of Tobacco and Health (PATH) Study, a nationally representative cohort of youth and adults in the US, designed to inform FDA's regulatory activities under the Family Smoking Prevention and Tobacco Control Act (FSPTCA). Using a four-stage stratified sampling design, the study sampled 32,320 participating adults (response rate 74%), aged 18 or older, of which 11,402 were current smokers (smoked 100 cigarettes in their lifetime and smoked some days or every day in the past month). Data were collected in 2013–2014, using audio computer-assisted self-

interview. Adult respondents were paid \$35 for participation (United States Department of Health and Human Services, National Institutes of Health, National Institute on Drug Abuse, Food and Drug Administration, and Center for Tobacco Products, 2017b).

2.2. Measures

2.2.1. Receipt of tobacco coupons via email or mail

Participants were asked whether in the past 6 months they have received promotions or coupons for cigarettes or tobacco products “in an e-mail message” or “in the mail” (No, Yes).

2.2.2. Redemption of tobacco coupons when purchasing cigarettes

Smokers were asked whether in the past month they had used a coupon when buying cigarettes. (No, Yes).

2.2.3. Demographic variables

Age was categorized into young adults (18–24), two age groups of middle age adults (24–44 and 45–64), and older adults (65 or older). Other demographics included sex, Hispanic origin, race (White, Black, or other race), self-identified sexual orientation (sexual minority vs. heterosexual) and census region (Northeast, Midwest, South, or West).

2.2.4. Economic variables

2.2.4.1. Ability to pay important bills. One item assessed financial difficulties by asking participants “In the past 30 days, because of a shortage of money, were you unable to pay important bills on time, such as rent, electricity or telephone bills?” (No, Yes).

2.2.4.2. Poverty status. Using data on annual household income and number of household members, participants were classified to be below (< 100% of poverty line), at or near (100–199% of poverty line), or at or above twice ($\geq 200\%$ of poverty line) the poverty level. Respondents with missing data on household income were coded as a separate group of “Unknown poverty status”. More details on this variable are available elsewhere (United States Department of Health and Human Services et al., 2017a).

2.2.4.3. Employment status. Participants indicated whether they currently: work full-time, part-time, or do not work for pay. The latter group was asked “Are you currently: looking for paid work, a student, a homemaker or caregiver not looking for paid work, retired, unable to work for health reasons or due to other reasons?”. Based on these questions, participants were classified as “employed full or part time”, “unemployed or unable to work”, and “not looking for paid job” (including students, homemakers, and retirees).

2.2.4.4. Educational attainment. Participants indicated the highest level of school they completed and were coded as “less than high school”, “GED or high school graduate”, “some college but no degree, or associate degree”, and “bachelor's degree or higher”.

2.2.5. Smoking related variables

Sixteen items measured *tobacco dependence* across users of different tobacco products. The psychometric properties of this instrument have been reported elsewhere (Strong et al., 2017). Responses across items were summed ranging from 0 to 61, with higher numbers indicating greater level of tobacco dependence. Then, a three-level tobacco dependence variable was created using tertiles as the cut off points (0–20 = low, 21–37 = moderate, 38–61 = high). *Past quit attempt* was assessed by asking participants if they had tried to quit using tobacco in the past 12 months. Smokers were coded as those who have tried to quit completely, those who have cut back or reduced the amount they smoke, and those who have not tried to quit. *Overall opinion of tobacco use* was assessed using one item that classified participants into smokers who thought positively or negatively of tobacco use, and those whose

opinion was neither negative nor positive.

2.3. Statistical analysis

All analyses were conducted using Stata 13 (Statacorp, 2013). Missing data on study variables, except poverty status, were small (< 1.8%). Respondents with missing data on all variables, except poverty status, were excluded from the analyses. About 7% of smokers ($n = 769$) had missing data on poverty status and were coded separately (Unknown poverty status). The final analytic sample included 10,994 smokers. Unadjusted and adjusted main effect logistic regression models were estimated to examine associations between the independent variables (i.e., demographic, economic, and smoking related variables) and each of three outcomes (1) coupon receipt via email, (2) coupons receipt via mail, and (3) coupon redemption when purchasing cigarettes. Since women are generally more likely to use coupons; and from an intersectionality perspective, we re-estimated all aforementioned models testing for a gender by race interaction effect to examine whether the intersection of gender and race confers higher risk for tobacco coupon use and redemption.

