Remote versus In-Person Learning During COVID-19: Comparison of E-Cigarette Susceptibility and Ever Use among a diverse cohort of 6th Grade Students in Texas.

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Abstract

Background: In response to SARS-CoV2 (COVID-19), school districts incorporated remote learning as a mitigation strategy. This study examines the association between classroom setting (i.e., on-campus versus remote) and e-cigarette susceptibility or ever use among a sample of Texas public middle school students.

Methods: Data from n=985 students enrolled in the CATCH My Breath E-Cigarette Prevention Program trial were collected in Spring 2021. Participants were 6th grade students in urban Texas. E-cigarette use was examined using the "at-risk" definition described by FDA, indicating either: (1) susceptible never user; or (2) experimental ever use. A multi-level, logistic regression models examined the association between classroom setting and e-cigarette susceptibility/ever use. Covariates included sex, race/ethnicity, academic achievement, household e-cigarette use, perceived school connectedness, and school-level economic status. Models account for nesting within school district. Analyses stratified by race/ethnicity were also conducted.

Results: Overall, 36.3% of the sample were susceptible never users or ever e-cigarette users. The sample was comprised of 55.0% on-campus and 45.0% remote learners. On-campus learners had greater odds of reporting e-cigarette susceptibility or ever use (aOR: 1.45; p=0.014). These findings were observed among Latino (aOR: 1.77; p=0.026) and White (aOR: 2.10; p=0.099) but not African American/Black (aOR: 0.86; p=0.728) youth.

Conclusions: On-campus learning during the Spring 2021 semester was associated with greater risk for e-cigarette susceptibility or ever use among a diverse sample of 6th grade students. E-cigarette susceptibility and ever use is a risk factor for progression to long-term e-cigarette use in later adolescence.

Implications: As school districts prepare to return to on-campus learning in 2022, a focused approach to e-cigarette prevention may be needed to prevent widespread e-cigarette initiation and continued use. Further, study findings demonstrate a need for further research on the school environment as a determinant of e-cigarette use.

Keywords: Youth; E-Cigarettes; Schools; Social Influences; COVID-19;

INTRODUCTION

Electronic cigarettes (e-cigarettes) are the most commonly used tobacco products among youth.[1] In 2020, nearly 35% of middle and high school students had used an e-cigarette at least once[2] and 45% of never users reported susceptibility to use.[2] Per the Food and Drug Administration (FDA), susceptible, never e-cigarette users and experimental ever users are described as a population at risk for progression to long-term e-cigarette use during late adolescence and early young adulthood.[3] As most e-cigarettes contain nicotine,[4,5] adolescent e-cigarette users have been found to be at elevated risk for nicotine dependence[6-8] as well as initiation to combustible tobacco products use.[9-11] Following the precautionary principle, the US Surgeon General[4] and the National Academy of Sciences[5] have both advocated for interventions to palliate further potential risk and harm to adolescents.

The novel coronavirus SARS-CoV2 (COVID-19) emerged in December 2019, and by March of 2020, had been declared a pandemic by the World Health Organization (WHO).[12] Several mitigation strategies were implemented to reduce the spread of COVID-19, including allowing school districts to transition to remote learning (i.e. utilize technology to educate in place of on-campus learning). It has been proposed that the transition to remote learning, as well as other social distancing efforts, may result in fewer opportunities to engage in deviant behavior such as substance use.[13] A longitudinal study of U.S. high school seniors (i.e., 12th grade students) found that the onset of COVID-19 mitigation strategies was associated with a decline in nicotine vaping but not among other substances (e.g., alcohol; marijuana), from February/March 2020 (baseline) to summer 2020 (follow-up).[13] Consequently, research is needed to examine the impact of COVID-19 mitigation strategies on e-cigarettes use behaviors among adolescents.

The plausibility of changes in learning setting impacting e-cigarette use is reinforced by changes in e-cigarette use prevalence from 2020 (pre-pandemic) to 2021 (mid-pandemic). Specifically, current e-cigarettes use among high school students declined from 19.6% in

2020[1] to 11.3% in 2021.[14] Although the decline in e-cigarette use is promising, the encouragement by these figures is reduced by a closer examination of the prevalence data. Notably, due to the COVID-19 pandemic, approximately 50% of the sample completed the National Youth Tobacco Survey (NYTS) in class, as opposed to 100% in prior years.[14] Current e-cigarette use among high school students who completed the survey in class was nearly double that of those who completed the survey at home (15% to 8.1%). In other words, the drop in high school e-cigarette use from 2020 to 2021 may be heavily influenced by students who transitioned to remote learning.

