



Tomorrow in Austin and via Livestream:
<http://go.uth.edu/TCORS2016>



Youth and E-Cigarettes: *Why Are We Concerned?*

Suchitra Krishnan-Sarin, PhD
Yale University School of Medicine

**Broadcast will begin
at 10:30 a.m. (CT)**

 **#TCORS2016**



hosted by



Emerging Trends in Tobacco and Other Substance Use In High School Students



Suchitra Krishnan-Sarin, Ph.D.
Professor of Psychiatry

Funding and Conflicts

- **Funding sources:**

- NIDA grant P50DA0 09241
- *The funding agencies had no role in the study design, collection, analysis, or interpretation of the data. The content of this presentation is solely the authors' responsibility and does not necessarily represent the official views of the funding agencies.*

- **Conflicts and Disclosures**

- Member of the FDA Tobacco Products Scientific Advisory Committee
- Principal Investigator of the NIDA-funded Yale Tobacco Centers on Regulatory Sciences

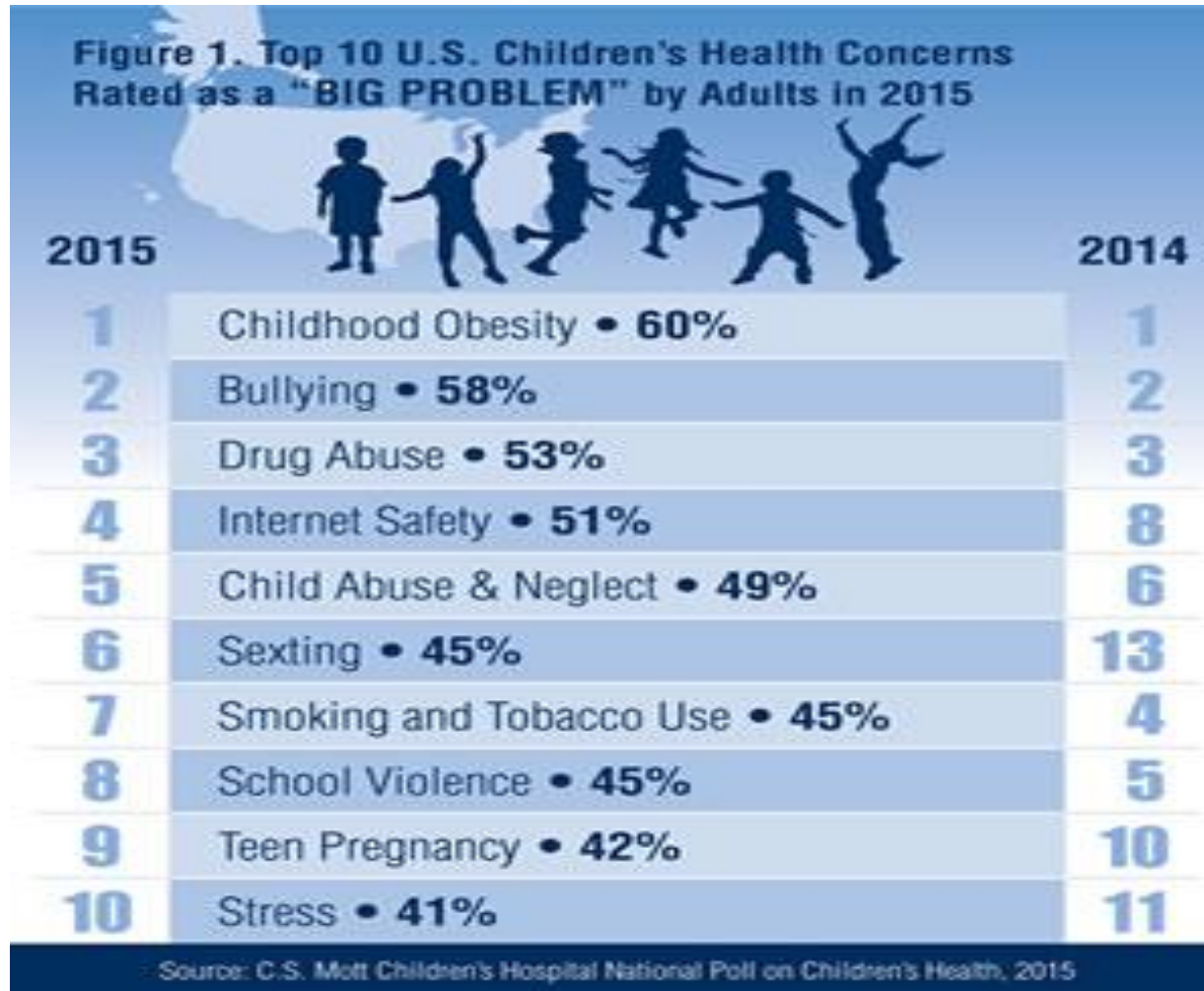
Tobacco Use: Cigarette Smoking

Between 1964 and 2014:

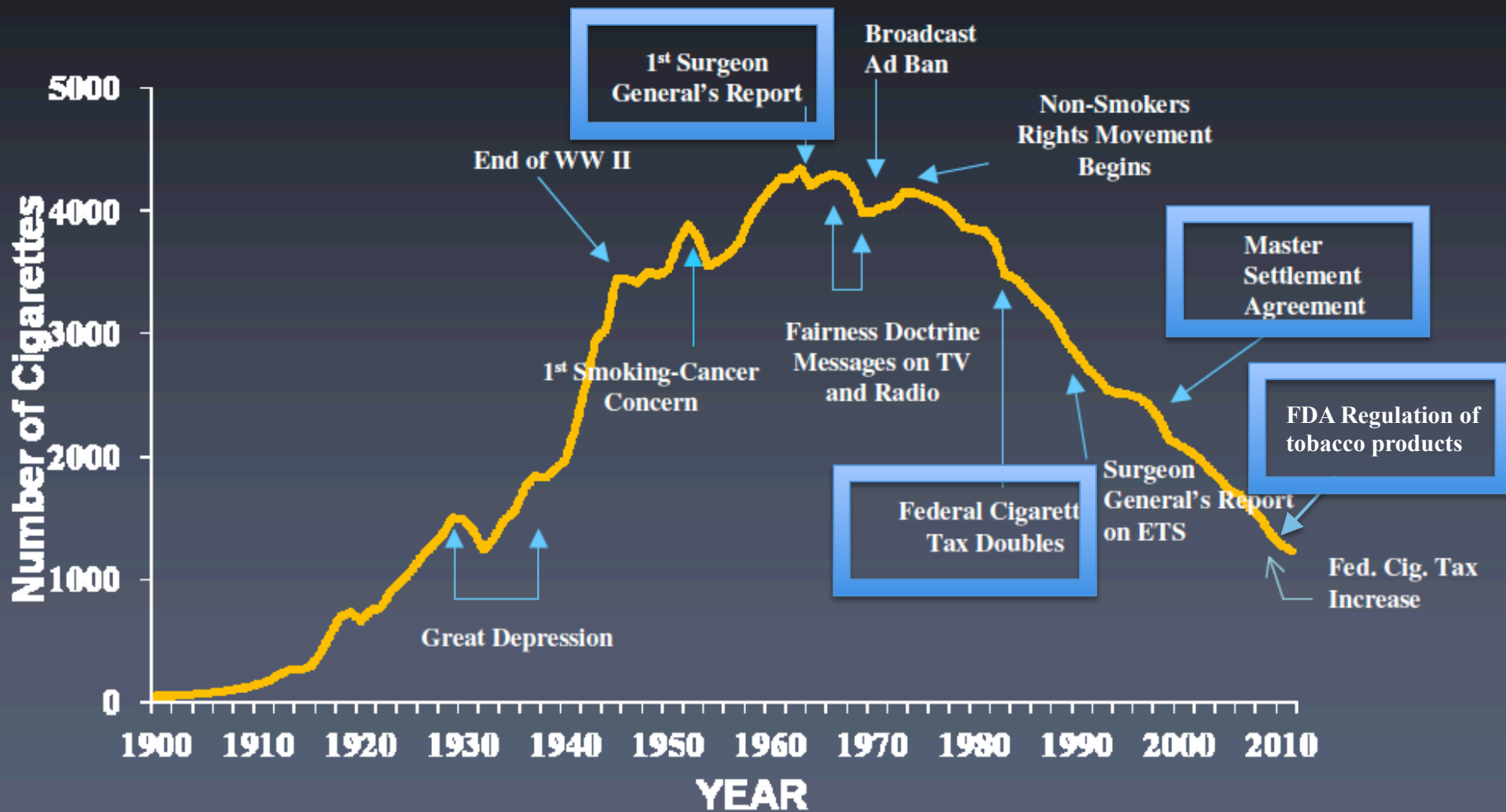
- ❑ **Over 20 million Americans died because of smoking, including**
 - 2.5 million nonsmokers
 - More than 100,000 babies

