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School Policy, Administrator Perceptions, and Student E-cigarette Use

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Abstract

Objective: In this study, we investigated the relationship between school e-cigarette policy and e-cigarette use among students. Secondly, we examined whether this relationship varied by administrator perceptions about e-cigarette use being “an issue.”

Methods: Data were utilized from written school policies, a school tobacco surveillance study of 2755 students (N = 310,412), and administrator interviews in 54 Texas schools.

Results: When administrators perceived e-cigarettes as an issue, the odds of ever e-cigarette use, susceptibility to use e-cigarettes, and perceived peer use of e-cigarettes were 0.20–0.54 times lower for students attending schools that had an e-cigarette policy compared to those without a policy ($p < .05$).

Conclusion: The impact of school policies on student e-cigarette use behavior is positive if policies are strongly implemented.

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Human Subjects Approval Statement

This study was approved by the University of Texas Health Science Center Internal Review Board HSC-SPH-15–1010.

Conflict of Interest Disclosure Statement

All authors of this article declare they have no conflicts of interest.

Keywords

e-cigarettes; adolescent health; school health policy; school administrators; school tobacco use

E-cigarette use is rising, especially among adolescents. The National Youth Tobacco Survey (NYTS) has shown high school student past 30-day e-cigarette use increased substantially from 1.5% in 2011 to 16.0% in 2015, and middle school students increased from 0.6% to 5.3%.¹ These estimates suggest that 3 million middle and high school students in the United States (US) were e-cigarette users in 2015.¹ As adolescent e-cigarette use continues to climb, there is concern that e-cigarettes are serving as a “gateway drug” to conventional cigarette smoking, other tobacco product use, or other substances, such as marijuana. Several studies have shown that adolescents who have used e-cigarettes are more susceptible to cigarette smoking in the future than those who have never used an e-cigarette.^{2–5}

In Texas, e-cigarette use is higher than national estimates. The 2014 Texas Youth Tobacco Survey (TYTS) determined that 24% of middle and high school students reported ever use of e-cigarettes and 14% reported past 30 day use, compared to 13.4% of high school and 3.9% of middle school students who reported past 30 day use nationally.^{6,7} In 2014, Texas was one of only 10 states that lacked minor regulations on e-cigarettes.⁸ However, Texas Senate Bill 97 (SB 97), which regulates “the sale, distribution, possession, use, and advertising of e-cigarettes, cigarettes, and tobacco products,” was signed into law on May 28, 2015.⁹ Effective October 1, 2015, those under the age of 18 were no longer allowed to purchase, possess, or use e-cigarettes in the state of Texas. SB 97 included comprehensive provisions that mandated institutional e-cigarette policies within middle and high schools in Texas, such as prohibiting e-cigarette use and possession at schools, school-related events, and on school property, including school buses.⁹ In addition, schools are required to include rules about e-cigarettes in their policies published in student handbooks and on district websites to confirm that school staff members are aware of these policies.

Determining how schools acknowledge and deal with e-cigarette use on their campuses is an important factor in supporting this regulation.¹⁰ No known research has been conducted specific to e-cigarette policies in schools to date. One study on Welsh adolescents found that school tobacco policy had no effect on e-cigarette use; however, the policy was not specific to e-cigarettes.¹¹ In contrast, there is ample research on conventional cigarette, or smoke-free, policies in schools. This body of literature has been mixed, in regards to whether school policies against cigarette smoking are associated with changes in youth past 30 day cigarette smoking.^{12–18} The Youth Tobacco Access Project determined that whereas enforcing a school tobacco policy was related to decreased smoking among students, just having a policy had no effect on student smoking.¹⁷ Additionally, a study on prohibiting school smoking concluded that, due to cigarette policies, students who have experimented with traditional cigarettes are less likely to transition into smoking regularly.¹⁸ In contrast, Lovato¹² determined that a strongly enforced policy was related to increased past 30 day smoking.