Onset and development of e-cigarette use patterns begins during early adolescence. The median age of e-cigarette initiation is approximately 14.1 year;[15] however, most ever users report susceptibility to e-cigarette use prior to initiation.[16-18] Susceptibility to use tobacco was originally developed as a psychosocial determinant of combustible cigarette initiation[19] and has been adopted as a predictor of e-cigarette initiation among youth[20-16-182], including among racially/ethnically diverse populations.[20] Further, the FDA describes their focus of targeted, e-cigarette prevention efforts (i.e., 'The Real Cost') as focused on youth who are susceptible, never users or ever users who have not yet progressed to established, long-term use.[3] The utility of susceptibility as a determinant of subsequent e-cigarette initiation, as well as the use of this construct by e-cigarette prevention campaigns, makes susceptibility an essential outcome in e-cigarette prevention research.

The school environment is a determinant of e-cigarette use and susceptibility.[21,22] For example, a study of high school students in Connecticut found that nearly half of all adolescent e-cigarette users reported using on campus.[23] Nationally representative data found that 52.2% of middle school and 73.7% of high school students reported observing peers use an e-cigarette on school grounds[24] and that those who did observe peers use an e-cigarette on school grounds were twice as likely to have ever used an e-cigarette or be susceptible to e-

cigarette use.[24] Thus, it is probable that youth who transitioned to remote learning were less exposed to peer e-cigarette users, access to e-cigarettes on- campus and other normalizing behaviors of e-cigarette use, thereby resulting in reduced e-cigarette susceptibility and use.

Home setting also plays an essential role in creating tobacco use norms. The relationship between household tobacco use and subsequent use behaviors among youth is well-established.[25] Product-specific research has found that this relationship holds for e-cigarettes as youth who live with an e-cigarette user (i.e. household use) are more likely to report ever and past 30-day e-cigarette use, relative to those who do not live with an e-cigarette user.[26,27] As such, any investigation into the role of school setting and environment including classroom setting (i.e., on-campus versus remote) have on e-cigarette use behaviors should include home setting as well.

Study Aims & Hypotheses

This study examines the association between learning setting (i.e. remote versus in-person learning) and e-cigarette susceptibility or ever use, among a diverse sample of 6th grade students in Texas. The outcome for this study corresponds to FDA's definition for "at-risk" youth, comprised of: (1) susceptible never e-cigarette users; and (2) ever e-cigarette users. Based on prior research,[13] we hypothesize that youth who reported in-person learning will have elevated risk of e-cigarette susceptibility and ever use, relative to those who were remote learners. Latino youth are less likely to be exposed to e-cigarette prevention campaigns, relative to non-Hispanic White youth[28] and, as a result, frequently report higher rates of e-cigarette susceptibility and ever use.[29,30] As such, our study examines the possible modifying role of race/ethnicity on the main effect of this study. Findings from this study aim to inform schools in their response to COVID-19 as well as planning for the post-COVID pandemic era.

METHODS

Study Procedures

This study analyzed baseline data from a National Institute of Health funded randomized controlled trial (RCT) of CATCH My Breath, a middle school-based e-cigarette prevention program. As treatment condition (i.e., experimental versus control) was not factored into this analysis, the study sample is considered a convenience sample of 6th grade students from two urban regions of Texas. Participants were recruited from n=22 middle schools across three school districts in the Dallas/Fort Worth and El Paso metropolitan areas.

Parental consent and student assent were collected prior to data collection. Data were collected via digital survey (Qualtrics) from February to May 2021. Student e-mail addresses were collected from each school district. Digital links were then e-mailed to the school assigned e-mail address for each participant. All participants were 6th grade students at the time of enrollment and data collection. This study was reviewed and approved by [removed for blinded review] and participating school districts. Participation was voluntary.

Study Sample

A total of n=1,133 6th grade participants were recruited during the Spring 2021 school session. However, this study analyzed data from a subsample of n=985 students. The subsample was as a result of two factors: first, 71 students among recruited participants (i.e. those with parental consent) completed an abridged paper version of the baseline survey because there were unable to take the online survey. The abridged version of the survey only assessed items specific to the main effect and exposure of the RCT; thus, participants who completed the abridged survey had missing data across a number of study variables. Second, approximately 7.3% (n=77) had missing data on study variable and were removed from the dataset. This resulted in the final analytic sample of n=985 participants (6th grade students) who completed the survey and had complete data on all study variables.