- ❑ **Smoking is still the leading cause of preventable disease and death in the United States.**

Top US Children's Health Concerns



Adult per capita cigarette consumption, U.S., 1900-2011



Monitoring the Future, 2015

Decreases in Adolescent Cigarette Use

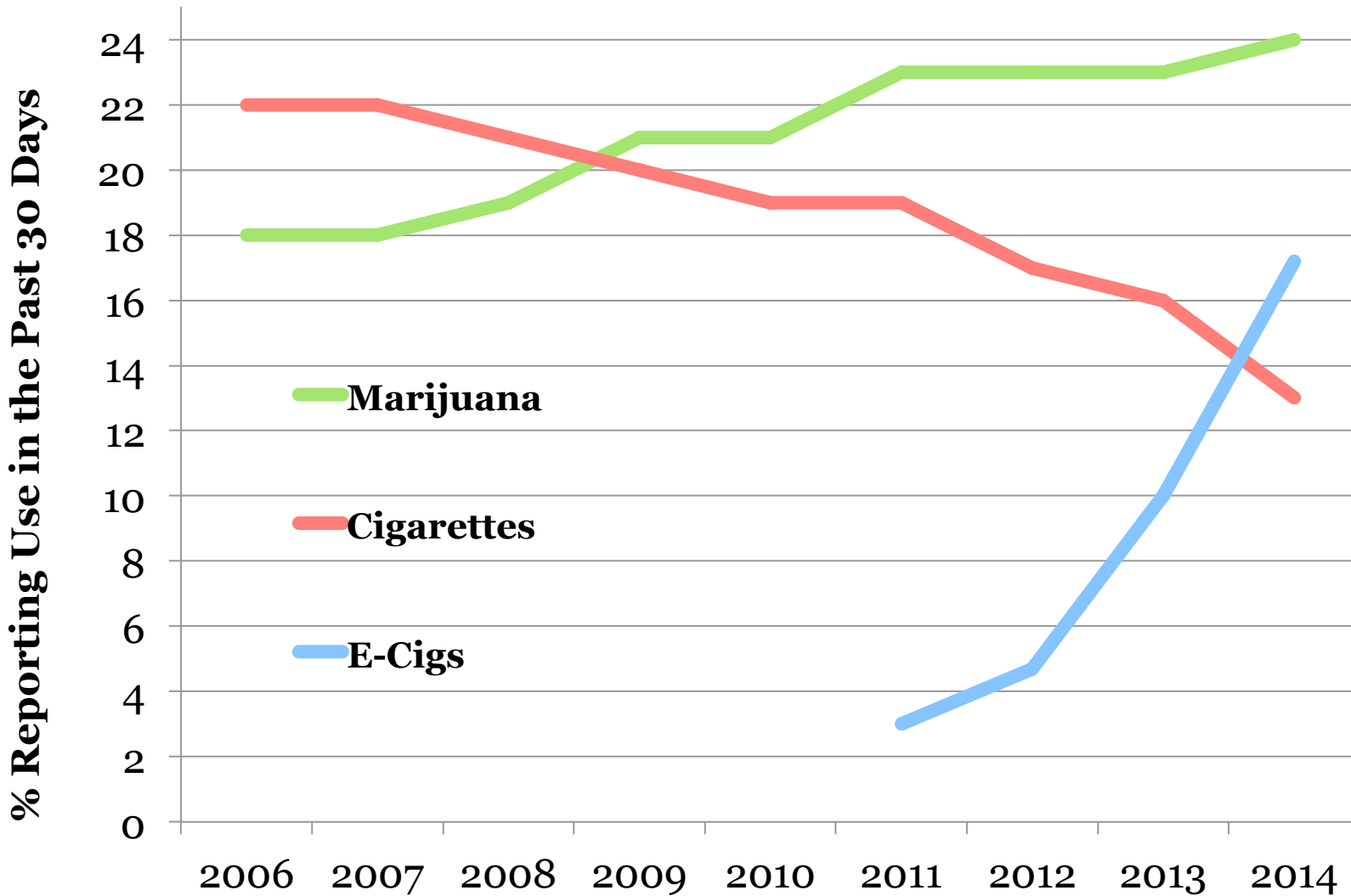
Percent of Students Reporting Daily Cigarette Use, by Grade



↗ Denotes significant difference between 2014 and 2015

SOURCE: University of Michigan, 2015 Monitoring the Future Study

Changing Landscape of Youth Substance Use



**MTFS
2015**

WHAT ABOUT RELATIONSHIPS BETWEEN USE OF OTHER SUBSTANCES AND TOBACCO PRODUCTS?

