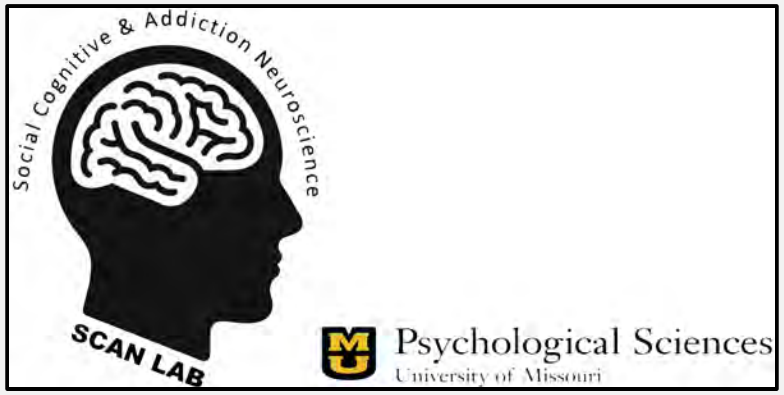
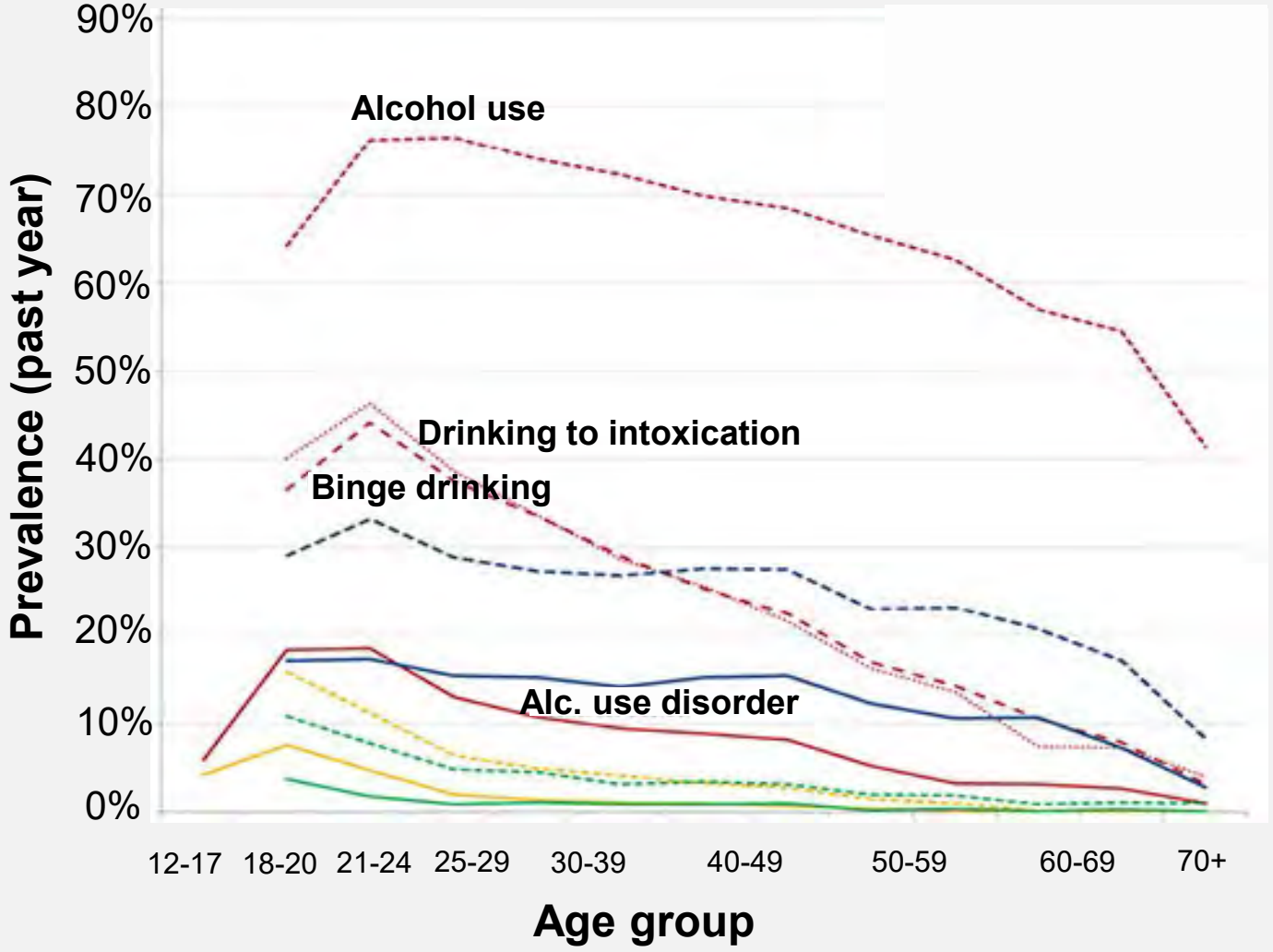
Effects of Alcohol: Differences across Individuals and Situations

