

UNRAVELING THE RELATIONSHIP BETWEEN SMOKING AND DRINKING IN YOUNG ADULTS



Why do they go together like drinking milk with cookies?



Yale University
School of Medicine

SHERRY MCKEE, PhD

Why do drinking and smoking go together like.....

- *“drinking milk with cookies”*
- *“eating peanut butter with jelly”*

Nichter et al., 2006; Stromberg et al., 2007



Why do drinking and smoking go together like milk & cookies?

Levels of Interaction

- Co-morbidity
- Cross-tolerance
- Cross-cue reactivity
- Pharmacological
- Social
- Psychological
- Conditioning
- Neurochemical
- Electrophysiological
- Molecular
- Genetic
- Environmental

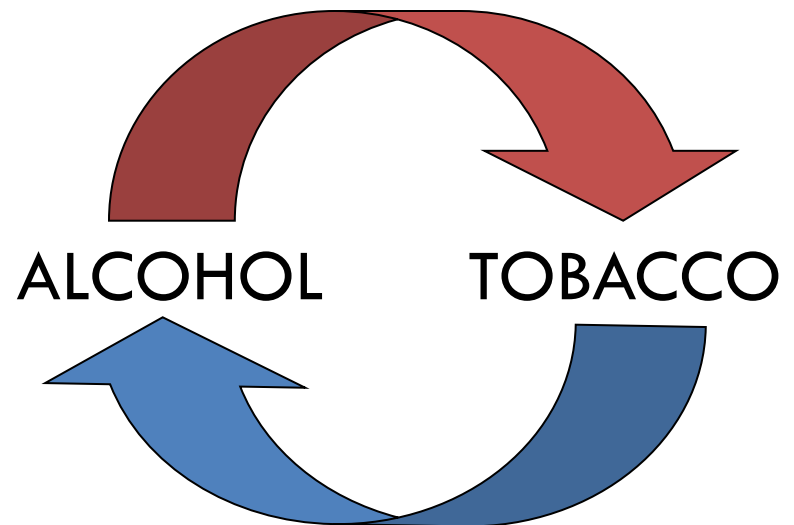


Dani & Harris, 2005
Davis & de Fiebre, 2006
Larsson & Engel, 2004
Li et al., 2007
Schlaepfer et al., 2008
Söderpalm et al., 2000

Why do drinking and smoking go together like milk & cookies?

Levels of Interaction

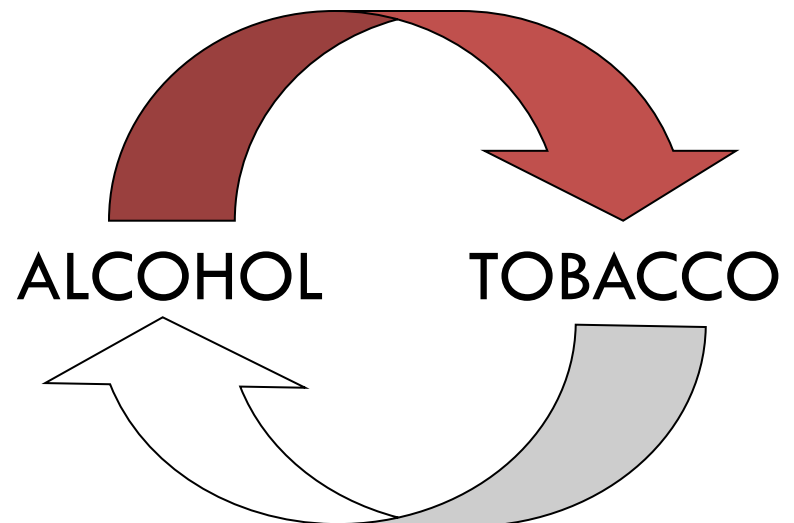
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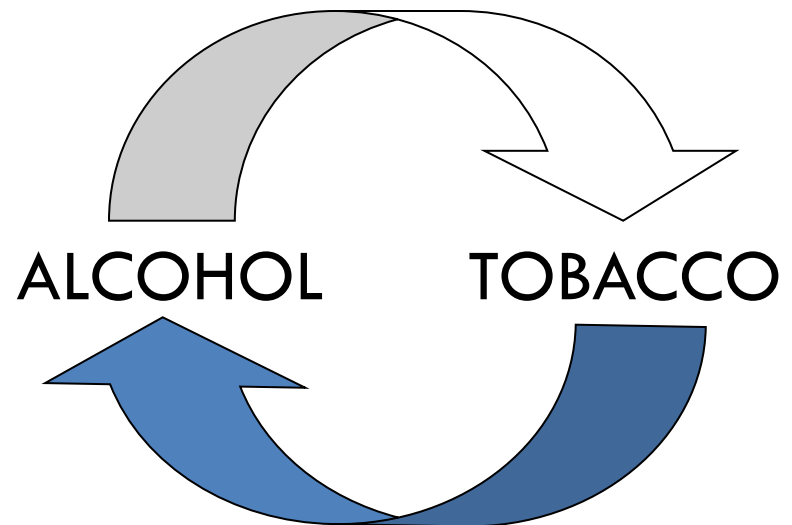
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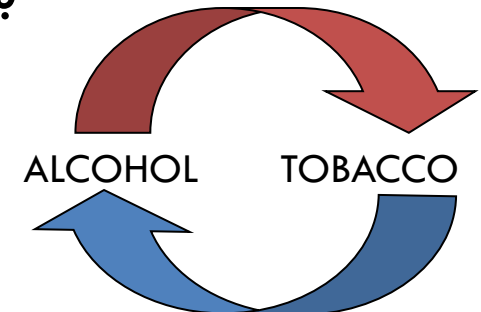
SECTION I

- Alcohol & tobacco co-use
 - ▣ **Part I:** Prevalence
 - ▣ **Part II:** Does tobacco use increase risk for alcohol misuse?
 - ▣ **Part III:** Does alcohol use increase the risk for daily smoking?



SECTION II

- How can knowledge of alcohol-tobacco interactions be utilized to reduce alcohol & tobacco use?
 - ▣ **Part I:** Screening
 - ▣ **Part II:** Policy
 - ▣ **Part III:** Treatment



Funding & Disclosures

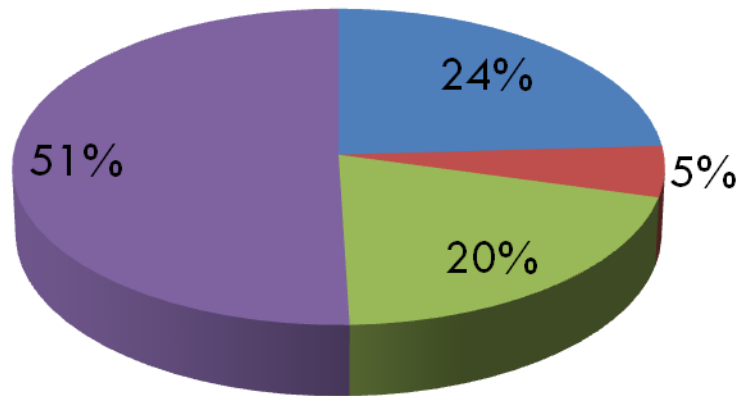
- ❑ National Institute on Alcohol Abuse and Alcoholism
- ❑ Alcoholic Beverage Medical Research Foundation
- ❑ National Institute of Drug Abuse
- ❑ National Cancer Institute
- ❑ Robert Wood Johnson Foundation
- ❑ NIH Common Fund
- ❑ Pfizer



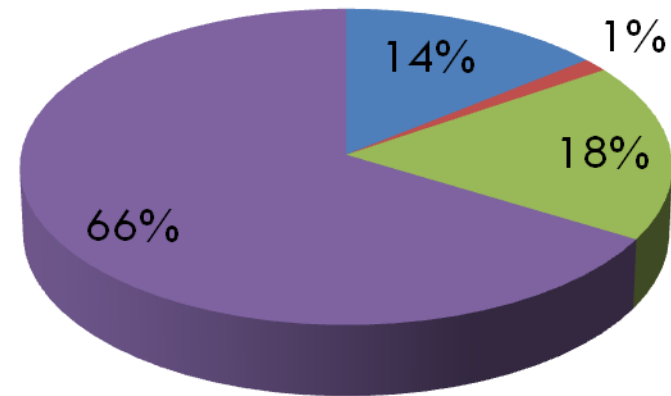
Alcohol & Tobacco Use: Prevalence

Cigarette Use by Drinking Status: Age 18+

**Current Cigarette Use
In Past Year Drinkers
n=27,935**



**Current Cigarette Use
In Past Year Abstainers
n=14,620**

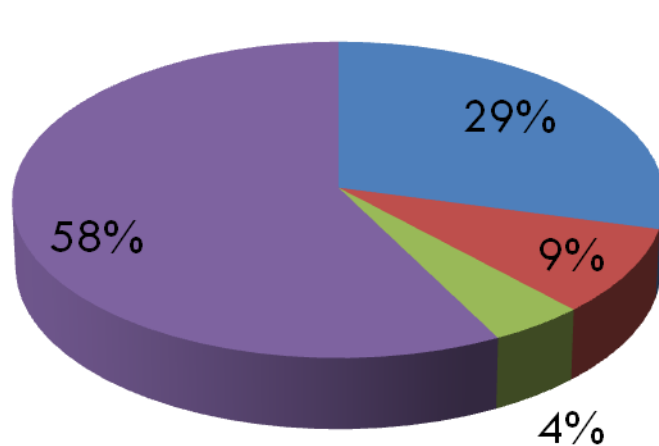


- Daily Smoker
- Chipper
- Ex-Smoker
- Never Smoker

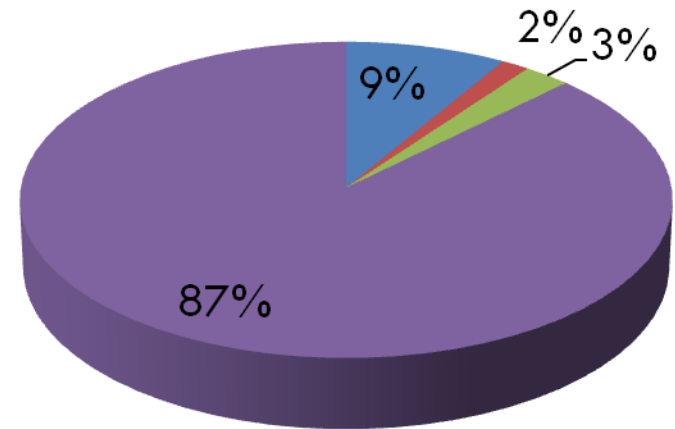
Alcohol & Tobacco Use: Prevalence

Cigarette Use by Drinking Status: Age 18-25

**Current Cigarette Use
In Past Year Drinkers n=3,977**



**Current Cigarette Use
In Past Year Abstainers n=1,768**

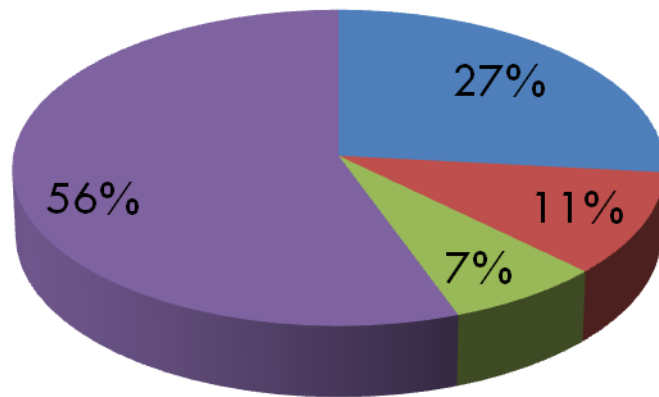


- Daily Smoker
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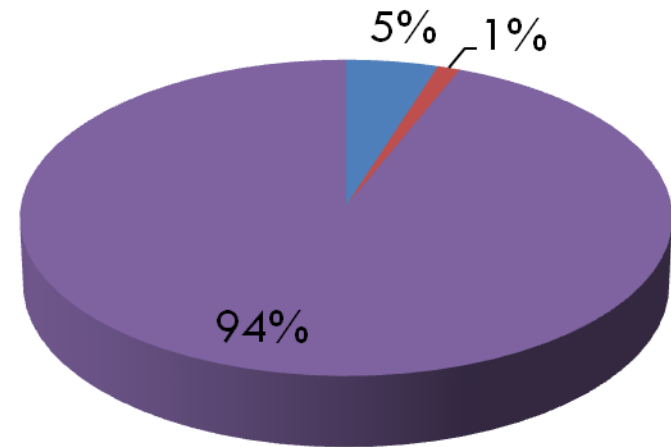
Alcohol & Tobacco Use: Prevalence

