

Assurances of Voluntary Compliance: A Regulatory Mechanism to Reduce Youth Access to E-Cigarettes and Limit Retail Tobacco Marketing

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Objectives. To evaluate assurances of voluntary compliance (AVCs) between state attorneys general and retail chains by assessing e-cigarette sales to underage decoys and tobacco marketing violations in corporate-owned stores (that sign AVCs) and franchise stores (that do not sign AVCs).

Methods. Decoys 18 to 19 years of age attempted to purchase e-cigarettes without presenting ID in California convenience stores (n=540). Auditors characterized the presence and content of age-of-sale signage and advertising for tobacco products. Data were collected and analyzed in 2018.

Results. Corporate-owned stores were less likely than were franchise stores to violate ID requests (adjusted odds ratio [AOR]=0.29; 95% confidence interval [CI]=0.12, 0.71) and to sell e-cigarettes illegally (AOR=0.37; 95% CI=0.15, 0.88). Regardless of AVC category, advertising violations were common in stores (vaping products, 26.3%; other tobacco products, 74.3%).

Conclusions. The differences in violation rates found in corporate and franchise stores imply that AVCs could reduce youth access to e-cigarettes. However, merchant education and routine enforcement are needed to better leverage restrictions on retail tobacco marketing in AVCs.

Public Health Implications. Strengthening compliance with existing AVCs and establishing new agreements with retailers shown to be in violation through federal or state inspections could reduce youth access to e-cigarettes and exposure to tobacco marketing. (*Am J Public Health.* 2020;110:209–215. doi:10.2105/AJPH.2019.305436)

 See also Liber, p. 141.

Dramatic increases in the prevalence and frequency of vaping among US high school students present a significant obstacle to establishing the first generation free from nicotine addiction.¹ Vape products are sold widely in convenience stores, where at least 4.1 million US adolescents (aged 13–16 years) shop at least weekly.² According to 1 study, more youths aged 12 to 17 years who had used flavored JUUL pods in the preceding month reported obtaining these products from brick-and-mortar retailers (74%) than from social sources (52%) and Web sites (10%).³

In addition, the US Food and Drug Administration cited at least 1300 retailers for selling e-cigarettes to minors between June

and August 2018.⁴ In California, where the study described here was conducted, more retailers sold e-cigarettes (22.0%) than cigarettes (17.6%) to underage decoys (18–19 years of age) in 2018.⁵ Amid growing concern about regulating the retail environment for e-cigarettes, interventions are needed to improve compliance with youth access laws.

One regulatory option is to implement assurances of voluntary compliance (AVCs) with retail chains that sell tobacco. AVCs originate in state unfair competition laws and consumer protection laws. Selling an addictive product to a minor is characterized as an “unfair, deceptive, and/or unconscionable act” for which the corporate parent is held responsible.^{6(p109)} AVCs are legally binding agreements between states and corporate violators designed to alter organizational training, supervision, and point-of-sale practices.⁷

Best practices developed by attorneys general in consultation with retailers, researchers, and state tobacco control officials require AVC retail chains to (1) train employees on state and local laws and company policies prohibiting tobacco sales to minors, including explaining the health-related reasons for laws that restrict youth access to tobacco; (2) display additional age-of-sale warnings; and (3) check identification for tobacco purchases by customers who appear to be underage (depending on the AVC). Notably, all AVCs were established before e-cigarettes were regulated as tobacco products in California.^{7,8} Whether agreements created to remedy repeat violations of underage sales of cigarettes affect sales of e-cigarettes has not been studied.

