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Developing a National Longitudinal Tobacco Cohort of Youth and Young Adults: The Tobacco Epidemic Evaluation Network (TEEN+) Study

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Abstract

Introduction: Timely and relevant data are critical to monitoring the rapidly changing youth vaping epidemic and for understanding the prevalence, patterns of use, knowledge, and perceptions of tobacco products. While e-cigarettes have been the most used tobacco product among youth for nearly a decade, new nicotine delivery products continue to be introduced to the US market. Flavored tobacco products, including flavored e-cigarettes, menthol cigarettes, and flavored cigars, drive disparities in use by young people.

Aims and Methods: To examine tobacco use among youth and young adults, the *Monitoring E-Cigarette Use among Youth* project established a longitudinal cohort of youth and young adults (13–24)—the Tobacco Epidemic Evaluation Network (TEEN+) study. TEEN+ focuses on

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Supplementary material

Supplementary material is available at *Nicotine and Tobacco Research* online.

Declaration of Interests

None declared.

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e-cigarette and other tobacco products use and also includes questions about other substance use (eg, marijuana, alcohol), physical health, mental health, and social determinants of health (eg, discrimination, poverty, sexual and gender identity). Geocoding of responses allows for the evaluation of local tobacco control policies. The cohort includes an oversample of California residents to generate reliable and representative state-level estimates. This manuscript provides an overview of methods and baseline demographics from Wave 1.

Results: The initial Wave 1 TEEN+ cohort included 10 255 in the national sample and 2761 in the California sample.

Conclusions: TEEN+ study data complement nationally-representative cross-sectional studies and allow for rapid evaluation of local and state policies. This manuscript describes the study's probability-based sample recruitment. Furthermore, we identify this initiative as a resource for evaluating the impact of flavored tobacco restriction policies and informing policy implementation efforts.

Implications: This manuscript provides an overview of the methodology and baseline characteristics for a new longitudinal cohort of youth and young adults, the Tobacco Epidemic Evaluation Network (TEEN+) study. The TEEN+ study data can be used to evaluate the impact of flavored tobacco product restriction policies and informing policy implementation efforts.

Introduction

E-cigarettes were first marketed in the United States around 2007.[1] Since then, features of e-cigarettes have changed rapidly, including flavors, nicotine concentration, size, shape, and device type. Recent studies have found dramatic increases in the sales of ice or cooling flavored e-cigarettes[2] and disposable e-cigarettes[3] and an increase in the nicotine strength of e-cigarettes sold in the United States.[4,5] The dynamic context of product availability and sales, coupled with changes in federal, state, and local policies, necessitates having adaptable tools for rapid surveillance.

E-cigarette use prevalence has fluctuated markedly among youth and young adults according to estimates from the National Youth Tobacco Survey (NYTS) and the National Health Interview Survey (NHIS). According to weighted NYTS estimates, although the prevalence of e-cigarette use among youth has apparently declined since a peak of 20.0% (5.4 million) in 2019,[6] 9.4% of middle and high school students (2.6 million) reported that they had used an e-cigarette at least once in the past month in 2022.[7,8] Among high school students who currently used e-cigarettes, 27.7% (approximately 840 000 students) reported frequent (20 or more days in the past month) use in 2018.[9] This proportion increased to 46.0% (980 000 students) by 2022.[7] Furthermore, e-cigarette use is more prevalent, and has changed more rapidly, among youth and younger adults compared with older adults. Based on NHIS estimates from January to June 2019, 8.1% (95% CI: 7.1, 9.1) of young adults aged 18–34 years used e-cigarettes, increasing to 12.2% (95% CI: 10.8, 13.6) by January to June 2022.[10] By comparison, e-cigarette use prevalence among adults aged 35–49 years was 4.8% (CI: 4.0, 5.7) during January to June 2019 and 5.9% (CI: 5.1, 6.8) during January to June 2022.[10]

E-cigarette use among youth and young adults is a public health concern. Nicotine can harm the adolescent brain, which continues to develop through approximately age 25.[1]

Additionally, e-cigarette aerosols contain harmful and potentially harmful constituents, including heavy metals and carcinogens.[1] Flavors are a major driver of youth e-cigarette use; in 2022, 84.9% of high school and middle school students who currently used e-cigarettes reported using flavored products, with fruit, candy, desserts or other sweets, mint and menthol being the most commonly used flavored products.[7] Additionally, 61.4% of young adults who use e-cigarettes have never smoked cigarettes, suggesting that e-cigarettes may be a starter product for nicotine use among young adults.[11]

