Tobacco Product Access Scenarios Influence Hypothetical Use Behaviors

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Objective: In this paper, we characterize how potential policies restricting access to tobacco products may impact use behaviors among adult, past 30-day, smokers and e-cigarette users. **Methods:** We conducted an online experiment with 820 smokers, e-cigarette users, and dual users (April 27-June 8, 2020). We randomized participants to one of 4 hypothetical access scenarios: (1) tobacco retail stores open + pharmacies open (TOPO); (2) tobacco stores open but favorite brand unavailable + pharmacies open (TOPO-NFB); (3) tobacco stores closed + pharmacies open (TCPO); and (4) tobacco stores closed + pharmacies closed (TCPC). Outcomes (measured on 0-100 visual analog scales) included the likelihood of quitting, reducing, switching brands or products, and finding another source of tobacco products. Seemingly unrelated regressions tested for associations between access scenarios and prospective tobacco use behaviors. **Results:** Participants in the TCPO and TOPO-NFB scenarios were more likely to reduce use, switch brands/products, and find another source (p*s* < .001) than those in the TOPO scenario. Dual and flavored product users were more likely to switch products (p*s* < .01). **Conclusions:** When tobacco retailers are closed, tobacco users may be more likely to quit and/or reduce use compared to when retailers are open. However, access restrictions could prompt users to switch tobacco brands/products or sources.

Key words: dual users; ENDS; cigarettes; policy; tobacco regulation
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Reducing tobacco use has been a major priority of governments worldwide and previous efforts towards this end have focused on taxing tobacco products, enforcing "smoke-free" workplace policies, and curbing marketing practices for tobacco products.[1] However, a relatively new approach has focused on the role that access to tobacco products might play in driving tobacco use. Influenced by prior research demonstrating that access to alcohol is an important independent risk factor for alcohol use and related health outcomes,[2] in 2007, the Institute of Medicine called on governments to "develop and, if feasible, implement and evaluate legal mechanisms for restructuring retail tobacco sales and restricting the number of tobacco outlets."[3] Conceptually, this approach relies on the idea that by limiting access to tobacco products, the additional effort and time needed to acquire those products are costs that effectively raise their price (ie, search/time costs).[4] Given that smokers have previously been shown to be price sensitive,[5-7] this is a compelling regulatory approach. Others have

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suggested that restricting access to tobacco products might deter tobacco use by "denormalizing" smoking,[8] reducing opportunities for product advertisement,[9] and reducing market competition, thereby driving tobacco prices upward.[10]

In the United States (US), tobacco products are available for purchase in approximately 380,000 physical locations including tobacco shops, convenience stores, grocery stores, and some pharmacies.[11] In addition to brick-and-mortar shops, online sales of tobacco products constitute a considerable and growing share of the tobacco market (an estimated 28% of electronic cigarette [e-cigarette] sales occur online[12] and the number of Internet Cigarette Vendors (IVC) has risen sharply over recent years).[13] Understanding if access to physical tobacco retailers and pharmacies (that can dispense tobacco cessation treatments and sell tobacco products [in some areas]), influences tobacco use behaviors is thus important for informing policies regarding the number, distribution, and types of establishments in which tobacco products can be obtained.

The high degree of heterogeneity in local tobacco policies provides insights on the influence of access to tobacco products on use patterns. Studies conducted in the US have previously reported that tobacco retailer density (TRD) is associated with individual smoking behaviors (eg, smoking initiation/experimentation, increased use) among adults[14,15] and youth.[16,17] Similarly, proximity to a tobacco retailer might be associated with fewer smoking cessation attempts and a lower quit attempt success rate.[18,19] For example, a longitudinal study concluded that adult men who were moderate/heavy smokers living within 0.5 kilometers of a tobacco retailer had a 27% lower likelihood of quitting smoking compared to those living more than 0.5 kilometer away.[18] As of 2020, 38 states in the US have taken action, at-least partly based on this body of evidence, to implement tobacco retailer licensing laws and zoning practices.[20] However, other evidence indicates that the effect of TRD on smoking behavior may not extend beyond experimentation with tobacco products (eg, may not predict continued use) and that TRD's influence on smoking behaviors might be eliminated once accounting for variables such as local cigarette prices[21] or neighborhood-level factors (eg, socioeconomic status of residents).[22]

Another approach to limiting access to tobacco products has been to restrict the sale of particular tobacco products, rather than levying restrictions on the retailers themselves. For example, in 2017 the Canadian province of Ontario banned the sale of menthol flavored tobacco products (including cigarettes).[23] Ontario's menthol ban was associated with significant reductions in the sales of menthol cigarettes and total cigarettes.[24] Furthermore, 30% of menthol smokers made quit attempts after the ban went into place, which exceeded the proportion that reported planning to quit prior to implementation of the ban.[25] Pre-ban menthol smokers, however, were more likely to have adopted use of other tobacco products and nonmenthol flavored tobacco products after implementation of the ban than nonmenthol smokers.[26] This movement from use of menthol cigarettes to other forms of tobacco suggests that bans on specific products or classes of products might have unintended consequences, including causing users affected by a ban to substitute with other forms of tobacco.[26-28] Similarly, an online survey of young adult tobacco users in San Francisco found that after a ban on the sale of flavored tobacco products was introduced in 2019, flavored tobacco use fell from 81% to 69% among 18-24-year-olds and from 85% to 76% among 25-34-year-olds. However, overall cigarette smoking in these groups had increased, again suggesting that access restrictions may have negative spillover effects.[29] To date, over 270 localities in the US have enacted flavored tobacco bans, including California, Massachusetts, and New York,[30] and more are considering such action. This regulatory activity may limit the viability of brands that manufacture flavored tobacco products, even in markets where sales of such products are legal.

Related to policies which restrict access to flavored tobacco products, US Food and Drug Administration (FDA) rulemaking on Premarket Tobacco Product Applications (PMTA) requires that brands that sell e-cigarette products submit evidence that their product "is appropriate for the protection of public health"[31] or be removed from the market. In January 2021, the FDA sent letters to 10 e-cigarette liquid manufacturers informing them that they were in violation of these rules, prompting these brands either to remove their products from the market or face legal action.[32] The consequences of such action on tobacco use behaviors remains unknown.

In sum, evidence indicates that restricting access to tobacco products may reduce smoking initiation, improve the success of quit attempts, and curtail the use of particular products (eg, mentholated cigarettes) but thus far, has been limited by wide variations in the methods (eg, examining sales data vs surveys of self-reported tobacco use), populations (eg, youth vs adults, Canada vs US), local tobacco policy, and retailer adherence to interventions.[17] Furthermore, the current tobacco access and availability literature has focused heavily on cigarette smokers, with comparably less study of how e-cigarette user behaviors,[33-37] as well as those of dual users of cigarettes and e-cigarettes, might change in response to access restrictions. Similarly, there has been less emphasis on how access restrictions may inadvertently influence tobacco users to switch the tobacco brands, products, and sources of tobacco products (eg, physical retailers, friends/family, online, etc.) they rely upon,[26-28,38] all of which potentially undermine the goals of policies that restrict access to tobacco. Predicting and comparing the responses of smokers, e-cigarette users, and dual users to potential policies that may restrict access to tobacco products will aid policymakers in selecting efficacious strategies for tobacco control that minimize unintended consequences.

