



Brief report

Exposure to Multimedia Tobacco Marketing and Product Use Among Youth: A Longitudinal Analysis

Kelvin Choi PhD¹, Shyanika W. Rose PhD², Yitong Zhou MS²,
Basmah Rahman MPH², Elizabeth Hair PhD^{2,3}

¹Division of Intramural Research, National Institute on Minority Health and Health Disparities, Bethesda, MD; ²Truth Initiative Schroeder Institute, Washington, DC; ³Johns Hopkins Bloomberg School of Public Health, Baltimore, MD

Corresponding Author: Kelvin Choi, PhD, Division of Intramural Research, National Institute on Minority Health and Health Disparities, Building 3 Rm 5W05, 9000 Rockville Pike, Bethesda, MD 20892, USA. E-mail: kelvin.choi@nih.gov

Abstract

Introduction: Tobacco companies continue to reach youth through direct-to-consumer marketing, which has been associated with overall tobacco use. We examine how exposure to these marketing activities influences product-specific use behaviors.

Methods: We analyzed data from 10 081 youth (aged 12–18 years) who participated in Waves 1 and 2 (2013–2015) of the Population Assessment of Tobacco and Health (PATH) Study. Participants reported past 6-month tobacco coupon receipt and online tobacco marketing engagement, and *susceptibility to ever* and *current use* of cigarette, e-cigarettes, cigars, smokeless tobacco, and hookah. Weighted multivariable logistic regression examined Wave 1 predictors of coupon receipt at Wave 2, and associations between coupon receipt, online engagement, and past 30-day use of different tobacco products.

Results: Youth received tobacco coupons at one (9.7%) or both waves (1.2%) and 11.1% engaged with online tobacco marketing. Coupon receipt and online marketing engagement at Wave 1 predicted Wave 2 coupon receipt among *susceptible-never*, *ever-but-not-current*, and *current* tobacco users ($p < .05$). Coupon receipt and online engagement at Wave 1 was positively associated with past 30-day use of cigarettes, e-cigarettes, cigars, smokeless tobacco, and hookah at Wave 2 ($p < .05$). The relationships were stronger for those who received coupons at both waves or engaged with more sources of online marketing.

Conclusions: Tobacco direct-to-consumer marketing is reaching youth. Repeated exposure to these marketing activities within and across media is associated with use of different tobacco products. New policies and strong enforcement of existing regulations prohibiting these illegal marketing tactics are critical to protect youth from future tobacco use.

Implications: Tobacco companies utilize coupons and online engagement activities to increase brand awareness, knowledge, and sales of their products. These kinds of marketing activities can be influential among youth at a time when they may develop tobacco use behaviors. Our findings suggest that tobacco companies may be targeting at-risk youth through cross-media marketing activities. The findings also indicate that exposure to these marketing activities predicts subsequent use of different tobacco products, with suggestive dose–response relationships. Increased regulations are needed to protect youth from these marketing activities.

Introduction

In 2018, 27.1% of US high-school and 7.5% of middle-school students reported past 30-day any tobacco use—an increase from 2017.^{1,2} Tobacco marketing has been determined as a cause of youth tobacco use.³ Consequently, the 1998 Master Settlement Agreement (MSA) and the 2009 Family Smoking Prevention and Tobacco Control Act (FSPTCA) restricted the ability of cigarette companies to market their products to youth.^{4,5} These restrictions still need to be applied to cigars and electronic cigarettes.⁶

Tobacco companies reach youth through direct-to-consumer marketing. From 2013 to 2014, 7.6% of US youth received tobacco discount coupons,⁷ and coupon receipt was demonstrably associated with tobacco use.^{7,8} In addition, 11.8% of US youth engaged in on-line tobacco marketing activities,⁹ which was also associated with tobacco use.^{9,10}

However, it remains unclear whether youth receive tobacco coupons over time, if there is cross-media exposure between direct-to-consumer marketing activities, and if predictors of tobacco coupon receipt differ by tobacco use continuum stage as in US adult populations.¹¹ Furthermore, it is unknown whether repeated tobacco coupon receipt exhibits a dose-response relationship with subsequent tobacco use among youth, as shown in an international study among adults.¹¹ No studies to date have examined whether exposure to tobacco coupons and engagement with online tobacco marketing activities are independently associated with specific tobacco product use among youth, and whether these associations vary across tobacco use status. In this study, we use data from the Population Assessment of Tobacco and Health (PATH) Study Wave 1 and 2 surveys to address these knowledge gaps.^{12,13}