To reduce young people's access to flavored e-cigarettes and other flavored tobacco products, several states and localities restrict the sale of flavored tobacco products. Policies and strategies vary. Some prohibit the sale of non-tobacco characterizing flavors only in e-cigarettes, or allow for exemptions for menthol flavor, while others comprehensively restrict the sale of all flavors across the full spectrum of tobacco products, including menthol cigarettes, cigars, and e-cigarettes.[12,13] By March 2023, 388 US jurisdictions, including eight states, had enacted some type of restriction on flavored tobacco product sales, covering approximately 35% of the population.[14] Many jurisdictions have also implemented complementary, simultaneous restrictions on nicotine concentrations and tax increases on e-cigarettes.

This context of rapid change in products, behaviors, and policies complicates researchers' and public health practitioners' ability to monitor the youth e-cigarette epidemic and evaluate the impact of policies on behavior. Timely data collection efforts leveraging multiple methods are warranted to better understand the real-time impacts of product availability and policy action on youth and young adult behavior, knowledge, attitudes, and perceptions.

The *Monitoring E-Cigarette Use Among Youth* project's main aim is to provide rapid data collection and analysis efforts to complement existing national- and state-level surveillance activities and generate robust data for policy evaluation. The project is composed of multiple initiatives,[15] including analysis of retail sales data purchasing[2–4,16–19] and survey data collection and analysis.[15] As a part of this project, the Tobacco Epidemic Evaluation Network (TEEN+) study longitudinal cohort was established.

Existing surveillance systems that provide annual or biennial cross-sectional data including tobacco use estimates have been the gold standard to assess prevalence and trends, but are not ideally positioned to allow for causal inferences about policy impact. Several notable cohort surveys focus on tobacco use, including the Population Assessment of Tobacco and Health (PATH)[20] and the Truth Longitudinal Cohort (TLC),[21] and provide data to assess within-person product use, knowledge, and perception over time. State-representative estimates, where they exist, are critical in providing evidence given how much tobacco policies vary.

This analysis focuses on the methodological considerations of establishing a longitudinal cohort of youth and young adults, and baseline demographic characteristics from the initial baseline survey (Wave 1). Surveys will be completed approximately every 6 months to allow for timely monitoring of sub-annual trends and changes over time. This analysis will provide

an overview of the TEEN+ study longitudinal survey design, sampling, and data collection as part of the multicomponent *Monitoring E-Cigarette Use Among Youth* project.

Methods

To assess overall trends and within-person changes over time, a national cohort was established for the TEEN+ study using probabilistic, address-based sampling. Starting in July 2022, invitations for Wave 1 were mailed and participants completed screening, consent, and survey participation online.

Population and Sampling

The TEEN+ study cohort was established to be representative of youth (13–17 years) and young adults (18–24 years) across the United States. In addition to the national cohort, respondents in California were oversampled so that representative state estimates could also be generated with sufficient sample size to analyze subgroups. California was selected because of the recent statewide flavored tobacco restriction policy and its large population size easily supports a sufficiently-powered sample. The goal was to empanel 10 000 respondents in the national cohort, with 1000 respondents naturally residing in California, based on population proportions. The California oversample included an additional 1800 respondents, for a total estimated sample of 2800 respondents in California.

Wave 1 was fielded from July to October 2022. To recruit the initial cohort, an address-based sample (ABS) was selected using the US Postal Service's Computerized Delivery Sequence File (CDSF) as the core sampling frame. The CDSF was supplemented with auxiliary data files, including US Census data and commercial data sources, to support stratified sampling. For this study, the sampling frame was divided into three strata as follows: (1) households with a high likelihood of having a 13–18 year-old member, (2) households with a high likelihood of having a 19–24 year-old member, and (3) all remaining households with no information about any youth or young adult members. The ability to incorporate ancillary commercial data to assess household composition, and the likelihood of a household member aged 13–24 years, reduced recruitment costs and allowed for more efficient sampling.

In addition to the age stratification, each Census Block Group (CBG) was classified as either high- or low-income. Low-income CBGs were those with a median annual household income of less than $50 000 for the national sample, and a median annual household income of less than $60 000 for the California oversample. These age and income strata were nested to create six overall strata for both the national sample and the California oversample.