Next, we further restricted our sample to smokers who received direct marketing coupons in the past 6 months ($n = 4043$), and participants were classified into those who received coupons (1) via email only, (2) via mail only, and (3) via both email and mail. Logistic regression models estimated the association between channel of coupon receipt and coupon redemption adjusting for all other covariates. In all analyses, balanced repeated replication weights were utilized with Fay's correction (shrinkage factor set at 0.3) to account for PATH study design, oversampling of tobacco users, and to ensure the findings were representative of US non-institutionalized adults (United States Department of Health and Human Services et al., 2017b).

As a sensitivity analysis and to test the robustness of the results, all models were re-estimated again excluding from the sample participants who had missing data on poverty status ($n = 769$) with an analytic sample of $n = 10,225$ smokers. Results from this re-analysis were similar in terms of direction, magnitude, and significance of associations to the results reported in the Tables and would not have changed our conclusions.

3. Results

3.1. Sample characteristics

Half the sample were male (53%) with a majority non-Hispanic (87%) and White (76%) (Table 1). Twenty-eight percent were unable to pay important bills in the past month, and 38% lived below the poverty line. The majority of smokers (61%) were employed. Overall, 37% reported receiving tobacco coupons through direct-to-consumer channels in the past 6 months: 22% via email and 32% via mail (5% via email only, 15% via mail only, and 17% via both channels), and 22% reported redeeming coupons when buying cigarettes.

3.2. Correlates of coupon receipt via email

Smokers aged 25–44 had higher odds to receive tobacco coupons via email compared to other age groups, as were females (aOR 1.15, 95% CI 1.04, 1.28) and sexual minority smokers (aOR 1.25, 95% CI 1.05, 1.49) compared to males and heterosexuals. There were no statistically significant racial differences in receipt of tobacco coupons via email (Table 2). Smokers who reported difficulty paying bills had significantly higher odds to receive coupons via email (aOR = 1.37, 95% CI 1.22, 1.54) than those who did not report such difficulty. Poverty status and employment status were not significantly associated with receipt of coupons via email in the adjusted model. Higher nicotine dependence was significantly associated with higher odds to receive tobacco coupons via email (aOR 1.45, 95% CI 1.28, 1.65; and aOR 1.77, 95% CI

Table 1
Sample characteristics of smokers, PATH study, Wave 1 (2013–2014), $n = 10,994$.

		n	%
Age	18–24	2410	22
	25–44	4503	41
	45–64	3400	31
	65 or older	681	6
Sex	Male	5785	53
	Female	5209	47
Hispanic origin	No	9614	87
	Yes	1380	13
Race	White	8398	76
	Black	1545	14
	Other race	1051	10
Sexual orientation	Heterosexual	10,068	92
	Self-identified sexual minority	926	8
Census region	Northeast	1651	15
	Midwest	2988	27
	South	4312	39
	West	2043	19
Able to pay important bills	Yes	7961	72
	No	3033	28
Poverty status	Below poverty line	4147	38
	At or near poverty line	2776	25
	At or above twice poverty line	3302	30
	Unknown	769	7
Employment status	Unemployed or unable to work	2924	27
	Not looking for paid work	1315	12
	Employed part or full time	6755	61
	Less than high school	1823	17
Education	GED or high school	4050	37
	Some college or associate degree	3956	36
	Bachelor's degree or higher	1165	10
Nicotine dependence	Low	3584	33
	Moderate	3575	32
	High	3835	35
Past quit attempts	Have not tried to quit	3730	34
	Tried cutting back	4662	42
	Have tried to quit completely	2602	24
Overall opinion of using tobacco	Negative	1425	13
	Neither positive nor negative	5033	46
	Positive	4536	41
Receipt of direct marketing coupons via email	No	8607	78
	Yes	2387	22
Receipt of direct marketing coupons via mail	No	7476	68
	Yes	3318	32
Coupon redemption when purchasing cigarettes	No	8525	78
	Yes	2469	22

Note. Data are unweighted.

1.52, 2.04 for moderate and high tobacco dependence, respectively).

3.3. Correlates of coupon receipt via mail

Smokers aged 25–44 had higher odds to receive coupons via mail than other age groups (Table 2). Females, non-Hispanic, White, and sexual minority smokers had higher odds to receive tobacco coupons via mail compared to males, Hispanics, Black, and heterosexual smokers.