Cigarette Use by Drinking Status: Age 18-25

**Current Cigarette Use
In Past Year Drinkers**



**Current Cigarette Use
In Past Year Abstainers**



DC/MARYLAND/VIRGINIA

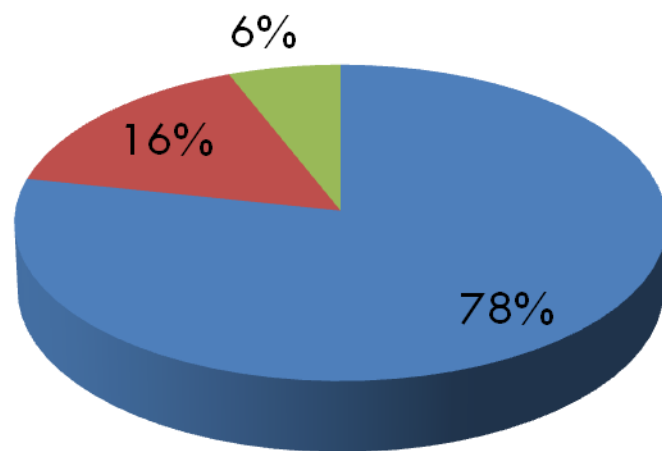
NESARC WAVE I (2001-2002), unpublished data

