Understanding Drug Use, Trauma and Demographics of Lesbian, Gay, and Bisexual (LGB) persons in the United States

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Abstract

Background

Substance abuse is a major public health crisis in the United States and one that in particular facing Lesbian, Gay, Bisexual, Trans, Intersex and Queer (LGBTIQ+) community. There is significant documentation of higher rates of substance abuse issues among LGBTIQ+ persons compared to cisgender heterosexual persons although little quantitative research has been conducted within this sub-population to understand factors that impact drug abuse.

Methods

To assess drug use among LGB persons in the United States, this paper uses secondary data analysis from the Generations' Study, a US population-based survey focused on LGB adults. The study assesses which demographic factors and childhood induced traumas may impact drug abuse for LGB populations across three age cohorts. To assess this, we used the drug use related questions from the Generations survey for our dependent variable and a range of demographic indicators and questions related to Adverse Childhood Effects as our independent variables.

Results

Our findings suggest interesting perspectives to add to the nascent literature of specific factors affecting drug use among LGB adults. This study uses descriptive statistics along with multivariate logistic regression to assesses odds ratio of our covariates against our dependent variable of drug abuse. Our statistically significant covariates for this study using logistic regression include all categories of cohort (age groups), gender, and sexual orientation. Bisexuals were 2.3 times the odds of being drug dependent and other sexual minorities were 3.48 times the odds compared with our base group of gay or lesbian persons. Sexual orientation: race covariate for bisexual and black was significant at the 10% level along with bullying for 3 of the levels, and for those who experienced sexual abuse as a child.

Conclusion

This research is one of the first to look at in-group risk factors for drug abuse issues of LGB adults contributing to a new literature to help shed light on who within the LGB groups are most at risk for developing drug abuse problems and suffering from drug dependency as an adult. This paper finds that women, non-binary, and bisexuals are most at risk of developing drug dependence within this group. It also confirms that similar to the general population, those who experience bullying and sexual abuse have higher odds of developing a substance abuse problem.

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1. Introduction

Substance abuse and mental health issues have impacts on individuals, families, friends, communities and within societies at large. Aside from individual and family level issues, this public health epidemic costs significant amounts of money and cost to the overall public health and medical system. Lesbian, Gay, Bisexual, Transgender, Intersex and Queer (LGBTIQ+) communities in particular are at risk of developing substance abuse and higher rates of mental health disease due to community, family, and societal levels stigma. Some studies have shown that Lesbian, Gay, and Bisexual (LGB) adults are more than twice as likely to use illicit substances and almost twice as likely to suffer from substance abuse problems compared to their heterosexual counterparts. (Medley et al., 2016). While there is significant documentation of higher rates of substance abuse issues among LGBTIQ+ persons compared to cisgender heterosexual persons, little quantitative research has been conducted within this sub-population to understand factors that impact drug use and substance abuse problems. This paper aims to analyze drug use among Lesbian, Gay and Bisexual (LGB) persons across three age cohorts to understand demographic and childhood trauma related indicators that may impact their likelihood to be affected by a substance abuse problem.

2. Background and Literature Review

2.1.Substance Abuse Epidemic

Substance use disorders are highly prevalent among Youth and in the United States. Some data suggest that approximately 67% of individuals with lifetime history of alcohol dependence met this criteria prior to age 25. (Hingson et al., 2006) According to the 2019 National Survey on Drug Use and Health, 60.1% of persons or about 165.4 million people in the United States had used a substance in the past month. While the majority were tobacco and alcohol users, among people aged 12 or older in 2019, 57.2 million people used illicit drugs in the past year. The percentage who used illicit drugs in the past year increased from 17.8 percent (or 47.7 million people) in 2015 to 20.8 percent (or 57.2 million people) in 2019. (Abuse, 2019) This is a relatively large number of persons who have used use illicit substances in the past year. Substance abuse and mental health issues may be corelated with some research showing an overlap of mental health problems of those with drug abuse problems. (Logan et al., 2002) Overdose from drugs have also been steadily rising in the United States since 1999 when the

recorded number of deaths were under 20,000 rising to the highest recorded total ever last year at 100,000. (Dyer, 2021) Since 1999, when the US began recording drug overdose until 2019, 841,000 people have died. ((CDC Wonder, 2021)