To address these limitations and evaluate the promises and pitfalls of alternative regulatory policies related to tobacco access and availability, 4 generalized hypothetical tobacco access scenarios were constructed for an online experiment. Current smokers and e-cigarette users were randomly assigned to one of those scenarios. Then, respondents were asked how likely they were to adopt 7 prospective tobacco use behaviors (quit all use, reduce use, maintain a similar level of use, increase use, switch brands, switch products, find another source). We were particularly interested in the behaviors of those who use cigarettes and/or e-cigarettes because of the popularity of those products and the fact that they are often perceived as substitutes (thus, restrictions on one product might increase demand for the other).[39-41]

Our 4 access scenarios represented generalized regulatory alternatives: an environment in which both tobacco retailers and pharmacies are open, one in which both tobacco retailers and pharmacies are closed, another in which tobacco retailers are closed but pharmacies remain open, and one in which tobacco retailers and pharmacies are both open but a user can no longer access their favorite brand. These scenarios allowed us to characterize how access to retailers might affect tobacco use frequency and switching behaviors, as well as understand if access to pharmacies (and smoking cessation therapy [SCT]) mitigates behavior changes due to regulating retail access. Results could also inform regulators regarding whether more targeted approaches, like those that affect access to particular brands (eg, PMTA rules or "flavor bans"), influence use behaviors.

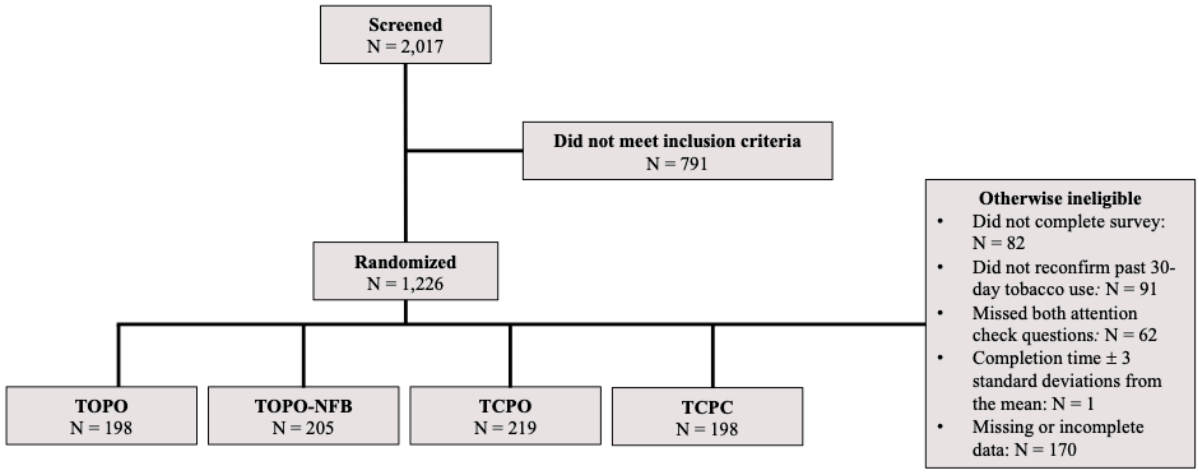
Through random assignment to generalized hypothetical tobacco access scenarios, this study design accounts for confounding variables, such as tobacco prices/taxes, local attitudes and tobacco use patterns, and retailer adherence to interventions, that have limited previous naturalistic evaluations of tobacco access restrictions. This approach may help to clarify the effect of tobacco product access on several tobacco use behaviors of interest (eg, use frequency, substitution, product seeking). In addition, by capturing a broader spectrum of potential tobacco use behaviors, results from this study may anticipate unintended consequences of policies aimed at restricting access to tobacco products.

METHODS

Recruitment and Inclusion Criteria

To predict how past 30-day adult smokers, e-cigarette users, and dual users might alter their tobacco use behaviors in response to restricted access to tobacco/nicotine products, retailers, and SCT, we conducted an online survey with an embedded experiment using Amazon's Mechanical Turk (MTurk). Participants were recruited from April 27 to June 8, 2020. To be eligible for the screening survey, respondents had to have an MTurk account registered in the US, be aged 18 or older, have completed 100 prior MTurk assignments, and held an MTurk approval rating of at least 90%. Among the 2017 individuals initially screened, 1226 reported past 30-day use of cigarettes and/or e-cigarettes and were deemed eligible for the survey. Respondents who did not submit the final page of the survey (N = 82), did not reconfirm past 30-day use of cigarettes or e-cigarettes (N = 91), missed both attention-check questions (N = 62), or had a completion

Figure 1
Participant Inclusion and Exclusion Flow Diagram



Note.
TOPO = Tobacco retail stores open + Pharmacies open, TCPC = Tobacco retail stores closed + Pharmacies closed, TCPO = Tobacco retail stores closed + Pharmacies open, TOPO-NFB = Tobacco retail stores open but favorite brand unavailable + Pharmacies open

time ±3 standard deviations from the mean (N = 1) were excluded from present analyses. A total of 236 observations were dropped by this data cleaning procedure. After accounting for observations with missing data for variables included in our regression models (N = 170), the final analytic data set was comprised of 820 unique observations.

The main results of this paper were not sensitive to this data cleaning procedure, demonstrating robust results between the analytic (N = 820) and total (N = 1226) samples. Those observations that were included in the analytic data set (N = 820) tended to be older and were less likely to be exclusive e-cigarette users than those observations that were excluded for missing data (N = 170), per chi-square tests (p*s* < .05).

Access Scenarios

Participants deemed eligible for the survey were randomized to one of 4 hypothetical tobacco/nicotine product access scenarios via a Qualtrics random link generator. Each of the 4 links directed participants to separate versions of the survey that differed only by the access scenario described. In this portion of the survey, participants were asked to imagine that they lived in a state where one of the following 4 tobacco/nicotine product access scenarios was in effect: (1) tobacco retail stores are open + pharmacies with SCT are open (TOPO; N = 198); (2) tobacco retail stores are open but their favorite brand is unavailable + pharmacies are open (TOPO-NFB; N = 205); (3) tobacco retail stores are closed + pharmacies are open (TCPO; N = 219); and (4) tobacco retail stores are closed + pharmacies are closed (TCPC; N = 198). Respondents were instructed to assume that the access scenario to which they were assigned was in effect for at least the next 3 months, but that online sources of all tobacco products were still available. Tobacco retail stores were further defined as "[physical places] where you obtain your tobacco products including convenience stores, tobacco outlets, vape/e-cigarette shops." Pharmacies were defined as "[physical places] where you can access nicotine replacement therapy/tobacco cessation medications." SCT was then explicitly defined to include nicotine replacement therapy (eg, gum, patches, nasal spray, inhalers) and non-nicotine containing tobacco cessation treatments including varenicline and bupropion

"or any other prescription medication taken for the purpose of aiding in smoking cessation."