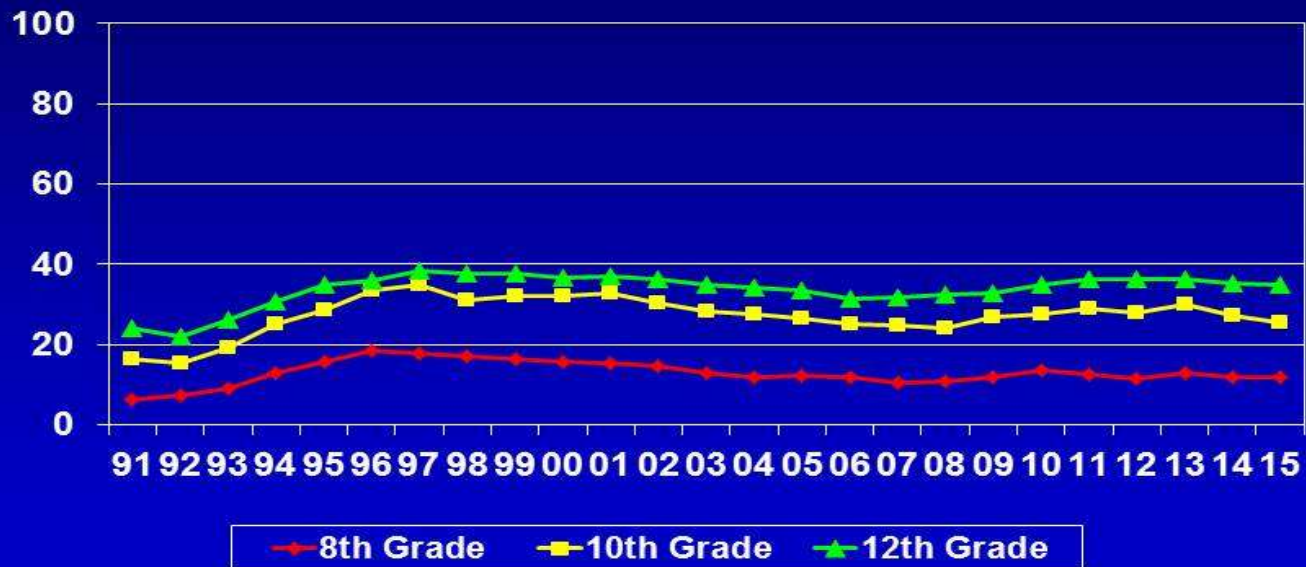
CONCERNS:

- INITIATION, PROGRESSION AND MAINTENANCE
OF CONCURRENT USE BEHAVIORS**
- INCREASED RISK**

Marijuana use among Youth

Monitoring the Future, 2015

Percent of Students Reporting Use of Marijuana in Past Year, by Grade

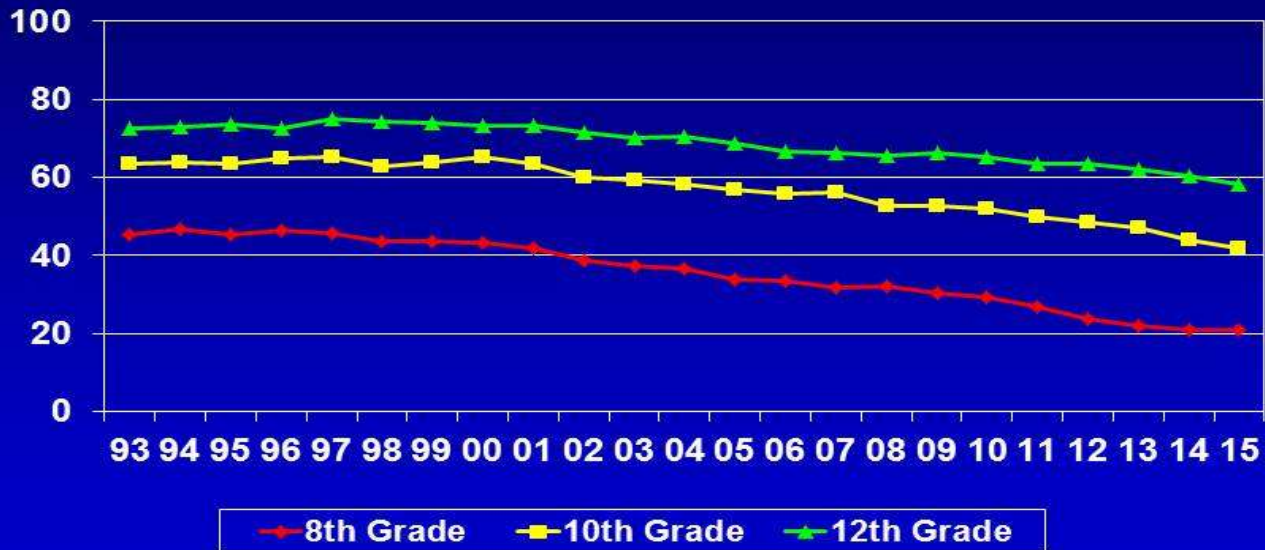


SOURCE: University of Michigan, 2015 Monitoring the Future Study

Alcohol use among Youth

Monitoring the Future, 2015

Percent of Students Reporting Use of Alcohol in Past Year, by Grade



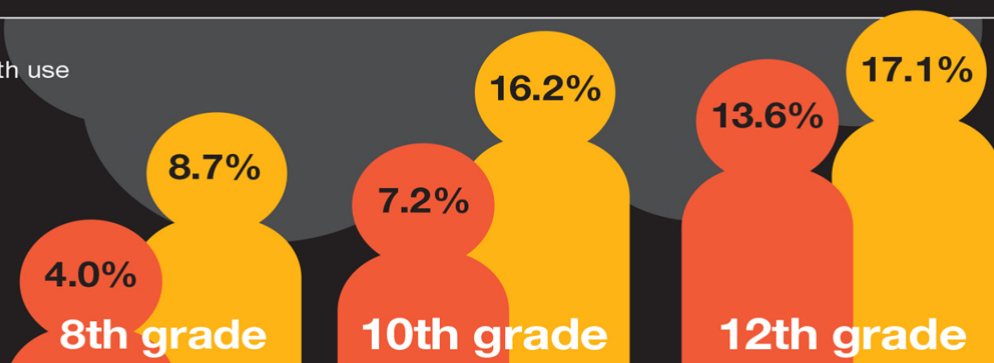
SOURCE: University of Michigan, 2015 Monitoring the Future Study

E-cigarette Use among Youth

Monitoring the Future 2015

TEENS ARE MORE LIKELY TO USE E-CIGARETTES THAN CIGARETTES

*Past month use



CIGARETTES



E-CIGARETTES



ONLY 14.2% OF 12TH GRADERS VIEW E-CIGARETTE USE AS HARMFUL, WHICH IS LESS THAN 5 STUDENTS IN THE AVERAGE CLASS.