"A number of risk factors have been identified for the development of Substance Use Disorders (SUD) such as age, family history of SUD, ethnicity, and psychiatric disorders." (Kilpatrick et al., 2000) There is also substantial literature with strong correlation and links between sexual and physical abuse to increased SUDs. (Danielson et al., 2009) Adverse childhood experiences (ACE) studies have established the strong association between childhood traumatic events (CTEs) and adverse health outcomes among adults. This includes many unhealth behaviors, mental health stressors, disease and drug and alcohol dependency. Studies have shown strong links between childhood abuse and household problems to a range of adult health problems. (Wu et al., 2010) Research has also shown that women who have alcohol or drug problems are more likely to have a history of sexual abuse or physical assault compared to women without those experiences. (Logan et al., 2002). The majority of the literature and research that exists have reviewed demographics and co-risk factors for the general population, women or youth. Much less research and evidence exist analyzing the LGBTIQ+ sub-population.

2.2. Lesbian, Gay, and Bisexual (LGB) stigma and discrimination

According to the United Nations Human Rights Office of the High Commissioner, "the Universal Declaration of Human Rights states that all human beings are born free and equal in dignity and rights, without distinction of any kind. Yet in all regions of the world, there are acts of violence and discrimination committed against individuals because of their sexual orientation or gender identity." (OHCHR). Sexual orientation, gender identity and expression, and sex characteristics (SOGIESC) is an umbrella term that is sometimes used interchangeably with Lesbian, Gay, Bisexual, Transgender, Intersex, Queer and other identities (LGBTQ+) to help categorize people who have sexual and gender identities outside of what most societies deem as 'normal'. These terms are trying to capture the same group and the preference of which phrase to use differs among various researchers, community members and policy makers. In most societies, the majority of individuals and what society expects is that most people will identify with the gender that they are assigned at birth (e.g., male or female) and that they will be attracted to and marry the opposite sex. For sexual and gender minorities, this is not always the

case and this group of individuals face many challenges because of their diversity. According to Human Rights Watch, "People around the world face violence and inequality—and sometimes torture, even execution—because of who they love, how they look, or who they are." (Watch, 2021) This comes in the form of institutional barriers such as discriminatory laws as well as cultural and societal barriers. Discrimination takes many layers including state violence, criminalization, community stigma, community violence and violence from family members. Statistics and data on accurate population estimates of sexual and gender minorities is extremely limited as most governments do not collect this data through census or civil registration. Most population-based surveys also do not include these demographic questions due to lack of knowledge and stigma among many institutions and researchers.

LGBTIQ+ stigma has many consequences on individuals and society as a whole. Thoughts of suicide and suicide morbidity occurs more frequently among LGB persons compared to heterosexual populations. (Haas et al., 2010) LGB persons may face higher levels of job loss and documented literature has noted LGB persons facing prejudice and hate crimes due to their sexual orientation. (Gordon & Meyer, 2007) LGB persons also face unique trauma and stressors such as the potential of conversion therapy or pseudo-science reparative therapy to try to "cure the gay" from these individuals. (Blosnich et al., 2020) Minority stress theory details and depicts the specific stressors and health related causes that LGB persons may face that differ from that of their heterosexual counterparts. These include, but are not limited to, internalized homophobia and hate, negative societal attitudes toward them, fear of rejection, discrimination and actual experiences of hate crimes, violence and homophobia. (Meyer, 1995)

2.3. LGB Drug Abuse

Some studies have shown that Lesbian, Gay, and Bisexual (LGB) adults are more than twice as likely to use illicit substances and almost twice as likely to suffer from substance abuse problems compared to their heterosexual counterparts. (Medley et al., 2016). "The 2015 Youth Risk Behavior Survey (YRBS)—the first U.S. national survey to include sexual orientation—revealed stark disparities in alcohol, tobacco, and other drug use between heterosexual and sexual minority adolescents." (Kann et al., 2016; Watson et al., 2020) According to the Substance Abuse and Mental Health Services Administration, among LGB adults with mental illness, 2 in 5 (38.2% or 2.6 million) had a serious mental illness. "An estimated 1.1 million LGB adults used

illicit opioids in the preceding 12 months (LGB adults: 9.8%; heterosexual adults: 4.24%). Prevalence of illicit opioid use was significantly higher among LGB women aged <50 and gay/bisexual men (18–25 and 50 +) compared with their heterosexual counterparts." (Capistrant & Nakash, 2019)

