

Using Animal Models to Identify Clinical Risk Factors in the Older Population Due to Alcohol Use and Misuse

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Division of Psychology



Many Thanks

- NIAAA
- Mayo Health Care-UWEC RIC
- The Republic of Singapore
- UWEC
- MOPF

Many Thanks



In Addition to: Samantha Scaletty, Abbey Kastner, Meredith Bauer, Amelia Schnieder, Sarah Trapp, Arreona Schriber

We Are Moving Where? (Melissa, when told there are cities north of Greenbay)

Wisconsin as the America's "Alcohol Research Laboratory" (Wall Street Journal)

Milwaukee	Fond du Lac
Janesville	La Crosse
Ricine	Madison
Shoboygan	Greenbay
Wausau	Oshkosh
Eau Claire (9 th)	Appleton

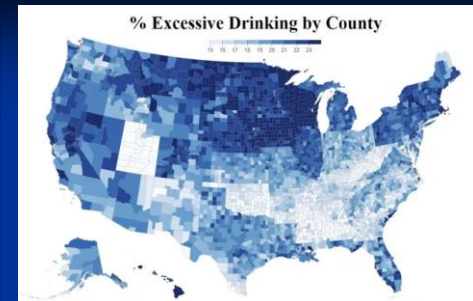


12 of the top 20 Drunkest Cities in the United States are in Wisconsin

Alcohol Drinking Rates

- Wisconsin adults drink more alcohol than adults in 49 of the 50 states in the USA
- Least Healthy State in relation to dangerous alcohol use (America's Health Ranking, Annual Report 2020)
 - Defined in terms of binge drinking
 - 4+ drinks for females; 5+ drinks for males
 - Defined in terms of heavy drinking
 - 8+ drinks for females/week; 15+ drinks for males

% Excessive Drinking by County



Why Investigate Alcohol Use in Older Populations?

- The number of individuals over the age of 60 are predicted to increase from 900 million to 2.1 billion by 2050.
- Older people consume alcohol often in a binge type pattern.
- The percent increase in alcohol drinking in older adults is greater than the percent increase in alcohol drinking in younger adults.
- Little is known about the impact of alcohol, either acute or chronic, on the aging brain.

Why Investigate Alcohol Use in Older Populations?

The number one lifestyle predictor for development of dementia including Alzheimer's Disease is a diagnosis of an Alcohol Use Disorder

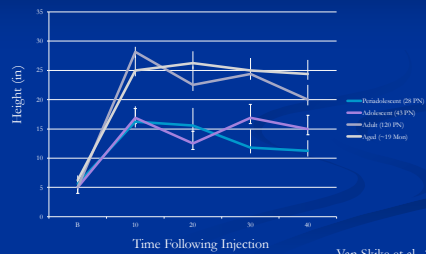
Why Study Alcohol in the Older Population?

DEADLY FALLS | WISCONSIN'S SENIORS
Wisconsin still has nation's highest rate of deadly falls among older adults

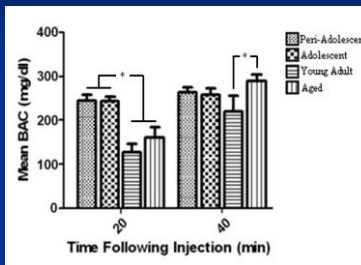
•David Wahlberg | Wisconsin State Journal
•Jan 4, 2021

It's not clear why Wisconsin tops the charts in fatal falls, a topic the Wisconsin State Journal examined in a [three-part series in March 2019](#). Possible factors include icy winters; [accident prevention](#), including among the elderly; the population being older and whiter than the U.S. average; and officials here potentially reporting falls as a cause of death more than in other states.

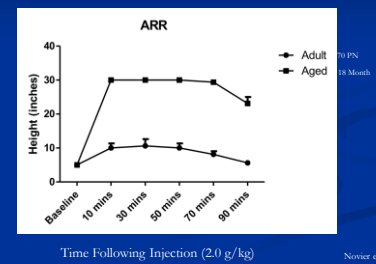
Ethanol Produces Greater ARR Impairment in Adults



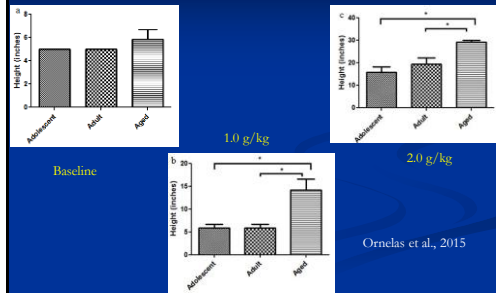
Is This A Boring Effect?