Coupon receipt via mail was also significantly higher among smokers who reported difficulty paying important bills (aOR = 1.38, 95% CI 1.24, 1.55) compared to those who did not report such difficulty, and lower among smokers with a bachelor degree education or higher (aOR = 0.81, 95% CI 0.66, 0.99) compared to those with GED or high school education.

Tobacco dependence was positively associated with mail coupon

Table 2
Unadjusted and adjusted associations between demographic and socioeconomic variables and tobacco coupon receipt via email and mail among U.S adult smokers, PATH study (n = 10,994), weighted estimates.

Independent variables	Receipt of tobacco industry coupons via email				Receipt of tobacco industry coupons via mail			
	n	%	Unadjusted	Adjusted	n	%	Unadjusted	Adjusted
			OR (95% CI)	aOR (95% CI)			OR (95% CI)	aOR (95% CI)
Age								
18–24	443	18	0.66 (0.58, 0.76)	0.68 (0.59, 0.78)	548	22	0.47 (0.41, 0.53)	0.48 (0.42, 0.55)
25–44	1142	25	1.00	1.00	1757	39	1.00	1.00
45–64	727	21	0.80 (0.73, 0.90)	0.82 (0.73, 0.91)	1070	31	0.72 (0.64, 0.81)	0.71 (0.63, 0.79)
65 or older	75	11	0.35 (0.27, 0.45)	0.42 (0.32, 0.55)	143	21	0.39 (0.32, 0.47)	0.45 (0.35, 0.56)
Sex								
Male	1143	20	1.00	1.00	1610	28	1.00	1.00
Female	1244	24	1.23 (1.12, 1.36)	1.15 (1.04, 1.28)	1908	36	1.44 (1.32, 1.57)	1.38 (1.25, 1.52)
Hispanic origin								
No	2112	22	1.00	1.00	3213	33	1.00	1.00
Yes	275	20	0.85 (0.73, 0.99)	0.95 (0.79, 1.13)	305	22	0.56 (0.47, 0.67)	0.64 (0.53, 0.78)
Race								
White	1837	22	1.00	1.00	2771	33	1.00	1.00
Black	314	20	0.90 (0.78, 1.04)	0.89 (0.77, 1.03)	430	28	0.77 (0.66, 0.89)	0.73 (0.62, 0.88)
Other	236	22	0.88 (0.74, 1.05)	0.91 (0.76, 1.09)	317	30	0.72 (0.60, 0.87)	0.84 (0.70, 1.02)
Sexual orientation								
Heterosexual	2146	21	1.00	1.00	3183	32	1.00	1.00
Self-identified sexual minority	241	26	1.38 (1.18, 1.62)	1.25 (1.05, 1.49)	335	36	1.26 (1.09, 1.47)	1.18 (1.01, 1.37)
Census region								
Northeast	321	19	1.00	1.00	493	29	1.00	1.00
Midwest	703	23	1.27 (1.07, 1.51)	1.25 (1.05, 1.49)	1105	37	1.45 (1.23, 1.72)	1.39 (1.17, 1.64)
South	933	22	1.19 (1.01, 1.39)	1.16 (0.98, 1.37)	1366	31	1.16 (0.98, 1.37)	1.12 (0.94, 1.33)
West	430	21	1.15 (0.94, 1.39)	1.17 (0.96, 1.42)	554	27	0.95 (0.81, 1.11)	1.02 (0.86, 1.20)
Able to pay important bills								
Yes	1539	19	1.00	1.00	2317	29	1.00	1.00
No	848	28	1.59 (1.42, 1.76)	1.37 (1.22, 1.54)	1201	40	1.60 (1.44, 1.77)	1.38 (1.24, 1.55)
Poverty status								
Unknown poverty status	111	14	0.68 (0.54, 0.87)	0.76 (0.59, 0.97)	176	22	0.70 (0.58, 0.83)	0.78 (0.65, 0.94)
Below poverty line	963	23	1.18 (1.06, 1.32)	1.05 (0.92, 1.21)	1364	33	1.15 (1.04, 1.28)	1.08 (0.94, 1.23)
At or near poverty line	639	23	1.18 (1.03, 1.35)	1.11 (0.96, 1.29)	949	34	1.19 (1.06, 1.33)	1.13 (0.99, 1.28)
At or above twice poverty line	674	20	1.00	1.00	1029	31	1.00	1.00
Employment status								
Unemployed or unable to work	676	23	1.12 (1.00, 1.25)	1.10 (0.97, 1.24)	962	33	1.01 (0.91, 1.12)	0.94 (0.84, 1.05)
Not looking for paid work	229	17	0.69 (0.57, 0.82)	0.88 (0.73, 1.07)	361	27	0.70 (0.59, 0.82)	0.81 (0.68, 0.97)
Employed part or full time	1482	22	1.00	1.00	2195	32	1.00	1.00
Education								
Less than high school	343	19	0.83 (0.72, 0.95)	0.82 (0.72, 0.94)	525	29	0.85 (0.73, 0.98)	0.90 (0.77, 1.05)
GED or high school	851	21	1.00	1.00	1305	32	1.00	1.00
Some college or associate degree	965	24	1.16 (1.03, 1.31)	1.14 (1.01, 1.30)	1360	34	1.07 (0.96, 1.17)	1.02 (0.92, 1.13)
Bachelor's or advanced degree	228	19	0.87 (0.71, 1.08)	0.99 (0.78, 1.25)	328	28	0.75 (0.62, 0.89)	0.81 (0.66, 0.99)
Nicotine dependence								
Low	574	16	1.00	1.00	816	23	1.00	1.00
Moderate	789	22	1.51 (1.33, 1.71)	1.45 (1.28, 1.65)	1218	34	1.77 (1.57, 2.00)	1.63 (1.43, 1.86)
High	1024	27	1.85 (1.62, 2.12)	1.77 (1.52, 2.04)	1484	39	2.13 (1.89, 2.41)	1.91 (1.68, 2.17)
Past quit attempts								
Have not tried to quit	748	20	0.84 (0.74, 0.96)	0.82 (0.72, 0.95)	1140	30	0.92 (0.82, 1.03)	0.86 (0.77, 0.98)
Tried cutting back	1057	22	1.00 (0.89, 1.13)	1.03 (0.91, 1.15)	1554	33	1.07 (0.96, 1.20)	1.08 (0.96, 1.20)
Have tried to quit completely	582	22	1.00	1.00	824	32	1.00	1.00
Overall opinion of using tobacco								
Negative	979	21	1.00	1.00	1428	31	1.00	1.00
Neither negative nor positive	1103	22	1.04 (0.93, 1.16)	1.12 (0.99, 1.26)	1653	33	1.09 (0.98, 1.21)	1.17 (1.05, 1.31)
Positive	305	21	1.03 (0.90, 1.18)	1.15 (1.01, 1.32)	437	31	0.97 (0.85, 1.12)	1.08 (0.94, 1.25)