Despite a fairly large literature documenting disparities between LGBTIQ+ and heterosexual and cisgender populations, there is a smaller literature on treatments targeted to the sexual and gender minority (SGM) community and even fewer studies targeted to the subgroups within the SGM community most at risk. [LGBTIQ+] people are too often analyzed as a single group when examining substance use disparities, which obscures important subgroup differences within the community. "When documenting [drug use], studies of substance use among SGM populations have rarely analyzed how multiple demographic factors intersect, which limits our understanding of substance use among specific groups." (Newcomb, 2021)

"Large-scale data that allow for within-group comparisons to elucidate potential differences across a spectrum of gender identities and sex assigned at birth have been largely unavailable." (Watson et al., 2020) Watson's 2020 publication was one of the first and they looked at the LGBTIQ+ population which includes both sexual minorities and gender minorities. They found that adolescents assigned male at birth had higher prevalence of substance use compared with assigned female at birth and that transgender persons were at greater risk compared with cisgender persons. Another recent study from 2020, using results from the 2015-2018 National Survey of Drug Use and Health found that "significant disparities in smoking, heavy drinking, and marijuana use were observed for lesbian/gay and bisexual women across nearly all racial/ethnic groups. Disparities were consistently greater in magnitude for Black and Hispanic LGB women compared with White LGB women. Few disparities were observed among men; the magnitude of observed disparities did not differ by race/ethnicity." The emerging evidence suggests that racial disparities vary by gender for LGBT populations. (Schuler et al., 2020; Watson et al., 2020) These are some of the only studies looking at within-group comparisons for LGBTIQ+ substance abuse.

3. Data Collection & Research Methodology

3.1. Data Source

The Generations study is the first longitudinal study examining the health and well-being across three generations of lesbians, gay men, and bisexuals (LGB) persons in the United States. The study explores identity, stress, health outcomes, and health care and services utilization among LGBs in three generations of adults who came of age at different historical contexts. LGB persons suffer disparities compared to their heterosexual peers in many aspects of life and society is changing over the time and in the United States becoming more accepting. This study aims to document generational differences in identity, stress and health to improve health services, public health and to support policy makers to reduce health disparities related to sexual orientation. (Meyer, 2020)

The survey was collected between 2016-2019 over three waves using the same participants. This research focuses on questions collected through wave 1 collected from 2016-2017. Participants were emailed or mailed a survey questions to complete and received a USD 25 gift card. Participants were recruited by Gallup Inc. using the Gallup Daily Tracking Survey which uses a dual-frame sampling procedure to support random sampling methodology. All individuals identified as LGBT were screened for eligibility. Of 366,644 participants screened, 3.5% identified as LGBT and 27.5% met eligibility criteria. The final sample size for wave 1 included 1,345 persons. (Meyer, 2020)

Eligibility criteria included LGB (lesbian, gay, bisexual, queer, or same- gender loving and not transgender), between ages 18-25 (younger), 34-42 (middle) and 38-55 (older) categories and who were Black, Latino, or White. This study is not required for further Institutional Review Board (IRB) assessment and approval as the original IRB approval is deemed significant (*see disclaimer section*).

3.2.Research Methodology and Variables

The purpose of this study is to assess which demographic factors and childhood induced traumas may impact drug abuse for LGB populations among the three age cohorts. To assess this, we used the drug use related questions from the Generations survey for our dependent variable and a range of demographic indicators and questions related to adverse childhood effects as our independent variables.

We conducted univariate, bivariate and multivariate analyses to assess drug dependency for these LGB adults and utilized the provided sample survey weights. Logistic regression is utilized for multivariate analysis as our outcome variable is transformed into a binary dummy variable. When the provided survey weights are applied, results from analyses are generalizable to the U.S. population of LGB (lesbian, gay men, and bisexual) adults ages 18-25, 34-41, and 52-59 during data collection. There are no stratification or cluster weights." (Meyer, 2020).

3.2.1. Outcome Variable

Drug Use Disorder Identification Test (DUDIT) Score was used in the Generations Study to determine drug use of the participants. DUDIT scare is calculated based on 11 questions related to drug abuse. A score ranging from 0 to 44 is calculated based on their responses to the questions. To utilize the DUDIT score, we transformed this variable to a binary outcome variable by two groups. The dummy variable 0 score for those who received a DUDIT score equivalent to no drug use or moderate drug use. All participants receiving a DUDIT score equivalent to substance abuse problem or extreme substance abuse problem were transformed to a 1 for drug abuse variable.