- Daily Smoker
- Chipper
- Ex-Smoker
- Never Smoker

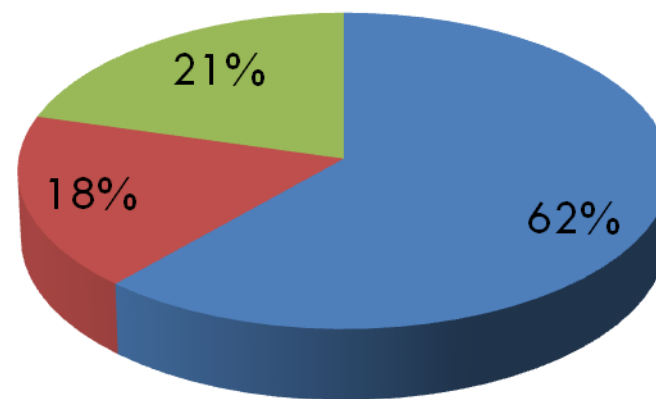
Alcohol & Tobacco Use: Prevalence

Alcohol Use by Smoking Status: Age 18+

**Past Year Alcohol Use
In Smokers n=10,444**



**Past Year Alcohol Use
In Non-Smokers n=32,112**

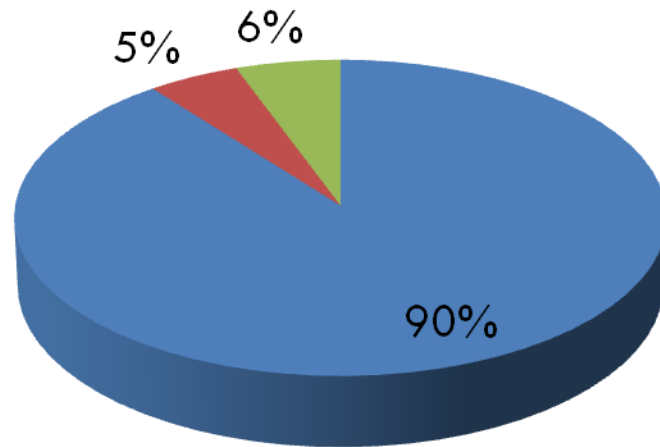


- Current Drinker
- Former Drinker
- Abstainer

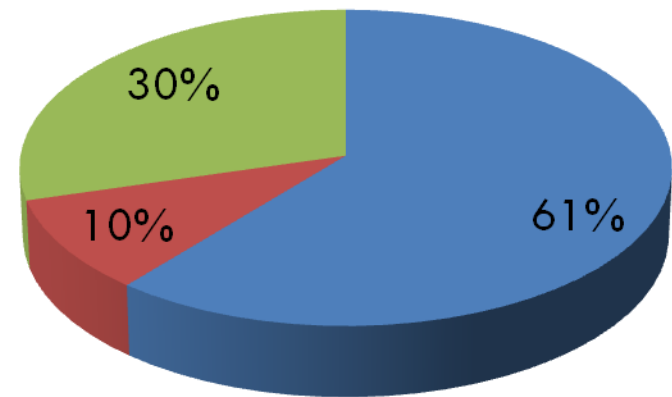
Alcohol & Tobacco Use: Prevalence

Alcohol Use by Smoking Status: Age 18-25

**Past Year Alcohol Use
In Smokers n=1,703**



**Past Year Alcohol Use
In Non-Smokers n=4,069**

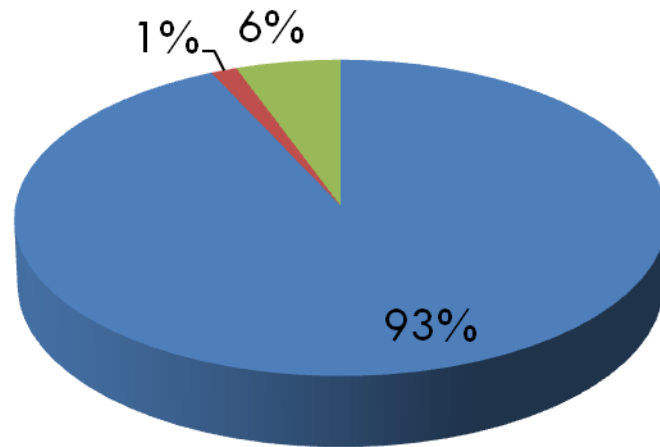


- Current Drinker
- Former Drinker
- Abstainer

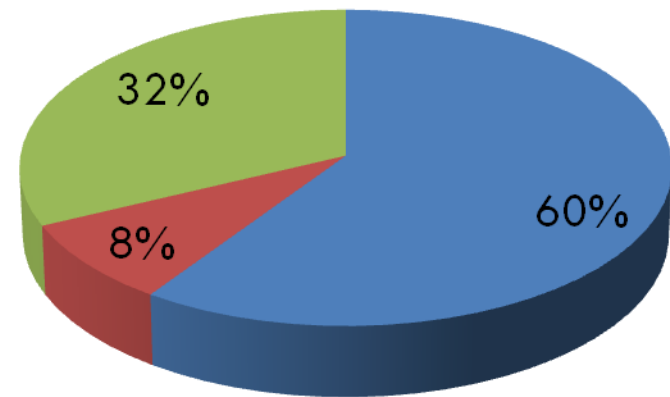
Alcohol & Tobacco Use: Prevalence

Alcohol Use by Smoking Status: Age 18-25

Past Year Alcohol Use
In Smokers



Past Year Alcohol Use
In Non-Smokers

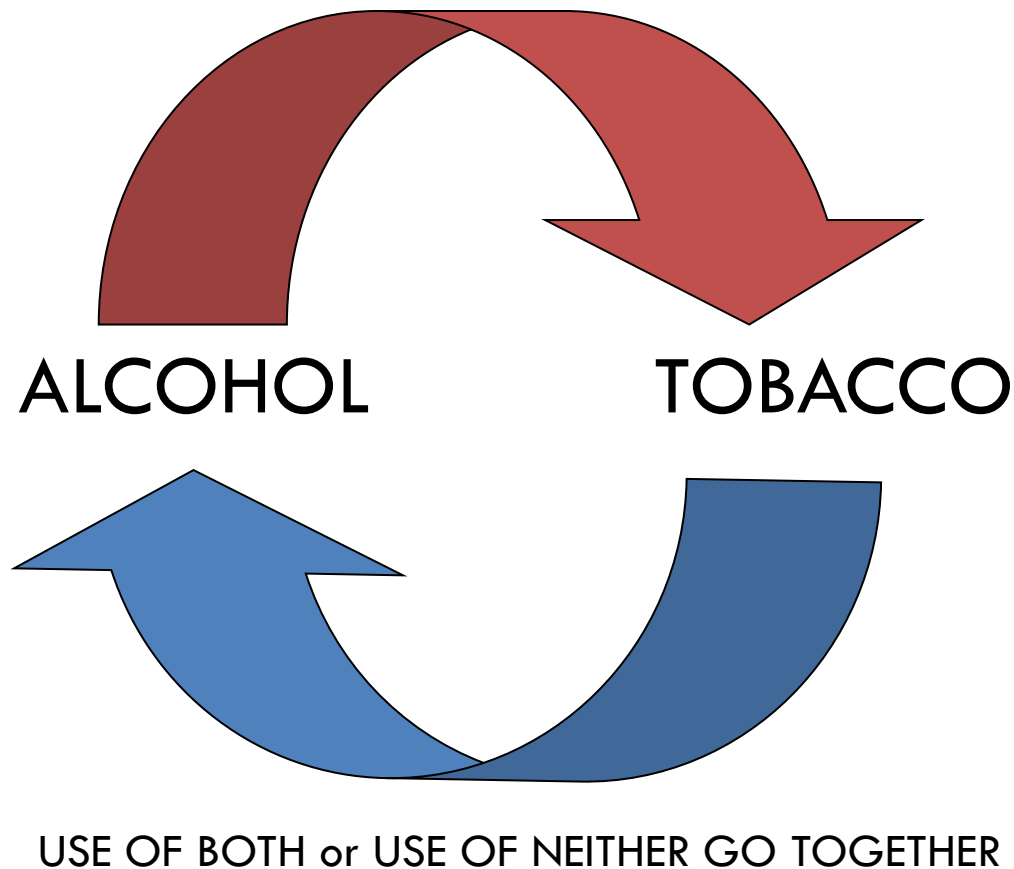


DC/MARYLAND/VIRGINIA

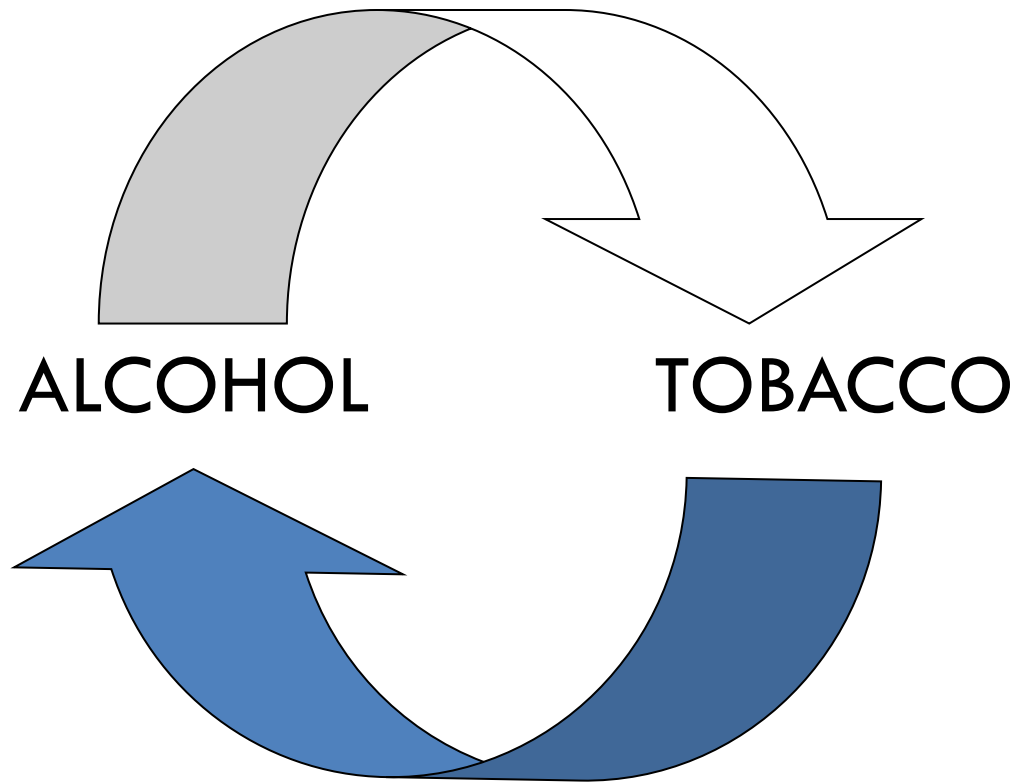
NESARC WAVE I (2001-2002), unpublished data

- Current Drinker
- Former Drinker
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Alcohol & Tobacco Use: Prevalence



Does tobacco use increase risk for alcohol misuse?

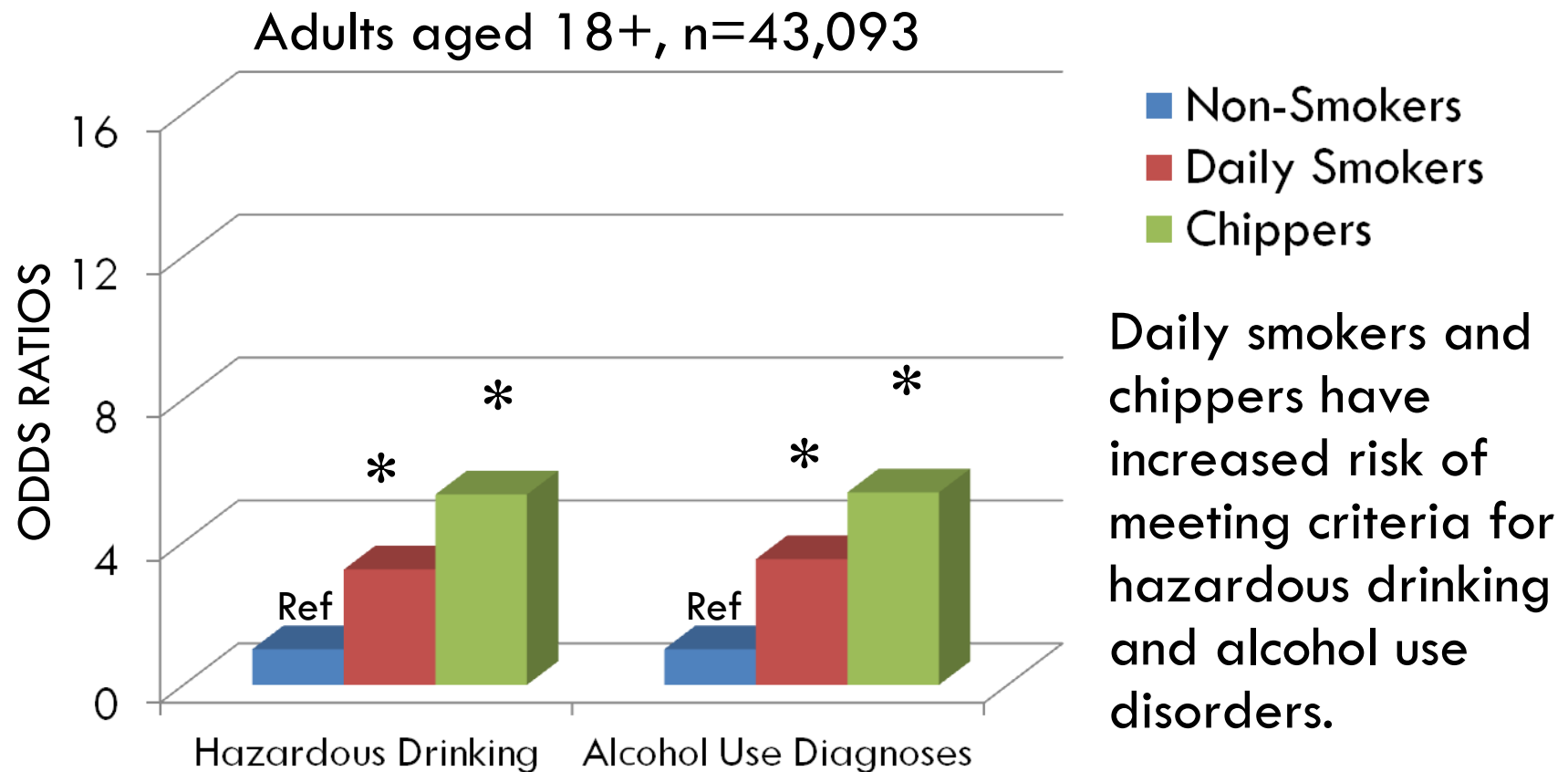


Does tobacco use increase risk for alcohol misuse?

- ❑ Binge Drinking (5+ males, 4+ females)
- ❑ Hazardous Drinking – NIAAA definition
 - ❑ **Males:** more than 14 drinks weekly and at least one episode of heavy drinking per year (5+ drinks)
 - ❑ **Females:** more than 7 drinks weekly and at least one episode of heavy drinking per year (4+ drinks)
 - ❑ <http://pubs.niaaa.nih.gov/publications/practitioner/cliniciansguide2005/guide.pdf>
- ❑ Alcohol Use Diagnosis (abuse or dependence)

Does tobacco use increase risk for alcohol misuse?

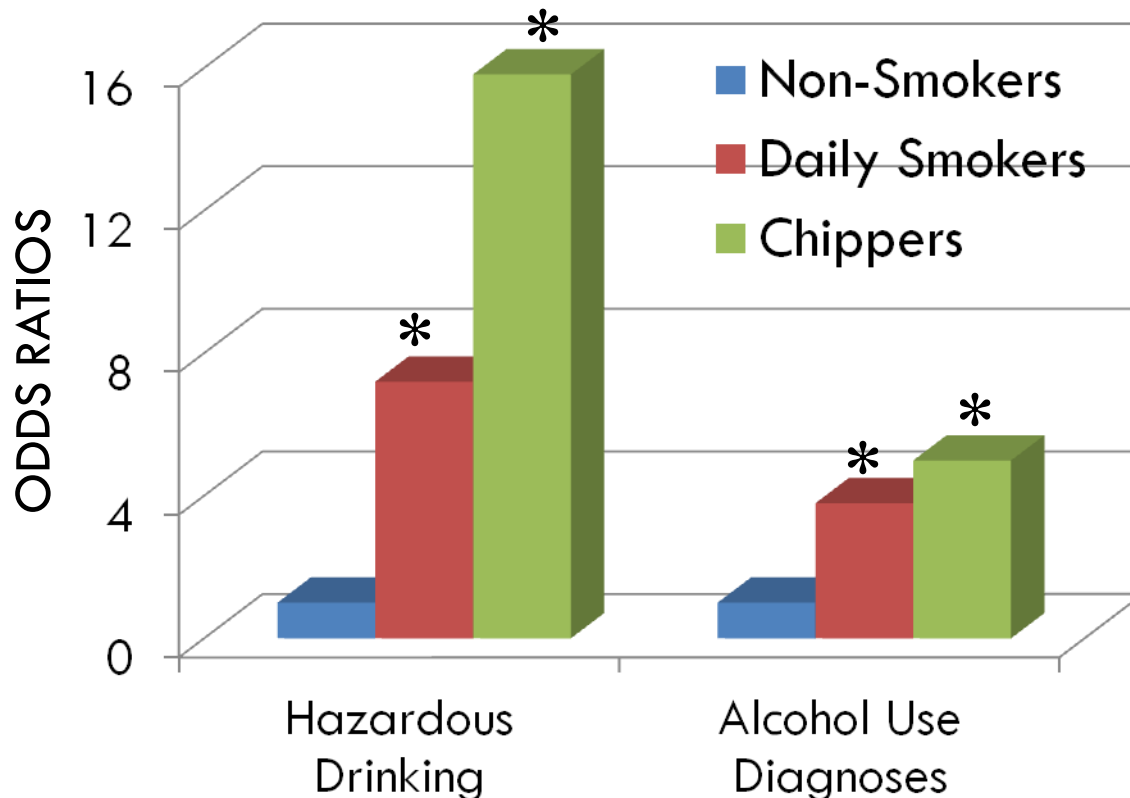
Rates of Problem Alcohol Use by Smoking Status



Does tobacco use increase risk for alcohol misuse?

Rates of Problem Alcohol Use by Smoking Status

Young Adults aged 18-25, n=5,838

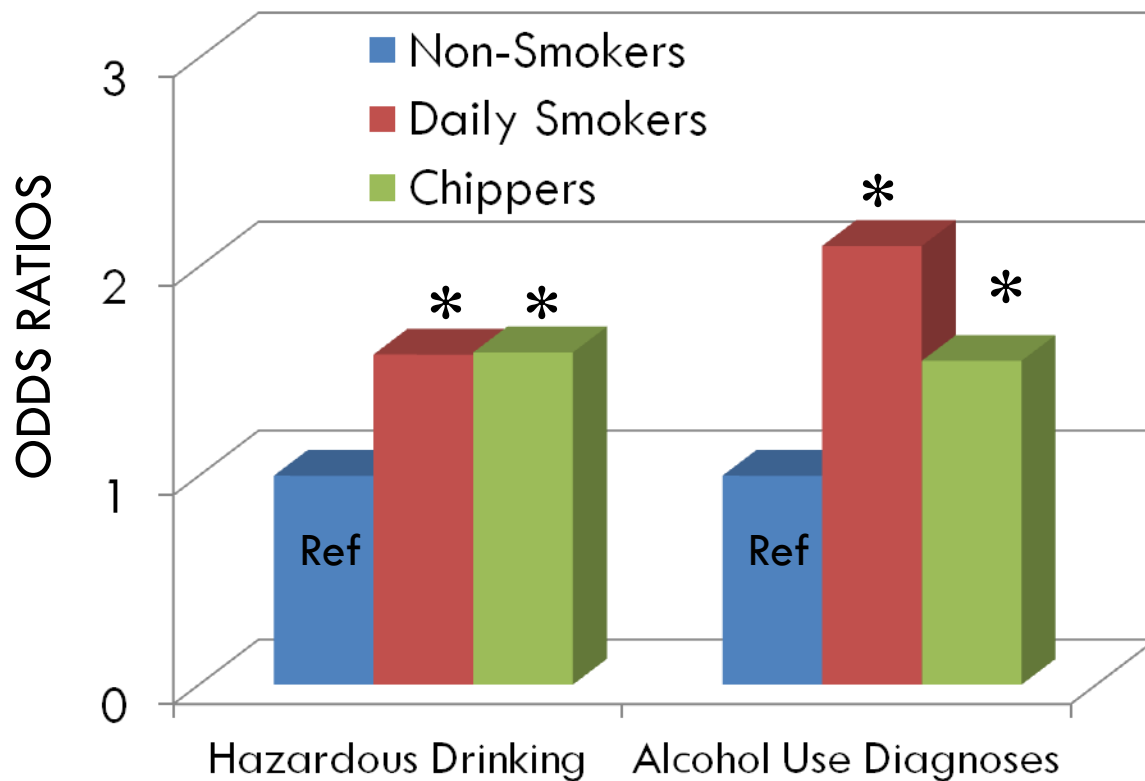


Young adults who smoke (daily or non-daily) are at greatest risk for meeting criteria for hazardous drinking and alcohol use disorders.