Methods

Data Source

The PATH Study is an ongoing, nationally representative, US longitudinal cohort study.^{13,14} Self-report information on tobacco use and risk factors is collected through audio computer-assisted self-interviews in English and Spanish. Additional details on the PATH Study are available elsewhere.^{12,15} PATH study data collection was approved by the Westat Institutional Review Board (IRB). This analysis of de-identified data was exempted by the Chesapeake IRB. The Wave 1 weighted response rate for the household screener was 54.0%. Among screened households, the weighted response rate was 78.4% for the Youth Interview (aged 12–17 years) at Wave 1 and 87.3% at Wave 2. This study analyzes data from the PATH Study Public-Use subsample of youth respondents completing interviews at both Wave 1 and 2 ($N = 10\,081$).

Measures

Coupon Receipt for Any Tobacco Product and Online Engagement

At both waves, participants were asked, “In the past 6 months, have you gotten a discount coupon for any tobacco product?” (yes or no). Respondents were categorized as receiving coupons at both waves, either wave, and neither wave.

Online engagement was measured by taking the sum of nine items: (1) “In the past 6 months, have you ever signed up for email alerts about tobacco products, read articles online about tobacco products, or watched a video online about tobacco products?”; (2) “Have you ever used a smart phone to scan a Quick Response (QR) code for a tobacco product or to enter a sweepstakes or drawing

from a tobacco company?”; (3) “Did this code take you to a tobacco company web site?”; (4) “In the past 6 months, did a tobacco company send you any information other than coupons?”; (5) “This is a website for [BRAND—ie, Camel, Marlboro, Newport, Swisher, or Blu]. In the past 6 months, have you been to this website?”; (6) “Did you register at the [BRAND] website?”; (7) “Have you liked or followed [BRAND] on Facebook, Twitter, or other sites?”; (8) “Have you sent a link or information about [BRAND] to others on Facebook, Twitter, or other sites?”; (9) “Have you played an online game related to [BRAND]?” Online engagement scores were categorized as 0 (no forms of online engagement), 1 (engagement with 1 form), or 2+ (engagement with two or more forms).¹⁰

Tobacco Use Susceptibility and Use Status

Participants were classified into tobacco use status based on Wave 1 tobacco use behaviors. Tobacco use and susceptibility for each of the following products were assessed: cigarettes, e-cigarettes, traditional cigars, cigarillos, filtered cigars, pipe, hookah, smokeless tobacco, and snus. *Current users* used any listed tobacco product in the past 30 days at Wave 1. *Ever but not current users* ever used any of those products at Wave 1 but not in the past 30 days. Susceptibility to tobacco use was assessed by answering four questions: (1) “Have you ever been curious about [using product]?”; (2) “Do you think you will [use product] in the next year?”; (3) “Do you think you will try a [product] soon?”; and (4) “If one of your best friends were to offer you [product], would you [use it]?” *Non-susceptible never users* had never used a tobacco product and answered that they were not at all curious to the first question and “definitely not” to the other three questions. All other never tobacco users were categorized as *susceptible never users*.¹⁶

At Wave 2, participants reported past 30-day use of cigarettes; any cigars (including traditional cigars, cigarillos, filtered cigars); e-cigarettes; smokeless tobacco (including snus, chew, snuff, dip); and hookah.

Correlates

Participant demographics were assessed at Wave 1: grade, gender, race and ethnicity, and parental education. Respondents were coded as “living with a tobacco user” if they answered yes to any of the following: “Does anyone who lives with you now do any of the following” with response options of “smoke cigarettes”; “use smokeless tobacco”; “smoke cigars, cigarillos, or filtered cigars”; or “use any other form of tobacco.”^{17,18} An answer of “no one who lives with me now uses any form of tobacco” was coded as “no.”

Statistical Analyses

Analyses were conducted using SVY procedures in Stata/SE, version 15.1 (StataCorp: College Station, Texas, US), to account for weighting and nonresponse. We estimated weighted prevalence of characteristics of youth who completed Waves 1 and 2. Multivariable logistic regression models were conducted separately for *non-susceptible never* tobacco users, *susceptible never* tobacco users, *ever-but-not-current* tobacco users, and *current users* at Wave 1 to examine correlates of coupon receipt for any tobacco product at Wave 2, including demographics, living with tobacco users, online tobacco marketing engagement, and Wave 1 coupon receipt. Multivariable logistic regression models were used to examine the association between coupon receipt for any tobacco product, online engagement, and specific past 30-day tobacco product use at Wave 2, controlling for covariates. Analyses were stratified by Wave 1 tobacco use status.