Prospective Tobacco Use Behaviors And Outcome Measures

The primary outcomes of interest were the likelihood that participants would adopt the following prospective tobacco use behaviors under their assigned access scenario: (1) quit all tobacco/nicotine product use; (2) reduce tobacco/nicotine product use; (3) maintain a similar level of tobacco/nicotine product use; (4) increase tobacco/nicotine product use; (5) switch the tobacco/nicotine brands they use (eg, Marlboro to Camel, JUUL to SMOK); (6) switch the tobacco/nicotine products they use (eg, cigarettes to e-cigarettes); and (7) find another source for their tobacco/nicotine products (eg, friend, Internet, mail-order). Each of these outcomes was assessed using a visual analog scale (VAS), rated from 0 "Not at all likely" to 100 "Extremely likely." Because the VAS was constructed from 0-100, these outcomes are interpreted as the percentage point likelihood that the respondent would adopt that behavior under their assigned access scenario.

Covariates

Respondents reported their sex, age, educational attainment, income, race/ethnicity, whether they use flavored tobacco products (menthol cigarettes or flavored e-cigarette liquids), the average amount of money they spent on tobacco/nicotine products per week over the last 30 days, ever use of tobacco/nicotine products other than cigarettes or e-cigarettes, whether or not they were seriously considering quitting their tobacco product(s) in the next 6 months, and whether or not they were daily users of their tobacco product(s). Respondents were classified as "exclusive smokers" if they reported past 30-day use of cigarettes only, "exclusive e-cigarette users" if they reported past 30-day use of e-cigarettes only, or "dual users" if they reported past 30-day use of both products. For dual users, daily use was defined as daily use of cigarettes and/or e-cigarettes.

Data Analysis

We used bivariate analyses (chi-squares and ANOVAs with *post hoc* Tukey's Honestly Significant Differences [HSD] tests) to examine unadjusted differences among the 4 access scenarios and the likelihood of adopting each of the 7 prospective tobacco use behaviors, demographics, and tobacco product use/purchasing characteristics. Because responses to outcomes were believed to be related to one another, adjusted associations between the 4 tobacco/nicotine product access scenarios and the 7 prospective tobacco use behaviors were assessed using Zellner's seemingly unrelated regressions (SUR).[42] This method allows for covariance between the error terms by jointly estimating a system of 7 linear regressions (one for each outcome) with a generalized least squares estimator. The SUR method is more efficient than estimating equations separately when the error terms are correlated.[42] The hypothesis that the error terms were independent was rejected based on a Breusch-Pagan test ($p < .05$), confirming the appropriateness of using SUR. This regression approach also allows for joint chi-square tests of significance for covariate coefficients across each outcome to assess whether covariates of interest were jointly associated across all 7 prospective tobacco use behavior outcomes. These joint postestimation tests were performed on each of the access scenarios, whether or not the respondent used flavored tobacco products, whether the respondent was seriously considering quitting tobacco use in the next 6 months, and tobacco use group (exclusive smokers, exclusive e-cigarette user, dual user). Regression analyses were adjusted for demographics and tobacco use/purchasing characteristics. Main findings were not sensitive to analyzing the data as independent linear regressions or to considering findings as logistic regressions (with VAS outcome scores ≥ 51 converted to 1*s* and scores from 0-50 converted to 0*s*). Survey results were analyzed using the statistical analysis software Stata/IC 16, and significance levels were set at the 5% threshold for 2-sided tests.

RESULTS

Sample Characteristics

Among the final analytic sample of 820 respondents, the majority (80.4%) identified as "White or Caucasian" and male (56.1%), and 44.0% respondents were in the 25-34-year-old age group (Table 1). With respect to the tobacco use and purchasing characteristics of our sample, 483 (58.9%) were

Table 1
Sample Characteristics and Unadjusted Differences in Sample Characteristics by Access Scenario

	Overall	TOPO[a]	TOPO-NFB[b]	TCPO[c]	TCPC[d]	p-value
N	820	198	205	219	198	
Experimental outcomes,[e] Mean (SD)						
Quit	45.7 (32.9)	37.3 (31.2)	40.8 (31.1)	51.0 (33.9)	53.1 (32.7)	< .001
Reduce	57.7 (31.4)	42.1 (31.3)	56.1 (29.3)	65.2 (30.2)	66.7 (28.6)	< .001
Maintain a similar level of use	50.5 (30.4)	66.1 (26.3)	53.5 (28.6)	42.2 (30.5)	40.8 (29.3)	< .001
Increase	26.5 (26.1)	33.0 (27.5)	25.8 (24.8)	24.2 (25.3)	23.4 (26.0)	< .001
Switch brands	41.8 (30.9)	29.2 (27.6)	57.0 (29.1)	38.4 (30.5)	42.3 (29.6)	< .001
Switch products	38.0 (30.0)	28.6 (27.7)	42.0 (30.2)	39.0 (30.1)	42.1 (29.9)	< .001
Find another source	50.1 (31.7)	31.8 (29.8)	57.4 (29.0)	51.7 (32.0)	59.0 (28.8)	< .001
Tobacco Use Group, N (%)						.805
Exclusive smoker	254 (31.0%)	66 (33.3%)	63 (30.7%)	69 (31.5%)	56 (28.8%)	
Exclusive e-cigarette user	83 (10.1%)	24 (12.1%)	20 (9.8%)	19 (8.7%)	20 (10.1%)	
Dual user	483 (58.9%)	108 (54.6%)	122 (59.5%)	131 (59.8%)	122 (61.6%)	
Age (years), N (%)						.894
18-24	72 (8.8%)	19 (9.6%)	22 (10.7%)	16 (7.3%)	15 (7.6%)	
25-34	361 (44.0%)	87 (43.9%)	89 (43.4%)	101 (46.1%)	84 (42.4%)	
35-54	333 (40.6%)	78 (39.4%)	82 (40.0%)	85 (38.8%)	85 (38.8%)	
55+	54 (6.6%)	14 (7.1%)	12 (5.9%)	17 (7.8%)	11 (5.6%)	
Race/Ethnicity, N (%)						.111
White or Caucasian	659 (80.4%)	157 (79.3%)	156 (76.1%)	187 (85.4%)	159 (80.3%)	
Non-white/Non-Caucasian[f]	161 (19.6%)	41 (20.7%)	49 (23.9%)	32 (14.61%)	39 (19.7%)	
Gender, N (%)						.314
Female	360 (43.9%)	86 (43.4%)	86 (42.0%)	90 (41.1%)	98 (49.5%)	
Male	460 (56.1%)	112 (56.6%)	119 (58.1%)	129 (58.9%)	100 (50.5%)	
Educational attainment, N (%)						.295
Some college (no degree) or lower	375 (45.7%)	94 (47.5%)	82 (40.0%)	103 (47.0%)	96 (48.5%)	
Bachelor's degree or higher	445 (54.3%)	104 (52.5%)	123 (60.0%)	116 (53.0%)	102 (51.5%)	
Income, N (%)						.288
$0-$24,999	134 (16.3%)	31 (15.7%)	40 (19.5%)	25 (11.4%)	38 (19.2%)	
$25,000-$49,999	286 (34.9%)	73 (36.9%)	69 (33.7%)	77 (35.2%)	67 (33.8%)	
$50,000-$99,999	306 (37.3%)	76 (38.4%)	69 (33.7%)	86 (29.3%)	75 (37.9%)	
$100,000+	94 (11.5%)	18 (9.1%)	27 (13.2%)	31 (14.2%)	18 (9.1%)	