Bruce D. Bartholow, Ph.D.

Frederick A. Middlebush Professor of Psychology



Drinking (& other drug use) across the lifespan



- Binge drinking and intoxication are normative in "emerging adulthood"
  - Ages 18-25
  - Nearly 50% of 21-24 yr-olds report getting drunk in the past year
- Alcohol involvement peaks during this time, then declines over the course of adulthood

Binge drinking and intoxication

- Binge drinking has a *behavioral* definition, according to the National Institutes of Health
  - Consuming enough alcohol to raise blood alcohol concentration (BAC) to 0.08 g/dL within two hours.
  - Typically, 5 ‘drinks’ (men) or 4 ‘drinks’ (women) within two hours
  - What constitutes ‘a drink’ can vary widely, so this is a loose definition

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- By contrast, *intoxication* has a legal definition (0.08 g/dL BAC), which is largely arbitrary
  - Behavioral, cognitive and emotional effects of that dose vary dramatically across people
  - Significant impairment occurs at much lower doses in most people

College student drinking

- College students consume larger quantities per occasion than any other demographic group
  - Even compared to their age peers who are not in college

College student drinking

- So-called ‘extreme binges’ (12 or more [men]/10 or more [women]) are very common in college students, particularly in first two years
  - College students generally drink with the intention of becoming very drunk
  - “If I don’t black out, then it wasn’t a very good night.”

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  - “If I don’t black out, then it wasn’t a very good night.”
- What BAC results from this level of consumption?

Men	BAC	Women	BAC
150 lbs	.26%	120 lbs	.33%
180 lbs	.21%	140 lbs	.28%
200 lbs	.17%	160 lbs	.24%

Common effects per number of drinks/BAC

# drinks	BAC	Common effects
1-2	.02-.05%	Feeling relaxed; some impaired judgment; behaviors exaggerated (talking more loudly; more gesturing); reaction time slows; difficulty concentrating
3-4	.08-.10%	Senses dulled; risk-taking increases; memory impairment; mild blackouts possible; slurred speech, stumbling gate; interpretation of events is skewed; falling asleep unintentionally (passing out)
BAC levels common in college student drinkers		
8-10	.17-.25%	Confusion, feeling dazed; vomiting; reduced pain perception; blackouts probable; passing out likely; very high risk of injury (self and others)
10-12	.25-.33%	Stupor (unresponsive to external stimuli, though may retain consciousness); cognition greatly impaired; breathing impaired
12-15+	.33-.40%	Coma; risk of cardiac arrest; neurologic damage

Common negative consequences of intoxication

- Getting in fights
- Sexual misconduct (or sex later regretted)
- Injury to self
- Injury to others
- Nausea/vomiting
- Hangover
- Passing out
- Missing school/work
- General stupidity

