Examining the Effects of Sociodemographic Identity on Adolescent and Current Alcohol Misuse

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INTRODUCTION

Identifying vulnerable populations that are at the greatest risk of developing alcohol use disorders (AUDs) is essential preventative medicine and education. Adolescents are likely to engage in risky alcohol use and misuse; therefore, education is essential to avoid widespread development of AUD in adolescence and adulthood (Spear, 2018). Long standing stereotypes that Black adolescents and adults are likely to drink more frequently and develop AUD at higher rates has been widely overturned (Wade and Peralta, 2017). Based on the literature, it was hypothesized that Black and/or Native Americans participants and low socioeconomic individuals would have decreased risk of developing AUDs. Neurological connections between amygdala, insula, hippocampus, and medial prefrontal cortex were also investigated as possible mediators of the relationship between current misuse and adolescent misuse. This study explores the effects of race and socioeconomic status (SES) on the relationship between adolescent and current alcohol misuse. Our results indicate that Black and Native American individuals do not engage in more adolescent or current misuse, which is consistent with the literature (Wade and Peralta, 2017). This study investigated a prolific dataset collected from an online sample by the CAB Lab at UNC-Chapel Hill and the Human Connectome Project (Van Essen et al., 2013). Adolescent misuse significantly indicates the development of current misuse which was evident in all analyses of HCP data and prolific dataset. Analysis revealed that when interacting with adolescent misuse, SES significantly affects the relationship between adolescent misuse and current misuse. Participants from lower SES that misuse alcohol as adolescents tend to have higher current misuse scores. The association between adolescent misuse and current misuse is mediated by neurological functional connectivity. Insular-amygdala and medial prefrontal-hippocampus functional connectivity strength is indirectly associated with current misuse.

METHODS

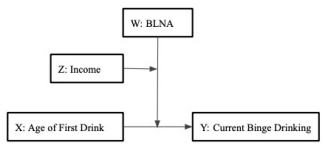
Prolific Dataset

The Cognition and Behavioral Addiction Laboratory (CAB Lab) at the University of North Carolina at Chapel Hill (UNC) designed an online self-report questionnaire to investigate behavioral flexibility and adolescent alcohol tendencies. The questionnaire was administered with Research Electronic DATA Capture (REDCap), IRB approved, and funded by the National Institute on Alcohol Abuse and Alcoholism (NIAAA), awarding participants monetarily upon completion. The questionnaire was restricted to United States citizens over the age of 18, fluent in English.

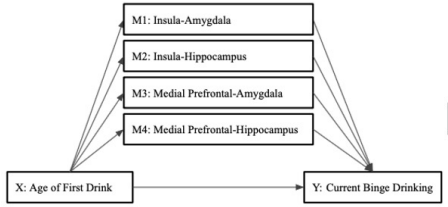
Any participants who did not provide information regarding sex, race, socioeconomic status on the MacArthur's ladder, alcohol misuse under 21, current alcohol misuse, family history, income to needs, race, and age were excluded. In total, 1014 consenting participants (49.6% female, 75.9% White, 18.6% Black, age 18-83 years, mean 35.4 years) completed the questionnaire following recruitment.

Human Connectome Project (HCP)

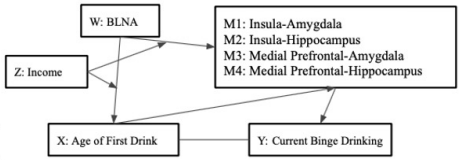
The Human Connectome Project (HCP) was under the direction of Washington University, the University of Minnesota, and Oxford University in pursuit of mapping human brain circuits (Van Essen et al., 2013). Only participants with 3T fMRI data were used for this analysis. Any participants who tested positive for illicit drugs or alcohol were excluded. Additionally, participants without sex, income, family history, current misuse, age of first drink, and race data were excluded, filtering the data to 943 participants. The family history density value was calculated giving values 0 to no parents with history of alcohol and/or drug use, 0.5 to 1 parent with history, 1.0 for 2 parents with positive history. 943 participants- 47% male, 9.6% Hispanic, 76.5% White, 13.1% Black, .200% Native American, and 5.9% Asian, Hawaiian, or Pacific Islander. They ranged in age from 22 to 37 years with an average of 28.8.