AVCs cover 15 major retail chains (e.g., pharmacies, supermarkets, convenience stores, and discount department stores) in as many as 47 states.⁷ However, limited evidence about the effectiveness of AVCs exists.^{9,10} Using public data from Food and

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Drug Administration (FDA) inspections, Dai and Catley found that AVCs were associated with lower odds of tobacco sales to minors in supermarkets and convenience stores but not in pharmacies or gas stations.¹⁰ The authors suggested that heterogeneity in gas station ownership (e.g., corporate entities vs franchisees) made it more difficult to detect the effects of AVCs on sales-to-minor violations. Because inspection protocols vary from state to state, research with a uniform protocol is needed to examine AVCs within chains rather than between states. As a means of filling these important gaps, we used a standard protocol to compare corporate and franchise stores in the same retail chains.

As binding agreements between parties rather than statutes or regulations, AVCs can restrict the location and content of advertising without being subject to First Amendment challenges. For example, AVCs limit the content of tobacco advertising to brand name, logo, and price and restrict placement of tobacco advertising and products to the primary display area (typically behind the counter); also, some AVCs prohibit exterior advertising for tobacco at stores near schools and playgrounds. Unfortunately, compliance with AVC marketing provisions has not been evaluated. Such research is important because retail tobacco marketing involves strategies that appeal to young people.^{11,12} In addition, greater exposure to retail tobacco marketing near schools is associated with higher odds of vaping and other tobacco use by students.^{13,14}

To the best of our knowledge, the current study is the first to examine AVC compliance for sales of e-cigarettes to underage decoys and restrictions on tobacco marketing, including vaping products. Convenience stores (with or without gas stations) are the focus of this research because they are the most common type of tobacco retailer and the most common retail source from which US adolescents (15–17 years of age) purchase e-cigarettes.^{15,16} Among convenience store chains with AVCs that operate in California, these agreements bind the corporate-owned stores and, to a lesser extent, the franchise stores.¹⁷ Franchisees never sign the AVCs, possibly limiting the agreements at locations where there is less corporate control. Therefore, we hypothesized that there would be greater compliance (lower odds of violation) among corporate-owned stores (hereafter

AVC–corporate) than franchise–operated stores (AVC–franchise).

METHODS

Data were collected in northern California (San Francisco Bay area), the Central Valley (Sacramento, Fresno, and Merced areas), and southern California (greater Los Angeles and San Diego areas) between January and March 2018, approximately 18 months after the state increased the minimum legal sales age for tobacco to 21 years. Senate Bill 7 (2016) removed the provision in California Penal Code section 308(b) making it a crime for a person younger than 18 years to purchase, receive, or possess certain tobacco products.

Sample

We obtained a list of licensed tobacco retailers maintained by the California Department of Tax and Fee Administration in December 2017. Using a search string that included multiple spelling variants,⁹ we identified all records for a subset of 4 convenience store chains with AVCs in California—7-Eleven, Chevron, Circle K, and Quik Stop ($n = 3046$)—from a total of 33 046 licensed tobacco retailers. Across all 4 chains, the state licensing list was used to categorize stores as AVC–corporate if the corporation was identified as the taxpayer or AVC–franchise if an independent owner was identified as the taxpayer. A target sample size ($n = 540$) was determined through a power calculation to test whether the sales violation rate was lower in AVC–corporate than AVC–franchise stores. The power calculation assumed a violation rate of 7.3%, equivalent to the rate for conventional tobacco sales in gas and convenience stores in 2017.¹⁸

Using ArcGIS 10.4 (Esri, Redlands, CA), we geocoded the sampling frame (mapping rate = 100%) and constructed a 15-mile roadway network buffer around the smallest category of stores: AVC–corporate 7-Elevens ($n = 37$). We constructed the sample around 34 of these stores, excluding 3 stores in remote parts of the state to reduce travel costs. The AVC–corporate sample included a census of AVC–corporate Circle K and Quik Stops in the 34 buffers; we then randomly sampled

AVC–corporate Chevrons, for a total of 270 stores. Similarly, the AVC–franchise sample included a census of Circle K and Quik Stop stores in the 34 buffers and a random sample of Chevrons ($n = 133$) and 7-Elevens ($n = 80$). The total sample ($n = 540$) included stores in 21 of 58 counties.