This

That

Major factors affecting BAC from a given dose

- BAC reflects alcohol overwhelming liver capacity
  - More and faster consumption = overwhelming the liver's capacity to "clear" the toxin
- Time
  - Faster consumption = less time for liver to clear = higher BAC
- Body weight (actually, total body water)
  - Larger = more water in which to dilute ingested alcohol
- Sex
  - Per kg of weight, men have higher blood volumes—also leading to greater dilution of ingested alcohol
  - Men also metabolize alcohol more readily than women due to higher activity of gastric enzymes (alcohol dehydrogenase).
- Stomach contents
  - Food in the stomach slows alcohol metabolism, allowing the liver more time to absorb more alcohol before it reaches the bloodstream.

BETWEEN-PERSON DIFFERENCES IN ALCOHOL'S EFFECTS

Same dose does not equal same BAC, and BAC does not equal intoxication!

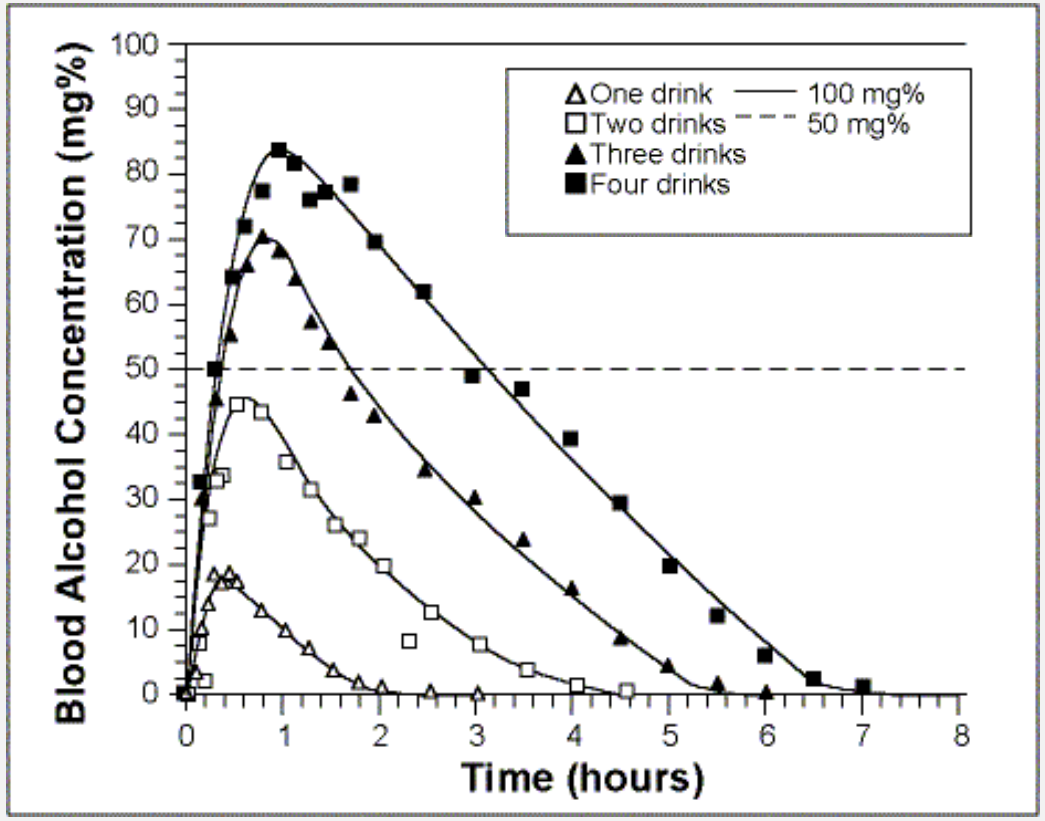
What do we mean by “alcohol effects?”

