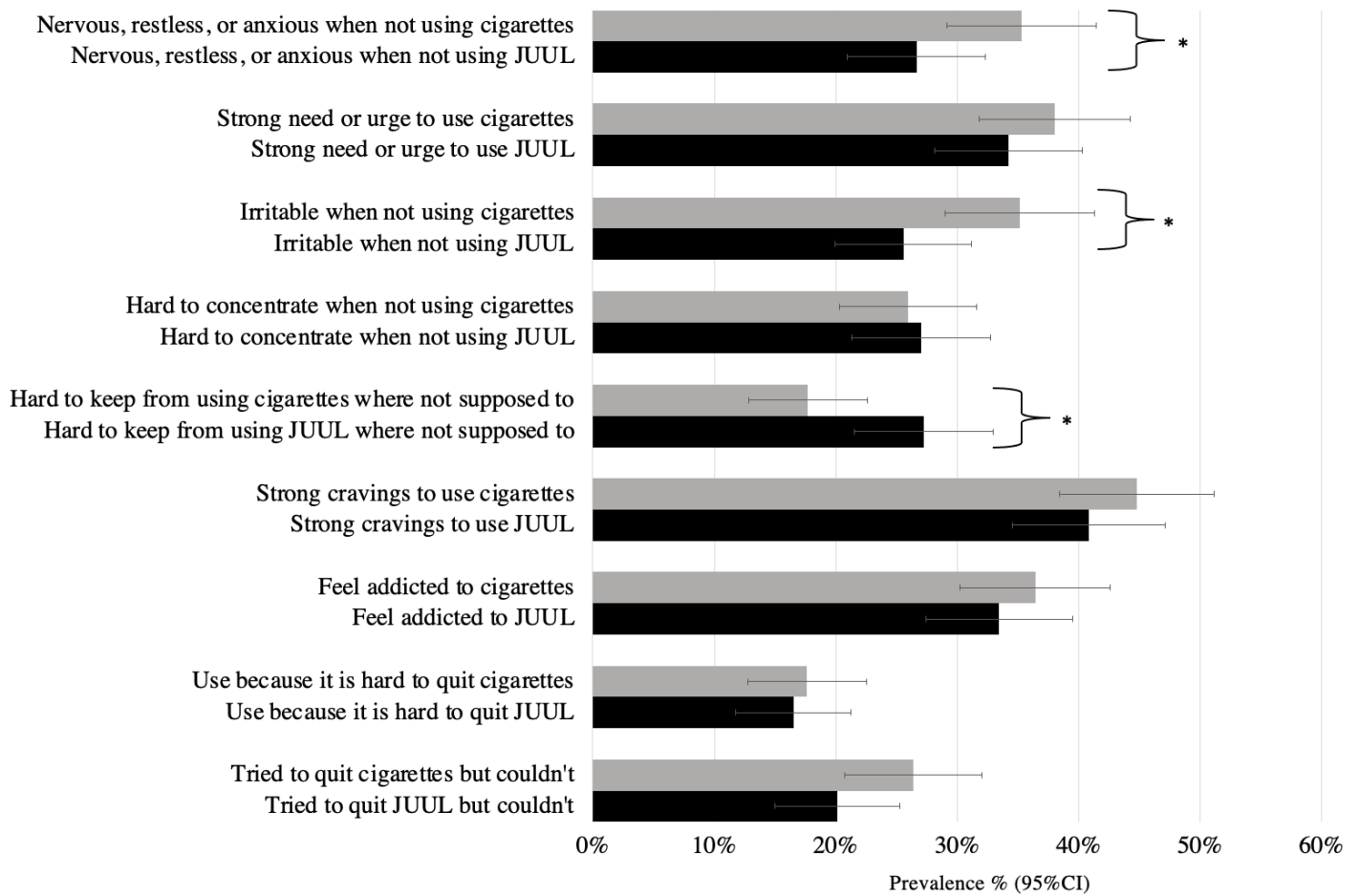
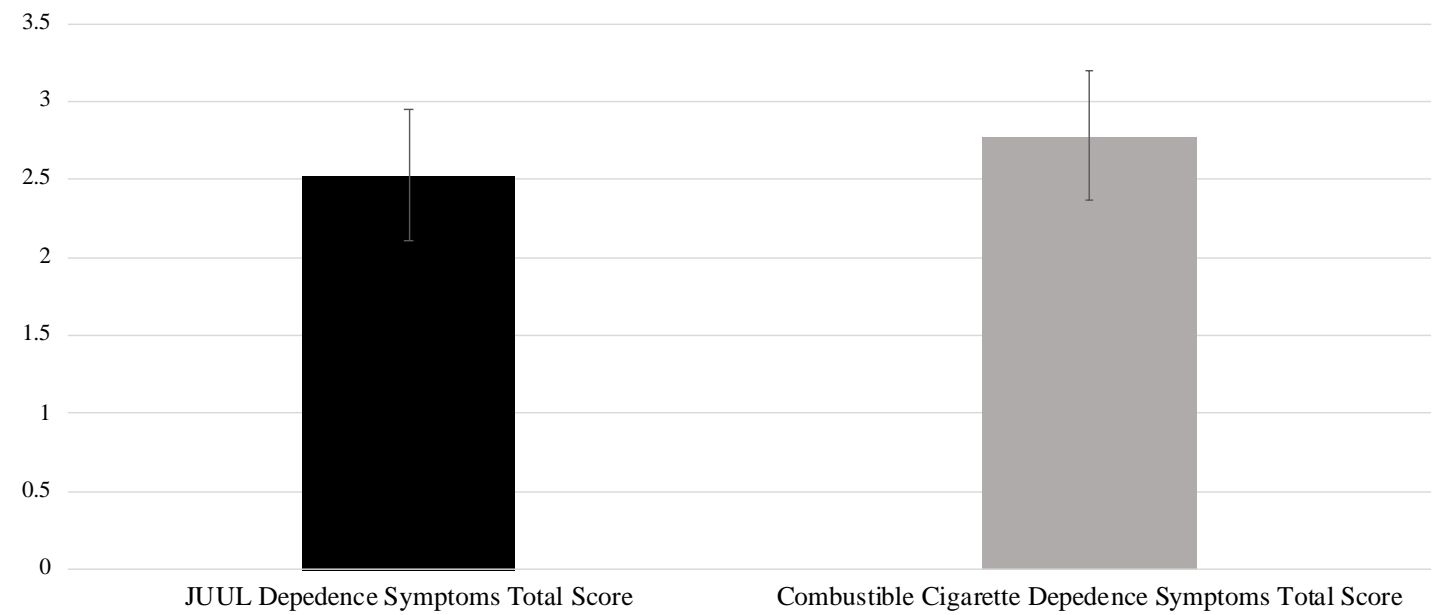