Moderation Analysis (SPSS Model 3)



Mediation Analysis (SPSS Model 4)



Mediating mediated mediation Analysis (SPSS Model 12)

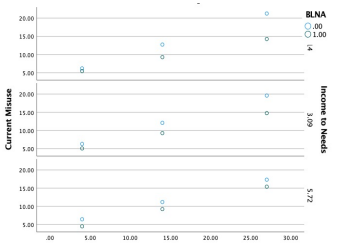
RESULTS

Hypothesis 1: Minoritized racial identity and low socioeconomic status are associated with reduced alcohol misuse.

Prolific Objective SES	Model 3 N=1014		
Variable	β [95% CI]	SE B	p
Y: Current misuse score			
X: Under 21 misuse score	.701 [.517, .885]	0.094	**<.001**
W: BLNA	.960 [-6.78, 8.69]	3.94	0.807
Z: Income to Needs	.225 [-.563, 1.01]	0.401	0.575
Covariates			
- Age	-.202 [-.282, -.121]	0.041	**<.001**
- Sex (male)	2.97 [.682, 5.27]	1.17	**0.011**
- Family History Density	9.72 [3.39, 16.0]	3.22	**0.003**
XW: Under 21 misuse and BLNA	-.341 [-.816, .134]	0.242	0.159
XZ: Under 21 misuse and Income SES	-.040 [-.079, -.001]	0.02	**0.045**
WZ: BLNA and Income SES	-.511 [-2.42, 1.39]	0.971	0.599
XWZ: Under 21 misuse and BLNA and Income SES	.060 [-.052, .172]	0.057	0.295

Prolific Subjective SES	Model 3 N=1030		
Variable	β [95% CI]	SE B	p
Y: Current misuse score			
X: Under 21 misuse score	.893 [.563, 1.22]	0.168	**<.001**
W: BLNA	-1.80 [-16.0, 12.4]	7.22	0.804
Z: MacArthur's Ladder	-.095 [-1.43, 1.24]	0.68	0.89
Covariates			
- Age	-.194 [-.275, -.113]	0.041	**<.001**
- Sex (male)	3.30 [1.01, 5.58]	1.16	0.005
- Family History Density	10.3 [3.84, 16.9]	3.32	**0.002**
- Income to Needs	-.130 [-.582, .322]	0.23	0.571
XW: Under 21 misuse and BLNA	-.337 [-1.15, .471]	0.412	0.413
XZ: Under 21 misuse and Ladder SES	-.066 [-.126, -.007]	0.03	**0.029**
WZ: BLNA and Ladder SES	.148 [-2.60, 2.89]	1.4	0.916
XWZ: Under 21 misuse and BLNA and Ladder SES	.041 [-.113, .195]	0.079	0.605

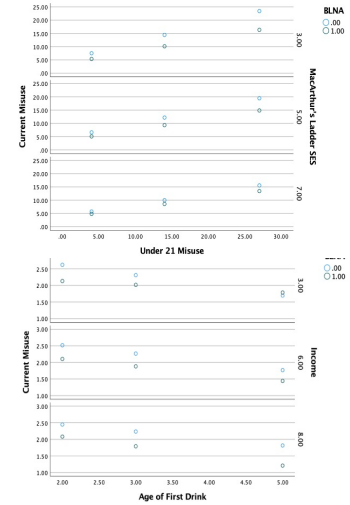
HCP SES	Model 3 N=943		
Variable	β [95% CI]	SE B	p
Y: Frequency of Drinking 5+ Drinks in Past 12 Months			
X: Age of 1st Drink	-.397 [-.551, -.242]	0.079	**<.001**
W: BLNA	-1.29 [-2.67, .094]	0.705	**0.068**
Z: Income	-.090 [-.184, .003]	0.048	0.058
Covariates			
- Age	-.029 [-.049, -.009]	0.01	**0.004**
Sex (1 = Male)	.607 [.466, .748]	0.072	**<.001**
Family History	.153 [-.191, .497]	0.175	0.384
Positive Drug Test	.164 [-.065, .392]	0.117	0.161
XW: Age of First Drink and BLNA	.350 [-.013, .714]	0.185	0.06
XZ: Age of First Drink and Income	.025 [-.004, .053]	0.015	0.091
WZ: BLNA and Income	.125 [-.180, .430]	0.155	0.42



Hypothesis 2: Neurological fMRI data may indicate connections within the brain that are strongly associated with adolescent alcohol misuse in participants with low SES .