- Alcohol *pharmacodynamics (APD)*: how alcohol moves through and affects the body (mainly, the brain)
  - Feelings of intoxication

- Alcohol *pharmacokinetics (APK)*: how the body affects the drug (i.e., what the body does to it)
  - Absorption rate, distribution throughout the body (via the blood), metabolism, and elimination
  - BAC is a classic measure related to APK

BAC trajectories over time

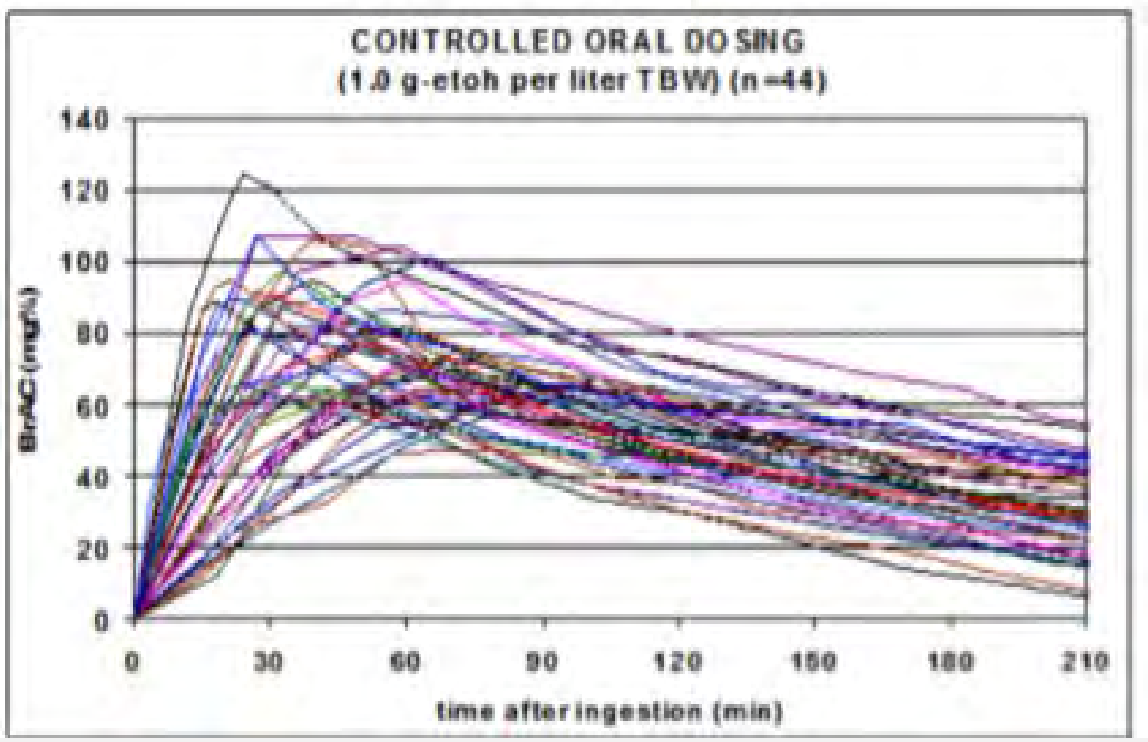
Average BAC "curves" of 8 fasting adult men



- Characteristic pattern after a single "bolus"
  - Rapid ascent to a peak, followed by gradual descent over several hours
- On average, BAC decreases by .015% per hour
  - There is no way of increasing this rate