The scores were transformed based on the recommendations from the original DUDIT framework where those who were born male and received a score above 6 were classified as drug dependent / extreme drug dependent. Those who were born female and received a score of 2 or more points were classified as drug dependent / extreme drug dependent. This is based on the original DUDIT framework and related to biological factors that affect drug dependency. (Berman et al., 2005) The rational for focusing on an outcome variable with no drug use / moderate drug use in the base category, is due to the fact that moderate drug use does not have severe individual and public health consequences that drug abuse has for persons.

Table 1: Outcome Variable

Variable		Type of Variable	Coding	Categories	Response options
Dependent Variable					
Y	Drug Abuse	Binary	0	0 – No drug use / moderate drug use	2
			1	1 - Drug abuse	

3.2.2. Independent Variables

Our independent variables selected from the survey include gender, sexual orientation, cohort, race, education, poverty status, happiness, and a range of childhood experiences. The childhood experiences selected include bullying, sexual abuse, having a parent who suffered from incarceration, parental substance abuse and a parent suffering from intimate partner violence. The rationale for focusing on adverse childhood experiences (ACE) in addition to demographics is due to the existing literature and potential link between ACE and substance abuse as an adult. The variables for selection, the type of variable and the number of responses are included below in Table 2. All variables selected are categorical variables due to the nature of this survey and the variables of interest. After variable selection, participants with missing data for any of the selected variables were excluded resulting in a sample size of n = 1,217 persons for this study.

Table 2: Independent Variables of Interest

Variable			Type of Variable	Coding	Categories	Response options
Independent Variable						
X	1	Cohort	Categorical	0	Younger (age 18-25)	3
				1	Middle (age 34-41)	
				2	Older (age 52-59)	
X	2	Gender	Categorical	0	Woman	3
				1	Man	
				2	Non-binary/GQ	
X	3	Sexual Orientation	Categorical	0	Lesbian/gay	3
				1	Bisexual	
				2	Other sexual minority identity	
X	4	Race	Categorical	0	White	3
				1	Black	
				2	Latino	
X	5	Poverty	Binary	0	Not in Poverty	2
				1	Experiencing Poverty	
X	6	Education	Binary	0	Less than High School Education	2
				1	More than High School	
X	7	Happiness	Categorical	0	Very Happy	3

Variable			Type of Variable	Coding	Categories	Response options
				1	Pretty Happy	
				2	Not too Happy	
X	8	Childhood Experience: Bullying	Categorical	0	Often	4
				1	Sometimes	
				2	Rarely	
				3	Never	
X	9	Adverse Childhood Experience: Sexual Abuse	Binary	0	No	2
				1	Yes	
X	10	Adverse Childhood Experience: Incarcerated Parent	Binary	0	No	2
				1	Yes	
X	11	Adverse Childhood Experience: Parent Sustance Abuse	Binary	0	No	2
				1	Yes	
X	12	Adverse Childhood Experience: Parental Intimate Partner Violence (IPV) Abuse	Binary	0	No	2
				1	Yes	

Appendix 3 provides a list of the questions from the original survey, the coding and references from the Generations study.

4. Analysis

All statistical methods and graphical representations were completed in R programming through R studio. R studio packages used to analyze and report the data include *tidyverse, janitor, patchwork, ggplot2, survey, and MASS, knitr, and skimr*. (Firke, 2021; Pedersen, 2020; Ripley, 2020; Waring et al., 2021; Wickham, 2016, 2021; Xie, 2021)

4.1.Univariate Descriptive Statistics

Our initial descriptive statistics and univariate analysis is provided in Table 3 showing the count (N) and % for all categorical variables of interest and the mean including standard deviation (SD) for the continuous variable DUDIT score. From our sample of 1,217 persons, 33% of LGB persons were experiencing drug abuse. This is quite a large percentage as compared to previous studies documented in the literature review section. We also see that within our sample, the youngest cohort is the highest proportion represented at 43% followed by the older (33%) and

the smallest being the middle cohort at 24%. Other interesting variables and distributions include non-binary which is at 6.6%. Non-binary persons are a small proportion of the population and of LGB persons due to societal history and norms of a binary gender structure. Non-binary persons have been increasing overtime. (Wilson & Meyer, 2021) The proportion of White respondents are also quite high at 75% compared with black (11%) and Hispanic (14%). These are taken into account utilizing the survey weights when conducting the multivariate statistical analysis.