The sample was disproportionately allocated to oversample households more likely to include a 13–18 or 19–24 year-old member to aid in sample efficiency. Households in the lower income CBG strata were also oversampled in anticipation of differentially lower response rates from these neighborhoods. Households not identified as having a teen or young adult were included in the sampling to ensure full population coverage. To ensure geographic dispersion of the sample, the CDSF was sorted by ZIP Code + Four and systematic samples were selected within each stratum. The target sample size was calculated

based on estimates for the anticipated response rate and the sampling fraction for each stratum was based on the target sample size. This sample design resulted in a fully probability-based, representative sample of 13–24 year-olds. This disproportional sampling allocation was addressed with the calculation of the base weights that reflect the differential selection probabilities, discussed in the weighting section below.

Survey Instrument

The web-based survey instrument was designed to take approximately 20–25 min to complete and included questions about e-cigarette use; other tobacco product use; substance use; and related attitudes, beliefs, and knowledge (Table SA). Other tobacco product use included cigarettes, cigar products (large cigars, small cigars, cigarillos), hookah/waterpipe, smokeless tobacco and snus, nicotine pouches, and heated tobacco products. Wherever possible, items that were validated or fielded in other large, national surveys including the National Youth Tobacco Survey (NYTS), PATH, and TLC surveys were incorporated. Tobacco product use questions included domains related to ever and current use, age of initiation, reasons for use, flavored product use, brands used, product access source, and cessation behavior.

Study Fielding and Recruitment

Survey materials and branding were co-developed with the survey vendor, Ipsos Public Affairs LLC. A study-specific website was created for invited respondents to visit. The website included information about the survey and frequently asked questions. Invited respondents were required to enter a password (found in their mailed invitation) to enter the screening and survey portion of the website.

The national sample was divided into four replicates, or groups, for mailing and the California oversample was divided into three replicates. Initial invitations were mailed in 9 × 12 envelopes and included a $2 incentive to encourage participation, as is common with other surveys to maximize response rate.[22] Postcards with reminders were sent 3× during the fielding period; two reminders went to the full sample, approximately 1.5 and 3 weeks after the initial invitation was mailed, and the last reminder only went to those who had yet to complete the survey.

Within each household, a screener respondent (required to be 18 years of age or older) completed a roster of household members. If only one 13–24 year-old resident was present, they were selected. If the household contained more than one 13–24 year-old resident, one was randomly selected to participate with a 70% weighted probability for a 13–17 year-old participant to ensure a final sample that would be balanced by age. This differential allocation compensated for the parental consent rate that was required for the 13–17 year-old participants.

Consent

In households with a 13–17 year-old resident selected for participation, a parent or guardian was asked to complete parental consent and background demographics. Then, selected youth respondents were asked to complete assent and begin the survey. Selected 18–24

year-old participants were asked to provide consent and then begin the survey. This protocol, including survey instruments and all consent and assent forms, were approved by Advarra (Pro00064406).[23]

Incentives

Participants received between $10 and $40 for survey completion, based on demographic characteristics of the respondent and household. Under-represented participants (eg, participants from minoritized racial and ethnic groups, younger participants) and those living in households without internet service, who required additional effort and resources to complete the survey, received higher incentives.

Data Collection and Sample Characteristics

All longitudinal studies experience attrition from wave to wave such that not all Wave 1 respondents will complete subsequent waves. Wave 2 will invite all respondents from Wave 1 to participate and will include a fresh ABS sample of new households to address attrition. This sampling is a common approach with longitudinal studies, such as the Population Assessment of Tobacco and Health (PATH) Study. The PATH Study is a collaboration between the National Institute on Drug Abuse (NIDA), National Institutes of Health (NIH), and the Center for Tobacco Products (CTP), Food and Drug Administration (FDA). The PATH study began with a very large initial cohort sample in 2011; a sizeable replenishment sample was selected and blended into the study in 2017.[24]

The new ABS sample will follow a similar design to the Wave 1 sample and will be sized based on estimated attrition rates to maintain the overall size of approximately 10 000 national completes and 2000 California completes. The largest dropout is expected to occur between Waves 1 and 2, based on prior survey methodology research.[21]

Weighting

Data were cleaned prior to weighting. Screened respondents who failed to qualify for the study based on the age requirements were not asked to complete the main questionnaire. Respondents who had moved locations, sped through, or skipped a majority of questions were excluded from the final sample. Speeders were defined as those who completed in less than one quarter of the median completion time, and high-item nonresponse was defined as having skipped 50% or more of the items that they were asked. Separate weights were created for the nationally representative sample and the California sample. The California weight pooled respondents from the national sample who live in California with the respondents selected for the California oversample. To ensure full coverage of weighting variables as needed for weighting, missing values were imputed using hot deck imputation,[25] a method of imputation in which the missing value is supplied by a donor record selected for its similarity to the record with the missing information.