Averages are misleading

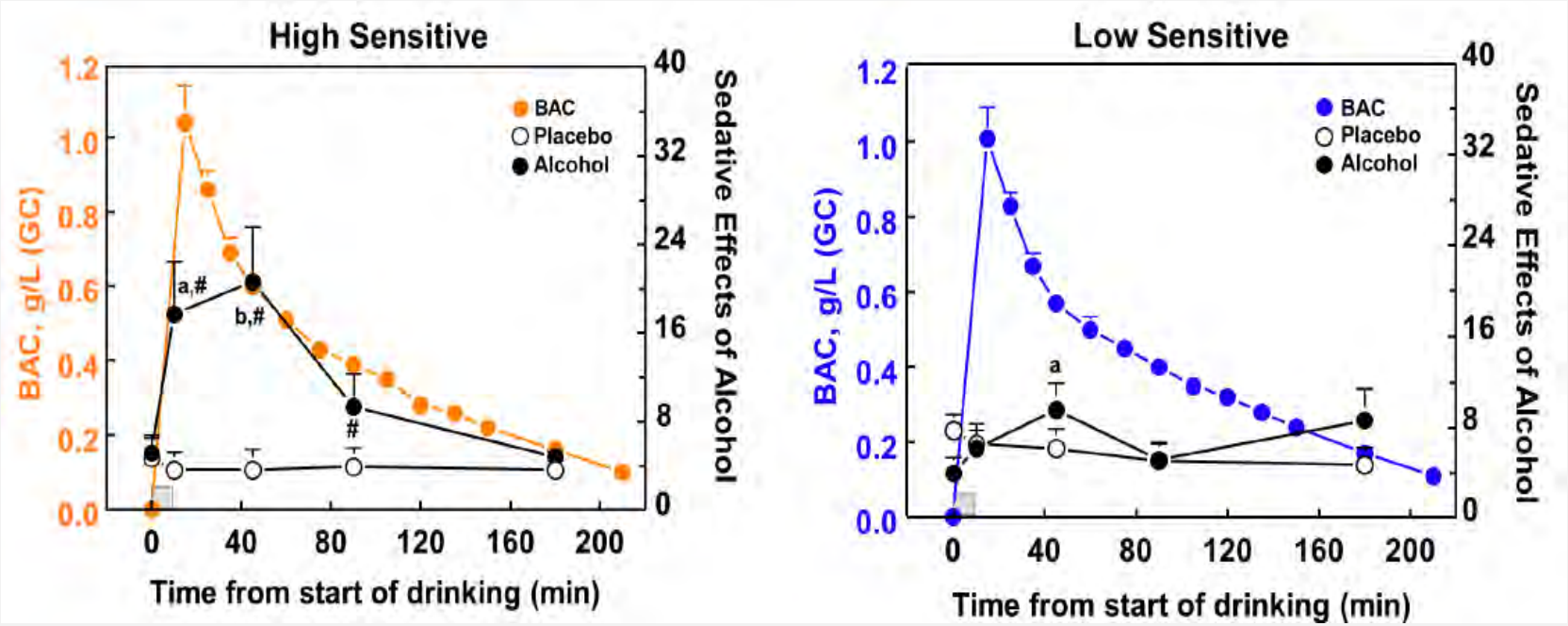
- Research has shown differences as large as 300% across individuals in the effects of a given dose on both alcohol *APK* (e.g., BAC) and *APD* (i.e., how it feels).



- Individual BAC curves from 44 adults who each consumed 1.0 g/L EtOH within 20 min.
- Huge variability in both peak BAC and in time to reach peak BAC