School policies are typically studied after policy implementation is authorized by state or local legislatures. In this study, we analyze e-cigarette policies that were in place in schools

before regulations by state law in 2015. To our knowledge, e-cigarette policies within schools have not been described previously nor has their impact on e-cigarette use behaviors investigated. To examine e-cigarette school policies, data from schools and students participating in the Texas Adolescent Tobacco Advertising and Marketing Surveillance (TATAMS) study, supplemented with an additional E-cigarette School Policy Interview, were analyzed for this manuscript. The purpose was to determine if there is an association between e-cigarette school policies and student ever and past 30-day e-cigarette use, susceptibility to future e-cigarette use, and perceived peer e-cigarette use. The study further examines whether or not administrator perceptions about student e-cigarette use within their schools modified this relationship. In addition, we examined if the strength of the policy was related to increased reductions in student e-cigarette use.

METHODS

Study Design

TATAMS is a rapid response surveillance system whose participants include students in 79 middle and high schools who were enrolled in 6th, 8th, and 10th grade in 5 counties surrounding the 4 most populated cities in Texas (Austin, Houston, Dallas-Ft. Worth, San Antonio). More information on the sampling scheme and study design are described elsewhere.^{19,20} Data were collected from these students from October 2014 through June 2015 via tablet-based surveys, which included pictures of e-cigarette devices to enhance the validity of related measures.²¹ Surveys were administered in the classroom. All survey measures were adapted from national surveillance studies (Population Assessment of Tobacco and Health, NYTS)^{22,23} and underwent cognitive testing before implementation.

Written information about e-cigarette policies was directly obtained from an Internet search of the school's online policy. In addition, an E-cigarette School Policy Interview was implemented to investigate if school administrators perceived e-cigarettes to be an issue in their schools during the 2014–2015 school year, before Texas legislation went into effect on October 1, 2015 and required e-cigarette school policies. One administrator at each TATAMS school was contacted to complete an interview regarding the 2014–2015 school year. Data on school e-cigarette policies and interviews were collected after the school year, from May 2015 through February 2016; however, questions on these policies were specific to the 2014–2015 school year.

Participants

A total of 3907 students completed the baseline TATAMS survey (representing a population of 461,069). The weighted baseline sample consisted of 32.2% sixth graders, 34.7% eighth graders, and 33.1% tenth graders. In addition, 49% were girls, 54.5% of the students were Hispanic, 27.9% non-Hispanic white/other, and 17.6% non-Hispanic black, representing the distribution of the students in the sampling frame, namely the 5 counties surrounding Austin, Dallas-Ft. Worth, Houston, and San Antonio in Texas.

Measures

Presence of written policy.—Written policies were gathered from student handbooks found on school websites and were specific to the 2014–2015 school year. Using only the written policies that were obtained, a dichotomous variable was created to note if provisions concerning e-cigarette use among students were included in the school policy or not.

Written policy index score.—An index score was created to measure the strength of the obtained written policies. The index score addressed the following key components abstracted from the written policies: (1) if a written policy exists (one question); (2) language that bans the use and possession of e-cigarettes by students (2 questions); (3) locations where e-cigarette use is banned, including in school buildings, outside on school grounds, on school buses, and at off-campus, school-sponsored events (4 questions); and (4) disciplinary action for first and repeated offenses for e-cigarette use within the school, including confiscation of e-cigarettes, meeting with parents, in-school suspension, out-of-school suspension, and expulsion (9 questions). Each one of these 16 components contributed equally to a written policy index score. The presence or absence of each of these 16 components was noted for each school's policy. The written policy index score was created as the sum of how many of these key components were present within a particular school's e-cigarette policy. Therefore, the index ranged from a possible score of 0 to 16. A higher written policy index score indicates a stronger written e-cigarette policy. Due to a lack of variability, the written policy index was then categorized by quartiles of the distribution of scores for further analysis. A score of 0 on the written policy index indicated that there was no e-cigarette policy, 10–12 low policy strength, 13 moderate policy strength, and 14–16 high policy strength. No written policy scored between 1 and 9.

Administrator perception.—All administrators who participated in the E-cigarette School Policy Interview were asked: 'Are e-cigarettes an issue at your school?' Responses to this question were dichotomized, to represent whether administrators perceived e-cigarettes as an issue at their school, or not.