Note. n's and % of adult smokers across predictor categories who received tobacco coupons via mail or email in the past 6 months.

receipt (aOR 1.63, 95% CI 1.43, 1.86, and aOR 1.91, 95% CI 1.68, 2.17 for moderate and high tobacco dependence, respectively). Smokers who expressed indifferent opinion of tobacco (neither negative nor positive) had higher odds of mail coupon receipt than smokers with a negative view of tobacco use (aOR 1.17, 95% CI 1.05, 1.31).

3.4. Correlates of coupon redemption for purchasing cigarettes

Smokers aged 25–44, females, non-Hispanic, White, and sexual minority smokers had significantly higher odds to redeem coupons when buying cigarettes than all other age groups, males, Hispanics, racial minorities (Blacks and other race), and heterosexual smokers

(Table 3). Smokers who reported difficulty paying bills (aOR = 1.44, 95% CI 1.26, 1.64) had significantly higher odds to redeem these coupons than those who did not report such difficulty. Poverty and employment status were not significantly associated with coupon redemption. Compared to smokers with GED or high school diploma, smokers with less than high school education (aOR = 0.76, 95% CI 0.65, 0.88) and those with a bachelor degree or higher (aOR 0.65, 95% CI 0.53, 0.80) had lower odds to redeem coupons when purchasing cigarettes.

Smokers with moderate (aOR 1.81, 95% CI 1.60, 2.05) and high (aOR 2.01, 95% CI 1.79, 2.26) tobacco dependence and those who had non-negative opinion of tobacco had significantly higher odds to

Table 3
Unadjusted and adjusted associations between demographic and socioeconomic variables and coupon redemption in the purchase of cigarettes among U.S adult smokers, PATH study (n = 10,994), weighted estimates.