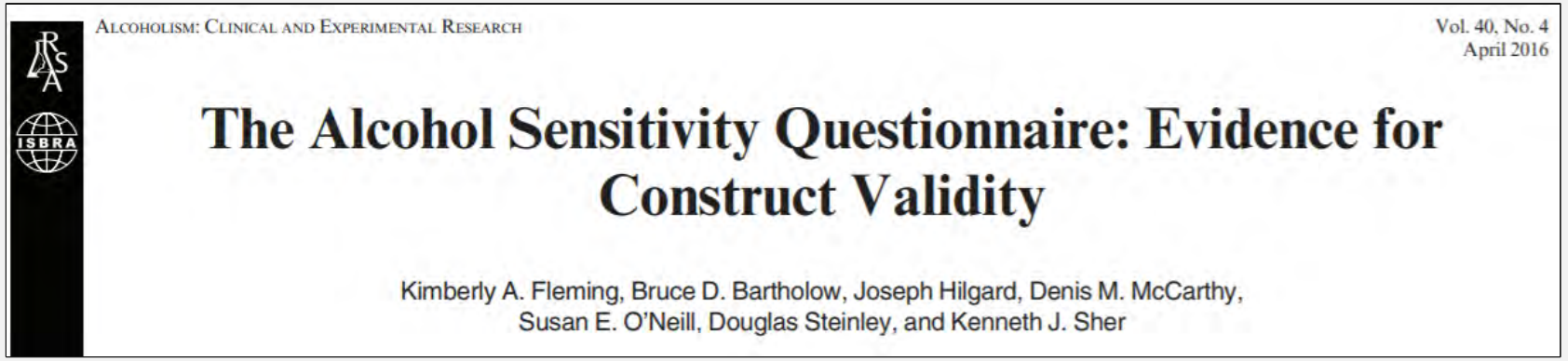
Alcohol differentially affects people

- Even when BAC trajectories are the same, APD still differs
  - For some, one “standard” drink is enough to cause impaired judgment and feelings of intoxication. For others, such effects occur only with much higher doses



Measuring alcohol sensitivity

- Researchers often ask people to report the number of drinks they require in order to feel various effects from drinking alcohol



  - E.g., “Have you ever felt more talkative after drinking alcohol? If so, what’s the minimum number of drinks you must consume in order to feel more talkative?”

Alcohol sensitivity and AUD risk

- Having relatively low sensitivity to alcohol's effects is known to confer increased risk for alcohol use disorder (AUD)
  - 'LS' individuals generally drink more than their 'HS' peers, because they need more to achieve desired effects (e.g., blackouts)
  - LS individuals generally experience drinking-related negative consequences more frequently than do their HS peers

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  - LS individuals generally experience drinking-related negative consequences more frequently than do their HS peers
- But among college student drinkers, LS is a desirable trait
  - LS individuals can "hold their liquor" better than their HS peers
  - Heavy drinking and the ability to 'keep partying' are highly desired and admired among college student drinkers

The ‘LS’ paradox

- LS increases odds of experiencing negative consequences of drinking
  - Mainly because LS people drink more than HS people

The ‘LS’ paradox

- LS increases odds of experiencing negative consequences of drinking
  - Mainly because LS people drink more than HS people
- But, at a given level of consumption (i.e., # of drinks), LS people are *less likely* to experience many negative consequences than their HS peers
  - John (LS) and Ted (HS) both consume 8 drinks.
  - At that dose Ted’s (HS) judgment is more impaired than John’s (LS), making Ted more likely to take risks, make bad decisions, and wake up on a stranger’s floor the next morning.

Sexual encounters later regretted

- Having sex with someone while intoxicated—and later regretting it—is quite common among college students.
  - 21-25% report alcohol-related regretted sex in the past year
  - Reported by both men and women, but often for different reasons
    - Partner choice vs. behavior itself
  - Of college women raped each year, ~72% are assaulted when they are too intoxicated to consent

- Might alcohol sensitivity play a role in whether people experience regretted sexual encounters?

Alcohol sensitivity and regretted sex

- A defining characteristic of LS is experiencing relatively less impairment from a given dose of alcohol.
  - Perceptions of sexual risk or partner intent likely less affected.