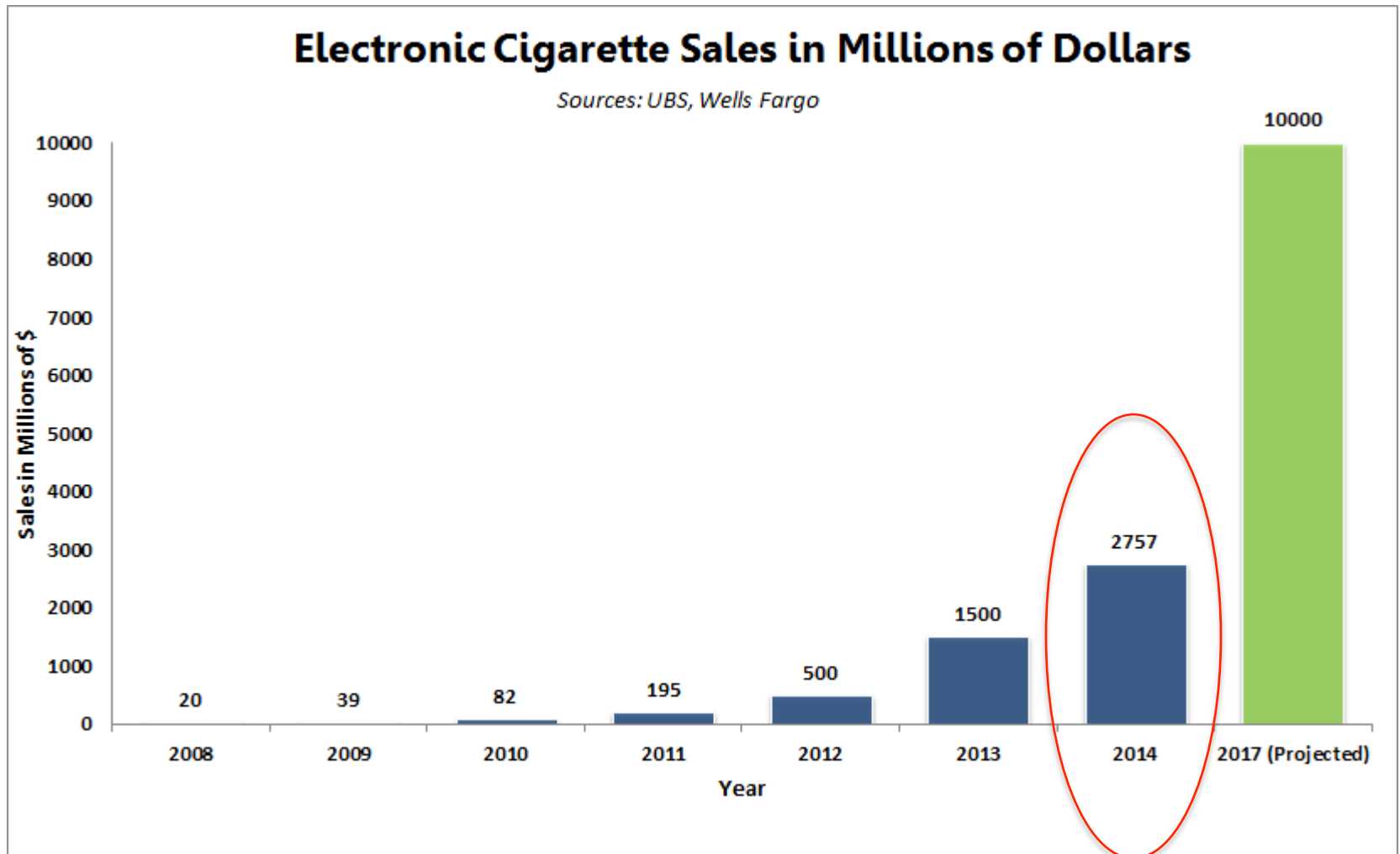
National Institute on Drug Abuse

The National Institute on Drug Abuse is a component of the National Institutes of Health, U.S. Department of Health and Human Services. NIDA supports most of the world's research on the health aspects of drug abuse and addiction. Fact sheets on the health effects of drugs of abuse and information on NIDA research and other activities can be found at www.drugabuse.gov.

Monitoring the Future (2015)



Exponential Growth....



Other Tobacco Products

- Cigars/Cigarillos



- Smokeless Tobacco



- Hookah



Two Research Studies

- Understanding the relationship between use rates of marijuana, alcohol and multiple tobacco products
- Understanding how tobacco products are used to use other substances

Middle and High School Focus Groups and Surveys in CT

Middle and High School Focus Groups and Surveys in CT

Focus Groups
June 2013
HS, MS and Colleges

Wave 1
Nov 2013



2 Middle Schools, 4 High Schools
Representing 4/9 DRG's in CT

Wave 2
June
2014



2 Middle Schools, 5 High Schools
Representing 5/9 DRG's in CT
(2 MS and 3 HS longitudinal)

Wave 3
May-Jun
2015

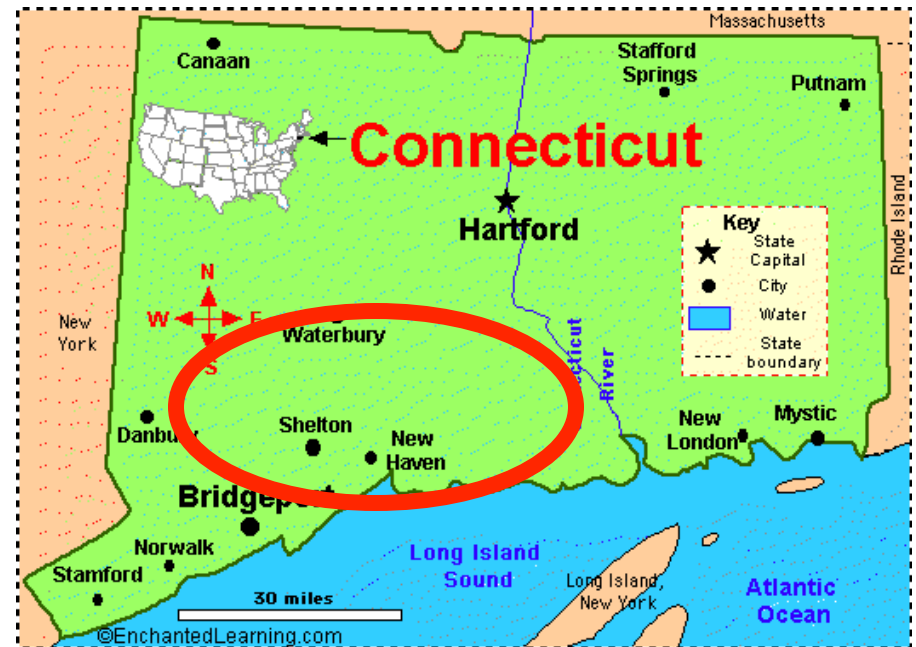


8 High Schools
Representing 7/9 DRG's in CT
(4 HS longitudinal)

DO ADOLESCENTS WHO USE E-CIGARETTES ALSO USE OTHER TOBACCO PRODUCTS AND OTHER SUBSTANCES (ALCOHOL AND MARIJUANA)?