Independent variables	Redemption of tobacco coupons			
	n	%	Unadjusted	Adjusted
			OR (95% CI)	aOR (95% CI)
Age				
18–24	469	19	0.65 (0.57, 0.74)	0.68 (0.59, 0.78)
25–44	1211	26	1.00	1.00
45–64	717	21	0.72 (0.63, 0.82)	0.71 (0.62, 0.81)
65 or older	72	10	0.30 (0.22, 0.41)	0.34 (0.25, 0.48)
Sex				
Male	1154	20	1.00	1.00
Female	1315	25	1.30 (1.17, 1.45)	1.23 (1.09, 1.40)
Hispanic origin				
No	2263	23	1.00	1.00
Yes	206	15	0.58 (0.47, 0.70)	0.69 (0.56, 0.85)
Race				
White	1997	24	1.00	1.00
Black	286	18	0.73 (0.62, 0.88)	0.69 (0.58, 0.83)
Other	186	18	0.57 (0.46, 0.71)	0.66 (0.53, 0.82)
Sexual orientation				
Heterosexual	2216	22	1.00	1.00
Self-identified sexual minority	253	27	1.30 (1.12, 1.51)	1.18 (1.01, 1.39)
Census region				
Northeast	306	18	1.00	1.00
Midwest	812	27	1.73 (1.36, 2.19)	1.65 (1.30, 2.08)
South	981	23	1.36 (1.06, 1.75)	1.29 (1.02, 1.65)
West	370	18	1.00 (0.75, 1.32)	1.09 (0.82, 1.43)
Able to pay important bills				
Yes	1597	20	1.00	1.00
No	872	29	1.64 (1.45, 1.85)	1.44 (1.26, 1.64)
Poverty status				
Unknown poverty status	137	18	0.92 (0.71, 1.18)	0.99 (0.75, 1.32)
Below poverty line	1004	24	1.31 (1.18, 1.46)	1.11 (0.95, 1.31)
At or near poverty line	657	23	1.20 (1.06, 1.38)	1.08 (0.93, 1.27)
At or above twice poverty line	671	20	1.00	1.00
Employment status				
Unemployed or unable to work	689	24	1.07 (0.95, 1.20)	1.00 (0.87, 1.14)
Not looking for paid work	233	18	0.66 (0.55, 0.79)	0.84 (0.69, 1.04)
Employed part or full time	1547	23	1.00	1.00
Education				
Less than high school	349	19	0.73 (0.63, 0.85)	0.76 (0.65, 0.88)
GED or high school	983	24	1.00	1.00
Some college or associate degree	953	24	0.95 (0.86, 1.05)	0.93 (0.83, 1.04)
Bachelor's or advanced degree	184	16	0.54 (0.45, 0.65)	0.65 (0.53, 0.80)
Nicotine dependence				
Low	509	14	1.00	1.00
Moderate	892	25	2.00 (1.78, 2.25)	1.81 (1.60, 2.05)
High	1068	28	2.26 (2.03, 2.51)	2.01 (1.79, 2.26)
Past quit attempts				
Have not tried to quit	835	22	1.10 (0.97, 1.25)	1.02 (0.87, 1.18)
Tried cutting back	1105	24	1.21 (1.07, 1.38)	1.21 (1.06, 1.39)
Have tried to quit completely	529	20	1.00	1.00
Overall opinion of using tobacco				
Negative	937	21	1.00	1.00
Neither negative nor positive	1202	24	1.22 (1.09, 1.37)	1.25 (1.10, 1.42)
Positive	330	23	1.20 (0.98, 1.47)	1.27 (1.02, 1.58)

Note. n's and % of adult smokers across predictor categories who redeemed tobacco coupons when buying cigarettes in the past month.

redeem coupons when buying cigarette than smokers with low tobacco dependence and those who expressed negative view of tobacco use.