Measures

E-Cigarette Susceptibility and Ever Use. The primary outcome variable for this study was e-cigarette susceptibility and ever use of e-cigarettes. Participants were categorized as: (1) non-susceptible, never e-cigarette users; and (2) susceptible, never e-cigarette users or ever e-cigarette users. A series of logic-skip pattern questions were used to categorized participants by e-cigarette status. First, participants were asked: "Have you ever used an electronic cigarette, even once? This includes JUUL, vape pens, mods, or any other type of e-cigarette." Those who responded "yes" were categorized as ever e-cigarette users. Those who responded "no" were asked three questions related to e-cigarette susceptibility.[17] The three e-cigarette susceptibility questions were: (1) "Have you ever been curious about using an e-cigarette?"; (2) "Do you think you will try an e-cigarette soon?"; and (3) "If one of your best friends were to offer you an e-cigarette, would you use it?" Participants were categorized as susceptible to e-cigarette use if they responded with anything other than "definitely not" to one or more of the questions.[17,31] Based on the FDA's classification of "at-risk" youth, we classified participants as non-susceptible never users (referent) and susceptible never users or experimental ever uses (coded as 1).

Class Modality. The primary independent variable of this study was class modality. Participants were asked: "Are your classes mostly…": "in person/at school", "online/on the computer", or "both." For this study, responses were dichotomized into remote (i.e., "online/on the computer"; referent) and in-person (i.e., "in person/at school" or "both").

Covariates. This study controlled for the following socio-demographic covariates: sex, race/ethnicity, academic achievement, and perceived school connectedness. For sex, males served as the referent group and females as the comparison group. Race/ethnicity was categorized as: Hispanic/Latino (referent); non-Hispanic, White; non-Hispanic, Black; Hispanic/Latino; and "other" (i.e., non-Hispanic, Asian; multiracial; and any other race). To

assess perceived school connectedness, participants were asked to report how much they agreed or disagreed with the following statements: (1) I feel close to people at my school; (2) I feel I am part of my school; (3) I feel the teachers at my school treat me fairly; and (4) I am happy to be at my school. Responses ranged from "strongly agree" (coded as 1) to "strongly disagree" (coded as 4). Mean score of these four items was used to compute perceived school connectedness and centered z-scores were computed for connectedness (i.e., [(value – mean) / 1 standard deviation)]) and reported, along the with mean and standard deviation.

Household e-cigarette use was assessed via the following item: "Do any of the following people in your household use e-cigarettes? (Check all that apply)" Possible responses were: mother/female guardian; father/male guardian; grandparents; other (for example, brother or sister); no one in my house use e-cigarettes. A binary variable reflecting household e-cigarette use was created. Household e-cigarette use was classified as selecting 1 or more e-cigarette users in the household.

This study controlled for school-level economic conditions. Specifically, proportion of students on free or reduced lunch for each school was reported for all n=22 schools. The proportion of students on free or reduce lunch ranged from 33.6% to 92.1%, with a mean of 63.4% (SD: 18.6). Given this distribution, we elected to create a three-category tertile variable reflection high (referent), middle, and low economic group. For these data, high (n=306) ranged from 33.6% to 52.5%, middle (n=350) ranged from 54.6% to 77.5%, and low (n=329) ranged from 78.5% to 92.1%.

Statistical Analyses

Prior to testing study hypotheses, we examined frequency distribution, measures of central tendency and variability, and reported these in our descriptive statistics. Additionally, we conducted a binary logistic regression that examined the unadjusted association between classroom type and e-cigarette susceptibility or ever use. To test our hypothesis, we

conducted a multilevel logistic regression models to estimate the association between classroom setting and e-cigarette use categories. The referent outcome category was non-susceptible never e-cigarette users. The adjusted model controlled for sex, race/ethnicity, academic achievement, household e-cigarette use, perceived school connectedness, self-reported exposure to positive e-cigarette content on social media, and school-level economic condition. School district was included as a nesting variable for all analyses. Analyses were conducted using STATA 14.2 (College Station, TX).