Participants

- 2241 CT high school students who completed an anonymous survey in November 2013
 - 3 High Schools
 - Mean age 15.60 [SD = 1.19] years
 - 45.8 % male
 - 65.1% Caucasian
 - 14.9% African American
 - 9.1% Hispanic



Measures

- **Current Cigarette Smoking** was determined using
 - “During the past 30 days, on how many days did you smoke cigarettes?”
 - Answer choices included 0, 1, 2, 3-5, 6-10, 11-20, 21-28, and everyday.
 - Current Smokers: 1 day or greater of use
- **Current e-cigarette, cigar, smokeless tobacco, hookah, and blunt use** was determined using
 - “During the past 30 days, on how many days did you [use the respective product]?” (open-ended response)
 - Current users: Used at least once in past month
- **Current alcohol and marijuana use status**, determined based on
 - During the past 30 days, on how many days did you use alcohol /marijuana?”
 - Answer choices included, “I have never tried alcohol / marijuana, I have tried alcohol / marijuana but did not use it in the past 30 days, 1, 2, 3-5, 6-10, 11-20, 21-28, and everyday
 - Current Users: Used at least once in past month

Analytical Strategy

- **Latent class analysis (LCA),**
 - Empirically identify subgroups of participants based on similar patterns of responses
 - Used to identify youth substance use profiles
- **Multinomial Regressions**
 - Evaluate which demographic characteristics were associated with class membership.

Past Month Substance Use

Substance Use		
	Current Use (%)	Days Used Per Month (mean [std. dev.])
E-cigarettes	11.6	8.84 (9.95)
Marijuana	14.5	11.64 (10.90)
Blunts	11.6	10.23 (10.36)
Alcohol	20.7	4.62 (6.16)
Cigarettes	7.2	11.22 (11.24)
Cigars	2.9	5.12 (7.46)
Smokeless Tobacco	2.8	9.69 (10.09)
Hookah	7.7	5.87 (7.54)

Morean et al., DAD, 2016

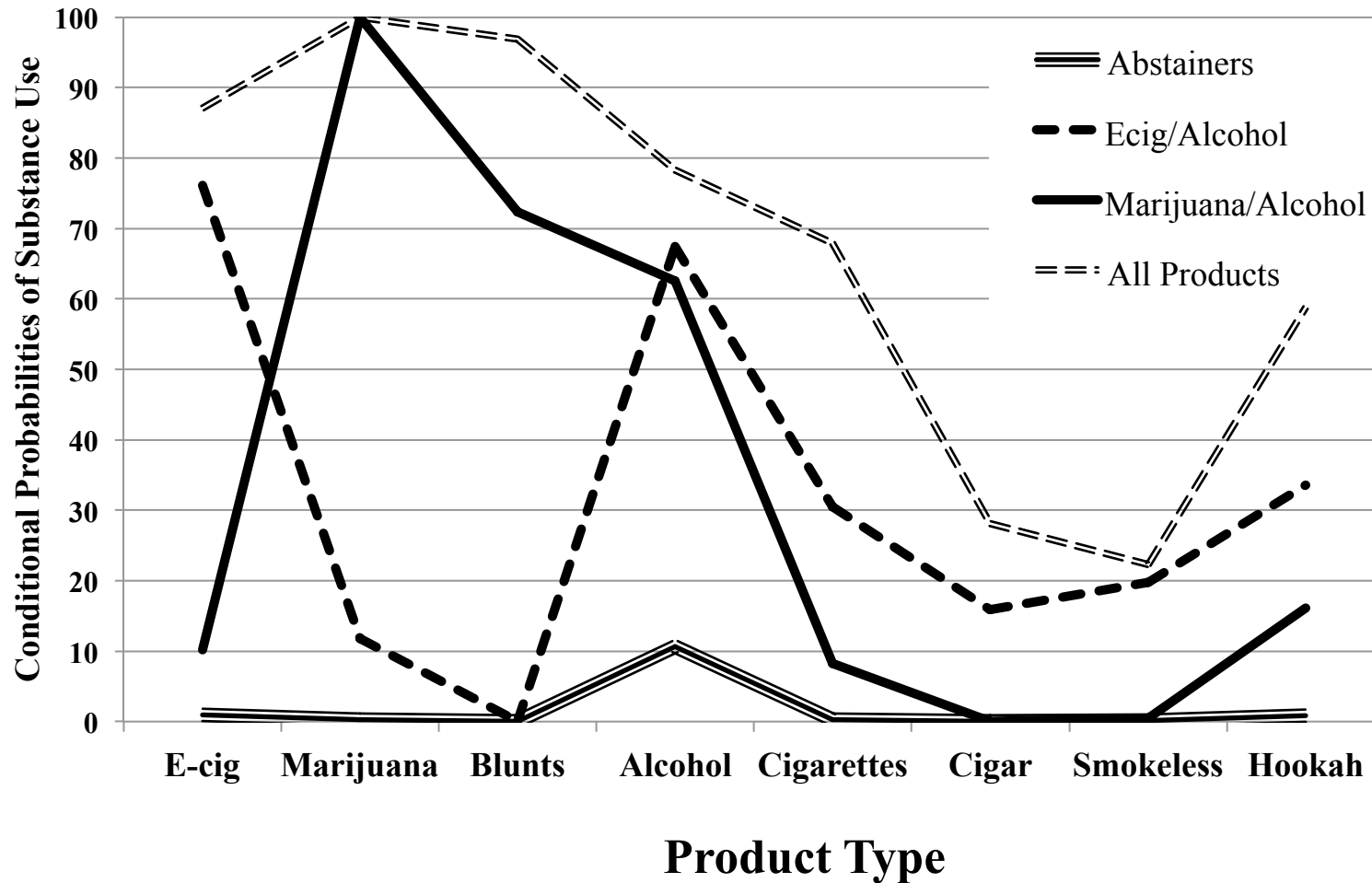
Fit Indices of LCA

<u># Classes</u>	<u>Log-Likelihood</u>	<u>AIC</u>	<u>BIC</u>	<u>Adjusted BIC</u>	<u>Entropy</u>	<u>LMR Test</u>	<u>Bootstrapped LR Test</u>
1	-5445.31	10906.62	10952.34	10926.92	1.00	NA	NA
2	-3845.07	7724.14	7821.29	7767.28	0.95	p < .001	p < .001
3	-3711.15	7474.30	7622.88	7540.28	0.94	p < .001	p < .001
4	-3618.98	7307.96	7507.97	7396.77	0.94	p < .001	p < .001
5	-3600.30	7288.61	7540.05	7400.26	0.94	p = 0.16	p < .001

Morean et al., DAD, 2016

Latent Classes

Current Substance Use



Morean et al., DAD, 2016

Current Product Use by Latent Class

	Total Sample	By Latent Class				
		Abstainers	E-cigs Alcohol	Marijuana Alcohol	All Products	
	N = 2241	81.60%	4.60%	6.90%	6.90%	
Current Use (%)						
E-cigarettes	11.6	1.5	80.6	5.2	91.6	
Marijuana	14.5	0.0	15.5	100.0	100.0	
Blunts	11.6	0.0	0.0	70.8	97.4	
Alcohol	20.7	10.3	56.3	61.0	80.0	
Cigarettes	7.2	0.3	35.9	9.1	67.7	
Cigars	2.9	0.0	18.4	0.0	29.0	
Smokeless	2.8	0.2	22.3	0.0	23.2	
Hookah	7.7	0.8	38.8	15.6	60.6	

Morean et al., DAD, 2016

Latent Classes: Constituency

- All classes: More older students
- E-cigarette-Alcohol class, All Products class: More males, Less African Americans
- Marijuana-Alcohol class: More African Americans and Latinos
- The Marijuana-Alcohol class was more likely to contain females, African-Americans, and Latinos when compared with the All products class and the E-cigarette-Alcohol Class.