3.5. The intersection between race and gender in coupon receipt and redemption

All main effect models reported in Tables 2–3 were re-estimated to test for an interaction between gender and race in coupon receipt and redemption (Data not presented in Tables). There was no statistically significant gender × race interaction predicting email receipt. We found a statistically significant gender × race interaction in models predicting mail coupon receipt (P = 0.032) and coupon redemption (P = 0.013). We plotted statistically significant interactions using predicted probabilities produced by the *margins* command in Stata 13 (Fig. 1 in Appendix A). Both White and other race women had higher odds of receiving and redeeming tobacco coupons than Black women, however, the difference between men and women in mail coupon receipt and redemption was greatest in the other race group. Future research with adequate sample sizes of other race groups may further our understanding of these gender and racial differences.

3.6. The association between channel of coupon receipt and coupon redemption

Controlling for all demographic, economic, and smoking covariates, smokers who received coupons via mail only (aOR = 2.97, 95% CI 2.31, 3.83), and those who received them via both channels (aOR = 4.56, 95% CI 3.61, 5.76), had three time and nearly five times higher odds than those who received them via email only to redeem coupons when buying cigarettes (Table 4). Post hoc multiple comparisons using Bonferroni's adjustment also show that smokers who receive coupons via both channels have higher odds to redeem coupons than those who receive them via mail only (aOR = 1.53, 95% CI 1.24, 1.88).

4. Discussion

In light of the tobacco industry's continued efforts to push for tobacco product discounts and promotions, we sought to examine the prevalence and correlates of direct tobacco coupon receipt via two main marketing channels (email, mail) and of coupon redemption in the US population.

Our findings confirm that receipt of direct marketing tobacco coupons is quite prevalent in the United States as over one-third of adult smokers reported receipt of such coupons. As the first study to report estimates of coupon receipt via specific direct marketing channels, we found that 22% and 32% of adult smokers receive tobacco coupons via email and mail channels, respectively. These estimates are consistent with data reported in previous studies showing that 35% to 49% of smokers receive direct marketing coupons (Choi et al., 2013; Choi et al.,

Table 4
Association between channel of coupon receipt and coupon redemption for cigarettes among U.S adult smokers who receive direct marketing coupons via email or mail, PATH study (n = 4043), weighted estimates.

Independent variables	n	%	Redemption of tobacco coupons	
			Unadjusted	Adjusted
			OR (95% CI)	aOR (95% CI)
Channel of coupon receipt				
Email	105	20	1.00	1.00
Mail	691	42	3.24 (2.53, 4.15)	2.97 (2.31, 3.83)
Email and mail	984	53	4.94 (3.97, 6.15)	4.56 (3.61, 5.76)

Note. Adjusted model adjusts for all demographics, economic, and smoking variables; n's and % reflect adult smokers across predictor categories who have redeemed tobacco coupons when buying cigarettes in the past month.

2018a; Choi et al., 2018b; Lewis et al., 2004a), and are concerning given that smokers can obtain coupons through additional non-direct marketing channels (e.g., at point of sale). Our study is also the first national study to report coupon redemption estimates, and it expands previous state-level studies showing that nearly a fourth (22%) of smokers redeem coupons when purchasing cigarettes (Choi et al., 2013; Lewis et al., 2004a; Lewis et al., 2015; Xu et al., 2013). Taken together, these estimates translates into millions of US smokers being exposed to price promotions that lower their cigarette prices.

Demographic characteristics of smokers who receive direct marketing coupons have been reported in few empirical studies (Choi et al., 2013; Choi et al., 2018a; Xu et al., 2013), however, none has distinguished between email and mail channels of receipt. Consistent with these studies, we found that coupon receipt via both channels and coupon redemption are more prevalent among White, middle-aged 25–44 year old, female, and self-identified sexual minority smokers. The findings also show economic disparities with coupon receipt via both channels and coupon redemption being more significantly prevalent among smokers facing recent financial difficulties and those with middle levels of educational attainment ranging from GED to associate degree. It is notable that demographic groups with the highest odds of coupon receipt and redemption are also the groups with the highest cigarette smoking rates in the population (e.g., Middle-aged adults, non-Hispanics, sexual minority groups, and sexual minority females, GED to associate level education). Known as price sensitive groups, those segments of the smoker population are also more likely to use other price minimization strategies (e.g., switching to a less expensive brand; purchasing cigarettes in states with lower excise taxes; purchasing lower-priced cigarettes on the Internet, Indian reservations, and on the black market; rolling their own cigarettes; using price discounts such as multi-pack or cartons offers) as ways to save money on cigarettes (Choi et al., 2012; Xu et al., 2013). To that end, coupons and price promotions for cigarettes could play a role in sustaining existing socio-demographic disparities in cigarette consumption.