RESULTS

Descriptive Statistics

Overall, 36.3% of the sample was classified as at-risk for e-cigarette use, indicating susceptible never users (32.7%) or experimental ever users (3.6%). The sample was 57.6% Hispanic/Latino and evenly distributed by sex (53% female). Detailed descriptive statistics of the full sample by e-cigarette use category are reported in Table 1.

The sample was 55% on-campus learners and 45% remote learnings. As seen in Table 2, there were differences in classroom setting by race/ethnicity and household e-cigarette use. There were no statistical differences in school connectedness (p=0.529) by classroom setting.

Study Hypotheses

As seen in Table 3, on-campus learners had 1.39 greater odds (95% CI: 1.07 – 1.81) of reporting e-cigarette susceptibility or ever use, relative to remote learners in the unadjusted models. The multi-level, logistic regression model found that on-campus learners had 1.53 greater odds (95% CI: 1.13 – 2.07) of reporting e-cigarette susceptibility or ever use, relative to remote learners, after controlling for sex, race/ethnicity, academic achievement, household e-cigarette use, perceived school connectedness, and school-level economic condition, as well as nesting within school district.

Stratified Analyses

Analyses were conducted, stratified by race/ethnic group. Among Latinos, on-campus learners had 1.75 (95% CI: 1.19 – 2.59) greater odds of reporting e-cigarette susceptibility or ever use, relative to remote Latino learner. Among non-Hispanic Whites, on-campuses had 2.14 (95% CI: 0.88 – 5.22; p=0.099) greater odds of reporting e-cigarette susceptibility or ever use, relative to White remote learners, though this finding was not statistically significant. Among African American/Black youth, on-campus learners did not have greater odds of reporting e-cigarette susceptibility or ever use (aOR: 0.81; 95% CI: 0.32 – 2.04); the only significant variable in this stratified analysis was being of the lowest economic status (aOR: 4.01; 1.14 – 14.21; p=0.031). Similarly, among non-Hispanic, Other youth, on-campus learners did not have greater odds of reporting e-cigarette susceptibility or ever use (aOR: 0.75; 95% CI: 0.31 – 1.80) p=0.517); school connectedness (aOR: 0.54; 95% CI: 0.34 – 0.85; p=0.008) and household e-cigarette use (aOR: 6.84; 1.92 – 24.32; p=0.003). Stratified analyses are described in further detail in Table 4.

DISCUSSION

This study found that 6th grade students who attended school in-person during the COVID-19 pandemic (i.e. Spring 2021 school session) had greater odds of reporting e-cigarette susceptibility and ever use than those who attended school remotely. To our knowledge, this is the first study to examine differences in e-cigarette susceptibility and ever use by classroom setting in the era of COVID-19. This study builds on prior longitudinal data that found a reduction in e-cigarette use from the onset of the COVID-19 pandemic (February/March 2020) to the implementation of mitigation strategies such as social distancing (July/August 2020) among high school seniors (12th grade).[13]

Findings presented in this study add context to the steep decline in adolescent e-cigarette use prevalence observed from 2020 to 2021. Specifically, e-cigarette use prevalence

in 2021 was nearly double among youth who attend in-person learning (15.0%) compared to those who were not attending in-person learning (8.1%).[14] Our findings, combined with national prevalence data[14] and evidence from a prior longitudinal study,[13] suggest that remote learning may have acted as an environmental, protective factor against e-cigarette susceptibility, and possibly ever use, among youth. The plausibly theory for this relationship stems from prior work showing the role of school environment as a normative influence towards e-cigarette use (e.g., use on campus), resulting in elevated risk for susceptibility and e-cigarette use.[21-24] It is important to note that this is a cross-sectional study of a convenience sample of 6th grade students in two metropolitan areas of Texas.

Stratified analyses found that the association between class setting and e-cigarette susceptibility/ever use was consistent for Latino and non-Hispanic White youth but not African American/Black or non-Hispanic "Other" youth. The relationship in the White sample appears to be of clinical significance, though lacks power to reach statistical significance, showing similarities with Latino youth. Conversely, stratified analyses for African American/Black youth show that economic status was the strongest correlate for e-cigarette susceptibility/ever use. Similarly, among non-Hispanic "Other" youth, two social/environmental factors (i.e., school connectedness; household e-cigarette use) were the strongest correlates for e-cigarette susceptibility/ever use. These findings are only preliminary and are limited by statistical power, however, may provide direction for future research on tailored health promotion strategies.