Table 3: Demographic and Descriptive Statistics for Variables of Interest

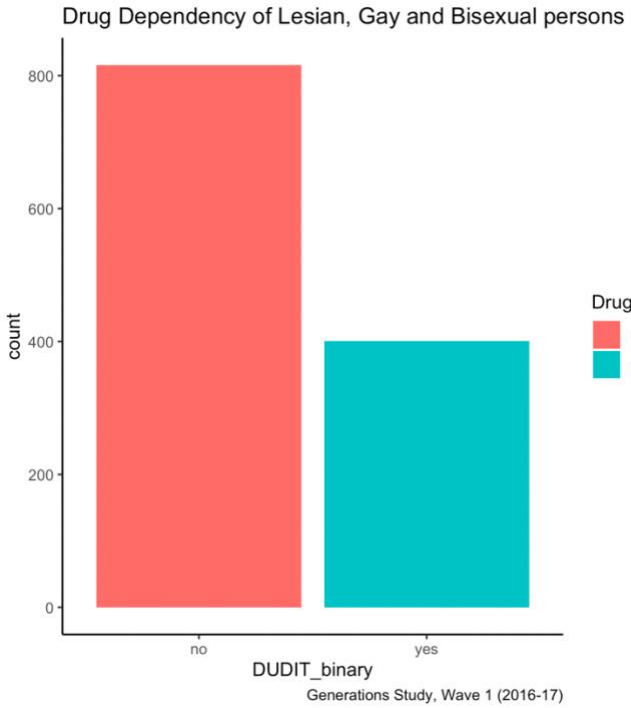
Demographic Variable	N (%)	Mean (SD)
Dependent Variable		
Drug Use - No drug use / moderate drug use - Drug abuse	 812 (67%) 405 (33%)	
Drug Use Disorder Identification Test (DUDIT)		3.3 (5.49)
Independent Variables		

Variable		Category	N	%
Cohort	0	Younger	521	43.0%
	1	Middle	295	24.0%
	2	Older	401	33.0%
Gender	0	Woman	595	48.8%
	1	Man	542	44.6%
	2	Non-binary/GQ	80	6.6%
Sexual Orientation	0	Lesbian/gay	675	55.1%
	1	Bisexual	397	32.8%
	2	Other sexual minority identity	145	12.1%
Race	0	White	912	75.0%
	1	Black	129	11.0%
	2	Latino	176	14.0%
Poverty	0	Not in Poverty	1065	88.0%
	1	Experiencing Poverty	152	12.0%
Education	0	Less than High School Education	229	19.0%
	1	More than High School	988	81.0%
Happiness	0	Very Happy	211	16.8%
	1	Pretty Happy	769	63.5%
	2	Not too Happy	237	19.0%
Bullying	0	Often	399	32.9%
	1	Sometimes	417	34.0%
	2	Rarely	221	17.9%

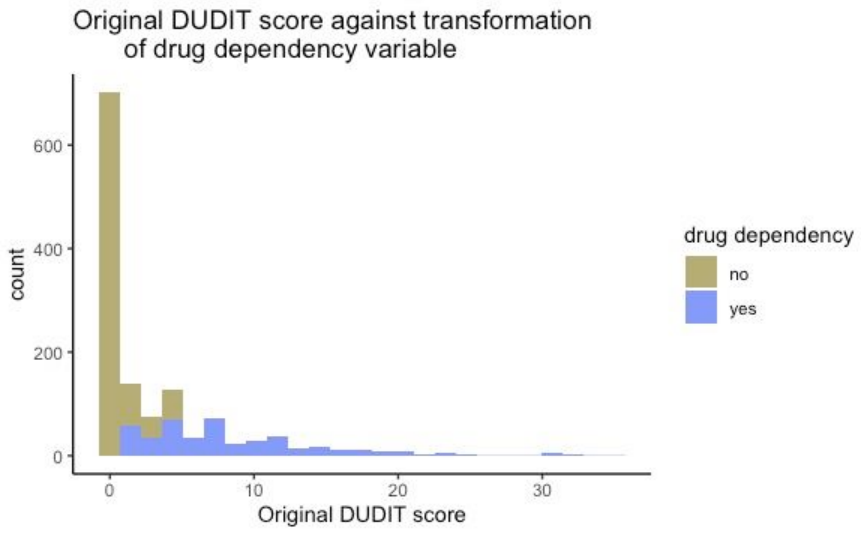
Variable		Category	N	%
	3	Never	180	14.6%
ACE: Sexual Abuse	0	No	780	64.0%
	1	Yes	437	36.0%
ACE: Incarcerated Parent	0	No	1067	88.0%
	1	Yes	150	12.0%
ACE: Parental Substance Abuse	0	No	669	55.0%
	1	Yes	548	45.0%
ACE: Parental IPV Abuse	0	No	840	69.0%
	1	Yes	377	31.0%

Graph 1 shows the distribution of our binary outcome variable of drug abuse and Graph 2 provides a histogram to understand the original DUDIT score classification transformed against our new binary outcome variable.