(continued on next page)

dual users, 254 (31.0%) were exclusive smokers, and 83 (10.1%) were exclusive e-cigarette users. A majority (68.2%) of our sample used flavored tobacco products (menthol cigarettes or flavored e-cigarette liquids) and endorsed ever use of tobacco products other than cigarettes or e-cigarettes (88.8%). In terms of daily user status, 64.8% of respondents reported using either cigarettes or e-cigarettes on a daily basis. Chi-squares did not reveal statistically significant differences in any of

Table 1 (*continued*)
Sample Characteristics and Unadjusted Differences in Sample Characteristics by Access Scenario

	Overall	TOPO[a]	TOPO-NFB[b]	TCPO[c]	TCPC[d]	p-value
Use of flavored tobacco products, N (%)						.762
No	261 (31.8%)	64 (32.3%)	67 (32.7%)	73 (33.3%)	57 (28.8%)	
Yes	559 (68.2%)	134 (67.7%)	138 (67.3%)	146 (66.7%)	141 (71.2%)	
Ever use of other tobacco products,[g] N (%)						.264
No	92 (11.2%)	28 (14.4%)	17 (8.3%)	27 (12.3%)	20 (10.1%)	
Yes	728 (88.8%)	170 (85.9%)	188 (91.7%)	192 (87.7%)	178 (89.9%)	
Weekly spending on tobacco/ nicotine products (past 30-day), N (%)						.730
$0.00-$1.99	58 (7.1%)	9 (4.6%)	14 (6.8%)	17 (7.8%)	18 (9.1%)	
$2.00-$9.99	198 (24.2%)	49 (24.8%)	53 (25.9%)	47 (21.5%)	49 (24.8%)	
$10.00-$29.99	325 (39.6%)	83 (41.9%)	77 (37.6%)	94 (42.9%)	47 (21.5%)	
$30.00+	239 (29.2%)	57 (28.8%)	61 (29.8%)	61 (27.9%)	60 (30.3%)	
Seriously considering quitting tobacco products in next 6 months, N (%)						.667
No	257 (31.3%)	58 (29.3%)	60 (29.3%)	73 (33.3%)	66 (33.3%)	
Yes	563 (68.7%)	140 (70.7%)	145 (70.7%)	146 (66.7%)	132 (66.7%)	
Daily use of tobacco products, N (%)						.436
"Some day" user	289 (35.2%)	70 (35.4%)	63 (30.7%)	81 (37.0%)	75 (37.9%)	
"Every day" user	531 (64.8%)	128 (64.7%)	142 (69.3%)	138 (63.0%)	123 (62.1%)	

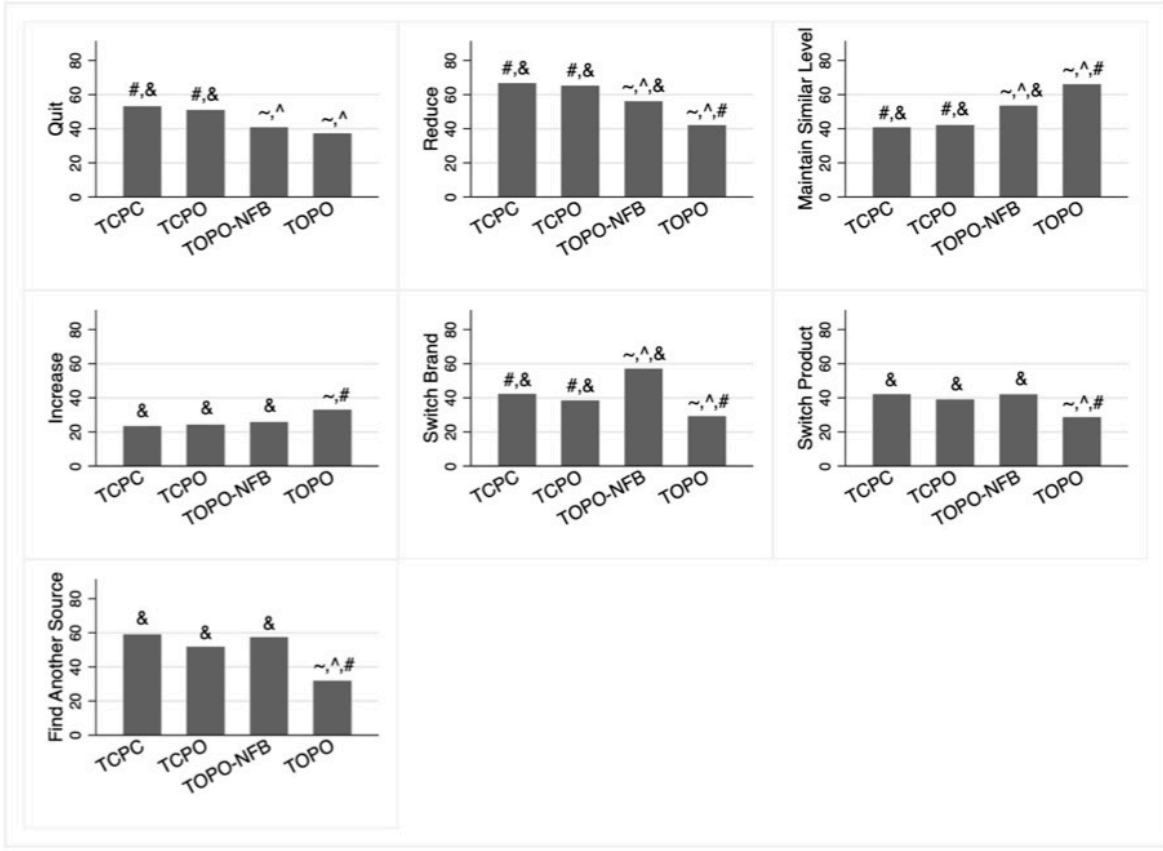
Note.
[a] Tobacco retail stores open + Pharmacies open
[b] Tobacco retail stores open but favorite brand unavailable + Pharmacies open
[c] Tobacco retail stores closed + Pharmacies open
[d] Tobacco retail stores closed + Pharmacies closed
[e] Values represent the Mean (SD) response on the Visual Analog Scale (VAS) item associated with that particular outcome (eg, Quit all tobacco use). Possible values on the VAS ranged from 0 "Not at all likely" to 100 "Extremely likely." Differences between access scenarios were assessed using ANOVAs.
[f] Includes African American/Black, Asian, American Indian or Alaska Native, Native Hawaiian or Other Pacific Islander, multi-racial, and "other"
[g] Includes traditional cigars, pipes, cigarillos/filtered cigars, chewing tobacco or dip/snus, hookah/shisha, nicotine

these measures between the randomly assigned access scenario groups (p*s* > .05).

Unadjusted Associations between Access Scenarios and Likelihood of Adopting Prospective Tobacco Use Behaviors

The means for each of the outcome measures, stratified by tobacco/nicotine product access scenario, are shown in Figure 2. For example, the mean (±Standard Deviation) VAS score for "quit all tobacco products" was 53.1±32.7 for participants in the TCPC scenario and 51.0±33.9 for participants in the TCPO scenario, compared to just 37.3±31.2 for those in the TOPO scenario

Figure 2
Mean VAS Values for Each Prospective Tobacco Use Behavior across Tobacco/Nicotine Product Access Scenarios



Note.
TOPO = Tobacco retail stores open + Pharmacies open, TCPC = Tobacco retail stores closed + Pharmacies closed, TCPO = Tobacco retail stores closed + Pharmacies open, TOPO-NFB = Tobacco retail stores open but favorite brand unavailable + Pharmacies open. Bar height represents the mean value participants in that access scenario reported on the Visual Analog Scale (VAS) item (0 "Not at all likely" to 100 "Extremely likely") corresponding to that particular prospective tobacco use behavior.
~ = Tukey's Honestly Significant Difference from TCPC scenario, p < .05
^ = Tukey's Honestly Significant Difference from TCPO scenario, p < .05
 # = Tukey's Honestly Significant Difference from TOPO-NFB scenario, p < .05
& = Tukey's Honestly Significant Difference from TOPO scenario, p < .05

(p*s* < .001; Table 1). Higher scores indicated a greater anticipated likelihood of quitting all tobacco product use.