Morean et al., DAD, 2016

Conclusions

- LCA identified four substance use classes, two of which included elevated ecigarette use.
 - Abstainers: 81.6%
 - Primarily E-cigarette and Alcohol users: 4.6%
 - Primarily Marijuana.-Alcohol users: 4.6%
 - Primarily users of all products: 6.9%
- Class membership differed by age, sex, and race.
- **Future research should evaluate characteristics that may explain the different product use profiles identified in the current study including cultural differences, peer group norms, and differing perceptions of the harmfulness of each substance.**

The Changing Landscape of Youth Substance Use



+



=

DOUBLE TROUBLE

DO ADOLESCENTS USE E- CIGARETTES TO VAPORIZE CANNABIS?

E-cigarettes and Cannabis Use



Hash Oil



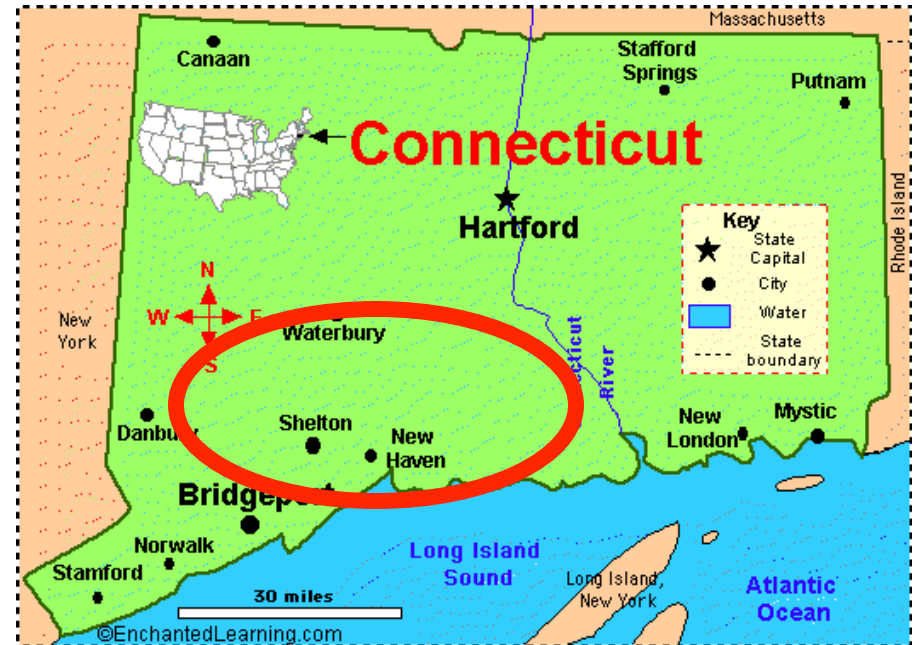
THC Wax



Dried Buds

Participants

- 3,847 CT high school students who completed an anonymous survey in Spring 2014
 - 5 High Schools
 - Mean age 16.00 [SD = 1.26] years
 - 51.7% female



Morean et al., Pediatrics, 2015

Measures

- **Lifetime E-Cigarette Use:** Have you tried an e-cigarette? (“Yes”)
- **Lifetime Cannabis Use:** During the past 30 days, on how many days did you use marijuana or hashish (hash)?
 - Never Users = “I have never tried marijuana/hashish”
 - Lifetime Users = “I have tried marijuana/hashish but did not use it in the past 30 days” or “I have used marijuana/hashish at least once during the past 30 days”
- **Dual E-cigarette/Cannabis Users** (Lifetime E-cig & Cannabis Use)
- **Lifetime use of E-cigarettes to vaporize cannabis:** Have you ever used an e-cigarette to vaporize/smoke marijuana? (“Yes”)

Measures

- **Forms of Cannabis Vaped:**

- “Which of the following have you used to smoke marijuana?”
 - “E-cigarettes filled with hash oil”
 - “E-cigarettes filled with a wax plug”
 - “Portable vaporizers filled with dried marijuana (like a G-pen)”
 - “Other” (write in response)



