Analysis of Self-Reported Sexual Orientation on Substance Use in Individuals Aged 18+
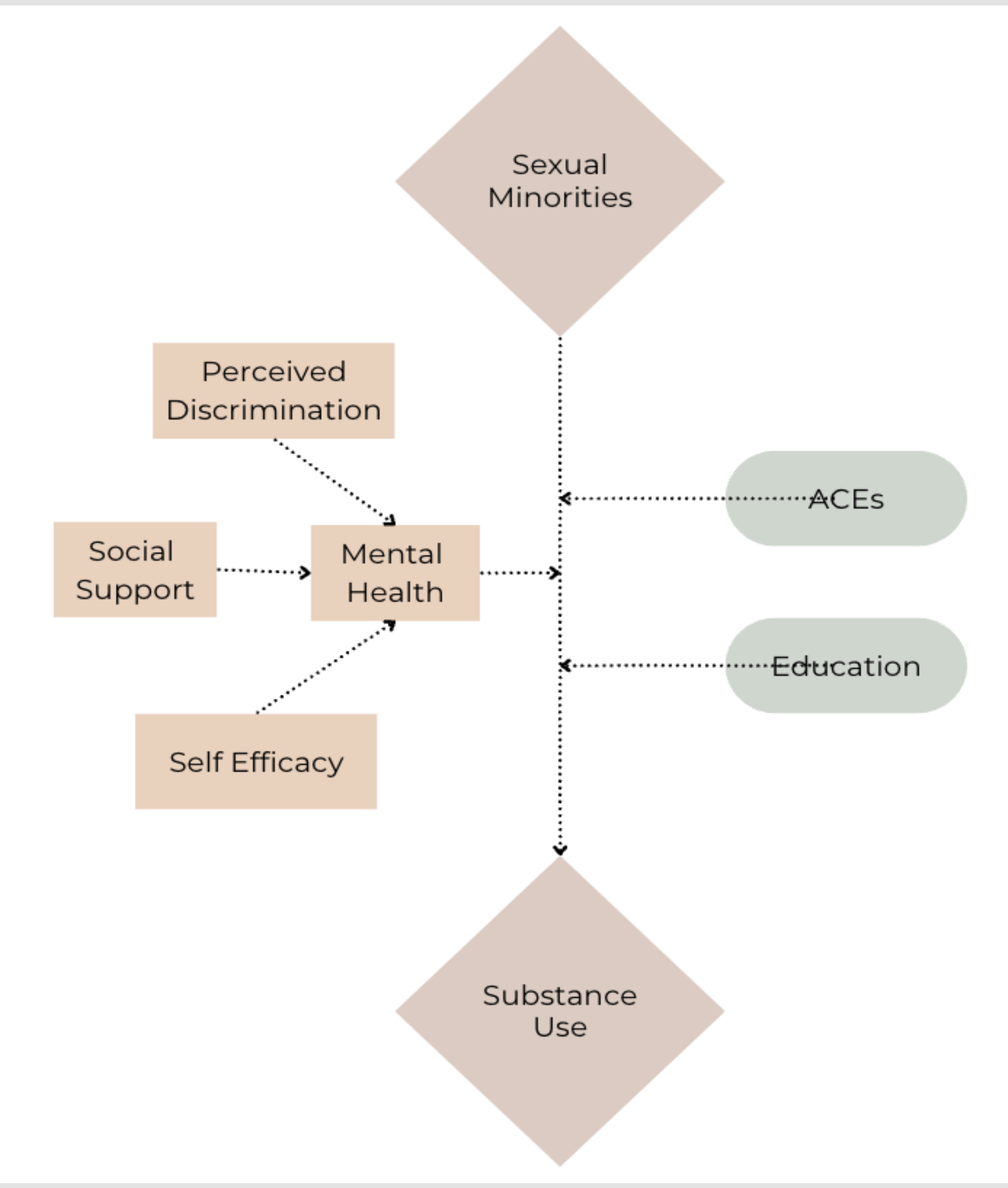
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Introduction

Research Question:

What is the association between having a minority sexual orientation and engaging in marijuana and alcohol use?