ANOVAs assessing unadjusted associations between the randomly assigned access scenarios and mean responses for each of the prospective tobacco use behaviors suggested the presence of between-group differences in all 7 outcomes (p*s* < .001; Table 1). Tukey's HSD pairwise comparisons showed statistically significant differences between the TCPO and TOPO scenarios across all 7 outcomes, most notably with those in the TCPO scenario being more likely to report they would quit, reduce, switch brands, switch products, and find another source for their tobacco products (p*s* < .05; Supplementary Table 1). An identical pattern emerged when comparing the TCPC scenario to the TOPO scenario (p*s* < .05). Similarly,

Table 2
Adjusted Associations between the Likelihood of Adopting a Hypothetical Tobacco Use Behavior and Tobacco/Nicotine Product Access Scenario

	Quit	Reduce	Maintain a Similar Level of Use	Increase	Switch Brands	Switch Products	Find Another Source
N	820	820	820	820	820	820	820
Access Scenario			**Reference group: TOPO[a]**				
TCPC[b]	16.5 (10.8, 22.2)***	25.2 (19.7, 30.6)***	-26.1 (-31.6,-20.6)***	-9.5 (-14.2,-4.9)***	12.6 (6.9,18.3)***	12.6 (7.1,18.1)***	27.0 (21.1,32.8)***
TCPO[c]	14.7 (9.2, 20.3)***	23.9 (18.6, 29.2)***	-24.2 -29.6,-18.9)***	-7.9 (-12.4,-3.4)**	9.5 (3.9,15.1)**	10.6 (5.3,16.0)***	20.6 (14.9,26.3)***
TOPO-NFB[d]	3.5 (-2.2, 9.1)	13.8 (8.4, 19.2)***	-12.9 (-18.3,-7.5)***	-8.2 (-12.8,-3.5)**	26.5 (20.8,32.2)***	11.8 (6.3,17.2)***	25.5 (19.7,31.3)***
Tobacco Use Group			**Reference group: Dual users**				
Exclusive smokers	7.1 (2.3, 12.0)**	4.1 (-0.5, 8.7)	-4.1 (-8.7,0.6)	2.9 (-1.1,6.8)	-1.5 (-6.3,3.3)	-7.4 (-12.1,-2.8)**	-5.8 (-10.7,-0.9)*
Exclusive e-cigarette users	2.3 (-4.9, 9.5)	-2.5 (-9.4, 4.4)	-0.2 (-7.1,6.7)	-1.7 (-7.6,4.2)	-2.2 (-9.4,5.0)	-11.3 (-18.3,-4.4)**	6.4 (-0.9,13.8)
Age (years)			**Reference group: 18-24**				
25-34	2.6 (-4.8, 10.0)	0.2 (-6.9, 7.3)	1.9 (-5.2,9.1)	-0.4 (-6.5,5.6)	1.8 (-5.6,9.3)	6.5 (-0.6,13.7)	6.9 (-0.7,14.5)
35-54	0.9 (-6.8, 8.5)	0.5 (-6.9, 7.8)	4.2 (-3.1,11.6)	-5.3 (-11.5,1.0)	-0.5 (-8.1,7.2)	3.9 (-3.5,11.3)	5.7 (-2.2,13.5)
55+	-0.6 (-11.3, 10.2)	-0.2 (-10.5, 10.1)	1.7 (-8.7,12.0)	-10.3 (-19.1,-1.5)*	-3.9 (-14.6,6.9)	-6.6 (-17.0,3.8)	-1.2 (-12.2,9.8)
Race			**Reference group: White/Caucasian**				
Non-white/Non-Caucasian[e]	1.0 (-4.9, 6.2)	2.0 (-3.0, 7.1)	0.2 (-4.9,5.3)	5.4 (1.1,9.7)*	4.2 (-1.1,9.5)	5.1 (0.0,10.2)*	3.7 (-1.7,9.1)
Sex			**Reference: Female**				
Male	-0.7 (-4.9, 3.4)	-3.3 (-7.3, 0.6)	3.9 (-0.1,7.9)	5.1 (1.7,8.5)**	-0.3 (-4.5,3.9)	0.0 (-4.0,4.1)	2.0 (-2.2,6.3)
Education			**Reference: Some college (no degree) or less**				
Bachelor's degree or more	4.21 (-0.3, 8.7)	2.1 (-2.1, 6.4)	2.7 (-1.6,7.0)	9.6 (5.9,13.2)***	3.5 (-1.0,8.0)	6.3 (2.0,10.6)**	0.3 (-4.3,4.8)
Income			**Reference: $0-$24,999**				
$25,000-$49,999	-5.2 (-11.2, 0.8)	-2.0 (-4.0, 12.2)	-0.9 (-6.7,4.9)	-3.5 (-8.5,1.4)	-3.9 (-10.0,2.1)	-4.1 (-9.9,1.8)	-5.2 (-11.4,1.0)
$50,000-$99,999	-3.0 (-9.2, 3.2)	-0.1 (-8.1, 7.9)	-0.9 (-6.9,5.0)	-2.1 (-7.1,3)	-2.9 (-9.1,3.30)	-3.3 (-9.3,2.7)	-3.2 (-9.6,3.1)
$100,000+	-2.5 (-10.6, 5.5)	-1.3 (-10.0, 7.3)	-7.9 (-15.6,-0.2)*	-11.7 (-18.3,-5.2)***	-1.8 (-9.8,6.3)	-5.5 (-13.2,2.3)	-10.7 (-18.9,-2.5)*
Use flavored tobacco products	-0.2 (-5.0, 4.5)	-0.8 (-5.3, 3.7)	3.9 (-0.7,8.4)	6.2 (2.3,10.0)**	1.1 (-3.7,5.8)	5.2 (0.6,9.8)*	-2.4 (-7.2,2.5)
Ever use of other tobacco products[f]	-0.1 (-6.4, 6.3)	2.5 (-3.5, 8.6)	-4.6 (-10.7,1.5)	3.0 (-2.2,8.1)	6.7 (0.3,13.0)*	7.8 (1.6,13.9)*	-0.1 (-6.6,6.4)

(continued on next page)

compared to those in the TOPO scenario, those in the TOPO-NFB scenario were more likely to report they would reduce, switch brands, switch products, or find another source for their tobacco products (p*s* < .05), but no differences were seen in the quit outcome between groups (p > .05). Notably, those in the TCPO scenario were more likely to report that they would quit or reduce

Table 2 (*continued*)
Adjusted Associations between the Likelihood of Adopting a Hypothetical Tobacco Use Behavior and Tobacco/Nicotine Product Access Scenario