Hash Oil

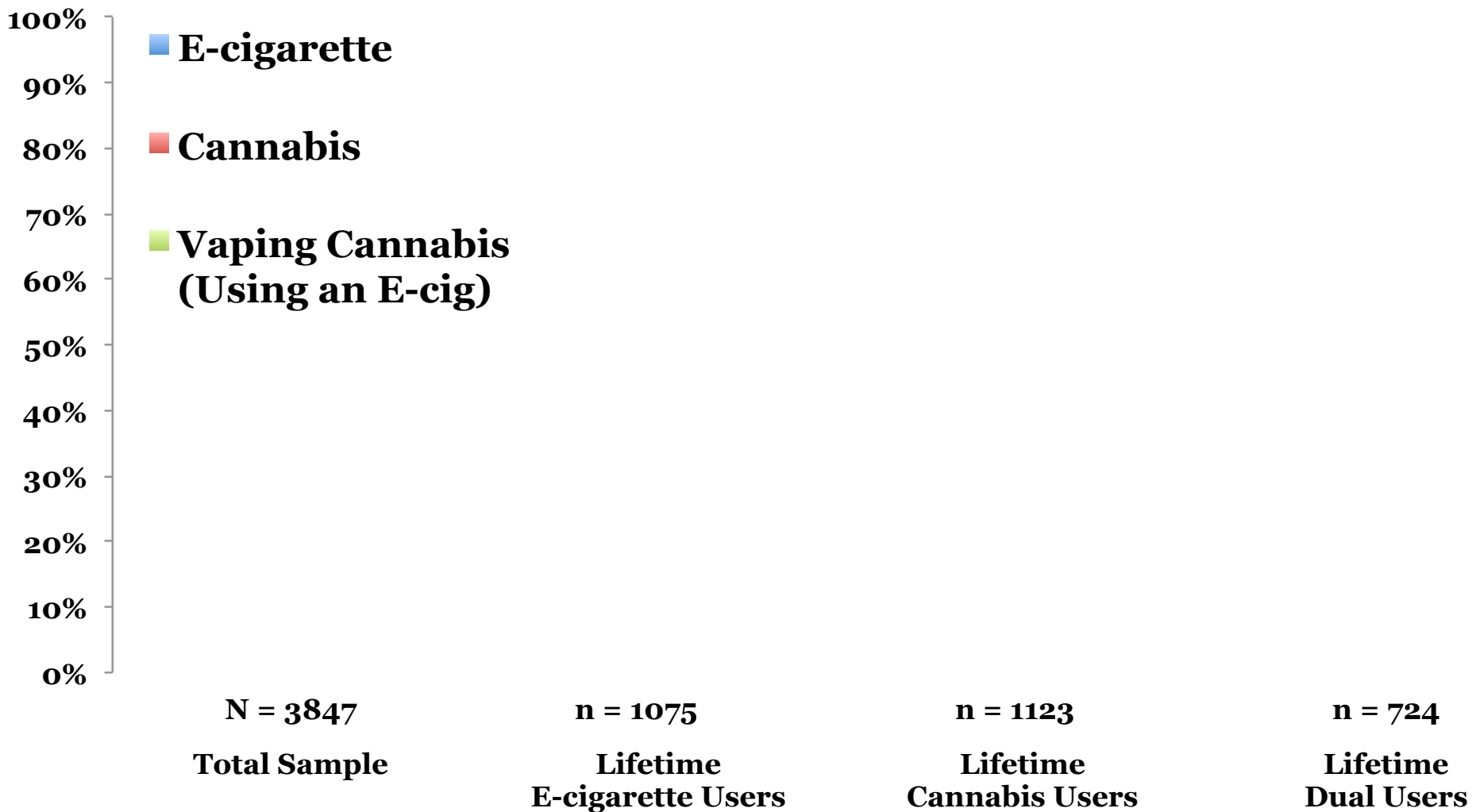


THC Wax

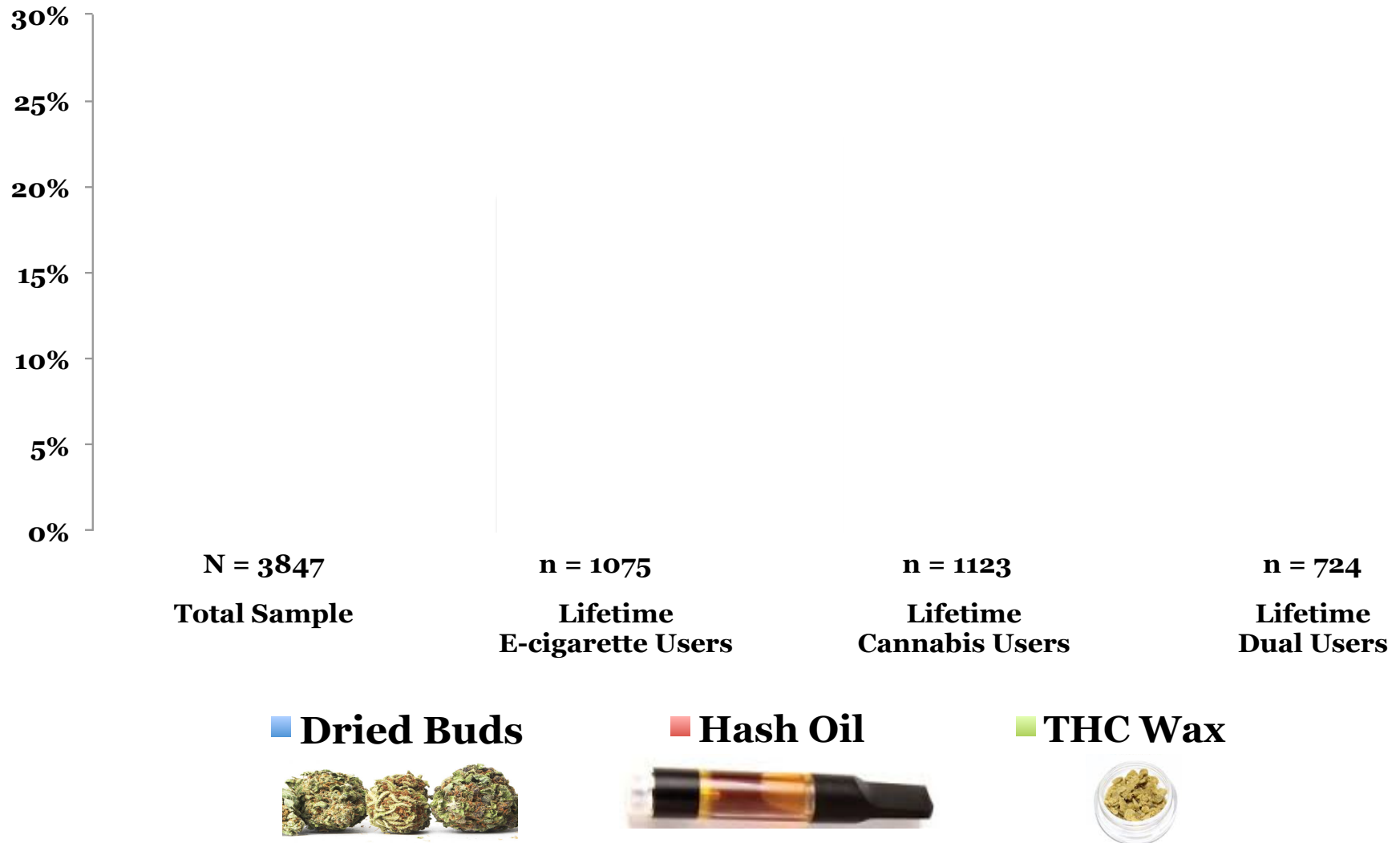


Dried Buds

Results: Product Use Rates



Results: Forms of Cannabis Vaped



Results: Risk Factors for Vaping Cannabis

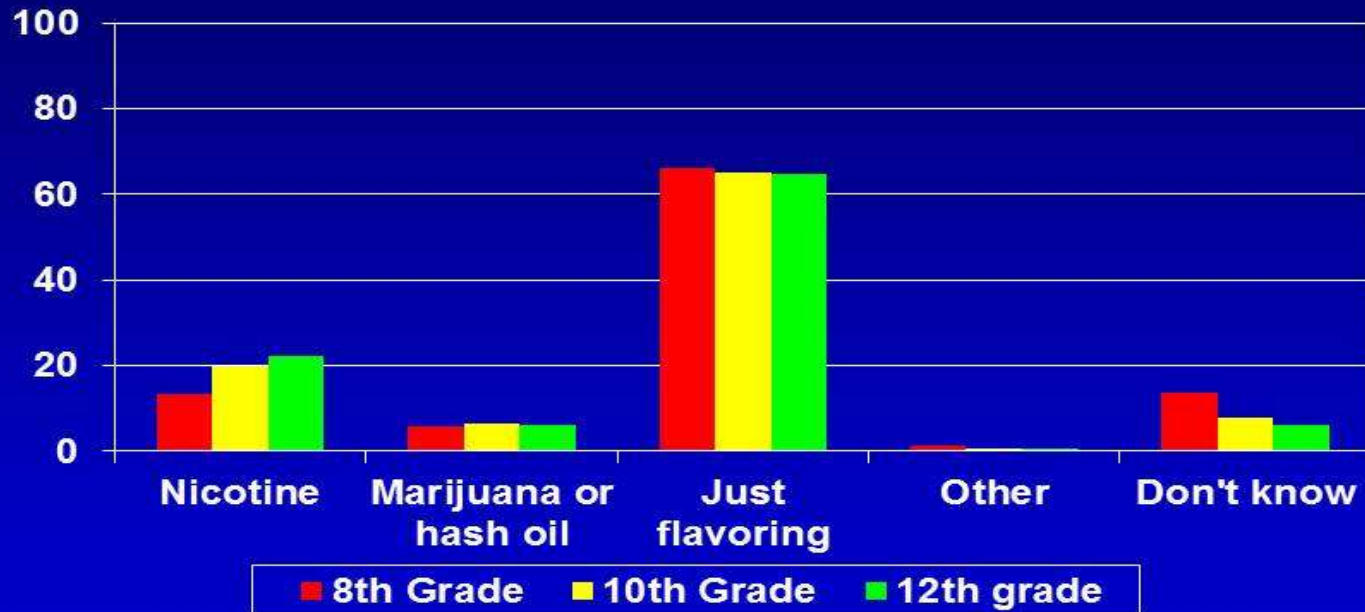
Variables	OR	95% CI
Age		
Males		
Medium SES		
High SES		
Lifetime E-cig Use		
Lifetime Cannabis Use	-	-