Does tobacco use increase risk for alcohol misuse?

Longitudinal Prediction of Problem Alcohol Use by Smoking Status

Young Adults aged 18-25, n=4,468

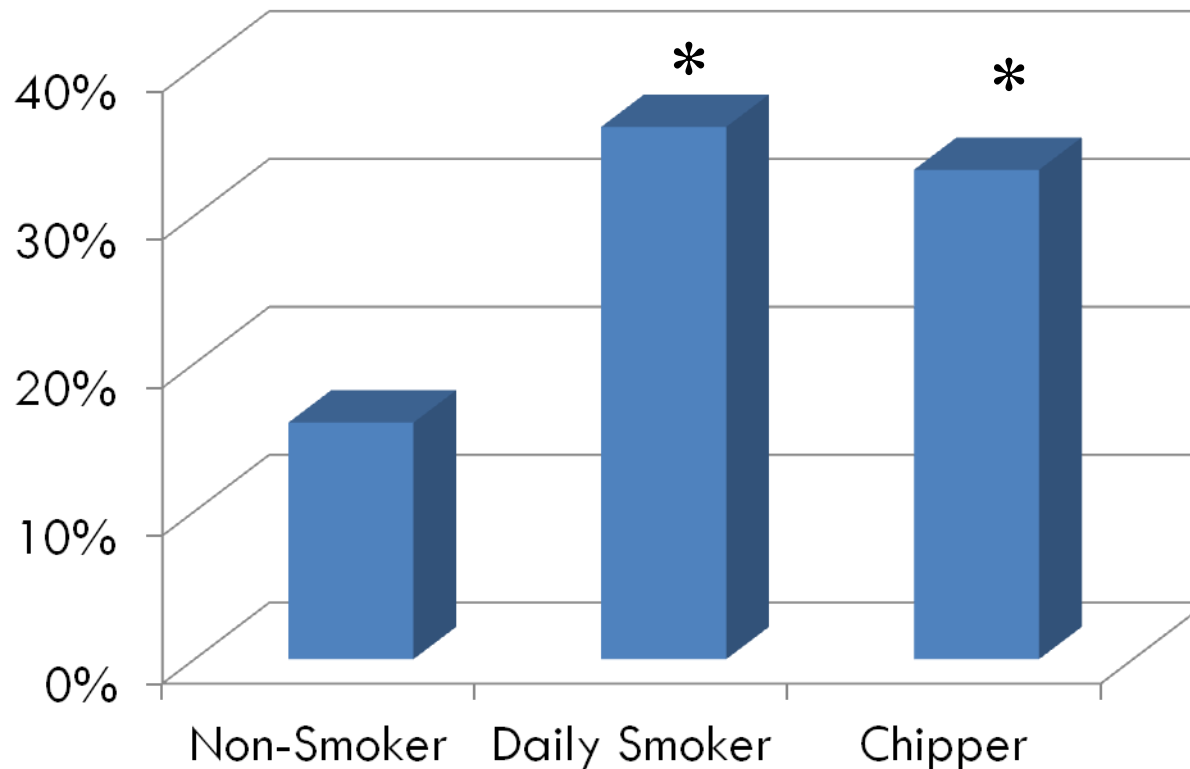


Smoking status at Wave I, predicted drinking behavior across a 3-yr span in young adults, while controlling for Wave 1 drinking behavior.

Harrison....McKee, under review

Does tobacco use increase risk for alcohol misuse?

% Binge Drinking at Least 1x per Week in Young Adults



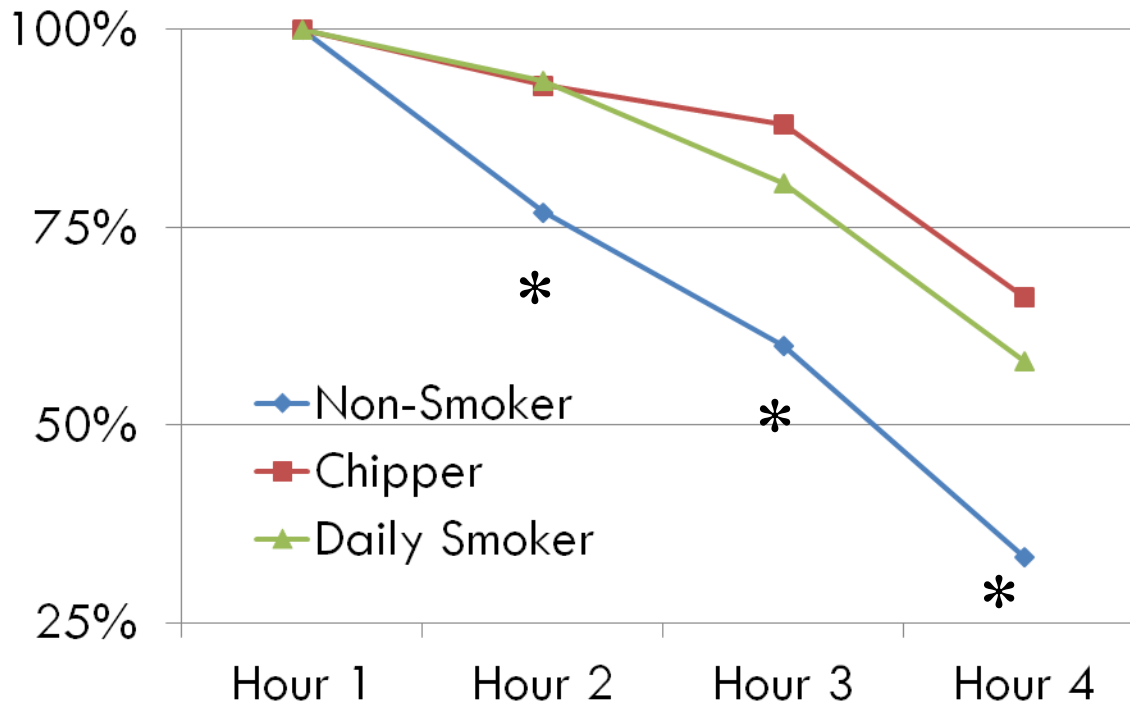
Smoking increases the amount consumed per episode and likelihood of frequent binge drinking

* $p < .05$

McKee et al., 2004, *Nic Tob Res*; Harrison, Hinson, McKee, 2009, *Addict Behav*

Does tobacco use increase risk for alcohol misuse?

% Consuming Alcohol by Hour During a Drinking Episode



Smoking increases the length of a drinking episode

Does tobacco use increase risk for alcohol misuse?

- smoking increases alcohol-related reinforcement
 - ▣ Increases reported pleasure and desire for alcohol
 - ▣ “brings on the buzz”
 - ▣ “get drunk quicker”



McKee et al., 2004, *Nic Tob Res*;
Harrison.. McKee, 2009, *Addict Behav*

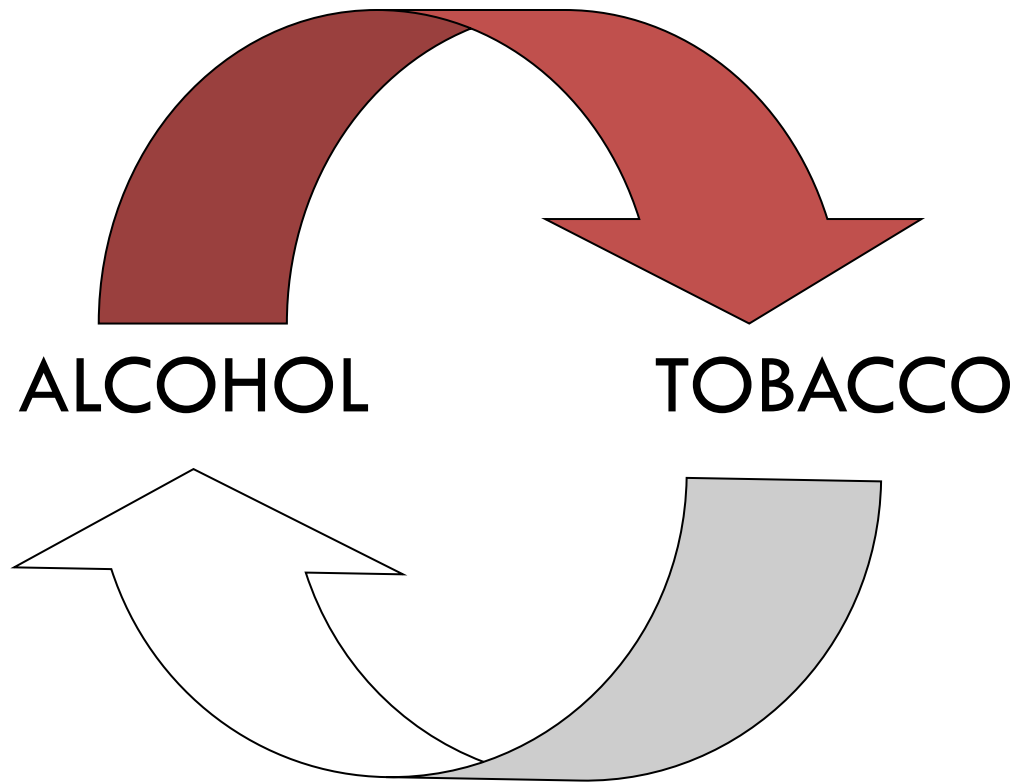
Does tobacco use increase risk for alcohol misuse?

YES, daily and non-daily smokers

- drink more
- drink for longer periods of time
- find alcohol more reinforcing

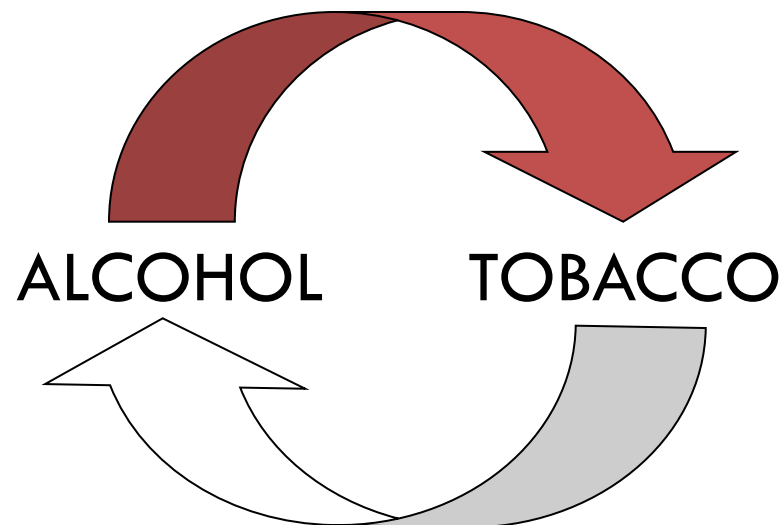


Does alcohol use increase risk for daily tobacco use?