	Quit	Reduce	Maintain a Similar Level of Use	Increase	Switch Brands	Switch Products	Find Another Source
Weekly spending on tobacco/ nicotine products (past 30 days)	**Reference group: $0.00-$1.99**						
$2.00-$9.99	0.3 (-8.2, 8.9)	4.2 (-4.0, 12.3)	-5.6 (-13.8,2.6)	-0.2 (-7.2,6.8)	0.8 (-7.7,9.4)	4.2 (-4.1,12.5)	2.7 (-6.1,11.4)
$10.00-$29.99	-5.7 (-14.0, 2.7)	-0.1 (-8.1, 7.9)	-7.5 (-15.5,0.5)	-5.2 (-12.0,1.7)	-2.6 (-11.0,5.8)	2.5 (-5.6,10.6)	2.5 (-6.0,11.0)
$30.00+	-6.7 (-15.7, 2.2)	-1.3 (-10.0, 7.3)	-8.6 (-17.2,0.1)	-5.8 (-13.1,1.5)	-0.4 (-9.4,8.6)	2.2 (-6.5,10.9)	3.3 (-5.9,12.5)
Seriously considering quitting tobacco products in next 6 months[g]	23.9 (19.6, 28.3)***	20.5 (16.3, 24.7)***	-12.1 (-16.3,-7.9)***	2.6 (-0.9,6.2)	2.3 (-2.1,6.7)	6.7 (2.5,10.9)**	-1.9 (-6.3,2.6)
Daily use of tobacco products	-10.4 (-15.3, -5.5)***	-5.4 (-10.1, -0.7)*	5.8 (1.1,10.5)*	-2.6 (-6.6,1.4)	3.2 (-1.7,8.2)	1.2 (-3.6,5.9)	1.6 (-3.4,6.6)

*p < .05; **p < .01; ***p < .001

Note.
Estimates represent the results of adjusted Seemingly Unrelated Regressions (SUR).
[a] Tobacco retail stores open/Pharmacies open
[b] Tobacco retail stores closed/Pharmacies closed
[c] Tobacco retail stores closed/Pharmacies open
[d] Tobacco retail stores open but favorite brand unavailable/Pharmacies open
[e] Includes African American/Black, Asian, American Indian or Alaska Native, Native Hawaiian or Other Pacific Islander, multi-racial, and "other"
[f] Includes traditional cigars, pipes, cigarillos/filtered cigars, chewing tobacco or dip/snus, hookah/shisha, nicotine replacement products

their tobacco use, and less likely to maintain a similar level of use or switch brands, than those in the TOPO-NFB scenario (p*s* < .05).

Adjusted Associations between Tobacco/ Nicotine Access Scenarios and Likelihood of Adopting Prospective Tobacco Use Behaviors

Following adjustment for demographics, actual tobacco use, and purchasing characteristics, those in the TCPC and TCPO scenarios (vs. TOPO) were significantly more likely to report intentions to quit, reduce, switch brands, switch products, and find other sources of tobacco/nicotine products. Similarly, those in the TCPC and TCPO scenarios were significantly less likely to maintain a similar level of use or increase use than those in the TOPO scenario (p*s* < .001; Table 2). For example, those in the TCPC scenario were 16.5 *percentage points* more likely to "quit all tobacco use" than those in the TOPO scenario ($\hat{\beta}$ = 16.5, p < .001). Further, compared to the TOPO scenario, those in the TOPO-NFB scenario were more likely to respond that they would reduce, switch brands, switch products, and find another source for their tobacco products (p*s* < .001) and less likely to maintain a similar level of use (p < .001) or increase use (p < .01). There was no statistically significant difference between the TOPO and TOPO-NFB groups in regards to their likelihood of quitting (p > .05). Post-estimation chi-squares confirmed that the TCPC (χ^2 = 231.61, p < .001), TCPO (χ^2 = 177.21, p < .001), and TOPO-NFB (χ^2 = 198.72, p < .001) scenarios were each jointly significant when tested across the 7 prospective tobacco use behavior outcomes suggesting a consistent pattern of associations of these access scenarios across the behavioral outcomes assessed.

Exclusive smokers ($\hat{\beta}$ = -7.4, p < .01) and exclusive e-cigarette users ($\hat{\beta}$ = -11.3, p < .01) were less likely to indicate that they would switch products than dual users. Similarly, compared to dual users, exclusive smokers were more likely to report that they would quit ($\hat{\beta}$ = 7.1, p < .01) and less likely to find other sources for their tobacco/nicotine

products ($\hat{\beta}$ = -5.8, p < .05). Both exclusive smoker status (χ^2 = 35.29, p < .001) and exclusive e-cigarette user status (χ^2 = 26.71, p < .001) were jointly significant across the 7 prospective tobacco use behavior outcomes suggesting tobacco use group was associated with the likelihood of adopting many of the prospective behavior responses.

Those who used flavored tobacco products were more likely to respond that they would increase use ($\hat{\beta}$ = 6.2, p < .01), as well as switch products ($\hat{\beta}$ = 5.2, p < .05), than those who did not report use of flavored tobacco products. Use of flavored tobacco products was jointly significant across all 7 prospective tobacco use behaviors (χ^2 = 18.30, p < .05) suggesting use of flavored tobacco products was commonly associated with the behavioral outcomes examined.

Daily users of tobacco products were less likely to report that they would quit ($\hat{\beta}$ = -10.4, p < .001) and reduce ($\hat{\beta}$ = -5.4, p < .05) tobacco/nicotine product use compared to those who only used tobacco products on "some days." Daily users were also more likely to endorse that they would maintain their current level of use ($\hat{\beta}$ = 5.8, p < .05) than non-daily users. Daily user status was also jointly significant across all 7 prospective tobacco use behaviors (χ^2 = 23.91, p < .01).

Lastly, those who reported seriously considering quitting tobacco product use in the next 6 months were more likely to indicate they would quit ($\hat{\beta}$ = 23.9, p < .001), reduce ($\hat{\beta}$ = 20.5, p < .001), and switch products ($\hat{\beta}$ = 6.7, p < .01) compared to those who were not considering quitting in the next 6 months. This group was also less likely to report that they would maintain a similar level of use ($\hat{\beta}$ = -12.1, p < .001). Seriously considering quitting tobacco product use in the next 6 months was jointly significant across all 7 of the prospective tobacco use behavior outcomes (χ^2 = 134.66, p < .001). See Supplementary Table 2 for detailed information on the quit interests of daily dual users.

DISCUSSION

The results from this experiment provide evidence that access to tobacco products may significantly impact tobacco use behaviors among adult exclusive smokers, exclusive e-cigarette users, and dual users. However, our results also indicate that implementing policies that restrict access to tobacco retailers or a user's favorite brand may have unintended consequences including prompting affected users to switch the brands, products, and sources (eg, from physical retailers to friends, Internet, mail-order, etc) they use. Furthermore, these results suggest that the response of tobacco users to access restriction interventions is specific to a user's preferred class of tobacco product, flavor, degree of nicotine dependence, and stage of quitting. Finally, results indicate that loss of access to pharmacies and SCT does not appear to influence the impact of retailer availability on tobacco use behaviors.