Theoretical Model:

Background

The relationship between substance use and sexual minority identities has been well established (Demant et al., 2016). Gay/lesbian individuals have an elevated likelihood of engaging in alcohol and drug misuse (Pitman et al., 2021). While substance use rates within sexual minority youth have been declining since 1999, it is still elevated compared to heterosexual young adults (Watson et al., 2017).

We are interested in studying substance use among sexual minority adults using more recent data and a larger population size. This research could contribute to a growing body of literature examining the factors that contribute to the increase in substance use specifically within this population. Further research can build on this to assess and create appropriate health interventions that address disparities in substance use among sexual minorities.

Methodology

Data Source and Sample:

Data set: Behavioral Risk Factor Surveillance System (BRFSS)

Variables (Code Name):

Independent Variable (IV):
- Sexual Orientation - coded as 0 = Straight, 1 = LGBTQ (SOMALE)

Dependent Variables (DVs):
- Days of marijuana use in the past 30 days (MARIJAN1)
- Days of alcohol use in the past 30 days (DRINKANY5)

Confounding Variables (CVs) :
- Education level: Coded into a dichotomous variable; high school or lower vs some college or higher (_EDUCAG)
- Adverse Childhood Experiences (ACEs): Combined into a score (0,1, or 2) using two ACE items:
  - Living with someone who used illicit drugs (ACEDRUGS)
  - Living with a problem drinker or alcoholic a (ACEDRINK)
- Mental Health: Days of poor mental health in the past 30 days (MENTHLTH)

This study utilized data from the BRFSS, a nationally representative telephone survey conducted to assess health-related behaviors among U.S. citizens. A subset of the BRFSS dataset was created with the variables of interest: SOMALE (IV), MARIJAN1 (DV), DRINKANY5 (DV), _EDUCAG (Confounding), ACEDRUGS (Confounding), ACEDRINK (Confounding), and MENTHLTH (Confounding).

The sexual orientation question was modified to only include responses of "Straight(that is, not gay)", which was coded as *Straight,* and "Gay" , "Bisexual", and "Something Else" were grouped together and coded as *LGBTQ.* Respondents who answered, "I don't know" or "Refused" were excluded from the analysis.

For the confounding variable Adverse Childhood Experience, two ACE items were combined to create a new variable, *ACEs*.

Statistical Analysis:

Linear regressions were conducted to assess associations between sexual orientation, and the continuous outcome variables – marijuana and alcohol use – after dummy coding the IV (i.e., the **crude models**).

Linear regressions were repeated to control for the various covariates in the models: education level, ACE score, and mental health status. Education level categories were coded dichotomously with anyone who indicated 'some college' or more coded as "1" and anyone who indicated 'high school' or less coded as "0". The results are shown in the **adjusted models**. Statistical significance was determined using a p-value threshold of <0.05. Analyses were conducted using Statistical Analysis Software (SAS) Studio.

Observations with **missing values** were excluded from analysis.

Model Specification:

$\text{Outcome}_i = \beta_0 + \beta_1 (\text{Sexual Orientation}_i) + \beta_2 (\text{Education Level}_i) + \beta_3 (\text{ACE Score}_i) + \beta_4 (\text{Mental Health Days}_i) + \epsilon_i$

Outcome_i = marijuana use in the last 30 days or alcohol use in the last 30 days

Results

Table 1: Descriptive Analysis of all Categorical BRFSS Variables Used in This Study (n = 11,585)

Categorical Variables	Count	Percentage
Sexual Orientation		
LGBTQ	718	6.20%
Straight	10867	93.80%
Combined ACE Score		
0	8240	71.13%
1	2397	20.69%
2	948	8.18%
Education		
High School or less	3059	26.40%
College and above	11585	73.60%

Table 2: Descriptive Analysis of all Continuous BRFSS Variables Used in This Study (n = 11,585)