The weighting process began by calculating the base weights to reflect the differential probabilities of selection from the stratified sampling. This process was also done separately for the national sample and California oversample. These selection probabilities were then adjusted to address survey nonresponse and any under- or over-coverage resulting from the

use of the CDSF frame. An iterative proportional fitting (raking) procedure was used to produce the poststratification weights.

Benchmarks for 13–24 year-olds were secured from the March 2022 Annual Social and Economic Supplement (ASEC) Supplement of the Current Population Survey (CPS)[26] and the 2019 American Community Survey (ACS).[27] For the national sample of 13–24 year-olds, the design weights were raked to the following geodemographic distributions, with adjustments applied separately among 13–17 year-old respondents and 18–24 year-old respondents: individual age by gender, race/ethnicity by age group, census division by age group, metropolitan status by age group, education level among 18–24 year-olds, household income by age group, dominant language by age group, living with parent status and census division by metropolitan status. The weighting adjustments for the California sample were similar to the national sample, except that they (1) did not include adjustments for census division and (2) included an adjustment for regions within California. California regions were defined as: Superior California/North Coast, San Francisco Bay Area, Northern San Joaquin Valley, Central Coast, Southern San Joaquin Valley, Inland Empire, Los Angeles County, Orange County, and San Diego—Imperial. Benchmarks for the California region were secured from the 2016 to 2020 American Community Survey.[27] The weights were trimmed within the age group and sample (national sample and total California sample) and scaled back to the total number of respondents in each sample. The design effect, sometimes called the unequal weighting effect, was 1.81 for the national weights and 1.85 for the California weights.

For Wave 1, all weights approximate the population at the time of data collection. For subsequent waves, longitudinal cohort weights will be generated as will pseudo-cross-sectional weights that will allow for an approximation of the population at the time of data collection; different weights will be used for different analyses. Within-person analyses over time will use cohort weights; estimates of prevalence will use pseudo-cross-sectional weights to approximate a randomly-selected group at a given data collection point.

Results

At Wave 1, among households who completed the screening section and consent and were confirmed to have an eligible household member, participation was 81.4% in the national sample and 81.5% in the California oversample. The American Association for Public Opinion Research (AAPOR) Response Rate 3 (RR3) which accounts for cases with unknown eligibility was 12.4% in the National Sample and 9.8% in the California oversample.[28] The initial cohort included 10 255 in the national sample, with 820 in California, plus an oversample of 1941 in California, for a total of 2761 Wave 1; this includes 13–17 year-old youth (n = 4211) and 18–24 year-old young adults (n = 6044) in the national sample as well as the California sample (n = 1065 youth and n = 1696 young adults). At Wave 1, the median time for survey completion was 24 min, after excluding any respondents who took the survey in multiple sessions (defined as 2 or more hours on the survey page). Four respondents who were sampled for the California oversample, but who reported having moved to a different state, were considered ineligible and removed from the final sample file. Seven respondents who engaged in suboptimal responding (those who sped

through or skipped a majority of questions) were also removed from the final sample file and excluded from weighting.

An examination of unweighted and weighted estimates in the TEEN+ Wave 1 sample suggests representativeness (Table 1). Consistent with other surveys,[29] some groups are slightly unbalanced; for example, the proportion of female respondents is slightly higher in the sample than in the general population. However, this is consistent with other nationally representative surveys,[29] and was ameliorated with weighting. Table 2 compares the demographics of respondents in the TEEN+ study to US Census benchmarks.

Discussion

Longitudinal survey methodologies are ideally suited for examinations of within-person changes in tobacco product use behaviors, which are critical to understand given the rapidly changing context of tobacco product availability and related policies. The robust sample size and national and California-representative design of the TEEN+ survey are expected to allow for subgroup analysis by demographic factors and will provide much needed data for evaluating the impact of flavored tobacco product restriction policies. While evidence is emerging on the impact of flavor policies, behavioral data that can be tied directly to policy implementation is a critical component of such evaluations and is less well established in the literature than some of the more near-term policy impacts, such as flavored tobacco product sales.[30]

The TEEN+ cohort study is similar to PATH and TLC in that it provides for longitudinal analysis of within-person changes; however, the TEEN+ study is unique in several respects. Specifically, TEEN+ uniquely allows for access to respondent geographic location (eg, to determine if the respondent is living in an area with a flavored tobacco sales restriction or not) and more timely data availability. Designed specifically as a policy evaluation, the TEEN+ study includes items to assess potential near- mid- and long-term outcomes of flavored tobacco product policies. In addition, there is an opportunity to add and edit items at each survey wave that reflect the rapidly changing product landscape. Finally, the national sample allows for specific analyses, such as within-person trajectories in areas with and without flavored tobacco restriction policies, that set the TEEN+ study apart.