This study observed interesting relationships between school connectedness and both classroom setting and e-cigarette susceptibility/ever user, though this was not the primary focus or aim. For example, perceived school connectedness did not differ by classroom setting (mean: 2.10 for in-person learners; 2.13 for remote learners), indicating the need to further examine this construct in the context of modern communication, interaction, and

connectivity. While the descriptive data suggest school connectedness may extend into digital communication, our findings reinforce the prior research showing school connectedness is a protective factor against adolescent tobacco use (aOR: 0.32). These findings suggest school connectedness can be achieved via remote learning while maintaining the protective effect against adverse health behaviors among youth.

This study has several limitations. First, data were self-reported by participants thus subject to response and recall bias. Second, temporal and causal inferences cannot be made as study data is cross-sectional. Third, this study did not account for peer and school related variables, with the exception of perceived school connectedness, and thus cannot speak directly to possible contributing factors (e.g., peer observation; peer pressure) for the observed relationship. Finally, data is from a diverse sample of adolescent in two metropolitan areas of Texas which is not generalizable to an entire population.

Despite these limitations, findings provide insights into our understanding of the school environment as a factor in adolescent e-cigarette use outcomes. School districts have the potential to play an active role in continuing this decline in youth vaping in addition to implementing a focused effort on e-cigarette prevention. While many schools in the U.S and globally implement e-cigarette prevention efforts,[32,33] our findings indicate a need for further exploration of the environmental factors within the school setting that may normalize and promote e-cigarette use, including the role of peer influence, social norms and access to e-cigarettes. Additional research, particularly using longitudinal data, is needed to replicate our findings among different age groups and grade levels. The need for future research notwithstanding, our findings suggest a current need for school districts to make a concerted effort to prevent a spike in e-cigarette susceptibility and use as students return to in-class learning.

Declaration of Interest

SHK and DSM are consultants in litigation against the vaping industry. This does not alter our adherence to NTR policies on sharing data and materials.

Data availability statement

As these data correspond to an ongoing, experimental study of adolescent participants, supporting data is not available at this time.

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Table 1: Descriptive of Full Sample by Exposure and Outcome (CATCH My Breath Study Sample n=985)

	Full Sample	Non-Susceptible,[a] Never E-Cigarette Users	At-Risk Youth[b]	P-Value
Percent of Sample	100%	63.8%	36.2%	
Class Modality[c]				
In-Person	55%	60.3%	39.7%	**P=0.013**
Remote	45%	68.0%	32.0%	
Sex				
Male	47%	61.8%	38.2%	P=0.222
Female	53%	65.5%	34.5%	
Race/Ethnicity				
Hispanic/Latino	57.6%	63.8%	36..2%	P=0.433
Non-Hispanic, White	21.2%	67.5%	32.5%	
Non-Hispanic, Black	9.3%	58.7%	41.3%	
Non-Hispanic, Other[d]	11.9%	60.7%	39.3%	
Perceived School Connectedness[e]				
Mean (SD)	2.12 (0.018)	2.25 (0.51)	1.89 (0.61)	**P<0.001**
z-score	3.81^-7(1)	-0.40 (1.06)	0.22 (0.89)	
Household E-Cigarette Use[f]				
No	86.7%	67.8%	32.3%	**P<0.001**
Yes	13.3%	37.4%	62.6%	
School Economic Condition[g]				
Low	31.1%	57.5%	42.5%	**P=0.013**
Middle	35.5%	64.6%	35.4%	
High	33.4%	68.9%	31.3%	

a Susceptibility to E-cigarette Use is (yes=1, no=0) where a response of "Definitely yes," "Probably yes," or "Probably not" to any of the following 3 questions is considered susceptible (1): Have you ever been curious about using an e-cigarette?"; (2) Do you think that you will try an e-cigarette soon?"; and (3) If one of your best friends were to offer you an e-cigarette, would you use it?"
b Self-reported ever use of an e-cigarette or susceptible to e-cigarette use, if never user.
c Participants reported class modality as in-person (i.e., "in person/at school" or "both") and remote (i.e., "online/on the computer")
d For this study, "other" reflects non-Hispanic, Asian; multiracial; and any other race
e Mean score of four-item assessment. Participants were asked (1) I feel close to people at my school; (2) I feel I am part of my school; (3) I feel the teachers at my school treat me fairly; and (4) I am happy to be at my school. Responses ranged from "strongly agree" (coded as 1) to "strongly disagree" (coded as 4). Higher scores reflect lower perceived school connectedness.
h Reflects living with one or more individuals who use e-cigarettes.
g Reflects school-level proportion of students on free or reduced lunch program. For these data, high (n=306) ranged from 33.6% to 52.5%, middle (n=350) ranged from 54.6% to 77.5%, and low (n=329) ranged from 78.5% to 92.1%.