Note. Bolded font indicates significant odds ratios. Reference groups for logistic regression were: females, low SES students, never e-cig users, and never cannabis users

E-cigarette Use

Monitoring the Future 2015

Substance Vaporized the Last Time e-Cigarette Used

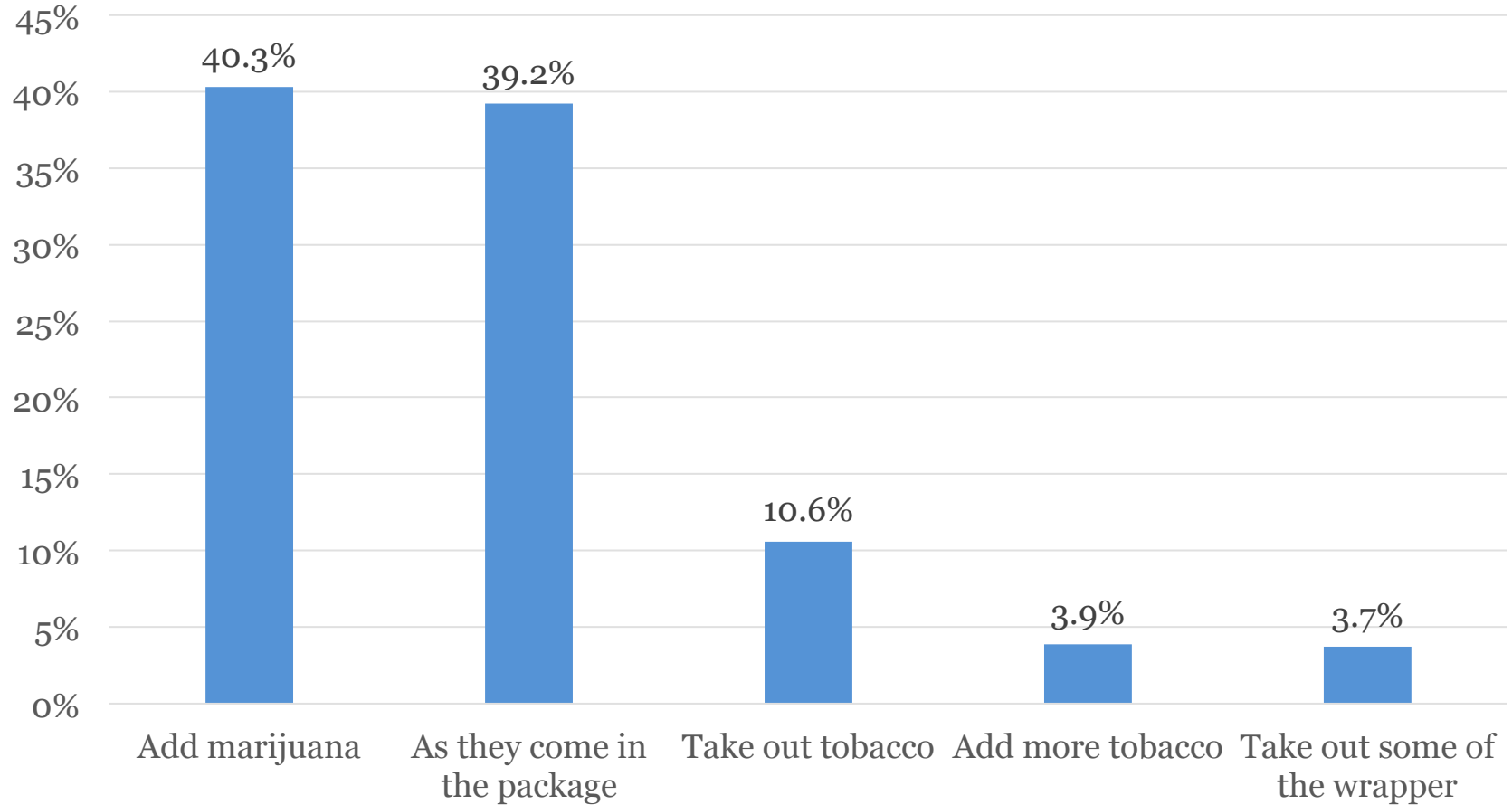


SOURCE: University of Michigan, 2015 Monitoring the Future Study

Conclusions

- Rates of vaping cannabis using e-cigs were considerable among e-cigarette, cannabis, and dual e-cig/cannabis users.
- Students used e-cigs to vape hash oil and THC-infused wax and vaporized bud using other portable electronic vaporizers.
- Males, younger students, e-cig users, and cannabis users were most likely to vape cannabis using e-cigs.
- **Study findings raise concerns about the lack of e-cig regulations and the unforeseen use of e-cigs for purposes other than vaping nicotine.**

Cigarillo Use Behaviors



Kong et al, in press



People involved

- Krysten Bold, Ph.D.
- Deepa Camenga, M.D.
- Christian Connell, Ph.D.
- Dana Cavallo, Ph.D.
- Ralitza Gueorguieva, Ph.D.
- Grace Kong, Ph.D.
- Elaine Lavelle, B.S.
- Amanda Liss, B.S.
- Thomas Liss, B.S.
- Meghan Morean, Ph.D.
- Patricia Simon, Ph.D.
- Ran Wu, M.S.

QUESTIONS?

Tomorrow in Austin and via Livestream:
<http://go.uth.edu/TCORS2016>



Youth and E-Cigarettes: *Why Are We Concerned?*

Suchitra Krishnan-Sarin, PhD
Yale University School of Medicine

 **#TCORS2016**

**Broadcast will begin
at 10:30 a.m. (CT)**



hosted by