Data Collection

Ewald & Wasserman Research Consultants (San Francisco) recruited 5 underage decoys aged 18 to 19 years (2 of whom were female) from northern and southern California. In a 6-hour training session, the Stanford Prevention Research Center team trained professional auditors and young-adult decoys to use an iPad to record data from 2 tasks: purchase attempts and assessment of retail marketing for tobacco products. Training sessions were conducted in 3 locations to accommodate data collectors from different regions and included mock purchase attempts and field practice in nonsample stores. The 5 pairs of underage decoys and professional auditors collected data from January 31 to April 4, 2018. Notably, neither decoys nor auditors had information as to whether stores were categorized as AVC–corporate or AVC–franchise.

E-Cigarette Purchase Task

Following a standard protocol, decoys carried \$20 in small bills and attempted to purchase any flavor of Vuse cartridges without presenting identification and without lying about their age.¹⁹ Our budget did not accommodate purchase requests for higher-priced JUUL pods, the top-selling brand at the time of data collection.¹⁹ If Vuse was not sold, decoys were instructed to purchase another brand; if no e-cigarette cartridges were sold, they were instructed to purchase a flavored cigarillo.

Regardless of whether a tobacco product was purchased, decoys were debriefed by the auditor, who recorded what product was requested, whether ID was requested, whether a product was sold, the clerk's gender and perceived age (older than 25 years [yes/no]), and the number of customers in line (0, 1, 2, 3, 4 or more). Purchased products were sealed in plastic bags and labeled with a unique number for each store.

Retail Marketing Assessment

Immediately after the purchase attempt debrief, professional auditors entered the store to assess retail marketing for vape and other tobacco products. Auditors used an iPad mini with an AVC field inspection form from the Arizona Attorney General's Office that we adapted and programmed in Qualtrics (Qualtrics, Provo, UT).²⁰ Separately for vape and conventional tobacco products, auditors recorded the presence of self-service displays, whether products and advertising were restricted to a single display area, the presence of interior and exterior advertising, and whether advertising content was limited to brand name, other trademarks or logos, and price. Auditors recorded the store brand (7-Eleven, Chevron, Circle K, Quik Stop, other) and assessed whether age-of-sale reminders were located near every register where tobacco was sold. They noted the presence of and oldest age mentioned (e.g., under 30 years, 27 years, 21 years) on signage in the main tobacco display area and on the store exterior near the entrance. Survey instruments and training materials are available on request.

Interrater Reliability

Auditors also conducted marketing assessments in a subset of stores ($n = 29$) they had not visited previously. Interrater reliability was assessed separately for advertisements of vaping products and conventional tobacco products. Given the lack of variability for multiple measures and the small sample size, we computed percentages of agreement for the following: age-of-sale signage, products outside the main display area, interior ads outside the main display area, self-service displays, interior content-limited advertising, and exterior advertising. We computed Cohen's κ values for age-of-sale signage and presence of exterior advertising.

Distance to Schools

We computed the Euclidean distance from each store to the nearest K–12 school boundary using GIS shapefiles that we obtained or created for public schools.²¹ For private schools, we geocoded an address list obtained from the California Department of Education (mapping rate = 99.8%) using ArcGIS version 10.4. Stores were coded as

being near a school if the location was either 500 feet from a public school boundary or 1000 feet from a private school address point. The reason for the larger distance from private schools was to accommodate imprecision in address point estimates.²² For the subsample of stores near schools, the presence of exterior advertising for any tobacco products was coded as a violation except at Chevron, which did not have this restriction (Table 1).