Results

Overall, 54.5% of sampled respondents were non-Hispanic white, 13.6% were non-Hispanic black, and 22.7% were Hispanic or Latino; 51.4% were male and 54.7% were in high school or more; and 34.0% lived with a tobacco user (Supplementary Table). Although most youth did not receive any tobacco coupons at either wave (89.1%), 9.7% reported having received a coupon at either Wave 1 or 2 ($n = 978$), and 1.2% received coupons at both waves ($n = 121$). Youth predominantly had no online engagement at Wave 1 (88.9%), but 8.8% had an online engagement score of 1 and 2.3% had a score of 2+. At Wave 1, 5.9% of youth used any tobacco in the past 30 days ($n = 564$), with most prevalent use of cigarettes ($n = 310$).

Regarding Wave 2 coupon receipt for any tobacco product, 4.5% of *non-susceptible never* users, 5.6% of *susceptible never* users, 7.7% of *ever-but-not-current* users, and 7.5% of *current* tobacco users received coupons. Wave 1 coupon receipt was not associated with Wave 2 coupon receipt among *non-susceptible never* users but was among *susceptible never* tobacco users (adjusted odds ratio [AOR] = 3.83), *ever-but-not-current* tobacco users (AOR = 3.07), and *current* tobacco users (AOR = 3.52; Table 1). Online engagement (score of 1 or higher) at Wave 1 was associated with greater odds of receiving coupons at Wave 2 in both *susceptible never* tobacco users

(score 1: AOR = 1.62; score 2+: AOR = 3.45), and *ever-but-not-current* tobacco users (score 1: AOR = 2.00; score 2+: AOR = 3.01). Among *ever but not current* tobacco users, youth with high school or greater education compared with middle school were less likely to receive coupons at Wave 2 (AOR = 0.59). No significant associations were found for coupon receipt by gender, race and ethnicity, parent education, or living with a tobacco user for any tobacco user status.

Overall, receiving coupons for any tobacco product at one wave was associated with *current* use of each product, including *past-30-day use* of cigarettes (AOR = 1.97), e-cigarettes (AOR = 1.96), cigars (AOR = 1.65), smokeless tobacco (AOR = 2.78), and hookah (AOR = 2.08); (Table 2). The odds were greater among those who received coupons at both waves. Similarly, participants with online engagement scores of 1 were more likely to report past 30-day use of cigarettes (AOR = 2.12), e-cigarettes (AOR = 1.58), cigars (AOR = 2.67), and hookah (AOR = 2.74). Those with online engagement scores of 2+ had even greater odds of past 30-day use of cigarettes, e-cigarettes, cigars, smokeless tobacco, and hookah.

When stratified by Wave 1 tobacco use status among *noncurrent* users at Wave 1, coupon receipt for any tobacco product at one or both waves was associated with greater odds of current cigar, smokeless tobacco, and hookah use. However, for *current* tobacco users at Wave 1, coupon receipt at one wave was associated with only