Aged Rats More Sensitive to Acute Ethanol



Impairment in the ARR is found at low doses



Is this simply a BAC effect?

Age	Dose	RR	ARR	MWM
Adult	1.0 g/kg	83.47 (5.63)		91.96 (8.45)
Adult	1.5 g/kg	130.36 (23.70)		158.63 (5.49)
Adult	2.0 g/kg	179.57 (20.25)	178.23 (3.96)	206.25 (11.41)
Aged	1.0 g/kg	73.15 (10.00)		91.35 (9.40)
Aged	1.5 g/kg	132.42 (18.00)		138.96 (7.55)
Aged	2.0 g/kg	169.63 (23.27)	214 (6.66)	177.53 (14.22)

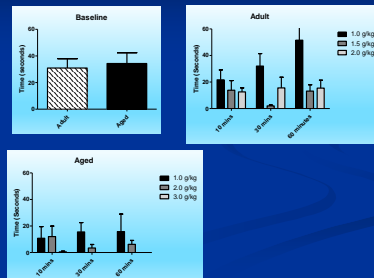
Go back 2 slides and remember to talk about statistics

Novier et al., 2013

Accelerating Roto Rod Typical measure of Ataxia



What about Roto-Rod?

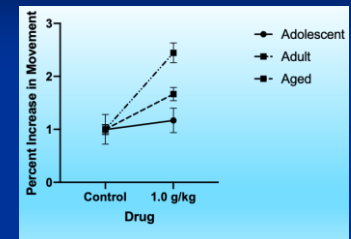


Looking at BAC again

Age	Dose	RR	ARR	MWM
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No age difference

Impact of Ethanol on Low Dose Alcohol



So...Older Adults Fall More...

- They consume alcohol.
- The alcohol consumption decreases motor coordination to a greater extent in aged animals.
- The alcohol consumption increases movement to a greater extent in aged animals.
- You move more and are less coordinated, you likely fall.

As A Health Care Provider

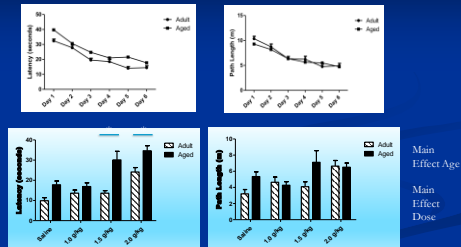
- Access alcohol use in all populations.
- AUDIT, quick 10 question assessment.
- Discuss mobility and impact on alcohol with patients.
- If a patient presents with a fall as a primary cause discuss alcohol use with them.

Alcohol, Cognitive Function and Older Adults

Various Water Maze Tasks Employed (submerged)



Acute Alcohol Produces Complex Changes in Spatial Memory Deficits in Aged Rats



Novier et al., 2013

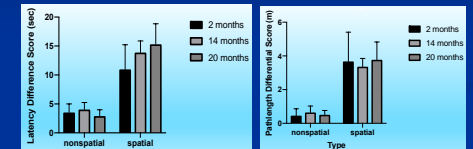
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Adults have higher BAC compared to aged

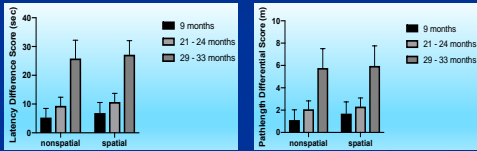
Novier et al., 2013

Acute Ethanol, Age and Cognitively Spared Animals



Matthews et al., 2020

Cognitively Impaired



Matthews et al., 2020

Important

- Understanding basic, subtle, cognitive function may be important to know as it relates to alcohol use in the patient population.

Understanding the Impact of Chronic Ethanol in Aged Animals

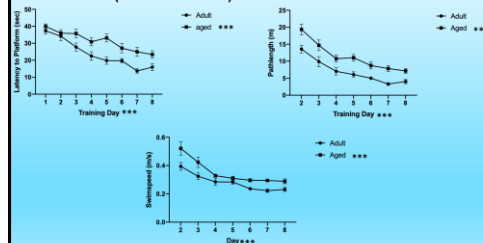
Various Water Maze Tasks Employed



AUD and Behavioral Flexibility

- Decrease in BF in abstinent alcoholics
- Decreased BF following high ethanol consumption in monkeys
- Decreased BF predicts which monkeys will engage in high ethanol consumption.

Differential Learning in Adult and Aged Animals (before CIE)



Impaired Behavioral Flexibility in Aged Rats Administered CIE