Does alcohol use increase risk for daily tobacco use?

Does alcohol facilitate the transition from non-daily to daily smoking?



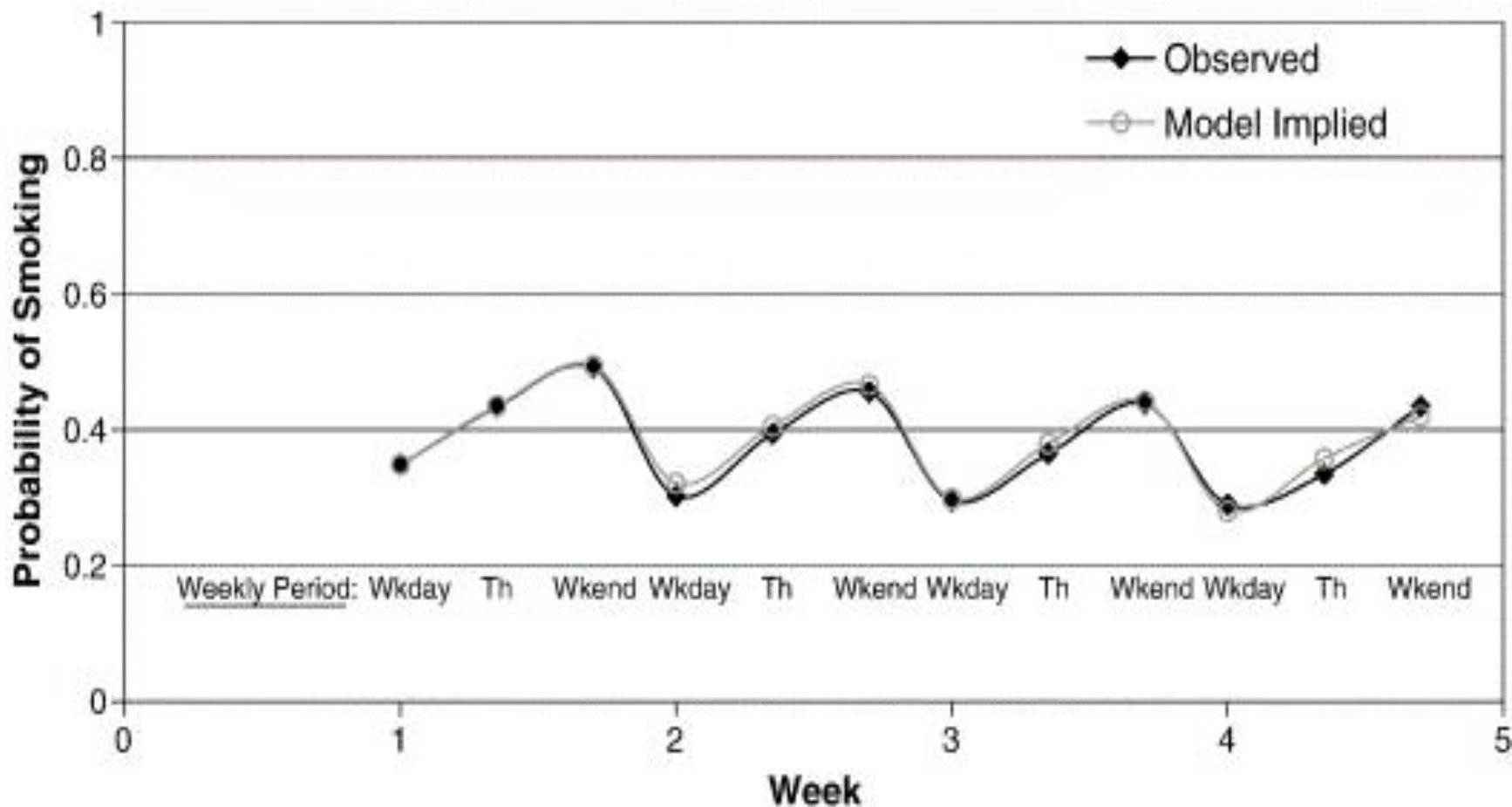
Does alcohol use increase risk for daily tobacco use?

- In young adult non-daily smokers, 75% to 90% of all smoking occurs during alcohol consumption



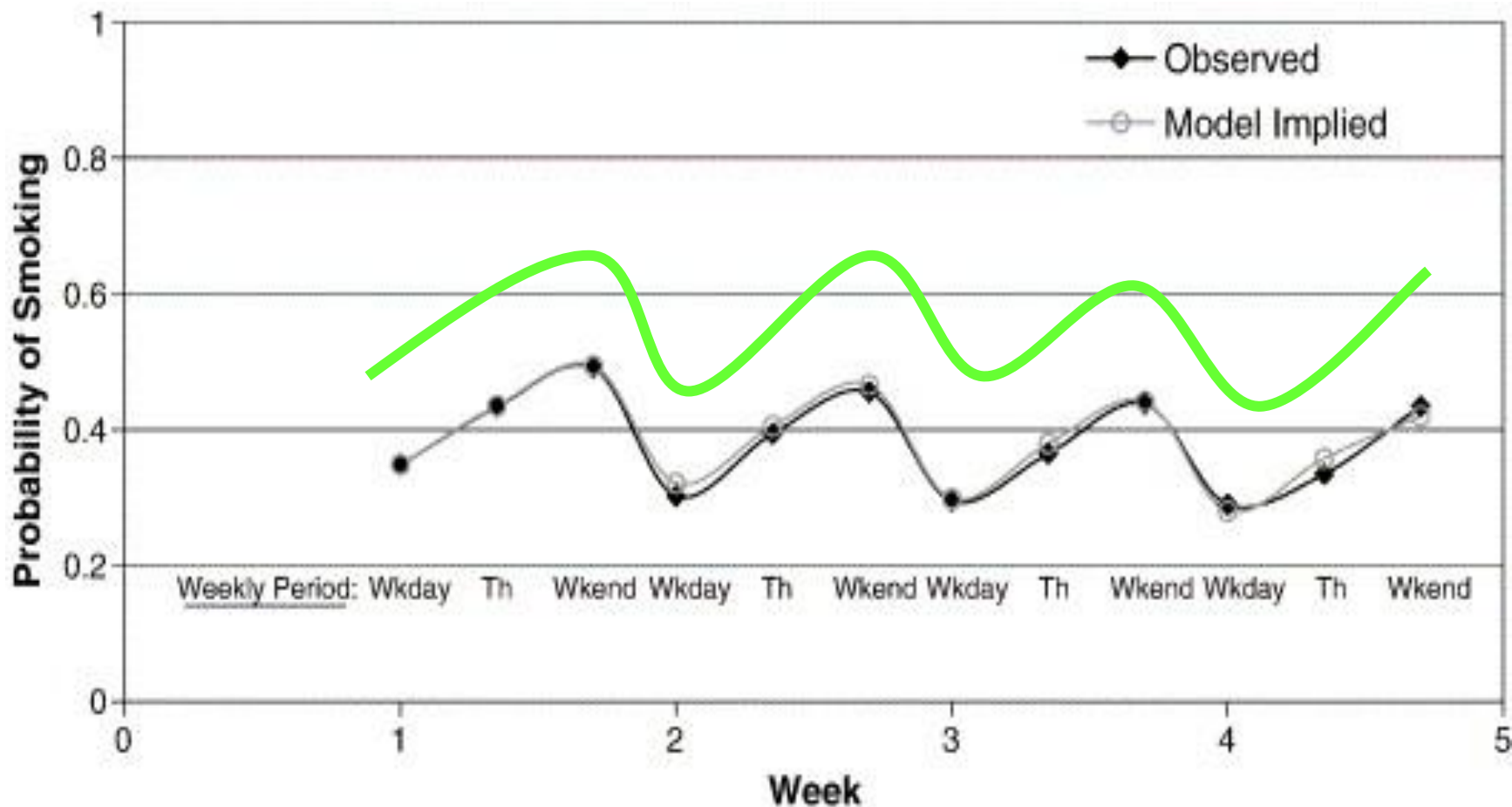
Does alcohol use increase risk for daily tobacco use?

Probability of Smoking in Freshman (Colder, 2006)



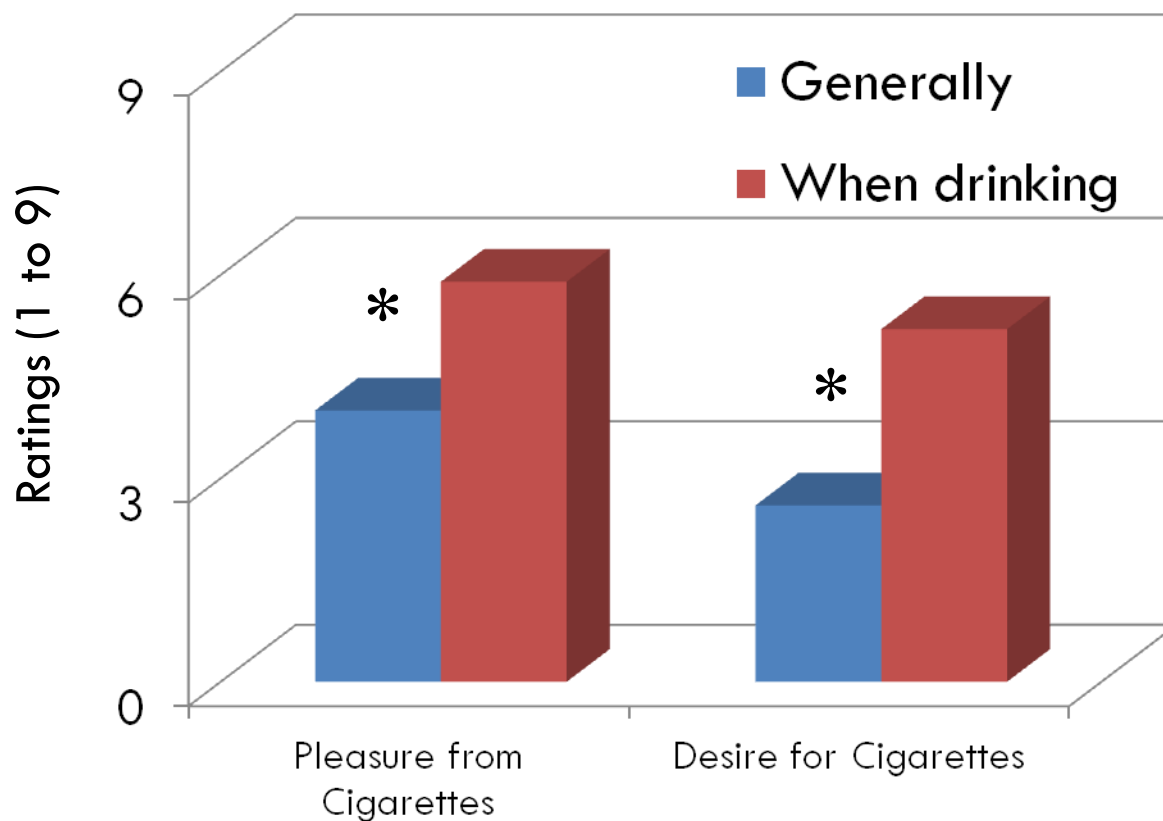
Does alcohol use increase risk for daily tobacco use?