Ever e-cigarette use.—On the TATAMS survey, all students were asked "Have you EVER used an electronic cigarette, vape pen, or e-hookah, even one or two puffs?" with response options of 'Yes' or 'No'. Those students who responded 'Yes' were considered e-cigarette ever users and those who responded 'No' were e-cigarette never users.

Past 30-day e-cigarette use.—Students who reported ever e-cigarette use were then asked "DURING THE PAST 30 DAYS, on how many days did you use an electronic cigarette, vape pen, or e-hookah? Please enter the number of days (from 0 to 30 days)." Students who responded with one or more days were considered past 30-day e-cigarette users.

Susceptibility.—Only students who reported never e-cigarette use were asked the following 3 questions, which were based on established traditional cigarette susceptibility measures.^{24–26} The first question asked: "Have you ever been curious about using electronic cigarettes, vape pens, or e-hookahs?" with responses including "Not at all curious," "A little

curious,” “Somewhat curious,” and “Very Curious.” The other 2 questions included: “Do you think you will use any of the following products in the next 12 months?” and “If one of your close friends were to offer you one of the following products, would you use it?” in reference to electronic cigarettes, vape pens, or e-hookahs. The responses for both of these questions were “Definitely not,” “Probably not,” “Probably yes,” and “Definitely yes.” If a student answered “Not at all curious” to the first question and “Definitely not” to the other 2 questions, they were considered non-susceptible. If students selected any other answer than “Not at all curious” or “Definitely not” to any of these 3 questions, they were considered susceptible to e-cigarette use.

Perceived peer e-cigarette use.—All students were asked: “How common is it for people your age to use electronic cigarettes, vape pens, or e-hookahs?” The response options were on a Likert scale where 1 represents “Not at all common” and 5 is “Very common.” To create a dichotomous variable, students who responded with a 1, 2, or 3 represented perceived peer e-cigarette use to be not common, and those that respond with 4 or 5 represented perceived peer e-cigarette use to be common.

Covariates.—Other tobacco product use was determined by asking students who indicated they had ever used any of these products, “DURING THE PAST 30 DAYS, on how many days did you smoke/use cigarettes; little filtered cigars; large cigars/cigarillos; hookah; smokeless tobacco? Please enter the number of days (from 0 to 30 days).” Students who responded one or more days to any of these items were considered past 30-day other tobacco users. Sex, race/ethnicity, grade level, and socioeconomic status (SES) also were considered as potential covariates, but not included in the final model due to less than optimal fit statistics.

Data Analysis

Weighted proportions were used to estimate administrators’ perception of e-cigarettes being an issue or not within schools (via the E-cigarette School Policy Interview) and student e-cigarette ever use, past 30-day use, susceptibility to use, and perceptions of peer use (via the TATAMS student survey) by presence of a school policy (Table 1). Weighted adjusted logistic regression models were used to analyze the association between school policy presence and student e-cigarette use behaviors by administrator perception of e-cigarettes as an issue at their school (Table 2). Descriptive statistics (sample sizes, percentages) were used to describe the components of the written school policies (Table 3). Finally, similar regression models were used to examine the relationship between the strength of the policy and student e-cigarette use behaviors (Table 4). The presence of the school policy was the independent variable and student e-cigarette use behaviors were the dependent variables in separate models; all logistic models were stratified by administrators’ perception of whether or not e-cigarettes were an issue at their school. Furthermore, the unit of analysis was the students who attended schools where the administrator completed the E-cigarette School Policy Interview. Goodness of fit tests were evaluated to determine best model fit among adjusted models using a Type I error level of 0.05. Final models included only other tobacco product use, given these fit statistics. The analyses were performed using STATA 14.0 (College Station, TX).

RESULTS

Of the 79 total TATAMS schools, 54 (68%) of school administrators completed the E-cigarette School Policy Interview. These administrators, representing the 54 TATAMS schools (9 private, 6 charter, 39 public) in the current study, were responsible for 2755 total students (N = 310,412) participating in the TATAMS study. Thirteen of the 54 administrators (24%) who were responsible for 809 students (N = 74,446) perceived that e-cigarettes were an issue at their school to represent, while 41 administrators (76%) who were responsible for 1946 students (N = 235,966) perceived e-cigarettes were not an issue at their school.