Analysis

There were different analysis samples for purchase and marketing outcomes. For the total sample of 540 stores, all analyses excluded stores that had different retail chain names in the field than appeared on the state retail licensing list ($n = 17$), closed stores ($n = 8$), tobacco retailers whose licenses had been suspended ($n = 1$), and stores with missing data for both tasks ($n = 2$). For purchase attempts, the analysis sample ($n = 458$) also excluded stores in which decoys attempted to purchase a cigarillo ($n = 47$) and stores with incomplete data ($n = 7$). For outcomes from the marketing assessment, the analysis sample was restricted to cases with complete data ($n = 510$), regardless of purchase attempt. Analysis of marketing specific to vaping products excluded stores where these products were not sold ($n = 34$).

All outcomes were coded to indicate violation of AVCs. For example, purchase task outcomes were whether ID was requested (1 = no, 0 = yes) and illegal sale of e-cigarettes (1 = yes, 0 = no). From the marketing assessment, violations were coded to match brand-specific AVC provisions (Table 1). For example, a violation was coded if retailers did not display age-of-sale signage that was compliant with the appropriate minimum age (30 years for Chevron and Circle K, 27 years for 7-Eleven, 21 years for Quik Stop) or if signs were not displayed at the required locations. Outcomes related to product placement and advertising were coded separately for conventional tobacco and vaping products. We coded violations for product placement (e.g., products outside display areas, self-service displays) and presence of interior advertising that did not meet content-limited restrictions. In an open-ended response format, data collectors were

asked to make notes about what advertising content violated the restrictions.

Retail violation rates (RVRs) were calculated by summing the number of stores with a violation, dividing by the total observations, and then multiplying by 100. RVRs are reported overall and by store type. Simple logistic regression models tested whether AVC–corporate stores were less likely than AVC–franchise stores to violate AVC restrictions (AVC–corporate = 1, AVC–franchise = 0), as indicated by odds ratios (ORs) below 1.0. Adjusted models controlled for store location near a school and store brand, with the most common brand coded as the referent category. It was impractical to randomly assign decoy–auditor pairs to stores located in 21 counties across northern, central, and southern California. Therefore, models for ID requests and sales outcome controlled for decoy, and models for marketing outcomes controlled for auditor. SPSS version 25 (SPSS Inc, Chicago, IL) was used in conducting all analyses.

RESULTS

Table 2 summarizes the counts and distributions of 4 convenience store brands within AVC categories for stores that were included in either the purchase task or the marketing assessment ($n = 512$).

Retail Violations

Overall, 6.6% of stores did not request IDs, and the same percentage sold e-cigarettes illegally, but they were not the same stores. Indeed, 16.7% of illegal sales occurred in stores where clerks requested IDs and decoys did not present one. As expected, violations of age-of-sale signage regulations and ID requests were less common in AVC–corporate than in AVC–franchise stores (Table 2). Regardless of AVC category, however, more than half of convenience stores (53.1%) did not post the required age-of-sale signage.

Table 3 presents unadjusted and adjusted odds ratios from logistic regressions examining whether AVC–corporate stores were more compliant than were AVC–franchise stores. After adjustment for store brand and auditor, AVC–corporate stores were significantly less likely to violate age-of-sale signage

TABLE 1—AVC Provisions, by Convenience Store Chain and Category: California, 2018

Chain	Age-of-Sale Signage	Request ID	Self-Service Display Ban	Limits Ad Content to Logo/Trademark and Price	Prohibits Exterior Ads Within 500 Feet of School/Playground
7-Eleven	Under 27 years	Under 27 years	Yes	Interior only	Yes
Chevron	Under 30 years	Under 30 years	Yes	Interior only	No
Circle K	Under 30 years	Under 30 years	Yes	Interior only	Yes
Quik Stop	Required, no age specified ^a	Under 27 years	Yes	Interior and exterior	Yes

Note. AVC = assurance of voluntary compliance.