These findings advance the existing literature by simultaneously characterizing how 3 potential tobacco access restriction polices – targeting tobacco retailers, pharmacies, and a user's favorite brand – may impact a broad set of prospective tobacco use behaviors independent of the unobserved confounding variables (eg, local attitudes regarding tobacco use, local non-retail related tobacco policies, retailer adherence to interventions, etc) that can hinder investigations conducted in a naturalistic setting. Importantly, our findings largely confirm what other investigators have found previously – that implementing access restrictions may nudge those already considering quitting to actually reduce their tobacco use (particularly less dependent users)[18,19,39,43,44] and that bans on specific products are generally effective in reducing use.[24,25,28,29] However, bans also may prompt affected users to seek out different tobacco products.[26-29,45] To our knowledge, however, these findings are extended for the first time to e-cigarette use behaviors and to dual users, constituting a novel contribution to the literature that merits validation and further investigation.

These findings have several important implications for regulatory policy. Of the 38 states with tobacco retail licensing laws, 20 do not include "electronic smoking devices" in their definitions of "tobacco products" and/or did not require a license to sell such devices.[20,46] The results of this study would suggest that an extension of licensing laws, paired with policies that regulate the number or distribution of licensed retailers, to cover the sale of e-cigarettes could be a useful strategy for deterring use of such products. Results reported here also suggest caution, as such action could prompt affected users to seek out other tobacco products

that are not covered by similar retailer licensing and regulation.

Additionally, in this experiment when tobacco retailers and pharmacies were open but a respondent's favorite brand was unavailable, we found that respondents were more likely to say they would reduce their overall level of tobacco use and less likely to maintain or increase use compared to when retailers, pharmacies, and their favorite brand were all available. The scenario we crafted could be thought of as analogous to implementing regulations that restrict the sale of flavored tobacco products, tobacco products without PMTA approval, or disposable e-cigarettes like "Puff Bar."[47] However, our results suggest that such an approach may not be as effective in reducing tobacco use or prompting quit attempts as policies that restrict access to tobacco retailers, potentially because affected users show a willingness to switch the brands and products they use.

Limitations

The results of this study should be considered alongside several important limitations. First, this study was designed to assess hypothetical tobacco use behaviors that tobacco users felt they would make under hypothetical access scenarios. Although the direction of the associations between tobacco access and tobacco use behaviors presented here may generalize outside of these hypothetical scenarios, we are unable to extrapolate these findings to ascertain the magnitude of the real-world response to access restrictions. Participants also faced no real-world consequences tied to their responses. The lack of material consequence for responses is in contrast to prior work utilizing discrete choice experiments[48,49] or virtual storefronts,[50,51] which often reward participants with the products they select during experiments. This work's focus was not amenable to such real-world reinforcement. Nevertheless, the methods described here provide a valid, yet, convenient framework for predicting and comparing the responses of tobacco users to hypothetical access restrictions to tobacco products.

Second, this study was conducted online and recruitment was exclusively from established users of MTurk, which raises questions about the generalizability of these findings. Comparing the demographic profile our sample to the nationally representative Population Assessment of Tobacco and Health (PATH) survey, this study's sample was determined to be largely similar,[52-54] but had a slightly higher proportion of white respondents, was slightly younger, and a larger share of respondents held college degrees. Thus, these results may be more applicable to younger tobacco users with higher levels of educational attainment.

Third, whereas the purpose of this work was to investigate use of tobacco and nicotine products, one should note that our question assessing past 30-day e-cigarette use did not explicitly ask respondents about past 30-day use of *nicotine-containing* e-cigarettes, nor was that a part of our pre-established inclusion criteria. The question read: "Have you used an e-cigarette in the past 30 days?" However, past 30-day e-cigarette users were subsequently asked about the nicotine concentration of their e-cigarettes and only 4 respondents reported "0 [mg/ml, mg, %]" and another 11 respondents entered non-numeric values.

Fourth, the present study included past 30-day tobacco users who were 18-20 years old, despite an increase in the US minimum age of purchase for tobacco products to age 21 in December 2019.[55] Understanding the responses of young tobacco users (18-20-year-olds) to access restrictions constitutes important information considering evidence that minimum age of sale laws are not completely effective in preventing underage retail access to tobacco products[56] and the fact that most adult tobacco users report starting their tobacco use as teenagers or young adults.[57]

Finally, past use of NRT may have influenced participant responses under the hypothetical regulatory scenarios. We conducted sensitivity analyses to determine if any of the prospective tobacco use behaviors investigated here differed by past ever-use of nicotine replacement therapy (NRT). Although approximately one-third (36.1%) of our sample had used NRT at some point in the past, within each access scenario, mean responses to each of the prospective tobacco use behaviors did not tend to differ by NRT use history, although those who reported past ever-use of NRT appeared less likely to increase use in 3 of the access scenarios (TCPO, TOPO-NFB, and TOPO) (Supplementary Tables 3 and 4). Main findings of adjusted regressions were not sensitive to controlling for ever-use of NRT.

Conclusion

Despite these limitations, the results reported here support the likelihood that access is an important determinant of tobacco use behaviors and that interventions limiting access to tobacco products have a role to play in the development of multipronged tobacco regulatory policy. These policies may be particularly helpful to those tobacco users with an established interest in quitting. Access restrictions also may push affected users toward substituting different types of tobacco products or seeking out tobacco from alternative sources. Before implementing any such policy, it would be prudent for regulators to prepare for this response.

Future research should build on our findings by examining how interventions restricting access to tobacco products can be implemented in ways that reduce potential unintended consequences. Additionally, future work could extend the methods described here to investigate other important regulatory questions surrounding access to tobacco products, including what impact access to e-cigarettes in pharmacies and/or reduced nicotine tobacco products might play. Finally, prior work has demonstrated that tobacco retailers are often concentrated in areas with higher proportions of African-American and Hispanic residents, as well as in communities with lower socioeconomic status.[5,58-62] Consequently, if ease of access to tobacco products is an important factor in tobacco use behaviors, then policies that restrict access to tobacco products might help address the significant racial-ethnic health disparities observed in tobacco-related disease.[63,64] Investigating how subpopulations may respond under different access scenarios is merited, as is consideration for how such regulation could be used to reduce health disparities.

IMPLICATIONS FOR TOBACCO REGULATION

Federal, state, and local regulators of tobacco product markets have implemented policies restricting access to all tobacco products (eg, minimum distance of retail outlets from schools), certain classes of products (eg, minimum age sale laws for e-cigarettes, Massachusetts' temporary ban on the sale of e-cigarettes in 2019) and the types of products available within a class (eg, flavor bans for menthol cigarettes and e-cigarettes). Effects of these regulatory strategies have been mixed though, likely due to variation in the populations, settings, and interventions studied. The current study contributes to tobacco regulatory science by predicting and comparing the responses of smokers, e-cigarette users, and dual users to hypothetical changes in a range of existing and potential policies that restrict access to tobacco products, offering insights into the promise and pitfalls of such strategies.

Human Subjects Approval Statement

This study was reviewed by the Virginia Commonwealth University's Institutional Review Board and was approved as exempt (HM20017207).

Conflict of Interest Disclosure Statement

All authors have contributed to the manuscript in a meaningful way, and all have read and approved the manuscript. The authors have no conflicts of interest to disclose.

