

Supplemental Online Content

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This supplemental material has been provided by the authors to give readers additional information about their work.

eTable 1. Participant Characteristics Full and Follow-up Samples: Adolescents in Northern California, USA (2019-2020)

The 1084 participants who completed ≥ 1 follow-up survey were similar to the full cohort in their aggregate characteristics, with some exceptions (eTable 1). Follow-up participants were statistically significantly ($P < 0.05$) more likely to be female and report good scholastic performance and less likely at baseline to report substance use or endorse sensation-seeking characteristics, although differences were modest in magnitude (eTable 1).

Characteristic (at Baseline)	All Participants N=1423 ^b	Follow-up Sample ^a N=1084 ^b	p-value ^c
Grade in school, No. (%)			
Ninth	800 (57.5%)	611 (57.5%)	0.99
Tenth	592 (42.5%)	452 (42.5%)	
Gender, No. (%)			
Female	801 (56.4%)	657 (60.6%)	<0.001
Male	606 (42.6%)	414 (38.2%)	
Other	14 (1.0%)	13 (1.2%)	
Race/ethnicity, No. (%)			
Hispanic/Latinx	485 (34.1%)	380 (35.1%)	0.07
Non-Hispanic White	699 (49.1%)	535 (49.4%)	
Other	239 (16.8%)	169 (15.6%)	
Computers at home, No. (%)			
None	163 (11.7%)	117 (11.0%)	0.08
One	364 (26.1%)	266 (25.0%)	
Two	344 (24.7%)	269 (25.3%)	
More than two	523 (37.5%)	413 (38.8%)	
Family vacations, No. (%)			
None in past year	296 (21.2%)	222 (20.8%)	0.94
One	363 (26.0%)	278 (26.1%)	
Two	299 (21.4%)	230 (21.6%)	
More than two	438 (31.4%)	336 (31.5%)	
School lunch program, No. (%)			
Free or reduced	802 (58.7%)	603 (57.8%)	0.01
Full price	359 (26.3%)	293 (28.1%)	
Don't know	206 (15.1%)	147 (14.1%)	
Scholastic performance, No. (%)			
Mostly A's	525 (37.0%)	455 (42.1%)	<0.001
Mostly B's	527 (37.1%)	403 (37.2%)	
Mostly C's or below	296 (20.9%)	178 (16.5%)	
Don't know	71 (5.0%)	46 (4.3%)	
Depression symptoms, No. (%)			
Positive screen	433 (30.6%)	343 (31.8%)	0.08
Negative screen	981 (69.4%)	735 (68.2%)	
E-cigarette use, No. (%)			
Never	841 (59.1%)	672 (62.0%)	<0.001
Ever (0 days in past 30 days)	279 (19.6%)	206 (19.0%)	
1-5 days in past 30 days	173 (12.2%)	121 (11.2%)	

6-30 days in past 30 days	129 (9.1%)	85 (7.8%)	
Other tobacco use ^d , No. (%)			
0 days in past 30 days	1355 (93.8%)	1030 (95.0%)	0.001
1-30 days in past 30 days	88 (6.2%)	54 (5.0%)	
Cannabis use, No. (%)			
Never	886 (62.3%)	703 (64.9%)	<0.001
Ever (0 days in past 30 days)	237 (16.7%)	180 (16.6%)	
1-5 days in past 30 days	183 (12.9%)	125 (11.5%)	
6-30 days in past 30 days	116 (8.2%)	76 (7.0%)	
Alcohol use, No. (%)			
0 days in past 30 days	1116 (78.8%)	872 (80.6%)	0.002
1-30 days in past 30 days	301 (21.2%)	210 (19.4%)	
Physically active, No. (%)			
0-1 days in past week	136 (9.6%)	100 (9.3%)	0.42
2-4 days in past week	501 (35.3%)	391 (36.2%)	
5-7 days in past week	782 (55.1%)	590 (54.6%)	
Sensation seeking score			
Standardized mean (SD)	0.00 (1.00)	-0.05 (0.99)	<0.001
Has a follow-up visit ^e , No. (%)			
Before March 20, 2020	521 (36.6%)	521 (48.1%)	
After March 19, 2020	950 (66.8%)	950 (87.6%)	
Any follow-up	1084 (76.2%)	1084 (100%)	

- a. Any follow-up, including 6-month or 12-month survey.
- b. Number of participants may be smaller for some variables due to missing data.
- c. Chi-square test to compare those without and without follow-up; exception: sensation seeking score tested with t-test.
- d. Any tobacco product (i.e., cigarettes, cigars, hookah, or smokeless tobacco), e-cigarettes excluded
- e. Not mutually exclusive: some participants completed 6-month follow-up before March 20, 2020 and 12-month follow-up after March 19, 2020.