^aQuik Stop did not have a specific age in its AVC agreement, so the state minimum legal sales age (21 years) was used.

regulations (adjusted OR [AOR] = 0.16; 95% confidence interval [CI] = 0.10, 0.25). In models that adjusted for store brand and decoy, AVC–corporate stores were significantly less likely to violate ID requests (AOR = 0.29; 95% CI = 0.12, 0.71) and less likely to sell e–cigarettes to underage

decoys (AOR = 0.37; 95% CI = 0.15, 0.88; Table 3). Although sales violations were more common at convenience stores near schools (RVR = 10.1%) than at other stores (RVR = 5.8%), the difference was not statistically significant (AOR = 2.56; 95% CI = 1.00, 6.56; Table 3).

Marketing Outcomes

Percentage agreement between auditors ranged from 70% to 100% for all measures with the exception of content-limited advertising for vaping products (interior advertising percentage agreement = 38.5%). The definition of content-limited advertising

TABLE 2—Sample Characteristics, Underage Purchase Results, and Age-of-Sale Signage, by Store Type: California, 2018

	AVC–Corporate (n = 255), No. (%)	AVC–Franchise (n = 257), No. (%)	Total (n = 512), No. (%)
Overall			
Store brand			
7-Eleven	23 (9.0)	79 (30.7)	102 (19.9)
Chevron	131 (51.4)	124 (48.2)	255 (49.8)
Circle K	89 (34.9)	43 (16.7)	132 (25.8)
Quik Stop	12 (4.7)	11 (4.3)	23 (4.5)
Purchase attempt subsample			
Store brand			
7-Eleven	23 (9.1)	75 (36.8)	98 (21.4)
Chevron	131 (51.6)	81 (39.7)	212 (46.3)
Circle K	89 (35.0)	37 (18.1)	126 (27.5)
Quik Stop	11 (4.3)	11 (5.4)	22 (4.8)
Clerk/store characteristics			
Male gender	148 (58.3)	131 (64.2)	279 (60.9)
Perceived age ≥ 25 y	196 (77.2)	167 (81.9)	363 (79.3)
≥ 1 other customer nearby ^a	180 (70.9)	142 (69.6)	322 (70.3)
Sold gas	230 (90.6)	117 (57.4)	347 (75.8)
Within 500 ft of K–12 school	41 (16.1)	38 (18.6)	79 (17.2)
Decoy characteristics			
Male gender	123 (48.4)	120 (58.8)	243 (53.1)
Requested Vuse brand	252 (99.2)	201 (98.5)	453 (98.9)
Underage purchase			
Did not request ID	11 (4.3)	19 (9.3)	30 (6.6)
Sold e-cigarette to decoy aged 18–19 y	12 (4.7)	18 (8.8)	30 (6.6)
Retail marketing subsample			
Age-of-sale signage (RVR)	100 (39.4)	171 (66.8)	271 (53.1)

Note. AVC = assurance of voluntary compliance; RVR = retail violation rate. All percentages represent the proportion of the row in the column.

^aWithin 10 feet of counter. The total sample (n = 512) includes all stores that appeared in the marketing assessment or purchase attempt analysis.

TABLE 3—Odds of Retail Violations in AVC—Corporate vs AVC—Franchise Convenience Stores: California, 2018