Graph 1



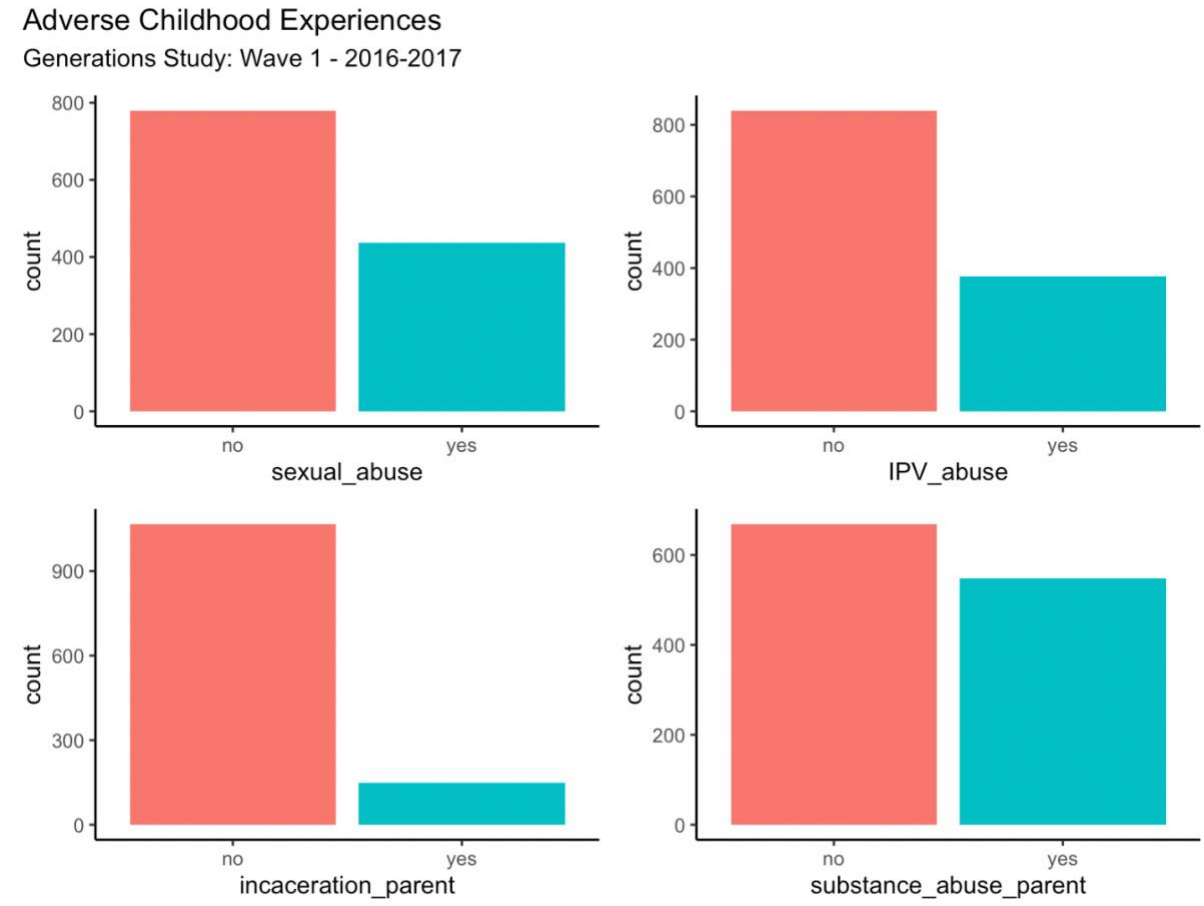
Graph 2



Additional interest related to some of the independent variables and univariate statistics are of the adverse childhood experiences (ACE). We see very high proportions of persons who have experienced sexual abuse (36%) and also whose parents experienced substance abuse problems

(45%). All four of the ACE variables of interest are also provided in Graph 3 to demonstrate these distributions.