Continuous Variables	Mean (# of days)	SD (# of days)
Poor Mental Health (in past 30 days)	4.92	11.21
Marijuana Use (in past 30 days)	2.28	7.11
Alcohol Use (in past 30 days)	2.37	2.63

Table 3: Relationship between Sexual Orientation and Alcohol Use in the Past 30 Days (N=11585)

	Crude Model			Adjusted Model		
Predictor	b	SE	p-value	b	SE	p-value
ACEs Score				0.378	0.039	<.0001
Mental Health				0.006	0.002	0.011
Intercept	2.56	0.098	<.0001	2.055	0.101	<.0001
Sexual Orientation (Reference = Straight)						
LGBTQ	0.204	0.101	0.438	0.082	0.100	0.415
Education (reference = high school or less)						
Some College Education				0.853	0.055	<.0001

Table 4: Sexual Orientation and Alcohol Use Model Statistics

	Crude Model	Adjusted Model
F	4.06	98.45
df1	1	4
df2	11583	11580
R^2	0.000035	0.033
Model Significance (p)	0.438	<.0001

Table 5: Relationship between Sexual Orientation and Marijuana Use in the Past 30 Days (N=11585)

	Crude Model			Adjusted Model		
Predictor	b	SE	p-value	b	SE	p-value
ACEs Score				1.488	0.104	<.0001
Mental Health				0.066	0.006	<.0001
Intercept	4.961	0.264	<.0001	3.150	0.273	<.0001
Sexual Orientation (Reference = Straight)						
LGBTQ	2.863	0.273	<.0001	2.161	0.270	<.0001
Education (reference = high school or less)						
Some College Education				1.040	0.147	<.0001

Table 6: Sexual Orientation and Marijuana Use Model Statistics

	Crude Model	Adjusted Model
F	110.22	143.81
df1	1	4
df2	11583	11580
R^2	0.009	0.047
Model Significance (p)	<.0001	<.0001

Conclusion

Individuals identifying as LGBTQ had:
- Significantly higher levels of marijuana use compared to their straight peers (b=2.16, p< 0.0001), after adjusting for ACEs, education and mental health.
- Not significantly higher levels of alcohol use compared to their straight peers (b = .082, p=0.415) after adjusting.

Additional findings:
- Higher ACEs scores and worse mental health were associated with higher marijuana and alcohol use.
- Higher education level does not serve as a protective factor for both marijuana and alcohol use.
- The crude model was not significance for LGBTQ identity and alcohol use, and the addition of confounding improved the model to become significant (R^2 increased in both models).

Limitations

Cross sectional study methods are vulnerable to :
- Social desirability bias: They may inaccurately respond to reflect social norms/ what is acceptable.
- Recall bias: Participants may not accurately remember past behaviors or events.

Specific limitations to this data set:
- Unequal group sizes: The straight population accounted for 93.80% of the data.
- Adjusted R² for marijuana use is only 0.047, and only 0.033 for alcohol use indicating the variance in these outcome variables are largely due to other factors than sexual orientation.

Future Direction

-Future research should attempt to collect larger samples of LGBTQ+ individuals to ensure a more balanced analysis.
While this cross-sectional study provided initial insight, longitudinal research could be more indicative of how these variables - such as sexual orientation, trauma, ACEs among other variables- interact over time.

References

1. Demant, D., Hides, L., Kavanagh, D., White, K., Winstock, A., & Ferris, J. (2016). Differences in substance use between sexual orientations in a multi-country sample: findings from the Global Drug Survey 2015. *Journal of Public Health, 39*, 532–541. https://doi.org/10.1093/pubmed/fdw069.
2. Pitman, A., Marston, L., Lewis, G., Semlyen, J., McManus, S., & King, M. (2021). The mental health of lesbian, gay, and bisexual adults compared with heterosexual adults: results of two nationally representative English household probability samples. Psychological Medicine, 52, 3402 - 3411. https://doi.org/10.1017/S0033291721000052.
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