Although women in the US smoke at a lower rate compared to men, tobacco coupon receipt and redemption are significantly higher among women. This could be a function of the generally higher coupon consumption among women but could also be a result of the long history of targeting efforts by the tobacco industry. Tobacco industry internal documents reveal that tobacco companies have long viewed women as a major consumer base, and for over 4 decades, tobacco companies targeted specific subgroups of low socio-economic status (SES) women, including military wives, inner-city minority women, working women, and older women, with marketing efforts including offering price discounts by mail and at point of sale (Brown-Johnson et al., 2014). Paying closer attention to the intersection of gender and race/ethnicity, we found that both White and other race women are more likely to receive and redeem tobacco coupons than Black women, but the gender gap in this behavior between men and women is most pronounced among other minority race groups. Future research with adequate sample sizes of other race groups (Asians, American Indians/Alaska Natives) may further our understanding of these gender and racial differences.

Accumulating evidence points to negative effects of tobacco coupons on smoking behavior of both adults and youth (Choi et al., 2019; Choi and Forster, 2014; Choi et al., 2018a; Rose et al., 2018; Soneji et al., 2014). Studies show that smokers who receive direct marketing coupons hold more positive views of the tobacco industry (Choi et al., 2013). Cross-sectional and longitudinal studies also show that use of tobacco coupons is associated with initiation and progression to smoking among adult non-smokers, and with sustained smoking and lower odds of cessation among adult smokers (Choi et al., 2019; Choi and Forster, 2014; Choi et al., 2018a; Rose et al., 2018; Soneji et al., 2014). Consistent with that, we found that more nicotine dependent smokers, who likely consume more cigarettes per day, and smokers with non-negative views of tobacco use are more likely to receive and redeem coupons than their counterparts. Of particular concern is the

effect of coupon use on nicotine dependent smokers of low SES among which tobacco use remains disproportionately high (Jamal et al., 2015; United States Department of Health and Human Services, 2014). Coupons and price promotions targeted at them could lead to sustaining or widening the already large SES disparities in tobacco use and cessation (Campaign for Tobacco-Free Kids, 2015; Ham et al., 2011; Jamal et al., 2015; Siahpush et al., 2010; United States Department of Health and Human Services, 2014). Practitioners and policy makers should consider ways to incentivize low SES smokers to consider cessation as the default choice to saving money.

Our findings highlight the connection between direct coupon receipt and redemption. Receipt of coupons through mail or simultaneously through mail and email, increases the odds of coupon redemption when purchasing cigarettes. The strong association between mail coupon receipt and redemption was observed in a recent study showing that nearly 70% of smokers who receive tobacco direct mailings also use coupons to purchase cigarettes (Lewis et al., 2015). Whereas direct mail delivers paper coupons directly to the consumer's address, direct email typically provides the consumer with a link through which they can claim coupons. The consumer is then required to log on to a company website, create an account, and choose to have tobacco coupons mailed to an address or downloaded through an application. In other words, receiving the actual coupons promoted via email require some extra effort on the consumer's part. This may explain why coupon receipt via mail is more strongly associated with redemption than email receipt.

Effective tobacco control measures including increasing tobacco product prices and reducing targeted industry marketing and advertising, are policies that also reduce tobacco use disparities, particularly among low SES groups (Centers for Disease Control and Prevention, 2014b). Yet, coupon distribution and redemption remain unchallenged by policy in the vast majority of states. While the FSPTCA (United States Department of Health and Human Services, 2009) prohibits the sale of tobacco products through mail-order coupon redemption, it does not restrict the discounting of tobacco products via coupons (Tobacco Control Legal Consortium, 2011). The FSPTCA give states and local jurisdictions the authority to regulate tobacco product sales in their localities (Tobacco Control Legal Consortium, 2013). Whereas restricting coupon distribution is likely to face legal challenges related to Preemption, the Commerce Clause, and the industry's right for commercial speech, prohibiting retailers from redeeming coupons at point of sale is a legally viable option that can be achieved through local laws (Tobacco Control Legal Consortium, 2011). In recent years, some states and local jurisdictions (e.g., New York city; Providence, Rhode Island; Massachusetts) have successfully implemented strong minimum price laws and local ordinances that prohibit the retail redemption of coupons (Tobacco Control Legal Consortium, 2013). Other States may follow suit to magnify the impact of price and tax increases on reducing tobacco use disparities. To prevent unintended consequences of such policies, however (e.g., use of lower-priced, unregulated, and illegally manufactured cigarettes) and to achieve health equity, policy-makers could improve accessibility to cessation services for populations affected by tobacco-related disparities (Centers for Disease Control and Prevention, 2014a), particularly low SES nicotine dependent smokers.