The impact of the written school policy on e-cigarette use differed by whether e-cigarettes were perceived as an issue at the school. Among schools where e-cigarettes were perceived as an issue by the school administrator, the prevalence of ever and past 30-day e-cigarette use, susceptibility to e-cigarette use, and perceived peer use of e-cigarettes was significantly lower among students in those schools with a school e-cigarette policy in comparison to students in schools without an e-cigarette policy (Table 1). The odds of ever use of e-cigarettes, susceptibility to e-cigarettes, and perceived peer use of e-cigarettes was 0.20–0.54 times lower compared to those students attending schools without an e-cigarette policy, after adjusting for past 30-day other tobacco use (Table 2, $p < .05$). We found no statistically significant relationship between school policy and past 30-day e-cigarette use, after adjusting for past 30-day other tobacco use (AOR = 0.53, $p = .17$).

Among schools where e-cigarettes were not perceived as an issue, we found no differences in the prevalence of ever or past 30-day e-cigarette use, susceptibility to e-cigarette use, or perceived peer use of e-cigarettes between students in schools with an e-cigarette school policy and those without one (Table 1). Furthermore, we found no differences in any of the outcomes in the regression models (Table 2, $p > .05$).

Table 3 shows the frequency of the 16 written e-cigarette policy components that comprised the written policy index score. Written policies with content specific to e-cigarettes were gathered for 38 (70%) of the 54 TATAMS schools participating in the E-cigarette School Policy Interview. Schools with administrators who perceived e-cigarettes were an issue had more e-cigarette policies in comparison to schools with administrators who did NOT perceive e-cigarettes were an issue (85% vs 66%). More disciplinary actions were taken at schools where administrators perceived e-cigarettes to be an issue compared to schools with administrators who did not perceive e-cigarettes were an issue, including meeting with the parents for first and repeated offenses (77% vs 61%), in-school suspensions for first and repeated offenses (85% vs 66%), and expulsion for repeated offenses (54% vs 20%).

The impact of the strength of the e-cigarette policy, as indicated by the written school policy index, differed by whether or not administrators perceived e-cigarettes to be an issue. In schools where administrators perceived e-cigarettes to be an issue, the presence of an e-cigarette policy with a low index score (10–12 out of 16) was associated with decreased odds of ever and past 30-day e-cigarette use, susceptibility to e-cigarette use, and perceived peer use (AOR = 0.12–0.54, $p < .01$) in comparison to no e-cigarette policy and after adjusting for past 30-day other tobacco use (Table 4). Additionally, after adjusting for past 3-

day other tobacco use, an e-cigarette school policy with a moderate index score (13 out of 16) was associated with decreased odds of past 30-day e-cigarette use (AOR = 0.14, $p = .02$) and susceptibility (AOR = 0.23, $p < .01$) in comparison to no e-cigarette policy. Finally, after adjusting for past 30-day other tobacco use, an e-cigarette school policy with a high index score (14/16 out of 16) had decreased odds of perceived peer use compared to schools with no e-cigarette policies (AOR = 0.45, $p = .02$). No associations were found between the strength of the written policy, as indicated by the written policy index score, and ever or past 30-day e-cigarette use, susceptibility to e-cigarette use, or perceived peer use of e-cigarettes, when administrators did not perceive e-cigarettes to be an issue within the schools ($p > .05$).