Probability of Smoking in Freshman (Colder, 2006)



Does alcohol use increase risk for daily tobacco use?

Self-Reported Pleasure and Desire from Smoking In Young Adult Non-Daily Smokers



Drinking increases pleasure and desire for cigarettes

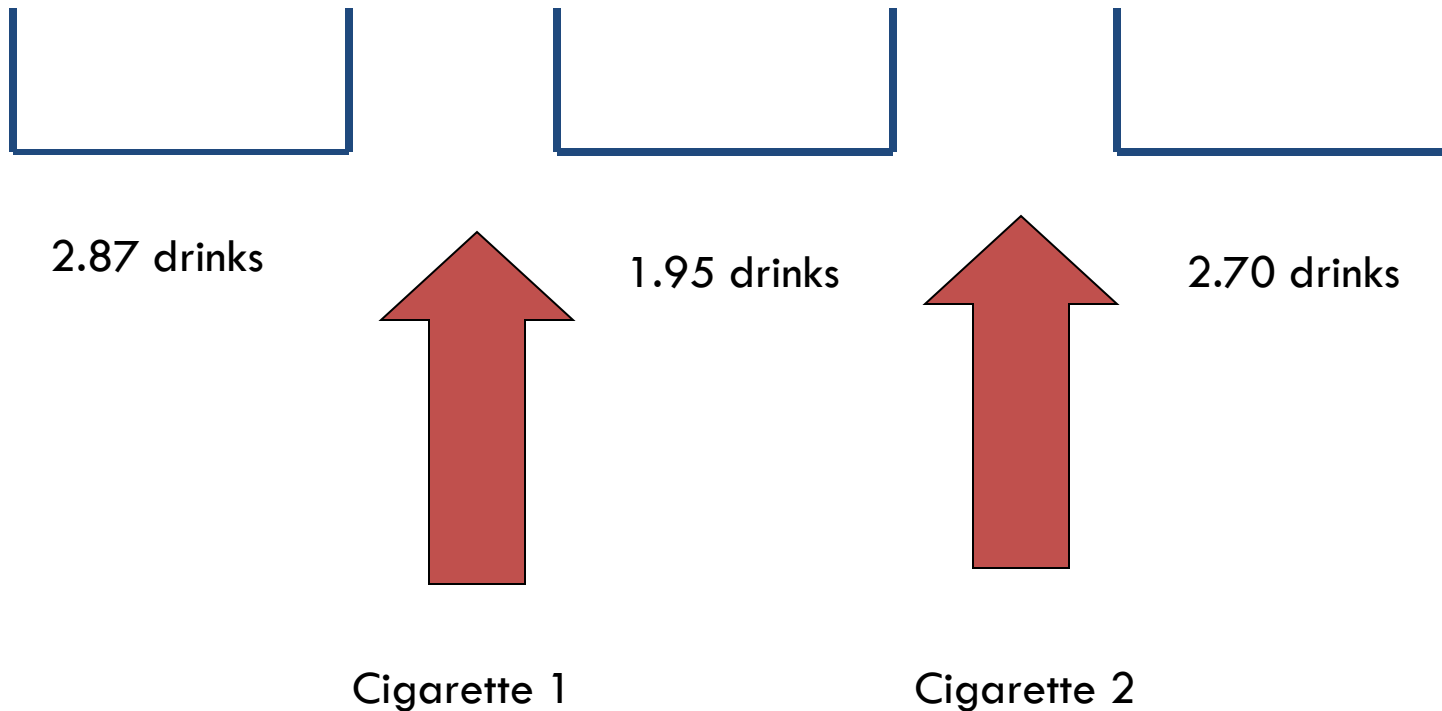
Does alcohol use increase risk for daily tobacco use?

“When I smoke cigarettes while drinking, I expect to.....”

	Non-Daily Smokers (n=101)	Regular Smokers (n=116)
Positive Reinforcement	65%	58%
Negative Reinforcement	23%	34%
Negative Consequences	12%	8%

Does alcohol use increase risk for daily tobacco use?

Hour by Hour Timeline of Smoking in Young Adult Non-Daily Smokers



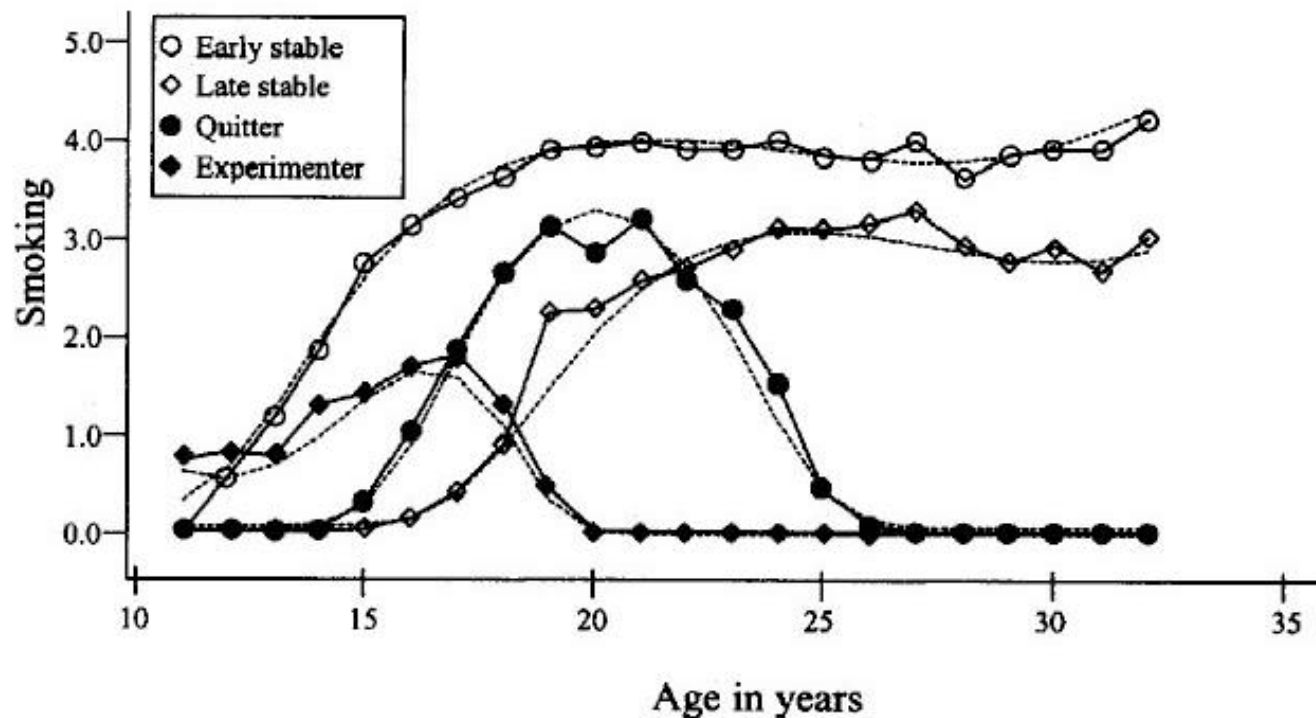
Does alcohol use increase risk for daily tobacco use?

- Young adult non-daily smokers report that smoking, while under the influence of alcohol, is a positive experience even for relatively inexperienced smokers
- Does alcohol facilitate the transition from non-daily to daily smoking?



Does alcohol use increase risk for daily tobacco use?

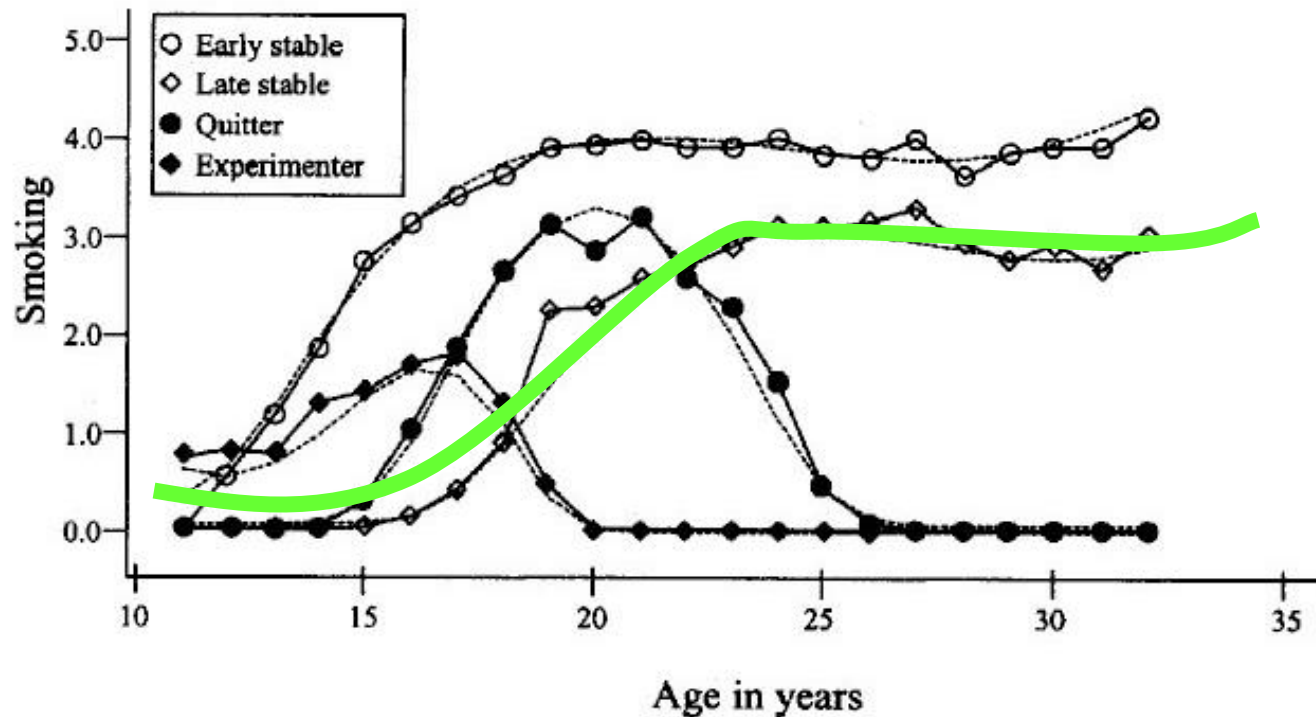
Smoking Trajectories (n=8,556)



A large proportion of smokers consolidate their smoking behavior in young adulthood

Does alcohol use increase risk for daily tobacco use?