Table 2: Descriptive Statistics of Classroom Setting (CATCH My Breath Study Sample n=985)

	In-Person[a]	Remote[a]	P-Value[b]
<u>Percent of Sample</u>	55.0%	45.0%	
Sex			
Male	55.4%	44.6%	P=0.821
Female	54.6%	45.4%	
Race/Ethnicity			
Hispanic/Latino	43.2%	56.8%	**P<0.001**
Non-Hispanic, White	79.4%	20.6%	
Non-Hispanic, Black	60.9%	39.1%	
Non-Hispanic, Other[d]	64.1%	35.9%	
Perceived School Connectedness[d]			
Mean (SD)	2.10 (0.59)	2.12 (0.56)	P=0.529
z-score	-0.02 (1.03)	0.02 (0.97)	
Household E-Cigarette Use[e]			
No	52.7%	47.3%	**P<0.001**
Yes	29.8%	70.2%	
School Economic Condition[f]			
Low	40.9%	59.2%	**P<0.001**
Middle	53.1%	46.9%	
High	70.2%	70.2%	

a Participants reported class modality as in-person (i.e., "in person/at school" or "both") and remote (i.e., "online/on the computer")

b Reflects statistical significant of chi-squared test.

c For this study, "other" reflects non-Hispanic, Asian; multiracial; and any other race

d Mean score of four-item assessment. Participants were asked (1) I feel close to people at my school; (2) I feel I am part of my school; (3) I feel the teachers at my school treat me fairly; and (4) I am happy to be at my school. Responses ranged from "strongly agree" (coded as 1) to "strongly disagree" (coded as 4). Higher scores reflect lower perceived school connectedness.

e Reflects living with one or more individuals who use e-cigarettes.

f Reflects school-level proportion of students on free or reduced lunch program For these data, high (n=306) ranged from 33.6% to 52.5%, middle (n=350) ranged from 54.6% to 77.5%, and low (n=329) ranged from 78.5% to 92.1%.

Table 3: Association of Classroom Setting and E-Cigarette Susceptibility or Ever Use

	At-Risk Youth[a]
	Odds Ratio (OR) 95% Confidence Intervals
Classroom Setting[b]	
Remote	1.00 (Referent)
In-Person	**1.53** (1.13 – 2.07)**
Sex	
Male	1.00 (Referent)
Female	1.31 (0.98 – 1.74)
Race/Ethnicity	
Hispanic/Latino	1.00 (Referent)
Non-Hispanic, White	0.88 (0.59 – 1.32)
Non-Hispanic, Black	1.09 (0.67 – 1.79)
Non-Hispanic, Other[c]	1.12 (0.71 – 1.77)
School Connectedness[d]	
Z-Score	**0.52*** (0.45 – 0.61)**
Household E-Cigarette Use[e]	
No	1.00 (Referent)
Yes	**2.99*** (1.98 – 4.51)**
School Economic Condition[f]	
High	1.00 (Referent)
Middle	1.17 (0.78 – 1.60)
Low	**1.57** (1.06 – 2.32)**

*** p<0.001; ** p<0.010; * p<0.050
NOTE: Non-Susceptible, Never E-Cigarette Use was the referent outcome. All models accounted for nesting within school districts.
a Reflects ever e-cigarette use or susceptibility to use e-cigarettes among never users. Susceptibility to E-cigarette Use is (yes=1, no=0) where a response of "Definitely yes," "Probably yes," or "Probably not" to any of the following 3 questions is considered susceptible (1): Have you ever been curious about using an e-cigarette?"; (2) Do you think that you will try an e-cigarette soon?"; and (3) If one of your best friends were to offer you an e-cigarette, would you use it?"
Only those that responded "Definitely not" to all three questions were considered not susceptible (0).
b Participants reported class modality as in-person (i.e., "in person/at school" or "both") and remote (i.e., "online/on the computer")
c For this study, "other" reflects non-Hispanic, Asian; multiracial; and any other race
d Mean score of four-item assessment. Participants were asked (1) I feel close to people at my school; (2) I feel I am part of my school; (3) I feel the teachers at my school treat me fairly; and (4) I am happy to be at my school. Responses ranged from "strongly agree" (coded as 1) to "strongly disagree" (coded as 4). Higher scores reflect lower perceived school connectedness. A z-score was used for this variable.
e Reflects living with one or more individuals who use e-cigarettes.
f Reflects school-level proportion of students on free or reduced lunch program. For these data, high (n=306) ranged from 33.6% to 52.5%, middle (n=350) ranged from 54.6% to 77.5%, and low (n=329) ranged from 78.5% to 92.1%.