Dr. Liana Hone

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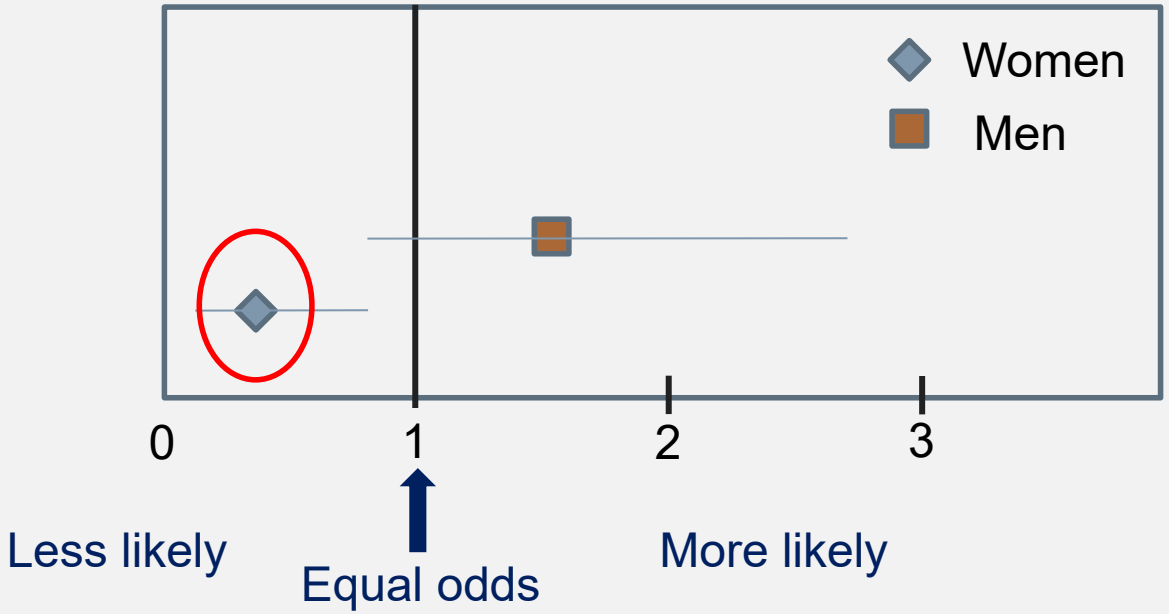


Odds of reporting regretted sex, predicted by alcohol sensitivity level and controlling for number of drinks

- LS women (but not men) are *less likely* to experience regretted sex at a given number of drinks than are their HS peers.
  - In any one instance, a woman who is relatively less sensitive to alcohol will be less impaired by a given # of drinks than a more sensitive woman, and therefore better able to make good decisions.