HCP Neurological Mediation	Model 4 N = 946		
	β [95%]	SE B	p
Y: Frequency of Drinking 5+ Drinks in Past 12 Months			
X: Age of First Drink	-.255 [-.308, -.202]	0.027	**<.001**
Insular-Amygdala	-.109 [-.170, -.048]	0.031	**<.001**
Insular-Hippocampus	.003 [-.066, .072]	0.035	0.929
Medial Prefrontal-Amygdala	-.005 [-.069, .060]	0.033	0.886
Medial Prefrontal-Hippocampus	-.065 [-.122, -.008]	0.029	**0.026**
Covariates			
- Handedness		0.001	0.509
- Family History	.112 [-.226, .450]	0.172	0.516
- Drug	.149 [-.070, .368]	0.112	0.183
- Sex (male)	.622 [.478, .765]	0.073	**<.001**
- Age	-.027 [-.046, -.008]	0.01	**0.005**
Indirect effects of X on Y			
Insula-Amygdala	-.006 [-.014, .001]	0.004	
Insula- Hippocampus	<.001 [-.003, .002]	0.001	
Medial Prefrontal-Amygdala	.0001 [-.002, .003]	0.001	
Medial Prefrontal-Hippocampus	.002 [-.007, .002]	0.002	

	Model 12 N=943			
Variable	β [95% CI]	SE B	p	
Y: Frequency of Drinking 5+ Drinks in Past 12 Months				
X: Age of First Drink	-.369 [-.523, -.214]	0.079	**<.001**	Conditional Direct Effects of Age of First Drink on Current Misuse
W: BLNA	-1.31 [-2.68, .073]	0.702	0.06	BLNA = 0
Z: Income	-.075 [-.169, .018]	0.048	0.11	3 -.309 [-.391, -.226] 0.042 **<.001**
Insular-Amygdala	-.105 [-.166, -.044]	0.031	**<.001**	6 -.249 [-.313, -.184] 0.033 **<.001**
Insula-Hippocampus	.009 [-.060, .078]	0.035	0.81	8 -.209 [-.311, -.106] 0.052 **<.001**
Medial Prefrontal-Amygdala	-.015 [-.079, .050]	0.033	0.65	BLNA = 1
Medial Prefrontal Cortex - Hippocampus	-.062 [-.119, -.005]	0.029	**0.03**	3 -.114 [-.268, .040] 0.078 0.147
Covariates				6 -.220 [-.431, -.008] 0.108 **0.042**
- Age	-.023 [-.043, -.004]	0.01	**0.02**	8 -.290 [-.633, .053] 0.175 0.097
- Sex (1 = Male)	.610 [.467, .754]	0.073	**<.001**	
- Family History	.184 [-.160, .528]	0.175	0.29	
- Positive Drug Test	.138 [-.090, .366]	0.116	0.24	
- Handedness	-.0006 [-.002, .001]	0.001	0.43	
XW: Age of First Drink and BLNA	.358 [-.004, .721]	0.185	0.05	
XZ: Age of First Drink and Income	.020 [-.009, .048]	0.015	0.18	
WZ: BLNA and Income	.134 [-.169, .438]	0.155	0.39	
XWZ: Age of First Drink, BLNA and Income	-.055 [-.136, .027]	0.042	0.19	



CONCLUSIONS

As expected, younger age of first drink and more severe adolescent misuse is associated with more severe current misuse. Interestingly, increased under 21 misuse and low SES individuals are at risk for more severe current misuse. Younger individuals, males, and participants with more family history of alcohol misuse are likely to report greater current alcohol misuse. The insula-amygdala and medial prefrontal cortex-hippocampus mediate the relationship between adolescent and current misuse. The weaker the connection between these areas, the greater the current misuse, suggesting that adolescent misuse weakens the connections between insula-amygdala and medial prefrontal cortex-hippocampus which increases the likelihood of misusing alcohol as an adult. Longitudinal studies are needed to confirm these suspicions.

Limitations to this research include variable differences. Measures of adolescent misuse, SES, family alcohol misuse history, and age ranges are distinct between the two datasets. Moving forward, focus on other minoritized populations and further investigation of double consciousness would provide insight into how identity affects the relationship between adolescent and current misuse.

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