The TEEN+ study's California oversample, in particular, offers an opportunity for evaluating the impact of a statewide flavored tobacco ban on youth and young adult tobacco use. In November 2022, California voters overwhelmingly upheld a state law to prohibit sales of all flavored tobacco products.[31] The law became effective in December 2022, making California the second state in the United States after Massachusetts with such a policy. TEEN+ Wave 1 completed baseline data collection in California before the policy's effective date, while subsequent waves reflect conditions in California following implementation. Information on tobacco use behaviors and related disparities among California youth and young adults before and after policy implementation is critical both to inform the state's implementation and enforcement efforts, as well as to add to the emerging evidence base on the impact of flavor restrictions on tobacco use among young people. Further, the California and national samples (excluding participants in Massachusetts, where

a statewide comprehensive flavor restriction has been effective since 2020) can be compared as a case and control.

The design of TEEN+ allows for additional, unique analysis opportunities. For example, there is the potential to create an indicator to control for those living in a state/city/county with a local or state restriction on flavored tobacco, including e-cigarettes, and those living in an area without a policy, to allow for comparative analyses of within-person changes in behavior, attitudes, and knowledge in policy versus non-policy areas. Longitudinal weights can be used to aid in the analysis of within-person data and pseudo-cross-sectional weights allow comparisons of patterns of use between waves.

While the TEEN+ study will utilize validated indicators of tobacco use when available, new and innovative items can also be expeditiously added and edited in the TEEN+ study survey, allowing for the assessment of new and emerging products and behavior patterns. For example, recent evidence from retail sales data indicate the emergence of e-cigarettes in “ice,” “cool” and other flavors that do not explicitly use the “menthol” descriptor but provide a cooling sensation.[2] Using this information, related survey items were rapidly developed for inclusion in the Wave 1 TEEN+ study while adhering to accepted constructs for assessing flavor use and adhering to requirements for institutional review of data collection instruments and protocols.[7,32] Newly-developed measures can be assessed in future validation studies. Individual waves of the survey can also be modified to include modules on a specific topic. The flexibility to add items and pivot measures is a key asset of TEEN+. By keeping pace with the rapidly changing tobacco product marketplace, TEEN+ is expected to yield timely and relevant data to inform public health practitioners and policy makers.

The TEEN+ survey will be subject to limitations inherent to longitudinal survey design, including that it should not be used to assess population-level prevalence or trends. Cross-sectional surveys, such as the National Youth Tobacco Survey, already yield this vitally important information. Further, as is common with longitudinal cohorts,[21] a degree of attrition is expected, which may reduce the representativeness of subsequent cohorts, and respondents who use tobacco may be more likely to drop out of the cohort than their peers. Efforts will be made to maximize the representativeness of subsequent samples according to demographic characteristics such as race and ethnicity, age, and tobacco product use. Finally, participation in a longitudinal cohort may impact respondents’ likelihood to take future surveys.

Conclusions

The TEEN+ study is a new national, longitudinal survey that provides timely and critical information about youth e-cigarette and other tobacco product use. In addition to being able to generate nationally representative estimates, TEEN+ study data can be used to generate California-representative estimates. This longitudinal survey fills an important gap; sample size is expected to allow for estimates of youth and young adult tobacco product use among demographic subgroups for the investigation of tobacco-related disparities, including

potential exploration of the pro-equity impact of flavored tobacco policies among youth and young adults.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Data availability

N/A—this paper reports on methods and cohort demographics only and does not include the analysis of empirical data.

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Table 1.