Supplemental Figure S1. Prevalence of Types of Nicotine Dependence Symptoms Experienced among JUUL and Combustible Cigarette Dual Users ($N=235$)



Note. * Significantly different based on based on the McNemar test on paired proportions ($p < .01$, two-tailed).

Supplemental Figure S2. Mean Scores of JUUL and Cigarette Dependence Symptom Score among Dual Users



Note. JUUL and Cigarette dependence symptoms scores were nonsignificant among dual users.

Supplemental Table S1. Descriptive Statistics of Comparison Sample of Past 30-Day Combustible Cigarette Users

Variables	Sample Characteristics N, Column % ^b
Sociodemographics	
Grade	
8 th	98, 23.3%
10 th	128, 51.7%
12 th	211, 48.3%
Gender	
Female	180, 43.6%
Male	238, 56.4%
Race/Ethnicity	
Non-Hispanic White	223, 52.3%
Non-Hispanic Black	19, 3.7%
Hispanic	62, 16.1%
Others ^d	108, 27.9%
Population Density	
Rural	174, 36.7%
Suburban	173, 47.3%
Large city	90, 16.0%
Region	
Northeast	41, 7.0%
Midwest	111, 25.5%
South	206, 42.4%
West	79, 25.2%
Parental education level	
No college degree	213, 54.7%
College degree	171, 45.3%
Past 30-day substance use	
Combustible cigarettes	
≤1 cigarette per day	267, 60.5%
1-5 cigarettes per day	102, 24.2%
1/2 pack per day	28, 5.6%
1 pack per day	18, 4.2%
1.5 packs per day	7, 1.6%
≥2 packs per day	15, 4.0%
JUUL	
No	76, 27.4%
Yes	219, 72.6%
Other tobacco products ^e	
No	197, 60.6%
Yes	119, 39.4%
No. alcohol/cannabis/other drugs ^f	
0	75, 16.7%
1	136, 30.3%
2	146, 34.3%
3	73, 18.7%

Note. Overall sample N= 437; participants with >1 Cigarette dependence symptoms: 220 (52.1%; unweighted N, weights %)

^aAvailable data (Ns=295-437). ^bUnweighted frequency (N) and weighted percentage (%) are reported. ^dOther race/ethnicity includes Asian and multiracial groups. ^eIncludes smokeless tobacco, cigars/cigarillos, and hookah tobacco. ^fTotal number of substance classes used (alcohol, cannabis, or other drugs [inhalants, hallucinogen, LSD, cocaine, crack, heroin, opioids, barbiturate drugs, tranquilizer drugs, methamphetamine]).