Table 4: Association of Classroom Setting and E-Cigarette Susceptibility or Ever Use by Race and Ethnic Group

	Hispanic/Latino (n=567)	Non-Hispanic, White (n=209)	Non-Hispanic, Black (n=92)	Non-Hispanic, Other[b] (n=117)
	At-Risk Youth[a]	At-Risk Youth[a]	At-Risk Youth[a]	At-Risk Youth[a]
	Odds Ratio (OR) 95% Confidence Intervals	Odds Ratio (OR) 95% Confidence Intervals	Odds Ratio (OR) 95% Confidence Intervals	Odds Ratio (OR) 95% Confidence Intervals
Classroom Setting[c]				
Remote	1.00 (Referent)	1.00 (Referent)	1.00 (Referent)	1.00 (Referent)
In-Person	**1.75** (1.19 – 2.59)	2.14 (0.88 – 5.22)	0.81 (0.32 – 2.04)	0.75 (0.31 – 1.80)
Sex				
Male	1.00 (Referent)	1.00 (Referent)	1.00 (Referent)	1.00 (Referent)
Female	**1.47* (1.00 – 2.14)**	0.95 (0.49 – 1.85)	0.93 (0.37 – 2.33)	1.72 (0.72 – 4.12)
School Connectedness[d]				
Z-Score	**0.51*** (0.41 – 0.64)**	**0.44*** (0.32 – 0.62)**	0.74 (0.48 – 1.15)	**0.54** (0.34 – 0.85)**
Household E-Cigarette Use[e]				
No	1.00 (Referent)	1.00 (Referent)	1.00 (Referent)	1.00 (Referent)
Yes	**3.29*** (1.84 – 5.88)**	**2.74* (1.16 – 6.49)**	0.49 (0.11 – 2.07)	**6.84** (1.92 – 24.32)**
School Economic Condition[f]				
High	1.00 (Referent)	1.00 (Referent)	1.00 (Referent)	1.00 (Referent)
Middle	1.58 (0.91 – 2.74)	1.07 (0.53 – 2.12)	0.80 (0.26 – 2.45)	0.64 (0.26 – 1.67)
Low	**2.05** (1.20 – 3.50)**	0.65 (0.15 – 3.71)	**4.02* (1.14 – 14.21)**	0.58 (0.17 – 1.95)

*** p<0.001; ** p<0.010; * p<0.050
NOTE: Non-Susceptible, Never E-Cigarette Use was the referent outcome. All models accounted for nesting within school districts.
a Reflects ever e-cigarette use or susceptibility to use e-cigarettes among never users. Susceptibility to E-cigarette Use is (yes=1, no=0) where a response of "Definitely yes," "Probably yes," or "Probably not" to any of the following 3 questions is considered susceptible (1): Have you ever been curious about using an e-cigarette?"; (2) Do you think that you will try an e-cigarette soon?"; and (3) If one of your best friends were to offer you an e-cigarette, would you use it?" Only those that responded "Definitely not" to all three questions were considered not susceptible (0).
b For this study, "other" reflects non-Hispanic, Asian; multiracial; and any other race
c b Participants reported class modality as in-person (i.e., "in person/at school" or "both") and remote (i.e., "online/on the computer")
d Mean score of four-item assessment. Participants were asked (1) I feel close to people at my school; (2) I feel I am part of my school; (3) I feel the teachers at my school treat me fairly; and (4) I am happy to be at my school. Responses ranged from "strongly agree" (coded as 1) to "strongly disagree" (coded as 4). Higher scores reflect lower perceived school connectedness. A z-score was used for this variable.
e Reflects living with one or more individuals who use e-cigarettes.
f Reflects school-level proportion of students on free or reduced lunch program. For these data, high (n=306) ranged from 33.6% to 52.5%, middle (n=350) ranged from 54.6% to 77.5%, and low (n=329) ranged from 78.5% to 92.1%.