	Age-of-Sale Signage		ID Requested		Sold E-Cigarettes Illegally		Content-Limited Advertising (Interior) Vaping Products		Content-Limited Advertising (Interior) Conventional Tobacco	
	OR (95% CI)	AOR (95% CI)	OR (95% CI)	AOR (95% CI)	OR (95% CI)	AOR (95% CI)	OR (95% CI)	AOR (95% CI)	OR (95% CI)	AOR(95% CI)
AVC—Corporate (Ref = franchise)	0.32 (0.23, 0.46)	0.16 (0.10, 0.25)	0.44 (0.20, 0.95)	0.29 (0.12, 0.71)	0.51 (0.24, 1.09)	0.37 (0.15, 0.88)	1.58 (1.04, 2.39)	1.47 (0.89, 2.42)	1.59 (1.07, 2.38)	1.89 (1.19, 3.02)
Store brand (Ref = Chevron)										
7-Eleven	0.60 (0.38, 0.95)	0.24 (0.13, 0.42)	0.82 (0.29, 2.38)	0.71 (0.23, 2.18)	1.28 (0.49, 3.36)	1.25 (0.44, 3.53)	0.86 (0.50, 1.48)	1.12 (0.60, 2.12)	3.45 (1.80, 6.64)	5.65 (2.76, 11.56)
Circle K	1.53 (0.99, 2.37)	1.40 (0.83, 2.36)	1.46 (0.64, 3.38)	3.18 (1.14, 8.83)	1.44 (0.60, 3.43)	3.05 (1.06, 8.79)	0.85 (0.52, 1.40)	1.28 (0.70, 2.36)	1.44 (0.90, 2.31)	1.77 (1.03, 3.04)
Quik Stop	0.12 (0.04, 0.42)	0.15 (0.04, 0.60)	0.73 (0.09, 5.85)	0.38 (0.04, 3.30)	0.79 (0.10, 6.41)	0.38 (0.04, 3.26)	2.09 (0.87, 5.02)	0.97 (0.35, 2.69)	... ^a	... ^a
Location near school (Ref = no)	0.94 (0.59, 1.49)	1.05 (0.60, 1.83)	1.83 (0.78, 4.27)	2.49 (0.97, 6.41)	1.83 (0.78, 4.27)	2.56 (1.00, 6.56)	1.55 (0.92, 2.60)	1.62 (0.89, 2.95)	1.15 (0.67, 1.98)	1.38 (0.76, 2.49)

Note. AOR = adjusted odds ratio; AVC = assurance of voluntary compliance; CI = confidence interval; OR = odds ratio. Chevron is the referent group because it was the most common brand in the sample. To address nonrandom assignment of decoys and auditors to stores, adjusted models for ID checks and illegal sales controlled for decoy and adjusted models for marketing outcomes (age-of-sale signage and content-limited advertising) controlled for auditor. American Lung Association Tobacco Control Grade values for jurisdiction tobacco retailer licensing (A = 4, F = 0) did not improve the model fit and were not included as a control. Intercept estimates are not shown.

^aQuik Stop could not be included in the model because all of the Quik Stop stores studied had interior advertising with content that violated the AVC.

is imprecise, which made it difficult to train auditors and likely contributed to low reliability. Cohen’s κ values were 0.78 for age-of-sale-signage, 0.54 for exterior advertising, and 0.58 for conventional tobacco sales, implying that assessments were somewhat subjective, fidelity to protocol was questionable, or signage changed between visits.

The majority of stores violated AVC regulations on interior content-limited advertising for any tobacco: RVRs were 81.5% for AVC—corporate stores and 71.9% for AVC—franchise stores. Contrary to expectations, AVC—corporate stores were significantly more likely to violate interior content-limited advertising regulations for conventional tobacco products (AOR = 1.89; 95% CI = 1.19, 3.02; Table 3). Although the same pattern was observed for vaping products in an unadjusted model (OR = 1.58; 95% CI = 1.04, 2.39), the association was attenuated in an analysis that adjusted for auditor (AOR = 1.47; 95% CI = 0.89, 2.42; Table 3).

Auditors’ notes about marketing violations included signs with images of branded products that show what is inside the package, other imagery, and signs with promotional language other than price. Examples of content-limited advertising violations included product imagery (e.g., cigarettes inside

a pack of Marlboro Ice), tobacco advertising with fruit and floral imagery, and advertising slogans (e.g., “Real. Simple. Different”; “Cool to the finish”; “A cut above the rest”; “Experience intensely satisfying vapor”). Other examples noted as violations were advertisements for mobile coupons for cigarettes and smokeless tobacco.

As shown in Table 4, tobacco products placed outside primary display areas were uncommon in both AVC—corporate and AVC—franchise stores. Few stores (1.2% of AVC—corporate and 3.5% of AVC—franchise) displayed any tobacco products outside the primary display area. Self-service displays were also uncommon. Only 1 store (an AVC—corporate store) had a self-service display for vaping products. Among AVC—franchise stores, 10 had self-service displays for vaping products and 1 had self-service displays for conventional tobacco.