Supplemental Table S2. Descriptive Statistics of Comparison Samples of Past 30-Day JUUL and Combustible Cigarette Use Status

Variables	JUUL use only (N=1532) N, Column % ^b	Cigarette use only (N=221) N, Column % ^b	Dual use (N=216) N, Column % ^b	Group difference P-Value
Sociodemographics				
Grade				<.001
8 th	286, 17.7% ²	51, 25.7% ¹	47, 20.8% ^{1,2}	
10 th	655, 42.4% ¹	61, 25.0% ²	67, 32.2% ²	
12 th	591, 39.9% ²	109, 49.3% ¹	102, 47.1% ^{1,2}	
Gender				.02
Female	757, 50.7% ¹	88, 42.0% ²	92, 45.1% ^{1,2}	
Male	758, 49.3% ²	116, 58.0% ¹	122, 54.9% ^{1,2}	
Race/Ethnicity				<.001
Non-Hispanic White	956, 64.4% ¹	87, 41.1% ²	136, 63.7% ¹	
Non-Hispanic Black	84, 5.3% ¹	14, 5.4% ¹	5, 2.0% ¹	
Hispanic	165, 11.3% ²	42, 22.5% ¹	20, 9.6% ²	
Others ^d	293, 18.9% ²	57, 31.0% ¹	51, 24.7% ^{1,2}	
Population Density				<.001
Rural	398, 24.4% ²	85, 33.9% ¹	89, 39.8% ¹	
Suburban	638, 51.9% ¹	88, 48.6% ¹	85, 46.1% ¹	
Large city	496, 23.7% ¹	48, 17.5% ²	42, 14.2% ²	
Region				<.001
Northeast	268, 15.7% ¹	24, 7.1% ²	17, 6.7% ²	
Midwest	436, 30.8% ¹	50, 20.7% ²	61, 30.6% ¹	
South	619, 36.3% ²	106, 47.1% ¹	100, 37.3% ²	
West	209, 17.2% ²	41, 25.0% ¹	38, 25.5% ¹	
Parental education level				<.001
No college degree	553, 39.4% ²	111, 62.7% ¹	102, 47.1% ²	
College degree	900, 60.6% ¹	70, 37.3% ²	101, 52.9% ¹	

Note. Overall sample N= 437; participants with >1 Cigarette dependence symptoms: 220 (52.1%; unweighted N, weights %)

^aAvailable data (Ns=295-437). ^bUnweighted frequency (N) and weighted percentage (%) are reported. ^cOther race/ethnicity includes Asian and multiracial groups. ^dIncludes smokeless tobacco, cigars/cigarillos, and hookah tobacco. ^eTotal number of substance classes used (alcohol, cannabis, or other drugs [inhalants, hallucinogen, LSD, cocaine, crack, heroin, opioids, barbiturate drugs, tranquilizer drugs, methamphetamine]).

Supplemental Table S3. Relative risk estimation by log-binomial regression model for any dependence symptom

Regressors	Any dependence symptoms	
	Risk Ratio (95% CI)^{a,b,c}	P-Value
Sociodemographics		
Grade		
8 th	REF	--
10 th	0.74 (0.61, 0.88)	.001*
12 th	0.75 (0.63, 0.91)	.003*
Female (male REF)	1.14 (1.04, 1.26)	.01*
Race/Ethnicity		
Non-Hispanic White	REF	--
Non-Hispanic Black	1.01 (0.74, 1.36)	.99
Hispanic	0.88 (0.72, 1.08)	.21
Others ^d	0.86 (0.72, 1.04)	.11
Population Density		
Rural	REF	--
Suburban	0.98 (0.88, 1.10)	.81
Large city	1.17 (1.01, 1.36)	.04
Region		
Northeast	REF	--
Midwest	0.92 (0.84, 1.01)	.09
South	0.94 (0.85, 1.03)	.19
West		.43
Parent with (vs. without) college degree	1.08 (0.96, 1.21)	.22
Nicotine dependence		
Combustible cigarette dependence symptoms (Any vs. None)	1.13 (1.02, 1.24)	.01*
Past 30-day substance use		
Other tobacco products ^e	0.94 (0.83, 1.06)	.31
No. alcohol/cannabis/other drugs ^f		
0	REF	--
1	1.20 (0.91, 1.59)	.20
2	1.42 (1.01, 2.01)	.04
3	1.61 (1.14, 2.28)	.007*
JUUL		
1-2 days	REF	--
3-5 days	1.44 (1.18, 1.77)	<.001*
6-9 days	1.46 (1.18, 1.82)	<.001*
10-19 days	1.89 (1.54, 2.32)	<.001*
20 or more days	2.34 (1.99, 2.74)	<.001*

Note. Past 30-day JUUL users N=1748. ^aMultivariable log-binomial regression model for binary outcome of JUUL dependence status (any symptoms vs. none). ^bAll regressors were simultaneously modeled consistent with the primary analysis except past 30-day combustible cigarette use for the model convergence. ^cSampling weight was considered. Complex analyses were conducted using the cluster variable (astrat: Stratum for single or multiple year analysis). ^dOther race/ethnicity includes Asian and multiracial groups. ^eIncludes smokeless tobacco, cigars/cigarillos, and hookah tobacco. ^fTotal number of substance classes used (alcohol, cannabis, or other drugs [inhalants, hallucinogen, LSD, cocaine, crack, heroin, opioids, barbiturate drugs, tranquilizer drugs, methamphetamine]). *Statistically significant after Benjamini-Hochberg correction for multiple tests to maintain study-wise false discovery rate of .05.