Smoking Trajectories (n=8,556)



A large proportion of smokers consolidate their smoking behavior in young adulthood

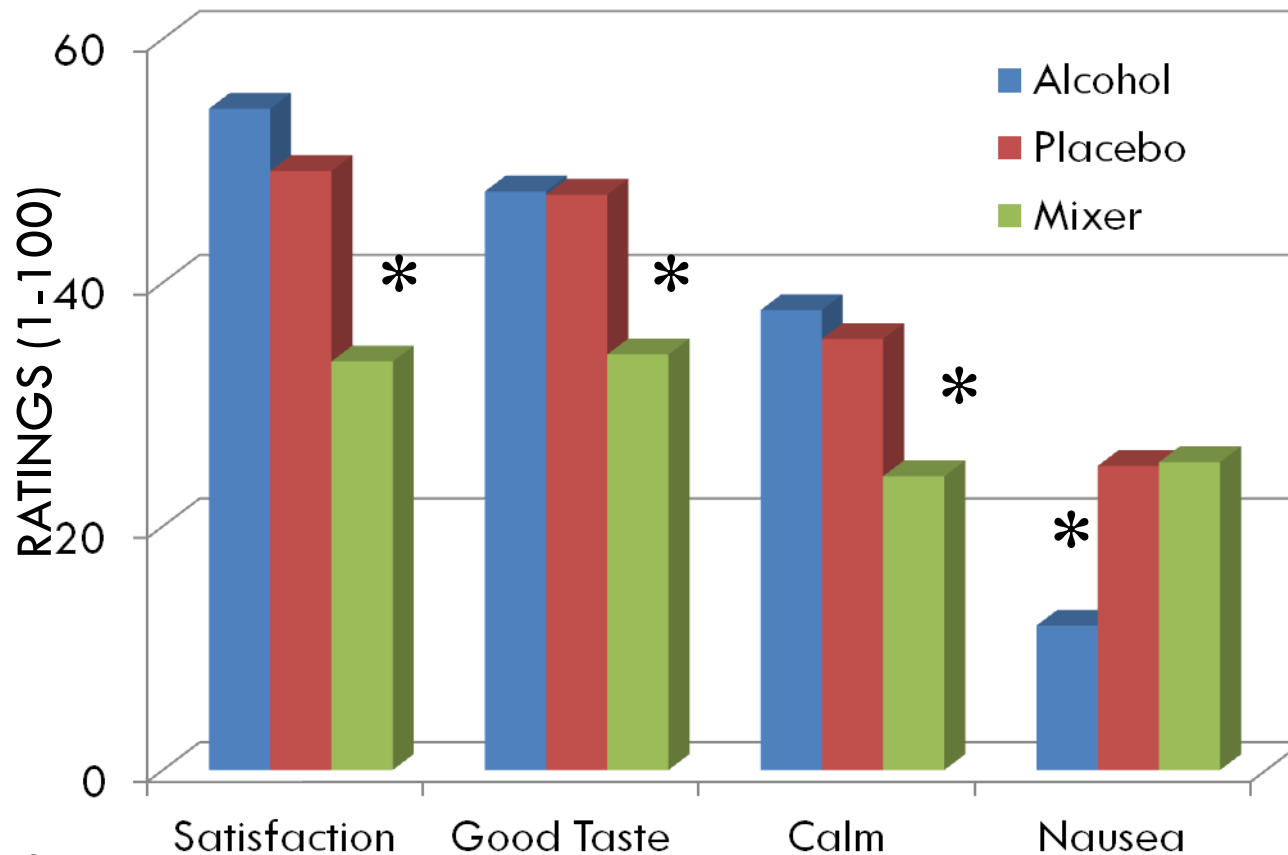
Does alcohol use increase risk for daily tobacco use?

- Does alcohol alter reactivity to tobacco in relatively inexperienced smokers who are heavy drinkers?
 - Alcohol (.08 g/dl)
 - Placebo (told alcohol)
 - Mixer (told no-alcohol)

- ▣ Subjective reactivity to a single cigarette
- ▣ Ad-lib smoking – 60 min

Does alcohol alter reactivity to tobacco?

Subjective Reactivity to a Single Cigarette Following Beverage Consumption

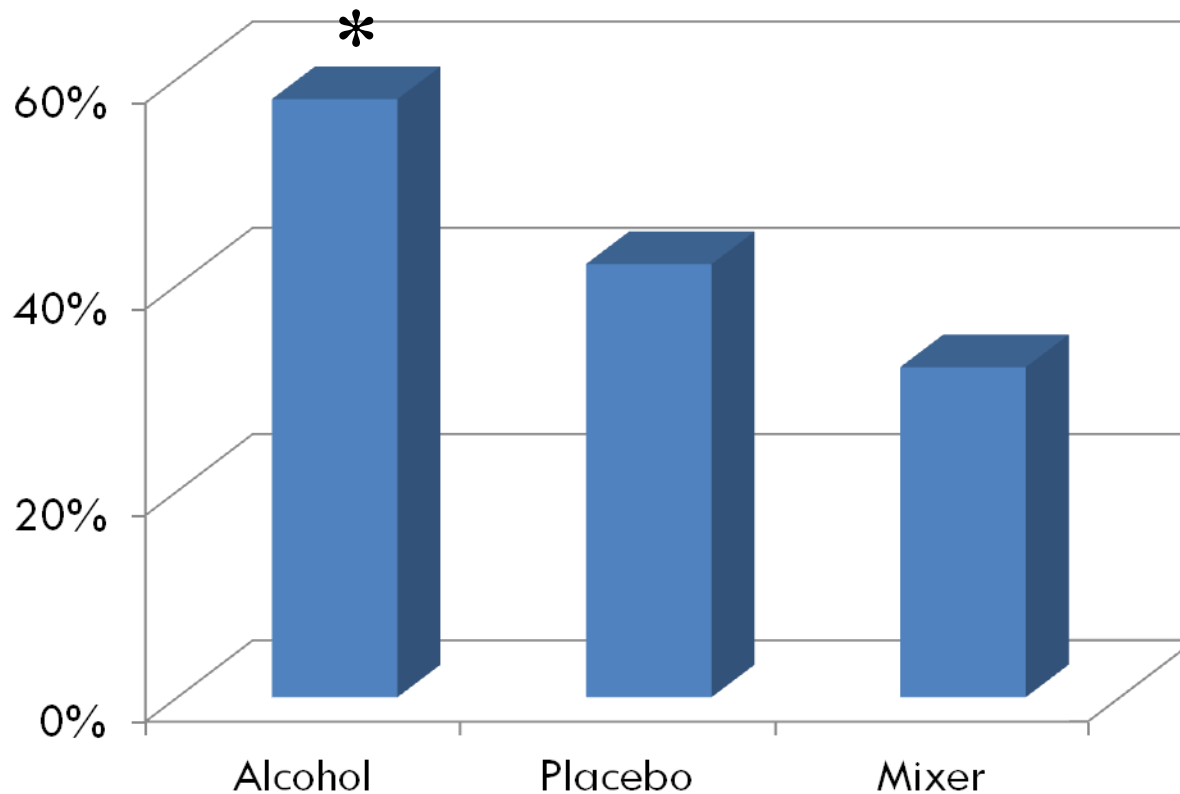


Alcohol and placebo beverages increased positive effects of smoking, but only the alcohol beverage decreased negative effects of smoking

* $p < .05$

Does alcohol alter reactivity to tobacco?

% Smoking Additional Cigarette Following Beverage Consumption



The alcohol beverage increased rates of additional smoking

Does alcohol alter reactivity to tobacco?

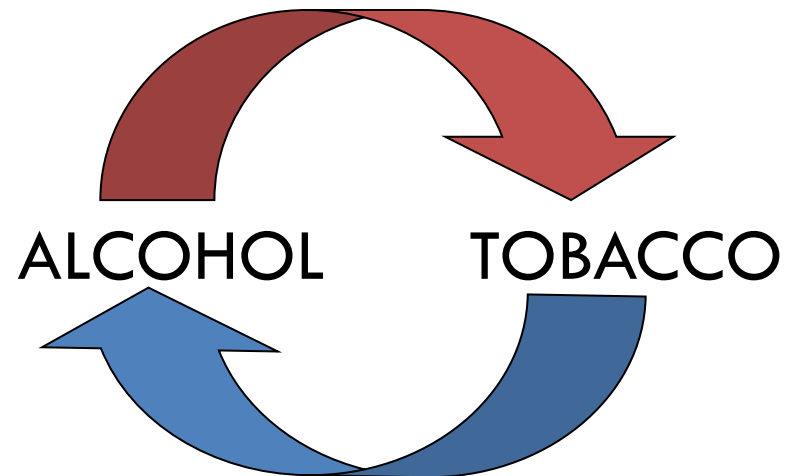
- The expectation of alcohol increased positive reinforcement and actual alcohol decreased negative consequences associated with smoking a cigarette in relatively inexperienced young adult smokers who are heavy drinkers.
- This study has implications for understanding how alcohol may facilitate the development of daily tobacco use



SECTION I

Summary

- Alcohol & tobacco co-use
 - ▣ High-comorbidity
 - ▣ Tobacco increases risk for hazardous drinking and alcohol use diagnosis, particularly for non-daily smokers
 - ▣ Smokers are more likely to drink more for longer and find it more reinforcing
 - ▣ Alcohol may facilitate the transition from non-daily to daily tobacco use



SECTION II

How can knowledge of alcohol-tobacco interactions be utilized to reduce alcohol and tobacco use?

- Screening
- Policy
- Treatment



Screening

- Can knowledge of either alcohol or tobacco use tell you something about the likelihood that the other substance is being used?
- 80% are screening for smoking status (*McAvoy et al., 1999; Taira et al., 1997; McBride et al., 1997*)
- 30% are typically screened for alcohol or drug use problems during primary care visits (*Edlund et al., 2004*)

Can smoking status be used as a clinical indicator for alcohol misuse?

- US Preventative Services Task Force recommends screening for hazardous drinking and alcohol use disorders
- Grade B – screening and brief interventions in primary care settings

Can smoking status be used as a clinical indicator for alcohol misuse?

- *John et al., 2003; Kranzler et al., 2002*
 - **Sensitivity** – rate of true positives
 - **Specificity** – rate of true negatives
 - **Positive predictive value** – rate of alcohol misuse given smoking behavior
 - **Positive likelihood ratio** – odds of alcohol misuse given smoking behavior vs. no alcohol misuse given smoking behavior

- NESARC Wave I (2001-2002) n=43,093
- Daily, chipper, former, or never smoker

Can smoking status be used as a clinical indicator for alcohol misuse?

Current Smoking = Daily Smokers + Chippers

	Sensitivity	Specificity	Positive Predictive Value	Positive Likelihood Ratio
Hazardous Drinking	43%	82%	45% vs 26%	2.34
Alcohol Use Disorders	51%	78%	18% vs 8%	2.33

Policy

- Policies which disaggregate tobacco and alcohol use may serve to reduce the use of both substances

- Does alcohol policy reduce tobacco use?
 - ▣ For example, does increasing alcohol taxes reduce tobacco use?
 - UNKNOWN

- Does tobacco policy reduce alcohol use?
 - ▣ Smokefree bans

Do tobacco policies reduce alcohol use?

- Collaboration with Andy Hyland – Roswell Park Cancer Center, Buffalo, NY

- Public health significance of smoke-free policies is clear
 - ▣ Second hand smoke exposure is reduced
 - ▣ Reduce overall smoking levels

- Does smoke-free legislation produce reductions in drinking behavior?

Do tobacco policies reduce alcohol use?

- International Tobacco Control Policy Evaluation Project www.ITCproject.org
- **Aim:** To conduct a longitudinal examination of the impact of the Scottish smoke-free policy on drinking behavior in smokers and non-smokers, compared to the rest of the United Kingdom, which did not have comprehensive smoke-free policies during the study period.