DISCUSSION

In this study, we examined whether a written school policy specific to e-cigarettes was associated with decreased student e-cigarette use behaviors and whether this effect was different for schools where administrators were aware of and reported that e-cigarettes were an issue. The latter appeared to serve as a proxy for how strongly the policy was implemented. The effect of the actual strength of the written policy on e-cigarette use behaviors was examined, too. The majority of TATAMS schools (70%) that participated in the E-cigarette School Policy Interview had a written e-cigarette school policy in place during the 2014–2015 school year, prior to the legislation (SB 97) that required schools to maintain such a policy. In schools where administrators perceived e-cigarettes to be an issue, this policy appeared to have a positive impact and may have lowered students' ever use of e-cigarettes, susceptibility to future e-cigarette use, and student perceptions that e-cigarette use among their peers was common. However, in schools where administrators reported that e-cigarettes were not an issue, no impact on e-cigarette use behaviors was observed in schools that had e-cigarette policies. Additionally, when examining the effect of the strength of the policy, no clear dose-response patterns across outcome variables emerged. Still, significant relationships were only observed for schools in which the administrator perceived e-cigarettes to be an issue.

As this is the first known study analyzing the impact of school e-cigarette policies on e-cigarette use behaviors, comparisons are made with studies on school policies specific to conventional cigarettes to integrate our findings with previous literature. Our e-cigarette policy findings were not always consistent with the body of literature on smoking policies. For example, whereas we found an inverse association for e-cigarette policy and ever use of e-cigarettes, previous literature determined that tobacco policy had no effect on ever use of conventional cigarettes. For example, the presence of a tobacco policy had a null effect on cigarette ever smoking among students in Taiwanese schools.²⁷ Additionally, no association was found between an anti-smoking policy and initiating smoking a cigarette for the first time in the previous year, in a study of Canadian students.²⁸ These findings reinforce the need for policy compliance and enforcement among administrators. Understanding more about not only the strength of school policies, but also how policies are implemented will be important to sustaining smoke-free schools and reducing tobacco use among youth, especially when adding e-cigarettes to these policies.

Susceptibility to e-cigarettes may be important in predicting future e-cigarette use, as susceptibility to cigarettes is a significant predictor of future cigarette smoking in adolescents.^{24–26,29} However, studies of the impact of tobacco policy on susceptibility are lacking, although one study indicated a positive association. Canadian high schools that implemented new tobacco policies in year one of an intervention showed an increase in student susceptibility to cigarettes in year 2 in comparison to control schools, even though past 30-day smoking decreased in intervention schools compared to control schools.³⁰ As our results indicated an inverse association, future research needs to determine the relationship between e-cigarette policy and susceptibility to e-cigarette use.

Research on school tobacco policies and peer perceptions of smoking has been analyzed in youth and young adult samples. Among Canadian high school students, having a written policy that prohibits student tobacco use and possession significantly decreased peer perception of smoking.³¹ Anti-tobacco policy on campus was associated with decreased peer perception of smoking among college students in the US.³² Additionally, several studies on middle and high school students have found a positive association between perceived peer smoking and increased past 30-day cigarette smoking.^{15,33–35} As these findings could extend to e-cigarettes, studying the impact of school e-cigarette policy on peer perceived e-cigarette use is warranted.

Unexpectedly, we did not find an overall association between e-cigarette school policy and past 30-day e-cigarette use. In a study on Welsh high school students, the association between the presence of a written school policy on cigarettes was not related to student past 30-day smoking.¹⁴ Despite not finding an association with tobacco policy and past 30-day smoking, these Welsh students smoked fewer cigarettes during and outside of school hours if they attended a school that had a tobacco policy (weekly average of 7 cigarettes during school and 18 cigarettes outside of school) compared to students who attended schools without a policy (weekly average of 17 cigarettes during school and 28 cigarettes outside of school).¹⁴ The results from this study are comparable to our findings where past 30-day e-cigarette use was also lower for students who attended schools with a policy (7.4%) in comparison to those without a policy (11.4%). An association may not have been found in our study due to the small sample of students in schools without e-cigarette policies being past 30-day e-cigarette users (N = 30 students).