Hone, Bartholow, et al., 2017

CONTEXT AND ALCOHOL EFFECTS

Where you drink, and with whom, matters a lot

Context effects on college student drinking

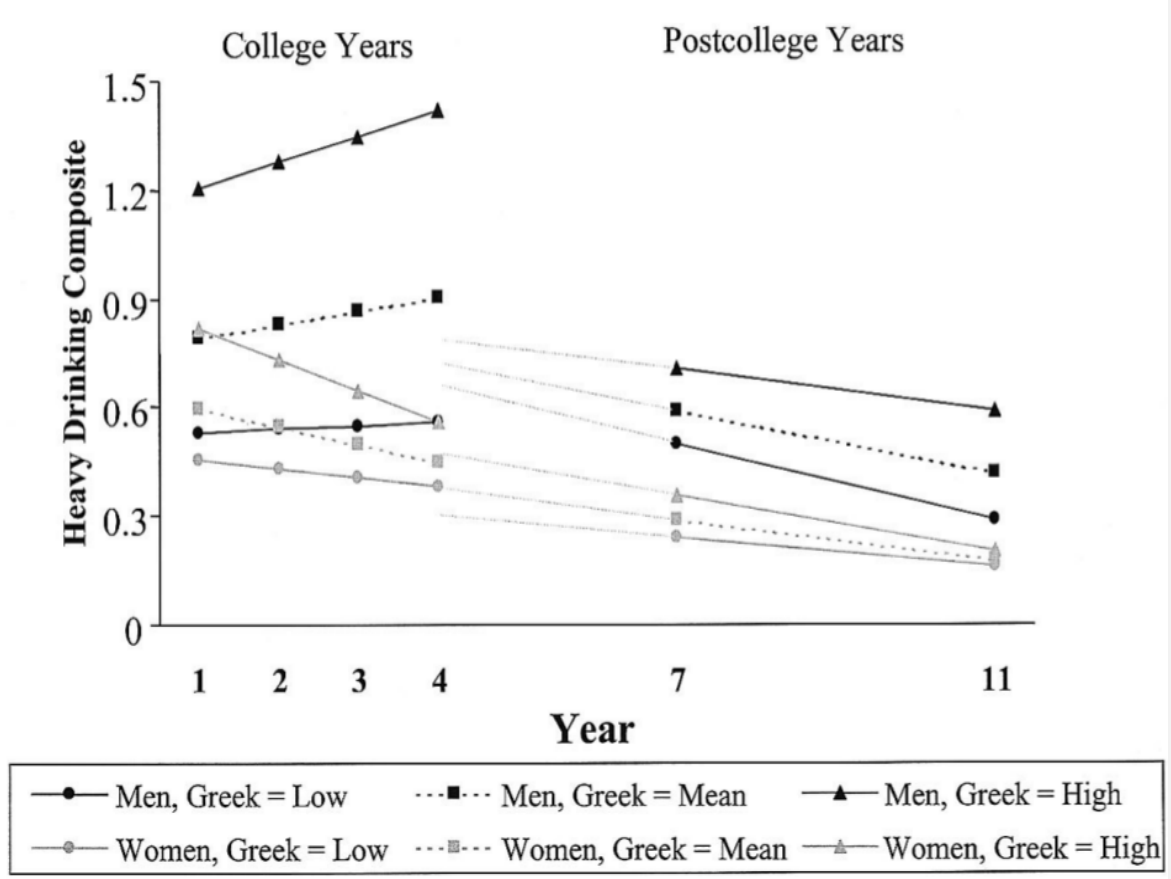
- The university itself is a heavy-drinking context
  - College students drink more than their age peers who do not attend college
  - Students at large universities, esp. those with Division I NCAA athletics, drink more than students at smaller schools
  - Students at schools with a Greek system drink more than those at schools w/o Greek houses
    - Even for students not affiliated with the Greek system
  - Women who attend co-ed schools drink more than women who attend schools w/o men

The Greek system as heavy-drinking context

- Surprising no one, research consistently shows that Greek students drink more than their non-Greek peers
- Interestingly, Greek-affiliated students drink more at chapter events than in other contexts
  - As do non-affiliated students

- Does this simply mean that Greek-affiliated students were destined to be heavy drinkers? Are they heavy drinkers after college too?

HD by Greek involvement during college and after



- More involvement with Greek system = more HD
  - For men, Greek involvement = increased HD throughout college
- By three years post-college, HD has dropped dramatically
  - No longer predicted by level of college Greek involvement

Bartholow, Sher, & Krull, 2003

Conclusions, I

- Alcohol is a complex substance that affects multiple neural systems and causes a wide array of effects, both between people and within the same person across situations
  - Variability across people is massive—as much as 300%
- Young people, especially college students, drink at very intoxicating levels and experience numerous adverse consequences
- Variability in sensitivity to alcohol's effects is a mixed blessing
  - LS increases risk for AUD and related problems, but decreases risk for certain immediate consequences at a given alcohol dose

Conclusions, II

- Alcohol consumption and alcohol's effects vary widely as a function of context and situations
  - The kind of drinking contexts often encountered by college students encourage more drinking and greater risk-taking compared to contexts in which "grown-ups" tend to drink
- What grown-ups consider to be "negative consequences" are not perceived to be negative by young people
  - Puking on yourself, getting hurt, hurting someone else, and doing generally stupid things when drinking are worn as a "badge of honor" for most college students.

Students need help understanding consent