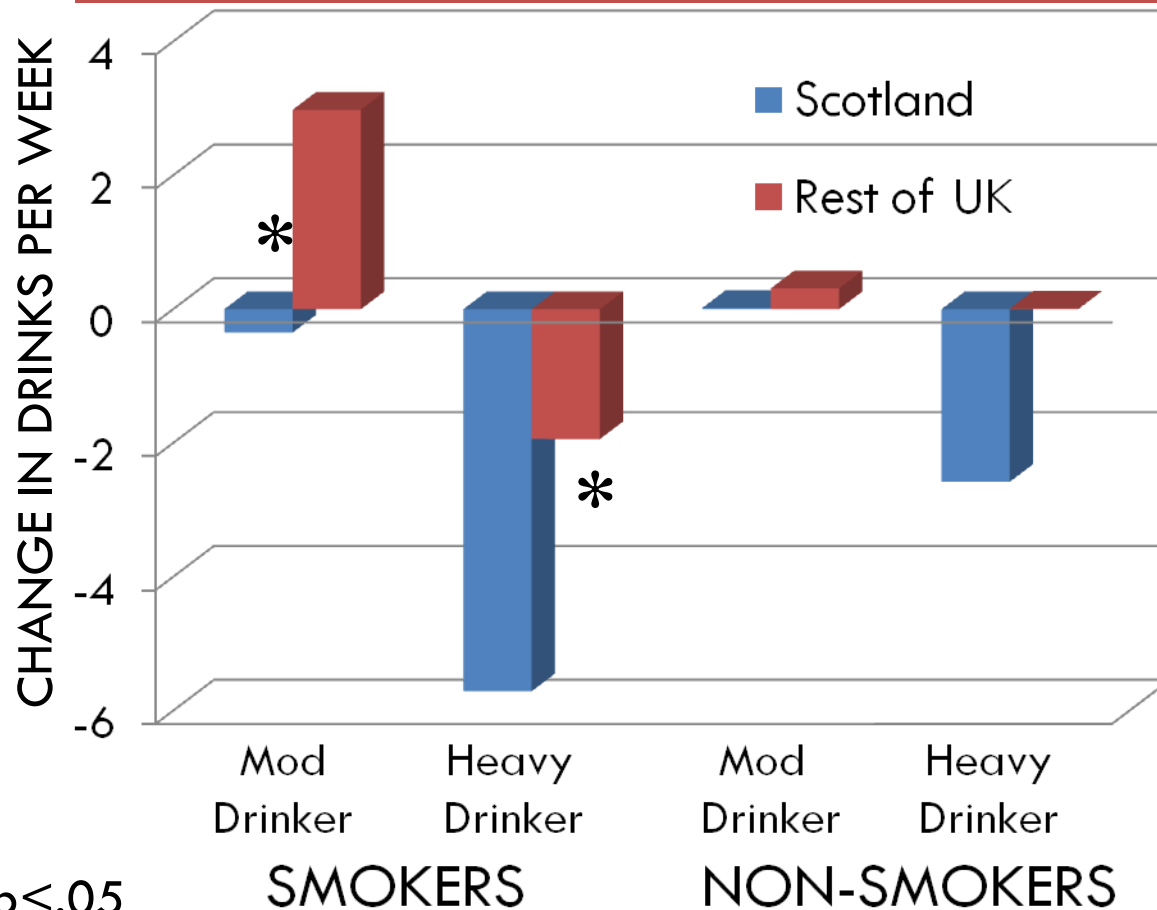
Do tobacco policies reduce alcohol use?

- Will drinking behavior in pubs decrease among Scottish smokers?
- Will this effect be most pronounced among heavy drinkers?
- Telephone interviews (smoking, drinking, pub attendance)
- Wave I – Feb/March 2006
- Wave II – March 2007
- n=1,059



Do tobacco policies reduce alcohol use?

Change in Drinks/wk in Pubs 1 yr Following Smoke-Free Legislation in Scotland



Drinking behavior decreased among Scottish smokers, compared to smokers in the rest of the UK, 1-yr following enactment of smoke-free legislation in Scotland.

Do tobacco policies reduce alcohol use?

- NESARC (2000-01 Wave 1; 2004-05 Wave II, n=34,653)

- If smoke-free legislation was enacted between waves
 - Individuals who met hazardous drinking criteria at Wave I were less likely to continue meeting criteria at Wave II (O.R. = 0.87; 95% CI=0.78-0.97)

 - Individuals were less likely to transition to meeting criteria for an alcohol use disorder at Wave II (O.R. = 0.81; 95% CI=0.69-0.94)

Do tobacco policies reduce alcohol use?

- Impact of smokefree policies on drinking appears to be greatest in those with heavy alcohol consumption
- Smoke-free policies have additional alcohol-related public health benefits
- Next steps:
- Sub-group analysis
- Influence of tobacco taxation and price on drinking



Treatment

- Does reducing either alcohol or tobacco use, reduce the use of the other substance?
 - ▣ SOMETIMES



Treatment

- Does quitting smoking reduce drinking?
 - ▣ Mixed findings
 - Some studies find that quitting smoking leads to reductions in alcohol use (*O'Malley et al., 2009*)
 - Other studies find that quitting smoking does not lead to meaningful changes in alcohol use (*Kahler et al, 2010*)
 - ▣ BUT drinking is a strong risk factor for the failure to quit smoking
 - ▣ NCI-funded study examining brief alcohol intervention added to the New York Quitline for hazardous drinkers

Treatment

- Does alcohol treatment increase rates of quitting smoking?
 - ▣ Mixed findings (concurrent vs sequential treatment)

 - ▣ Smoking cessation treatment following alcohol treatment (*Cooney et al., 2009*)
 - Increase rates of smoking cessation
 - Does not increase rates of alcohol relapse

Treatment

- Medications
 - ▣ alcohol and tobacco share common pathways to produce reinforcement in the brain
 - ▣ Can medications designed to reduce alcohol-related reinforcement, also reduce smoking?
 - ▣ Can medications designed to reduce tobacco-related reinforcement, also reduce alcohol use?

Can medications designed to reduce alcohol-related reinforcement, also reduce smoking?

- Naltrexone (opiate antagonist)
- Effective for the treatment of alcohol dependence
- Thought to reduce alcohol-related reinforcement

- Some evidence that naltrexone may increase rates of smoking cessation and reduce weight gain during a quit attempt (*O'Malley et al., 2006*)

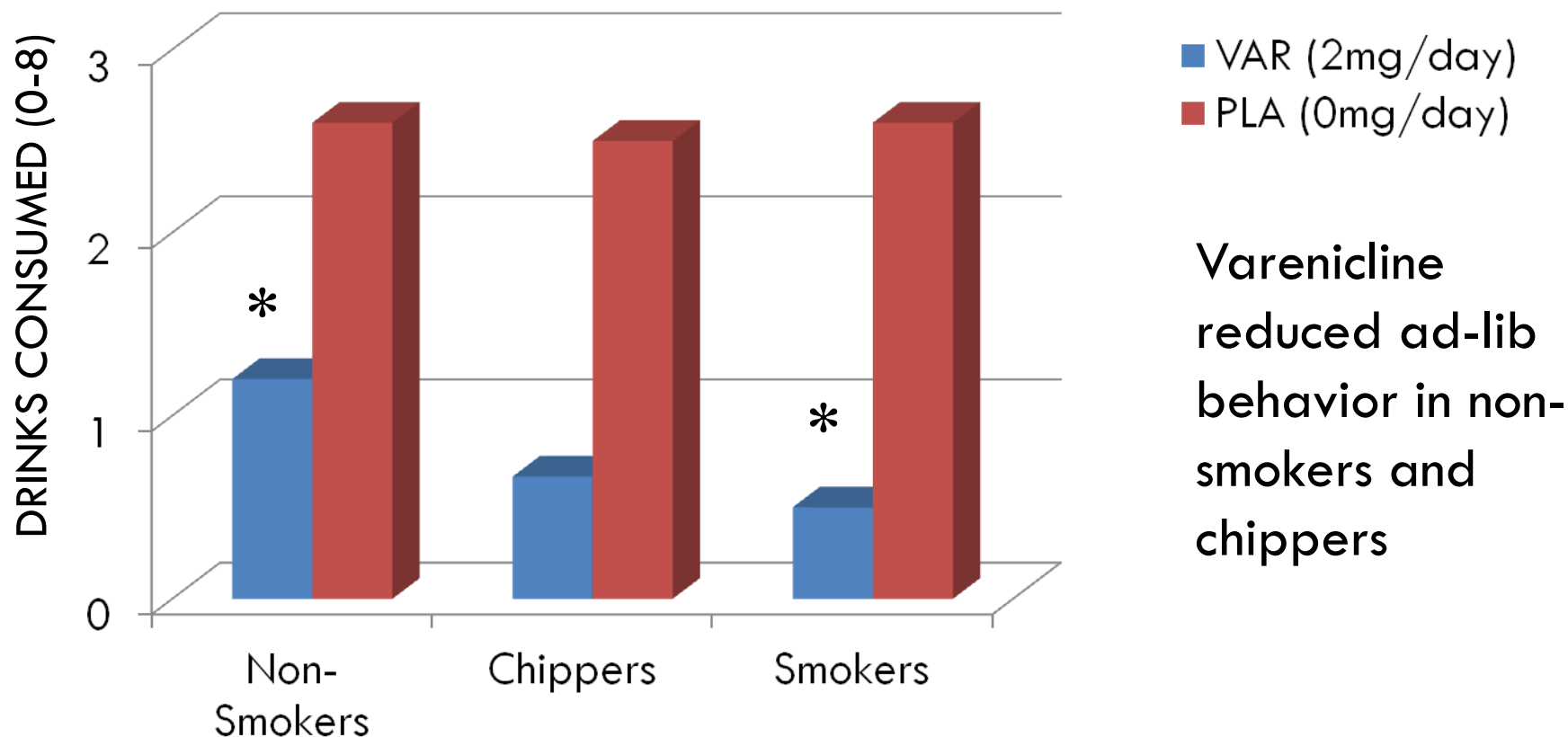
Can medications designed to reduce smoking-related reinforcement, also reduce drinking?

- Varenicline (partial nicotinic agonist)
 - ▣ Effective for smoking cessation
 - ▣ Increases rates of smoking cessation 2x over zyban and 4x over placebo (*Jorenby et al., 2006*)



Can medications designed to reduce smoking-related reinforcement, also reduce drinking?

DRINKS CONSUMED during 2-hr self-administration period



*p<.05

Can medications designed to reduce smoking-related reinforcement, also reduce drinking?

Aim: What happens to drinking behavior in smokers taking smoking cessation medications to quit smoking?

- ITC-Four country data (US, Canada, UK, France)
- Drinking, smoking, medication use assessed across 2 waves, 1 yr apart
- N=4,995
 - ▣ Varenicline (n=291)
 - ▣ Nicotine replacement (n=751)
 - ▣ No medication (n=3,953)



Can medications designed to reduce smoking-related reinforcement, also reduce drinking?

	Varenicline vs NRT	Varenicline vs No Medication	NRT vs No Medication
Any Drinking (yes/no)	O.R. = 0.56*	O.R. = 0.74	O.R. = 1.10
Drinks 1 x month or more (yes/no)	O.R. = 0.43*	O.R. = 0.62*	O.R. = 1.14*

- Adjusted for Wave 1 drinking, sex, race, age, heaviness of smoking, and quitting smoking
- Effects of varenicline on alcohol consumption are independent of effects on quitting smoking

*p<.01

McKee et al., submitted

Why do drinking and smoking go together like milk & cookies?

FINAL WORDS

- Alcohol & nicotine co-use
 - ▣ Potentiated reinforcement
 - ▣ Tobacco use increases risk for alcohol misuse
 - ▣ Alcohol use increase risk to transition from non-daily to daily smoking
- How can knowledge of alcohol-nicotine interactions be utilized to reduce alcohol and tobacco use?
 - ▣ Screening, Policy, Treatment & Medications
 - ▣ Afternoon session
 - How can this knowledge be applied to young adult populations?



With many thanks.....

The lab:

Erika Balchunas

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Paula Cunningham

Naralys Estevez

Emily Harrison

Nina Hill

Meaghan Lavery

Lauren Panicek

Merritt Piro

Kwesi Prempeh

Jesse Wanzer

Andrea

Weinberger

Katie

Yanagisawa



QUESTIONS?