Overall, 16.8% of stores were located near at least 1 K–12 school. Of these 86 stores, 46 were subject to AVC—specific requirements on advertising restrictions near schools. In this subset of convenience stores, RVRs for presence of exterior advertising were 10.9% for vaping products and 73.9% for other conventional products.

DISCUSSION

Relative to AVC—franchise stores, AVC—corporate stores were significantly less likely to violate ID checks and less likely to sell e-cigarettes illegally to underage decoys. Only the sales violation rate in AVC—corporate stores (4.7%) satisfied the Healthy People 2020 goal of 5.0%.²³ This finding is noteworthy because AVCs were established before e-cigarettes were regulated as tobacco products in California. The difference between corporate and franchise stores may also explain why AVCs have not appeared to be uniformly effective in studies involving FDA compliance data.¹⁰ Our study suggests that improvements in retail education and enforcement of AVCs are needed to close the gap between corporate and franchise stores.

Our study also documented substantial noncompliance with age-of-sale signage and the marketing provisions of AVCs. Even though AVC—corporate stores were less likely than were AVC—franchise stores to violate age-of-sale signage, it is noteworthy that more than half of convenience stores (overall) were noncompliant. Violations of content-limited advertising were noted in 76.7% of stores overall, and violations were more common in AVC—corporate stores. This poor compliance may have resulted from ambiguity in the provisions, lack of direction from

TABLE 4—Retail Violation Rates for AVC Marketing Restrictions, by Product and Store Type: California, 2018

	Vaping Products			Conventional Tobacco Products			Any Tobacco Products		
	AVC-Corporate (n = 254), No. (%)	AVC-Franchise (n = 222), No. (%)	Overall (n = 476), No. (%)	AVC-Corporate (n = 254), No. (%)	AVC-Franchise (n = 256), No. (%)	Overall (n = 510), No. (%)	AVC-Corporate (n = 254), No. (%)	AVC-Franchise (n = 256), No. (%)	Overall (n = 510), No. (%)
Product outside main display area	3 (1.2)	6 (2.7)	9 (1.9)	0 (0.0)	3 (1.2)	3 (0.6)	3 (1.2)	9 (3.5)	12 (2.4)
Interior ads outside main display	65 (25.6)	52 (23.4)	117 (24.6)	113 (44.5)	93 (36.3)	206 (40.4)	126 (49.6)	104 (40.6)	230 (45.1)
Self-service displays	1 (0.4)	10 (4.5)	11 (2.3)	0 (0.0)	1 (0.4)	1 (0.2)	1 (0.4)	11 (4.3)	15 (2.4)
Interior content-limited advertising	77 (30.3)	48 (21.6)	125 (26.3)	200 (78.7)	179 (69.9)	379 (74.3)	207 (81.5)	184 (71.9)	391 (76.7)

Note. AVC = assurance of voluntary compliance. Any tobacco is the combination of vaping products and conventional tobacco products.

corporate headquarters, lack of enforcement, or a combination of these factors. Poor compliance may also have been the result of individual business decisions to sell or advertise tobacco products or agreements between retailers and tobacco companies to display marketing materials that do not conform with AVC provisions.²⁴ Our results indicate that clarifying and enforcing restrictions on advertising limited to trademark, logo, and price will be important in leveraging the unique capacity of AVCs to limit retail tobacco marketing.

Strengths and Limitations

Strengths of this study include a statewide sample of convenience stores and a “blinded” procedure such that decoys and auditors did not know which category each store represented. In addition, a design that compared corporate and franchise stores in the same chains fills a documented gap in previous research.¹⁰ Another strength is the use of standard protocols, with training materials and an electronic data collection instrument that are available on request.