Graph 3



4.2. Bivariate Descriptive Statistics

Bivariate statistical tests were conducted against the binary outcome variable of drug abuse against each independent variable to understand the proportion with each category. Chi-squared statistics and the p-value for each analysis is conducted and reported in Table 4. Women and non-binary persons have the highest levels of drug dependency compared to men and also the youngest cohort has the highest levels followed by middle then older suggesting higher levels of drug abuse among younger LGB persons. Also, interestingly enough, bisexuals and other sexual minorities have high level of drug abuse. Race chi-squared test was the only variable not statistically significant.

Those who were happy also reported lower levels of drug abuse as we may expect along with those who were never bullied showing the lowest levels of drug abuse. Also, as expected those who answered yes to the four ACE related indicators all showed higher proportions of drug abuse as compared to those who did not have those adverse childhood experiences and they were all significant at the $p < .002$ level or lower.

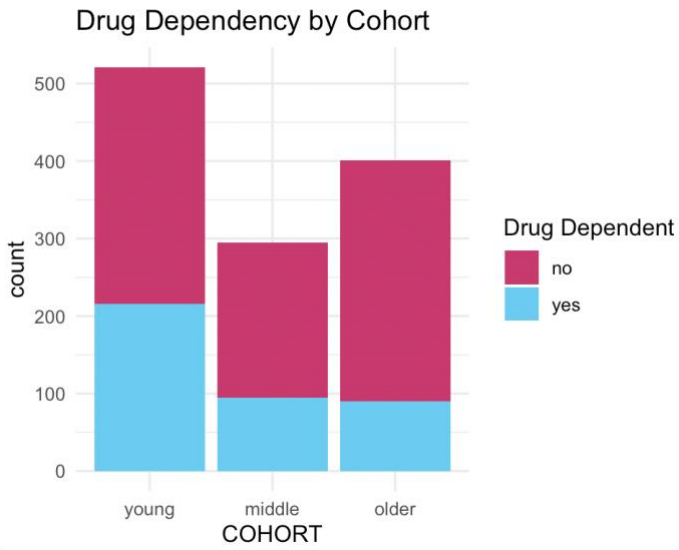
Table 4: Bivariate Statistical Results

Variables (Categories)	**Drug Abuse (Y)** No	Yes	Chi-Squared	p value
Gender				<
woman	340 (57%)	255 (43%)		
man	434 (80%)	108 (19%)		
non_binary	38 (47%)	42 (53%)	86.857	0.001
COHORT				
young	302 (58%)	219 (42%)		
middle	199 (67%)	96 (33%)		
older	311 (78%)	90 (22%)	43.154	0.001
sexual_orientation				
(1) Lesbian/gay	517 (77%)	158 (23%)		
(2) Bisexual	222 (57%)	171 (43%)		
(3) Other sexual minority identity	69 (48%)	76 (52%)	77.016	0.001
race				
white	621 (68%)	291 (32%)		
black	82 (63%)	47 (38%)		
latino	109 (61%)	67 (38%)	4.551	0.103
poverty				
(0) Not in poverty	725 (68%)	340 (32%)		
(1) Yes in poverty	87 (57%)	65 (43%)	7.113	0.007
Education				
(1) HS less	140 (61%)	89 (39%)		
(2) More than HS	672 (68%)	316 (32%)	4.367	0.030

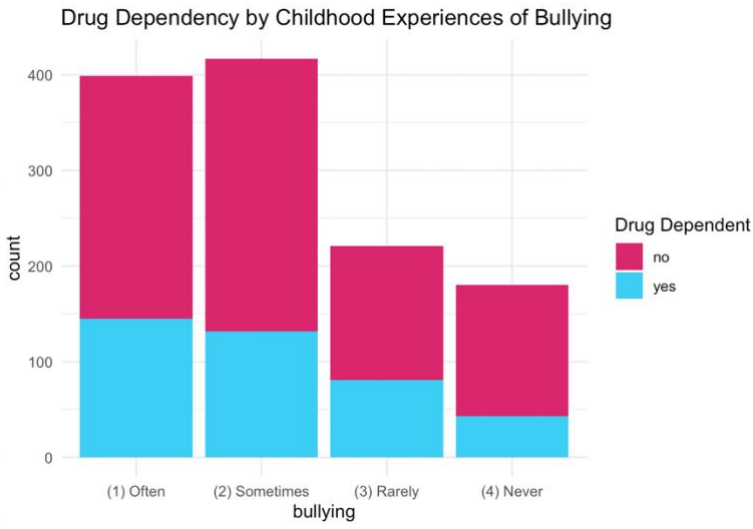
Variables (Categories)	**Drug Abuse (Y)** No	Yes	Chi-Squared	p value
happiness				
(1) Very happy	169 (75%)	52 (25%)		
(2) Pretty happy	507 (66%)	262 (34%)		
(3) Not too happy	146 (61%)	91 (39%)	12.321	0.002
Childhood Experience: Bullying				
(1) Often	251 (63%)	148 (37%)		
(2) Sometimes	285 (68%)	132 (32%)		
(3) Rarely	140 (63%)	81 (37%)		
(4) Never	136 (76%)	44 (24%)	15.087	0.002
Childhood Experience: Incarcerated Parent				
no	729 (68%)	338 (32%)		
yes	83 (55%)	67 (45%)	10.405	0.001
Childhood Experience: Parental IPV Abuse				
no	585 (69%)	255 (31%)		
yes	227 (60%)	150 (40%)	9.411	0.002
Childhood Experience: Sexual Abuse				
no	563 (72%)	217 (28%)		
yes	249 (57%)	118 (43%)	28.991	0.000
Childhood Experience: Parent Sustance Abuse				
no	470 (70%)	199 (30%)		
yes	342 (62%)	206 (38%)	10.327	0.001
Total	812 (67%)	405 (343%)		