Finally, our study found several associations between the strength of the policy and e-cigarette use, susceptibility, and peer perceptions of use, although we found no dose-response relationship. In comparison to no e-cigarette school policy, an e-cigarette school policy with a low index score was associated with decreased student e-cigarette use behaviors. Findings on smoke-free school policies in other studies had null findings. The Welsh study determined that neither moderate nor strong tobacco policies had an association with ever e-cigarette use.¹¹ A study of Florida public schools found that the strength of a tobacco-free policy, as measured by 12 policy components, was not significantly related to self-reported student past 30-day cigarette smoking.³⁶ A strong policy meant that a written policy was in place that applied to students, staff, families, and visitors at all school-related locations, whereas a moderate policy referred to a written policy that did not apply to everyone or all locations.¹¹ However, this study did not specify their tobacco policies to

include e-cigarettes and did not determine administrator enforcement or knowledge of this policy. There were no dose-response relationships found between the written policy index score and the outcome variables in the current study, which could be due to a high prevalence of e-cigarette use by students that required stronger policy within these schools. Additional studies have shown mixed results between the strength of tobacco policies and cigarette smoking. A Canadian study determined that a strongly enforced tobacco policy, which measured the consistency of administrators enforcing tobacco policy for students with a range from 0–3, was associated with higher past 30-day cigarette smoking in high school students.¹² However, researchers determined that enforcing school policies in middle and high schools was associated with decreased student self-reported past 30-day smoking and staff observations of student smoking, although the policy alone did not have a statistically significant relationship.¹⁷ As our study did not examine the relationship between policy enforcement and student e-cigarette use, further research is necessary to determine the effect of these 2 components on student e-cigarette use behaviors.

Some researchers have analyzed the association between student perceptions of the strength of cigarette policies and student past 30-day smoking. A Canadian study analyzed 3 questions from a self-response survey that asked students if there was a standard set of rules for prohibiting smoking at their school, if students were fined if caught smoking, and if students were to get in trouble for breaking the smoking rules.¹³ They found a positive association between strong tobacco rules and increased high school student past 30-day smoking.¹³ Strong smoking rules already may be in place due to increased smoking prevalence among students. Furthermore, high school students in this study had increased odds of being past 30-day cigarette smokers compared to students in elementary schools.¹³ Despite how students perceive policies, having a policy could be more effective in decreasing smoking among students than not having one. For example, a 2007 study found that a lack of a written school policy increased conventional smoking among German students between 10 and 15 years old.³⁵ Further studies utilizing a larger sample over time as well as student perceptions of policy are necessary to analyze the impact that this nuance has on the effect of school policy on past 30-day e-cigarette use.

No known studies analyzed administrator perceptions with the presence of written school policy on any type of tobacco use, while our study determined that administrator perception of e-cigarettes could be important in implementation of e-cigarette policy. Administrators' perceptions that e-cigarettes are an issue within their school could encourage administrators to create and disseminate e-cigarette policy to decrease e-cigarette use. Further longitudinal research would be necessary to define the role of administrator perceptions in determining the relationship between e-cigarette policies at schools, student e-cigarette use, and how administrators implement these policies.

Limitations

Several limitations exist in the current study. One limitation of this study is not acquiring a full sample to be representative of all Texas schools. As these were *post hoc* analyses, schools were not selected for the TATAMS system based on the presence or absence of a school policy; rather, all TATAMS schools were eligible to participate in the study. These

results are specific to this subset of schools in Texas and may not generalize to the rest of the state or elsewhere in the nation. Importantly, because this was a cross-sectional study and occurred before e-cigarette policies were mandated, no causal relationships can be inferred from our results and longitudinal data on the longer-term effects of policies as well as administrator perceptions would greatly add to the literature. Additionally, there was low variability in the strength of the policy variable, which could affect the associations with e-cigarette use behavior, and determining the compliance and enforcement of e-cigarette policies through both administrators and students could improve this measure. Finally, social desirability bias could affect youth responses and cause underreporting of e-cigarette use, especially in schools where policies are present.

Conclusion

This is the first known study to assess the associations between e-cigarette-specific school policies and e-cigarette use behaviors among students. In schools where administrators perceived that e-cigarettes were an issue – that is, where policies were implemented strongly, the impact of the e-cigarette policy was positive. Students in these schools reported less ever e-cigarette use, susceptibility to future e-cigarette use, and perceived use of e-cigarettes among their peers. No clear relationship between the strength of the written policy and its effect on e-cigarette use behaviors among students was observed, although there were significant relationships observed in schools where administrators perceived e-cigarettes as an issue. Further research is necessary to explore this further and determine the long-term effectiveness of school policies on e-cigarette use, including the impact that the strength and enforcement of the policy has on student e-cigarette use behaviors. As e-cigarette use is likely to become more problematic in schools, given increases in e-cigarette use prevalence among youth, policies like these will be increasingly necessary.