Table 1. Characteristics Associated With Receiving Tobacco Coupon at Wave 2

W1 characteristics	Received coupons at Wave 2			
	Non-susceptible never tobacco users at W1 ($n = 931$)	Susceptible never tobacco users at W1 ($n = 4413$)	Ever-but-not-current tobacco users at W1 ($n = 1287$)	Current tobacco users at W1 ($n = 873$)
	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)
Gender				
Male	Ref.	Ref.	Ref.	Ref.
Female	1.71 (0.80 to 3.66)	1.30 (0.95 to 1.78)	1.28 (0.77 to 2.12)	1.07 (0.49 to 2.35)
Race and ethnicity				
Non-Hispanic white	Ref.	Ref.	Ref.	Ref.
Non-Hispanic black	0.82 (0.21 to 3.21)	1.29 (0.79 to 2.10)	1.00 (0.41 to 2.41)	0.65 (0.17 to 2.49)
Non-Hispanic other	1.22 (0.28 to 5.37)	0.74 (0.36 to 1.51)	0.51 (0.23 to 1.16)	0.91 (0.21 to 3.86)
Hispanic or Latino	1.15 (0.49 to 2.70)	1.21 (0.80 to 1.81)	0.63 (0.33 to 1.21)	0.45 (0.11 to 1.86)
Grade				
Middle school or less	Ref.	Ref.	Ref.	Ref.
High school or more	0.80 (0.40 to 1.60)	0.96 (0.70 to 1.31)	0.59 (0.35 to 0.99)	1.17 (0.36 to 3.83)
Parent education				
Less than high school	Ref.	Ref.	Ref.	Ref.
High school or equivalent	0.75 (0.26 to 2.20)	1.40 (0.84 to 2.35)	1.33 (0.58 to 3.04)	1.7 (0.53 to 5.44)
Some college or associates degree	0.67 (0.27 to 1.64)	1.03 (0.63 to 1.69)	1.48 (0.68 to 3.19)	1.69 (0.52 to 5.44)
Bachelor's degree	0.37 (0.11 to 1.20)	0.73 (0.37 to 1.43)	1.59 (0.51 to 5.00)	1.00 (0.17 to 5.70)
Advanced degree	0.70 (0.13 to 3.79)	1.45 (0.78 to 2.69)	0.53 (0.10 to 2.68)	0.38 (0.02 to 6.14)
Living with tobacco users				
No	Ref.	Ref.	Ref.	Ref.
Yes	1.33 (0.63 to 2.80)	1.25 (0.88 to 1.77)	1.29 (0.73 to 2.27)	0.73 (0.29 to 1.84)
Received coupons				
No	Ref.	Ref.	Ref.	Ref.
Yes	1.61 (0.56 to 4.61)	3.83 (2.56 to 5.74)	3.07 (1.78 to 5.29)	3.52 (1.45 to 8.56)
Online engagement score				
0	Ref.	Ref.	Ref.	Ref.
1	1.73 (0.50 to 5.97)	1.62 (1.04 to 2.54)	2.00 (1.14 to 3.51)	2.15 (0.90 to 5.17)
2+	0.93 (0.06 to 13.53)	3.45 (1.74 to 6.83)	3.01 (1.12 to 8.06)	0.90 (0.25 to 3.22)

AOR = adjusted odds ratio; CI = confidence interval; W1 = Wave 1.

Table 2. Associations Between Coupon Receipt, Online Engagement, and Past 30-Day Tobacco Product Use

	Wave 2 past 30 days				
	Cigarette use	E-cigarette use	Cigar use	Smokeless tobacco use	Hookah use
	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)
Overall (N = 10 081)					
Received coupons					
No	Ref.	Ref.	Ref.	Ref.	Ref.
Only at one wave	1.97 (1.49 to 2.60)	1.96 (1.46 to 2.62)	1.65 (1.08 to 2.51)	2.78 (1.67 to 4.64)	2.08 (1.34 to 3.24)
At both waves	3.33 (1.92 to 5.79)	2.16 (1.11 to 4.20)	2.21 (0.87 to 5.63)	5.00 (1.67 to 14.99)	4.68 (2.45 to 8.96)
Online engagement					
0	Ref.	Ref.	Ref.	Ref.	Ref.
1	2.12 (1.55 to 2.89)	1.58 (1.12 to 2.23)	2.67 (1.68 to 4.22)	1.90 (0.89 to 4.06)	2.74 (1.71 to 4.40)
2+	2.66 (1.71 to 4.12)	2.38 (1.37 to 4.14)	3.27 (1.76 to 6.06)	2.73 (1.21 to 6.14)	3.46 (1.59 to 7.51)
Noncurrent users at Wave 1 (n = 8993)					
Received coupons					
No	Ref.	Ref.	Ref.	Ref.	Ref.
Only at one wave	1.39 (0.87 to 2.23)	1.56 (1.00 to 2.44)	1.24 (0.60 to 2.58)	3.11 (1.56 to 6.20)	2.63 (1.50 to 4.63)
At both waves	2.24 (0.96 to 5.25)	1.05 (0.27 to 4.04)	4.55 (1.54 to 13.46)	7.63 (1.22 to 47.64)	6.27 (2.63 to 14.93)
Online engagement					
0	Ref.	Ref.	Ref.	Ref.	Ref.
1	1.94 (1.19 to 3.14)	1.48 (0.98 to 2.24)	2.65 (1.34 to 5.22)	2.02 (0.77 to 5.31)	2.73 (1.49 to 5.00)
2+	2.60 (1.39 to 4.84)	2.56 (1.23 to 5.33)	1.66 (0.46 to 5.97)	1.78 (0.37 to 8.64)	1.59 (0.43 to 5.97)
Current users at Wave 1 (n = 873)					
Received coupons					
No	Ref.	Ref.	Ref.	Ref.	Ref.
Only at one wave	2.17 (1.29 to 3.65)	1.92 (1.13 to 3.26)	1.50 (0.84 to 2.67)	2.12 (0.93 to 4.84)	1.12 (0.47 to 2.65)
At both waves	3.92 (0.91 to 16.85)	2.22 (0.66 to 7.55)	0.66 (0.09 to 4.97)	2.43 (0.56 to 10.59)	3.08 (0.74 to 12.82)
Online engagement					
0	Ref.	Ref.	Ref.	Ref.	Ref.
1	1.99 (1.24 to 3.18)	1.36 (0.82 to 2.27)	2.13 (1.10 to 4.13)	1.29 (0.50 to 3.33)	2.17 (0.80 to 5.85)
2+	0.84 (0.41 to 1.73)	1.02 (0.43 to 2.42)	1.85 (0.77 to 4.47)	1.32 (0.45 to 3.87)	3.04 (1.13 to 8.15)