Although good reliability was obtained on most measures, lower reliability on content-limited advertising, exterior advertising, and age-of-sale signage may be indicative of poor fidelity to protocols and disagreement about how to interpret AVC requirements. The interrater reliability of purchase task assessments (e.g., clerk gender, age, number of customers in line) was not measured because decoys and auditors were not in stores at the same time. In addition,

there was imprecision in estimates for stores near private schools relative to public schools. Of the 36 stores within 500 feet of a public school boundary, 30.6% had an address point that was more than 1000 feet from a store. This suggests that the number of stores near private schools was more likely underestimated than overestimated.

With the corporate–franchise comparison as a proxy for convenience stores with and without AVCs in the same retail chains, greater compliance in corporate than franchise stores implies that AVCs could reduce illegal sales of e-cigarettes to minors. However, future research could compare (1) stores with and without AVCs in the same chain (e.g., Safeway stores in states that did or did not sign AVCs), (2) stores from AVC and non-AVC chains in the same retail sector, or (3) data collected before and after implementation of a new AVC. A rigorous design would randomly assign decoys and auditors to stores, a limitation of our study and many others focusing on youth access.²⁵ In addition, we did not examine compliance with the training requirements of AVCs, another limitation that future research should address.

Public Health Implications

Corporate retail chains with a history of violations can change their behavior by improving employee training, sales practices, and marketing. To address growing concerns about underage access to vape products,²⁶ state attorneys general could expand AVCs from convenience stores, supermarkets, pharmacies, and gas stations to other types of

retail chains, such as dollar stores and smoke or vape shops. New AVCs should be established with brick-and-mortar retailers that have already received warning letters or fines after FDA inspections (e.g., Dollar General, Family Dollar, Marathon, Avail Vapor, Madvapes, Vapor Shark).²⁷ AVCs may be valuable in proactively bringing about changes without the necessity of other regulatory actions. In acknowledgment that tobacco retailers and manufacturers may exploit regulatory gaps,²⁸ AVCs should supplement (rather than supplant) other policies, such as strong requirements for tobacco retail licensing and comprehensive “tobacco 21” laws.^{29,30}

Evidence that California convenience stores violated marketing provisions of AVCs merits attention from the state attorney general. Greater investment in enforcement of AVC marketing provisions is warranted, particularly given that exposure to retail tobacco marketing is a risk factor for tobacco initiation.^{31,32} Indeed, the potential for AVCs to reduce exterior advertising of tobacco at stores near schools is particularly novel. New AVCs could strengthen requirements for stores near schools, such as increasing school zones (e.g., from 500 to 1000 feet, as with local policies in California and elsewhere) and limiting advertising for flavored tobacco products that appeal to youths. Existing surveillance mechanisms could be expanded to integrate reporting on AVC-relevant age-of-sale signage and advertising measures, which have already been implemented in Florida and Pennsylvania.

AVCs provide a mechanism for state attorneys general to engage directly with

tobacco retailers, thereby adding to Master Settlement Agreement efforts with manufacturers.⁷ Without AVCs, state attorneys general would not be involved with sales to minors in most states. Although some AVC provisions have been incorporated into state and local regulations over the past decade, this mechanism offers further opportunities for unique areas of enforcement. **AJPH**

CONTRIBUTORS

L. Henriksen and N. C. Schleicher originated and designed the study in collaboration with J. G. L. Lee. T. O. Johnson managed the survey development and data collection. N. C. Schleicher analyzed the data. L. Henriksen drafted the article. All of the authors revised the article for critical content.

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CONFLICTS OF INTEREST

J. G. L. Lee receives licensing royalties from a store audit and compliance and mapping system owned by the University of North Carolina at Chapel Hill; the system was not used in this study. The other authors have no conflicts of interest to report.

HUMAN PARTICIPANT PROTECTION

The research protocol was approved by the institutional review board of the Stanford University School of Medicine with a waiver of informed consent.

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