IMPLICATIONS FOR HEALTH BEHAVIOR OR POLICY

As e-cigarettes rise in popularity, especially among youth, monitoring their use is important for prevention efforts. Preventing e-cigarette use in adolescents can prevent future addiction to nicotine as well as many other potential health risks. The current study highlights the importance of written school policies specific to e-cigarettes to reduce student e-cigarette use behaviors, especially in schools where e-cigarette use is problematic, or perceived as an issue, and the policies are therefore strongly enforced. As this is the first known study on e-cigarette policies in schools, several other integral factors should be analyzed in future studies. Understanding the strength and impact of various components of e-cigarette policies would assist administrators in selecting the essential elements to include in school e-cigarette policies as well as the impact of administrator compliance and enforcement of these policies.

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Table 1:
Weighted Characteristics of Student E-cigarette Use Behaviors among Middle and High School Students in Texas

	Administrator perceives e-cigarettes were an issue ^{a,b} (n = 809; N = 74,446)	Administrator perceives e-cigarettes were NOT an issue ^a (n = 1946; N = 235,966)	Total Students (n = 2755; N = 310,412)
	% (95% CI)	% (95% CI)	% (95% CI)
Ever e-cigarette use			
No policy	31.1 (19.6–42.5)	16.7 (8.7–29.8)	18.3 (10.7–29.4)
Policy exists	16.5 (12.7–20.3)	17.5 (11.2–26.3)	17.2 (11.9–24.2)
Past 30 day e-cigarette use			
No policy	11.4 (3.2–19.7)	6.9 (3.2–14.3)	7.4 (3.9–13.5)
Policy exists	7.4 (5.0–9.7)	7.1 (4.5–10.9)	7.1 (4.9–10.3)
Susceptibility to e-cigarette use			
No policy	40.1 (25.3–54.9)	32.8 (24.9–41.7)	33.5 (26.3–41.5)
Policy exists	25.9 (20.2–31.6)	31.1 (25.6–37.2)	29.6 (24.4–35.5)
Perceived peer use			
No policy	61.3 (49.2–73.3)	22.4 (12.1–37.8)	26.6 (15.4–41.9)
Policy exists	25.4 (20.5–30.2)	21.2 (15.0–29.0)	22.4 (16.5–29.7)

Note.

^a: Analyzed from the E-cigarette School Policy Interview

^b: 95% CI run with unstratified sampling weights due to small sample sizes from the TATAMS student survey

Table 2:

The Relationship between Written School Policies and Student E-cigarette Use Behaviors (Sample n = 2755; Population N = 310,412)^a

	Administrator perceives e-cigarettes were an issue ^b (n = 809; N = 74,446)			Administrator perceives e-cigarettes were NOT an issue ^b (n = 1946; N = 235,966)		
	OR	95% CI	p-value	OR	95% CI	p-value
Ever e-cigarette use						
No policy	Ref	----	----	Ref	----	----
Policy exists	0.40	(0.17–0.96)	.04	1.07	(0.45–2.53)	.88
Past 30 day e-cigarette use						
No policy	Ref	----	----	Ref	----	----
Policy exists	0.53	(0.20–1.39)	.17	1.11	(0.49–2.54)	.80
Susceptibility to e-cigarette use						
No policy	Ref	----	----	Ref	----	----
Policy exists	0.54	(0.30–0.95)	.03	0.95	(0.59–1.54)	.83
Perceived peer use						
No policy	Ref	----	----	Ref	----	----
Policy exists	0.20	(0.08–0.52)	<.01	0.96	(0.42–2.17)	.92

Note.