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Supplementary Table 1
Tukey's Honestly Significant Difference (HSD) Test Results Comparing Means for the Likelihood of Adopting Prospective Tobacco Use Behaviors between Experimental Access Scenarios

Group vs Group	Difference in means	HSD[a] Test Statistic
Quit		
TCPC vs TCPO	2.15	0.95
TCPC vs TOPO-NFB	12.3	5.47*
TCPC vs TOPO	15.8	7.00*
TCPO vs TOPO-NFB	10.2	4.51*
TCPO vs TOPO	13.7	6.05*
TOPO-NFB vs TOPO	3.5	1.54
Reduce		
TCPC vs TCPO	1.5	0.72
TCPC vs TOPO-NFB	10.6	5.10*
TCPC vs TOPO	24.6	11.78*
TCPO vs TOPO-NFB	9.1	4.38*
TCPO vs TOPO	23.1	11.06*
TOPO-NFB vs TOPO	14.0	6.68*
Maintain a Similar Level of Use		
TCPC vs TCPO	1.4	0.68
TCPC vs TOPO-NFB	12.7	6.32*
TCPC vs TOPO	25.3	12.59*
TCPO vs TOPO-NFB	11.3	5.64*
TCPO vs TOPO	24.0	11.91*
TOPO-NFB vs TOPO	12.6	6.28*
Increase		
TCPC vs TCPO	0.8	0.47
TCPC vs TOPO-NFB	2.4	1.30
TCPC vs TOPO	9.6	5.28*
TCPO vs TOPO-NFB	1.5	0.84
TCPO vs TOPO	8.7	4.82*
TOPO-NFB vs TOPO	7.2	3.98*

(continued on next column)

Group vs Group	Difference in means	HSD[a] Test Statistic
Switch Brands		
TCPC vs TCPO	3.9	1.88
TCPC vs TOPO-NFB	14.8	7.21*
TCPC vs TOPO	13.1	6.39*
TCPO vs TOPO-NFB	18.6	9.10*
TCPO vs TOPO	9.2	4.51*
TOPO-NFB vs TOPO	27.8	13.61*
Switch Products		
TCPC vs TCPO	3.1	1.50
TCPC vs TOPO-NFB	0.1	0.03
TCPC vs TOPO	13.5	6.53*
TCPO vs TOPO-NFB	3.0	1.47
TCPO vs TOPO	10.4	5.03*
TOPO-NFB vs TOPO	13.4	6.51*
Find Another Source		
TCPC vs TCPO	7.3	3.48
TCPC vs TOPO-NFB	1.6	0.78
TCPC vs TOPO	27.2	13.00*
TCPO vs TOPO-NFB	5.7	2.70
TCPO vs TOPO	19.9	9.52*
TOPO-NFB vs TOPO	25.6	12.22*

Note.
TOPO = Tobacco retail stores open + Pharmacies open, TCPC = Tobacco retail stores closed + Pharmacies closed, TCPO = Tobacco retail stores closed + Pharmacies open, TOPO-NFB = Tobacco retail stores open but favorite brand unavailable + Pharmacies open.

[a] Tukey's Post-estimation Honestly Significant Difference Test (HSD)

*** Mean responses on Visual Analog Scale (VAS) items determined to be significantly different between scenarios at the 95% confidence level.**

Supplementary Table 2
Intentions to Quit Tobacco Use in the Next 6 Month among Daily Dual Users

	Daily Dual Users (N = 210)
Not seriously considering quitting either cigarettes or e-cigarettes in the next 6 months, N (%)	89 (30.69%)
Seriously considering quitting cigarette use in the next 6 months, N (%)	58 (20.00%)
Seriously considering quitting e-cigarette use in the next 6 months, N (%)	32 (11.03%)
Seriously considering quitting both cigarette and e-cigarette use in the next 6 months, N (%)	111 (38.28%)

Supplementary Table 3
Differences in Mean Value Reported for Each Prospective Tobacco Use Behavior by Ever Use of Nicotine Replacement Therapy

	TCPC[a] (N = 198)			TCPO[b] (N = 219)		
	Yes[c] (N = 79)	No[d] (N = 119)	p	Yes[c] (N = 77)	No[d] (N = 142)	p
Quit mean (SE)	54.4 (4.0)	52.3 (2.8)	.664	45.0 (4.2)	54.2 (2.7)	.056
Reduce mean (SE)	69.6 (3.3)	64.7 (2.6)	.238	66.1 (3.7)	64.7 (2.4)	.738
Maintain a Similar Level of Use mean (SE)	38.3 (3.3)	42.4 (2.7)	.336	30.3 (3.6)	43.2 (2.5)	.498
Increase mean (SE)	17.9 (2.5)	27.0 (2.5)	.156	16.4 (2.3)	28.5 (2.2)	.001
Switch Brands mean (SE)	42.1 (3.4)	42.4 (2.7)	.941	42.3 (2.9)	36.3 (2.4)	.163
Switch Products mean (SE)	40.5 (3.4)	43.2 (2.7)	.542	41.1 (3.7)	37.9 (2.4)	.447
Find Another Source mean (SE)	58.7 (3.4)	59.2 (2.5)	.908	56.1 (3.7)	49.4 (2.7)	.142

Note.
Means and standard errors were compared between those that reported ever use of nicotine replacement therapy and those that did not, for each tobacco use outcome and within assigned access scenarios, using t-tests.
[a] Tobacco retail stores closed + Pharmacies closed
[b] Tobacco retail stores closed + Pharmacies open
[c] Reported ever use of nicotine replacement products (eg, gum, patches, lozenges)
[d] Did not report ever use of nicotine replacement products (eg, gum, patches, lozenges)

Supplementary Table 4
Differences in Mean Value Reported for Each Prospective Tobacco Use Behavior by Ever Use of Nicotine Replacement Therapy

	TOPO-NFB[a] (N = 205)			TOPO[b] (N = 198)		
	Yes[c] (N = 80)	No[d] (N = 125)	p	Yes[c] (N = 60)	No[d] (N = 138)	p
Quit mean (SE)	36.1 (3.6)	43.8 (2.7)	.084	31.5 (3.8)	39.9 (2.7)	.081
Reduce mean (SE)	51.6 (3.6)	58.9 (2.4)	.079	39.2 (4.3)	43.4 (2.6)	.384
Maintain a Similar Level of Use mean (SE)	56.2 (3.3)	51.8 (2.5)	.283	64.5 (3.7)	66.8 (2.1)	.562
Increase mean (SE)	21.2 (2.5)	28.7 (2.3)	.033	22.9 (3.4)	37.4 (2.3)	.001
Switch Brands mean (SE)	61.4 (3.2)	54.2 (2.6)	.085	20.3 (3.2)	33.1 (2.4)	.003
Switch Products mean (SE)	44.2 (3.7)	40.7 (2.5)	.411	18.9 (2.9)	32.8 (2.4)	.001
Find Another Source mean (SE)	60.6 (3.4)	55.3 (2.5)	.201	27.9 (4.0)	33.5 (2.5)	.224

Note.
Means and standard errors were compared between those that reported ever use of nicotine replacement therapy and those that did not, for each tobacco use outcome and within assigned access scenarios, using t-tests.
[a] Tobacco retail stores open but favorite brand unavailable + Pharmacies open
[b] Tobacco retail stores open + Pharmacies open
[c] Reported ever use of nicotine replacement products (eg, gum, patches, lozenges)
[d] Did not report ever use of nicotine replacement products (eg, gum, patches, lozenges)