Demographic Characteristics of Youth and Young Adults (13–24 years) in the TEEN+ Study (Wave 1), 2022

	National Sample (n = 10 255)[1]			California Sample (n = 2761)		
	Unweighted *n*	**Unweighted %**	**Weighted %**	**Unweighted *n***	**Unweighted %**	**Weighted %**
Sex assigned at birth						
Male	4697	45.8	50.3	1196	43.3	50.3
Female	5555	54.2	49.7	1565	56.7	49.7
Sexual orientation						
Heterosexual	8347	81.6	82.4	2236	81.1	82.7
Gay, lesbian, bisexual, pan-sexual, queer, asexual, intersex	1412	13.8	12.9	368	13.3	12.1
Prefer not to answer	476	4.7	4.7	154	5.6	5.2
Gender identity						
Not transgender	9362	95.3	95.7	2493	95.0	95.3
Transgender	104	1.1	1.0	21	0.8	0.7
Nonbinary, genderfluid, or genderqueer	220	2.2	2.0	61	2.3	2.1
Other (something else not included, questioning, not sure)	139	1.4	1.3	50	1.9	1.8
Age						
13–17 years	4211	41.1	44.6	1065	38.6	44.0
18–20 years	2521	24.6	23.0	729	26.4	23.4
21–24 years	3523	34.4	32.5	967	35.0	32.5
Race/ethnicity						
American Indian or Alaska Native	65	0.6	0.4	11	0.4	0.3
Asian, non-Hispanic	383	3.7	4.7	277	10.0	11.8
Black or African American, non-Hispanic	1286	12.6	13.5	149	5.4	5.2
Hispanic or Latino	1921	18.8	24.2	1446	52.4	51.6
Other, non-Hispanic (including multiracial)	748	7.3	5.1	232	8.4	5.8
White, non-Hispanic	5843	57.0	52.1	646	23.4	25.4
Family financial situation						
Live comfortably	4187	40.9	47.8	1080	39.2	46.7
Meet needs with a little left over	3642	35.6	33.5	977	35.5	33.8
Just meet basic expenses with nothing left over	2037	19.9	15.7	579	21.0	16.2

	National Sample (n = 10 255)[1]			California Sample (n = 2761)		
	Unweighted *n*	**Unweighted %**	**Weighted %**	**Unweighted *n***	**Unweighted %**	**Weighted %**
Do not meet basic expenses	362	3.5	2.9	117	4.3	3.2
Exposure to household tobacco smoking[2]						
Yes	1955	19.1	17.5	380	13.8	14.0
No	8281	80.9	82.5	2375	86.2	86.0
Tobacco product use						
Ever e-cigarette use	3366	32.8	31.7	759	27.5	28.5
Current (P30D) e-cigarette use	1430	13.9	13.7	264	9.6	9.7
Ever cigarette use	2200	21.5	20.9	483	17.5	17.8
Current (P30D) cigarette use	524	5.1	5.1	111	4.0	4.4
Ever any tobacco product use[3]	4205	41.1	39.5	964	35.0	34.8
Current (P30D) any tobacco product use[3]	1892	18.5	18.2	378	12.4	14.0

[1] Due to respondents skipping or electing not to respond to certain questions and data imputation methods, the total number of respondents for each demographic variable does not necessarily sum to the full sample (n = 10 255 for the National Sample and n = 2761 for the California Sample).

[2] All respondents were asked: “During the past 7 days, on how many days did someone smoke tobacco products in your home while you were there?”

[3] Any tobacco product includes: e-cigarettes, cigarettes, cigar products (cigars, cigarillos, little cigars), hookah/waterpipe, smokeless tobacco or snus, heated tobacco, and nicotine pouches.

Table 2.

Demographic Characteristics of Youth and Young Adults (13–24 years) in the TEEN+ Study (Wave 1), 2022 compared to the US Census

	National sample (n = 10 255)		US Census Benchmarks (Based on March 2022 Annual Social and Economic Supplement of the Current Population Survey[26] and the 2019 American Community Survey[27])
	Unweighted n	Unweighted %	%
Sex assigned at birth			
Male	4697	45.8	50.6
Female	5555	54.2	49.4
Age			
13–17 years	4211	41.1	43.6
18–20 years	2521	24.6	23.6
21–24 years	3523	34.4	32.8
Race/ethnicity			
American Indian or Alaska Native	65	0.6	1.1
Asian, non-Hispanic	383	3.7	5.4
Black or African American, non-Hispanic	1286	12.6	13.7
Hispanic or Latino	1921	18.8	24.7
Other, non-Hispanic (including multiracial)	748	7.3	3.7
White, non-Hispanic	5843	57.0	51.4
Region			
Northeast	1393	13.6	16.4
South	4359	42.5	38.5
Midwest	2671	26.1	21.0
West	1832	17.9	24.1
Metropolitan statistical area category			
Non-metro	1771	17.3	13.2
Metro	8484	82.7	86.8