^a. Models are adjusted for past 30 day other tobacco use from the TATAMS student survey

^b. Analyzed from the E-cigarette School Policy Interview

Table 3:
Frequency of Components in E-cigarette Written Policies in Participating TATAMS Schools (n = 54)

	All schools (n = 54)		Schools where administrator perceives e-cigarettes were an issue ^a (n = 13)		Schools where administrator perceives e-cigarettes were an issue ^a (n = 41)	
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
E-cigarettes are specifically named	38 (70.4%)	12 (92.3%)			27 (65.9%)	
Bans use of e-cigarettes by students	38 (70.4%)	12 (92.3%)			27 (65.9%)	
Bans possession of e-cigarettes by students	38 (70.4%)	12 (92.3%)			27 (65.9%)	
Bans e-cigarettes						
Within school buildings	38 (70.4%)	12 (92.3%)			27 (65.9%)	
Outside on school grounds	38 (70.4%)	12 (92.3%)			27 (65.9%)	
On school busses	34 (63.0%)	10 (76.9%)			25 (61.0%)	
Off-campus, school-sponsored events	38 (70.4%)	12 (92.3%)			27 (65.9%)	
Disciplinary action for first offense						
Confiscation	2 (3.7%)	1 (7.7%)			1 (2.4%)	
Meeting with parents	35 (64.8%)	11 (84.6%)			25 (61.0%)	
In-school suspension	38 (70.4%)	12 (92.3%)			27 (65.9%)	
Out-of-school suspension	35 (64.8%)	10 (76.9%)			26 (63.4%)	
Disciplinary action for repeated offenses						
Confiscation	2 (3.7%)	1 (7.7%)			1 (2.4%)	
Meeting with parents	35 (64.8%)	11 (84.6%)			25 (61.0%)	
In-school suspension	38 (70.4%)	12 (92.3%)			27 (65.9%)	
Out-of-school suspension	38 (70.4%)	12 (92.3%)			27 (65.9%)	
Expulsion	15 (27.8%)	7 (53.8%)			8 (19.5%)	

Note.

^a: Analyzed from the E-cigarette School Policy Interview

Table 4:

The Relationship between the Strength of the Written School Policy and Student E-cigarette Use Behaviors (n = 2755; N = 310,412)^a

	Administrator perceives e-cigarettes were an issue ^b (n = 809; N = 74,446)			Administrator perceives e-cigarettes were NOT an issue ^b (n = 1946; N = 235,966)		
	OR	95% CI	p-value	OR	95% CI	p-value
Ever e-cigarette use						
No (0)	Ref	---	---	Ref	---	---
Low (10–12)	0.22	(0.08–0.56)	<.01	1.28	(0.40–4.03)	.67
Moderate (13)	0.16	(0.01–1.72)	.12	0.99	(0.37–2.68)	.99
High (14–16)	0.90	(0.58–1.41)	.62	1.01	(0.39–2.59)	.99
Past 30 day e-cigarette use						
No (0)	Ref	---	---	Ref	---	---
Low (10–12)	0.23	(0.10–0.52)	<.01	0.70	(0.30–1.65)	.41
Moderate (13)	0.14	(0.03–0.71)	.02	1.41	(0.55–3.61)	.46
High (14–16)	1.23	(0.65–2.33)	.49	0.97	(0.38–2.50)	.95
Susceptibility to e-cigarette use						
No (0)	Ref	---	---	Ref	---	---
Low (10–12)	0.54	(0.46–0.64)	<.01	1.13	(0.54–2.37)	.74
Moderate (13)	0.23	(0.10–0.50)	<.01	0.89	(0.53–1.48)	.64
High (14–16)	1.02	(0.59–1.79)	.93	0.94	(0.47–1.89)	.86
Perceived peer use						
No (0)	Ref	---	---	Ref	---	---
Low (10–12)	0.12	(0.05–0.32)	<.01	1.06	(0.35–3.18)	.92
Moderate (13)	0.09	(0.01–1.23)	.07	0.92	(0.39–2.21)	.86
High (14–16)	0.45	(0.24–0.85)	.02	0.95	(0.29–3.13)	.93

Note.

^a: Models are adjusted for past 30 day other tobacco use from the TATAMS student survey

^b: Analyzed from the E-cigarette School Policy Interview