Abbreviation: SD = standard deviation

eTable 2. Behaviors at Follow-up: Associations with Stay-at-Home Order

Models in eTable 2 include behaviors (i.e., e-cigarette, other tobacco, cannabis, and alcohol use and physical activity, in separate models) observed at follow-up (6-month or 12-month), in which the main independent variable of interest was whether a follow-up response was collected after the stay-at-home order (n=950 observations) relative to before the order (n=521 observations). Models included only follow-up responses and control for baseline behaviors and characteristics. Due to the timing of the stay-at-home order relative to the cohort's progression, participants contributed either one observation before, one observation after, or one observation before and one after the stay-at-home order.

The odds of reporting e-cigarette use were not meaningfully or statistically significantly different between follow-up responses collected after the stay-at-home order versus before (eTable 2). Similarly, the adjusted odds of reporting cannabis use were modestly but not statistically significantly higher in responses collected after the stay-at-home order, and the adjusted odds of reporting alcohol use did not differ (eTable 2). Unlike substance use, the proportion of students achieving ≥ 5 days of physical activity per week strongly declined after the stay-at-home order (eTable 2). Results largely did not vary when responses collected between March 20 and April 18, 2020 were excluded, although the association with physical activity was slightly attenuated (eTable 2).

	Relative Odds ^a of Reporting Behavior in Follow-up after March 19, 2020 vs. Earlier Follow-up (95% Confidence Interval)					
	All follow-up responses			Excluding March 20 - April 18, 2020		
	N	n	Adjusted ^b OR (95% CI)	N	n	Adjusted ^b OR (95% CI)
E-cigarettes ^c	1078	1461	0.90 (0.58, 1.39)	1027	1154	0.87 (0.44, 1.74)
Other Tobacco ^{c,d}	1084	1471	1.12 (0.56, 2.23)	1034	1164	1.69 (0.65, 4.34)
Cannabis ^c	1082	1467	1.20 (0.82, 1.77)	1032	1160	1.21 (0.75, 1.97)
Alcohol ^c	1073	1454	0.99 (0.70, 1.41)	1020	1148	1.03 (0.62, 1.72)
Physical Activity ^e	1084	1468	0.57 (0.45, 0.73)	1034	1163	0.68 (0.49, 0.95)

- All odds ratios from generalized estimating equation logistic regression models weighted for losses to follow-up and including within-participant correlation (exchangeable) and robust variance estimation.
- Adjusted model covariables (all measured at baseline): sex, race/ethnicity, year in school, home computer ownership, family vacations, school lunch program participation, use of e-cigarettes, cannabis, alcohol, and other tobacco, physical activity, academic performance, depression screen, sensation-seeking, and school. Missing covariable values multiply imputed.
- Use ≥ 1 day in the past 30 days
- Any tobacco product (i.e., cigarettes, cigars, hookah, or smokeless tobacco), e-cigarettes excluded
- Physically activity ≥ 5 days in the past week

Abbreviations: CI = confidence interval; N = number of participants; n = number of responses; OR = odds ratio

eTable 3. Changes in Behaviors: Spring 2019 and Fall 2019 Cohorts

This table examines changes in behaviors (i.e., starting or stopping e-cigarette, other tobacco, cannabis, and alcohol use and physical activity) between subsequent survey waves (i.e., baseline to 6-month follow-up and, for the spring cohort, 6-month follow-up to 12-month follow-up). Multivariable models assess whether initiation at 6-month follow-up among baseline non-users or stopping at 6-month follow-up among baseline users differed between the two cohorts. In the spring cohort, all 6-month follow-up preceded the California stay-at-home order and all 12-month follow-up occurred after the order. In the fall cohort, 6-month follow-up occurred after the order.

Initiation and stopping of past 30-day use of e-cigarettes, other tobacco, and alcohol did not differ meaningfully or statistically significantly between the cohorts (eTable 3). Likewise, no meaningful difference was observed for these outcomes between 6-month and 12-month follow-up in the spring cohort (eTable 3). Cannabis initiation at 6-months was lower in the fall cohort (4.4% vs. 8.9%) and became nominally statistically significantly in adjusted models. However, decreased stopping at 12-months in the spring cohort (eTable 3) led to overall similar cannabis use prevalence before and after the stay-at-home order (Main Text Table 3). Becoming physically activity ≥ 5 days per week was lower in follow-up observations collected after the stay-at-home order. Likewise, more than half of participants who had achieved ≥ 5 days of physical activity prior to the stay-at-home order no longer reached that level after the order (eTable 3). The adjusted odds of no longer achieving this level of physical activity at 6-month follow-up in the fall cohort (after the stay-at-home order) were 2.4-times the odds in the spring cohort (eTable 3).