Also adjusted for gender, race and ethnicity, grade, parent education, and living with tobacco users. AOR = adjusted odds ratio; CI = confidence interval.

current cigarette and e-cigarette use. Engagement with one form of online tobacco marketing was associated with higher odds of cigarette, cigar, and hookah use among Wave 1 *nonusers* and similarly with higher odds of cigarette and cigar use among Wave 1 tobacco users. In addition, online engagement with 2+ forms was associated with *current* cigarette and e-cigarette use among Wave 1 *nonusers* but only with hookah use among Wave 1 tobacco users.

Discussion

We found that about one in 10 US youth received tobacco coupons, and similarly about one in 10 US youth engaged with online tobacco marketing, as shown in previous studies.^{7,9} We also found that, among youth at risk for tobacco use initiation and progression, online tobacco marketing engagement predicted subsequent coupon receipt. Furthermore, at-risk youth who received tobacco coupons were likely to subsequently receive coupons. This may be because many of the coupons have unique identifiers so that tobacco companies can send additional coupons if redeemed.¹⁹ However, the MSA and the FSPTCA prohibit marketing to youth,^{4,5} and major tobacco companies whose products are popular among adolescent smokers also claim that they do not send coupons to anyone younger than 21 years.²⁰ As our findings were independent of living with tobacco users, they suggest that tobacco industry self-regulation fails to protect youth from exposure to tobacco marketing. Youth engagement with direct-to-consumer tobacco marketing appears to violate existing youth marketing restrictions and indicates a failure of enforcement of these regulations.

Previous studies only examined effects of these marketing activities on overall tobacco use.^{7,9} We found that coupon receipt and online marketing engagement were both independently associated with cigarette, e-cigarette, cigar, smokeless tobacco, and hookah use. In addition, we observed a dose-response relationship between exposure to these tobacco marketing activities and tobacco product use, which provides further evidence for causal inference.²¹ The patterns were less consistent when we stratify the analyses between noncurrent and current users at Wave 1, probably due to the low prevalence of tobacco use and exposure to these marketing activities, resulting in insufficient statistical power. Nonetheless, our findings indicate the potential impact of youth exposure to direct-to-consumer tobacco marketing on the use of tobacco products.²²

Our study has limitations. First, measures were self-reported and were subject to recall errors. Second, the PATH Study did not assess the products being promoted in tobacco coupons received or in online marketing activities, preventing us from conducting product-specific analyses. Third, attrition in longitudinal studies can introduce bias in the associations we estimated. However, the weighting process accounts for nonresponse and should minimize such bias. Fourth, one of the online engagement items assessed exposure to online articles and/or videos about tobacco products. It is possible that not all these articles and/or videos were directly from the tobacco industry. Finally, due to the skewed distribution, we were unable to examine the incremental effect of online engagement on subsequent tobacco use.

Conclusion

Despite the MSA and the FSPTCA,^{4,5} many US youth are repeatedly exposed to tobacco direct-to-consumer tobacco marketing, either within or across media, and this exposure is robustly associated with cigarette and smokeless tobacco use. Furthermore, MSA- and FSPTCA-related marketing restrictions do not currently apply to cigars, e-cigarettes, and hookah. These regulations need to be expanded and more robustly enforced to protect youth. Potential policy interventions include prohibiting the redemption of tobacco discount coupons at the point of sale, strengthening age verification on tobacco company Web sites for all tobacco products (including e-cigarettes), and increasing enforcement of violations of youth access provisions online.

Supplementary Material

Supplementary data are available at *Nicotine and Tobacco Research* online.

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Declaration of Interests

None declared.

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