5. Strengths and limitations

Data are nationally representative allowing generalizability of findings to the non-institutionalized U.S adult smoker population. The study has several limitations. Data were self-reported, thus a recall bias is possible if smokers fail to remember receiving coupons. In such a case, our estimates of coupon receipt are likely an underestimation of the real magnitude of this issue. Questions assessing coupon receipt did not assess the type of tobacco products promoted by these coupons. Previous studies, however, support that most tobacco coupons promote cigarette products (Brock et al., 2015; Choi and Forster, 2014).

Questions on coupon receipt did not quantify exposures in terms of the number of coupons received or redeemed, or their economic value. Assessment of coupon redemption was not specific to coupons received via direct-to-consumer channels, and smokers may have redeemed coupons received through other channels (e.g., point of sale). In addition, PATH study did not assess coupon receipt of specific tobacco products. The number of smokers who reported redemption of coupons for products other than cigarettes was too small to allow for meaningful statistical modeling. Finally, data on non-White minority racial groups other than Blacks (e.g., Asian, American Indians, Alaska Natives) are not available in PATH public use file (which was used to conduct all analyses) thus potential racial disparities concerning these groups could not be explored.

6. Conclusions

Our study offers new insights into the characteristics of the consumer base that receives and redeems tobacco industry coupons via direct marketing channels in the US. The findings point to demographic and socioeconomic disparities in coupon receipt and redemption, and highlight specific segments of the smoker population as vulnerable to industry direct marketing tactics. Receipt of coupons via direct to

consumer marketing channels, particularly direct mail, are likely to translate into redemption of coupons when purchasing cigarettes. Restrictions on tobacco coupon redemption may incentivize smokers vulnerable to tobacco marketing tactics to quit, but should be implemented jointly with increasing access to affordable cessation resources.

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Conflicts of interest

None.

Appendix A

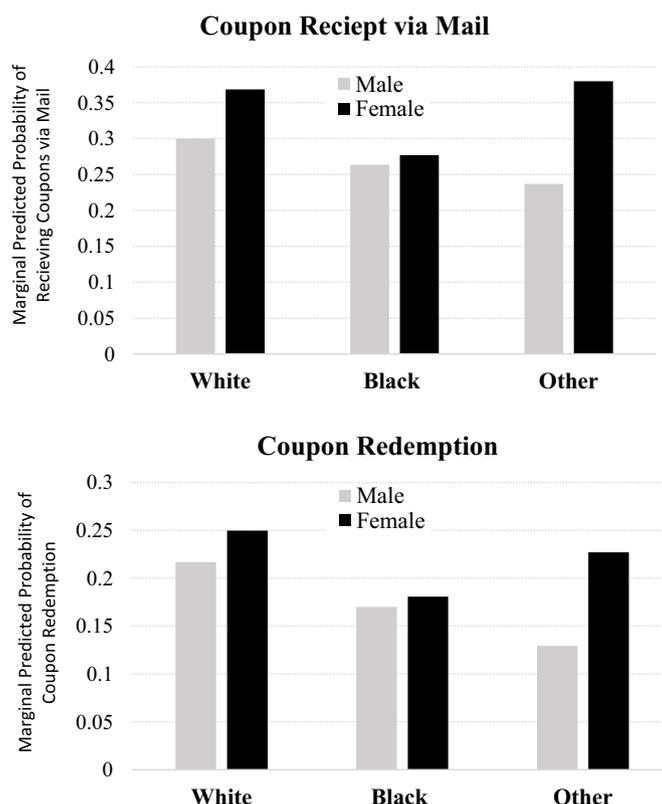


Fig. 1. Predicted probabilities, by gender and race, for (a) receipt of tobacco coupons via mail, (b) redemption of tobacco coupons when purchasing cigarettes. Wave 1 (2013–2014), the Population Assessment of Tobacco and Health (PATH) Study, United States.

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