	Initiating ^a				Stopping ^a			
	Before / Before Stay-at-Home	Before / After Stay-at-Home	Cohort Comparison ⁱ		Before / Before Stay-at-Home	Before / After Stay-at-Home	Cohort Comparison ⁱ	
Spring 2019 Cohort ^{b,c}	Baseline to 6-months	6-months to 12-months	AOR ^j (95% CI)	p-value	Baseline to 6-months	6-months to 12-months	AOR ^{j,k} (95% CI)	p-value
E-Cigarettes ^e	4.7%	5.5%	0.69 (0.30, 1.61)	0.39	57.3%	52.5%	1.04 (0.45, 2.39)	0.92
Other Tobacco ^{e,f}	1.8%	3.2%	0.94 (0.19, 4.63)	0.94	67.6%	69.2%	2.13 (0.42, 10.9)	0.36
Cannabis ^e	7.0%	8.9%	0.49 (0.24, 0.99)	0.05	41.8%	33.9%	0.64 (0.28, 1.45)	0.28
Alcohol ^e	11.3%	11.9%	1.38 (0.80, 2.40)	0.25	48.3%	56.3%	1.84 (0.82, 4.10)	0.14
Physical Activity ^g	35.3%	24.2%	0.59 (0.37, 0.93)	0.02	31.9%	50.5%	2.39 (1.61, 3.56)	<0.001
Fall 2019 Cohort ^{c,h}	Baseline to 6-months	Before / After Stay-at-Home	Cohort Comparison ⁱ		Baseline to 6-months	Before / After Stay-at-Home	Cohort Comparison ⁱ	
E-Cigarettes ^e	3.9%	61.5%	0.69 (0.30, 1.61)	0.39	61.5%	1.04 (0.45, 2.39)	0.92	
Other Tobacco ^{e,f}	0.8%	61.1%	0.94 (0.19, 4.63)	0.94	61.1%	2.13 (0.42, 10.9)	0.36	
Cannabis ^e	4.4%	43.2%	0.49 (0.24, 0.99)	0.05	43.2%	0.64 (0.28, 1.45)	0.28	
Alcohol ^e	12.5%	54.3%	1.38 (0.80, 2.40)	0.25	54.3%	1.84 (0.82, 4.10)	0.14	
Physical Activity ^g	26.1%	51.7%	0.59 (0.37, 0.93)	0.02	51.7%	2.39 (1.61, 3.56)	<0.001	

- a. Initiating calculated as percentage with the outcome at the second timepoint (i.e., past 30-day product use) among those without the outcome at the first timepoint; Stopping calculated as percentage without the outcome at the second timepoint (i.e., past 30-day product use) among those with the outcome at the first timepoint.
- b. Schools recruited March 2019 to May 2019 whose 6-month follow-up was completed before the March 19, 2020 California stay-at-home order
- c. From the fall 2019 cohort schools, N=51 6-month follow-up responses were collected prior to the March 19, 2020 California stay-at-home order (collected from February 27, 2020 to March 7, 2020). For this analysis, those responses are included with the spring 2019 cohort.
- d. Wilcoxon signed-rank test for paired responses (exact) to compare prevalence of initiating or stopping from baseline to 6-months and 6-months to 12-months in the spring 2019 cohort; hypothesis test (but not displayed prevalence) restricted those with both 6-month and 12-month follow-up (N=387)
- e. Use ≥ 1 day in the past 30 days
- f. Any tobacco product (i.e., cigarettes, cigars, hookah, or smokeless tobacco), e-cigarettes excluded
- g. Physically activity ≥ 5 days in the past week
- h. Schools recruited August 2019 to February 2020 whose 6-month follow-up was completed after the March 19, 2020 California stay-at-home order
- i. Models estimate whether changes in behaviors from baseline to 6-month follow-up differ by cohort. Odds ratio and p-value are from a main term for cohort, estimated using logistic regression models weighted for losses to follow-up with robust variance estimation.
- j. Adjusted model covariables (all measured at baseline): gender, race/ethnicity, year in school, home computer ownership, family vacations, school lunch program participation, academic performance, depression screen, sensation-seeking, school, and other behaviors (i.e., use of e-cigarettes, cannabis, alcohol, and other tobacco and physical activity, excluding the outcome behavior). Missing covariable values multiply imputed.
- k. Adjusted model for stopping other tobacco use excluded home computer ownership, family vacations, and academic performance as covariables due to perfect prediction.

Abbreviations: AOR = adjusted odds ratio; CI = confidence interval