Graphs 4, 5, and 6 help to illustrate the proportions of those experiencing drug abuse among the three cohorts, those who experience different levels of bullying and those who experienced sexual abuse as a child.

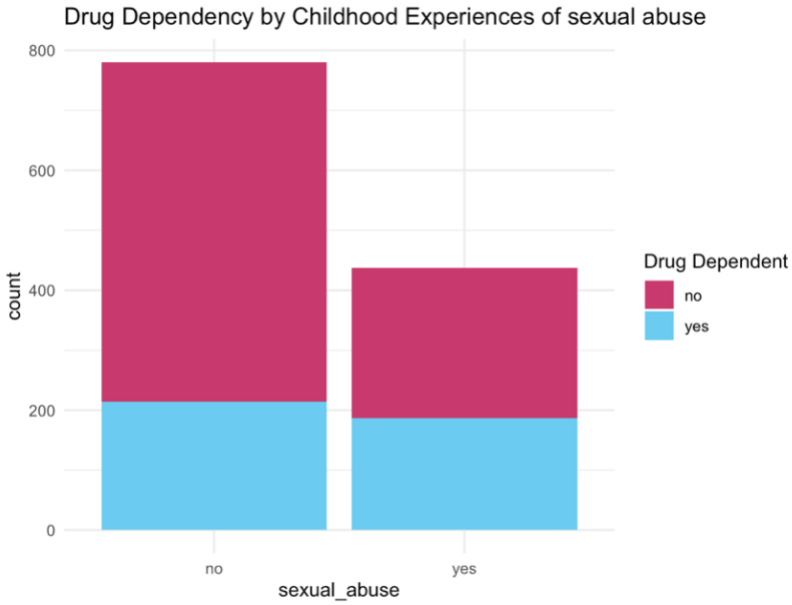
Graph 4



Graph 5



Graph 6



4.3. Multivariate Descriptive Statistics

Given the binary nature of our outcome variable, multivariate logistic regression was performed to understand how our independent variables interact with our outcome variable holding other factors constant. R programming statistical software was used in R Studio along with the *survey*

package to apply survey weights under a generalized linear model. (Lumley, 2004, 2010, 2021) Table 5 provides the multivariate logistic regression results, reporting both the beta coefficients of the log of odds as well as the odds ratio of each covariate followed by the robust standard error in case of heteroskedasticity. The p-values at the 10%, 5% and less than 1% thresholds are noted along with the log likelihood.

Younger cohorts noted the highest odds of drug dependency compared to the middle and older age cohorts. Sexual orientation was notable in terms of the odd ratio, noting the highest odds ratio of all covariates. Other sexual minorities were 3.48 times the odds compared with gay or lesbian persons to suffer from drug abuse/drug dependency. Bisexual were also at a higher odd at 2.3 times gay/lesbian sexual orientation. Other sexual minorities included respondents who chose queer, pansexual, same-gender loving, asexual spectrum, anti-label or other. (Meyer, 2020) In terms of gender, men had a lower odds of drug dependency compared with non-binary persons and women. Part of the explanation around the higher odds of drug dependency related to gender is due to the DUDIT classification system where a lower score for persons born women who may be drug dependent at score of 2 or above compared with males who require 6 or above score. (Berman et al., 2005) While race was not found to be a significant variable, when analyzing sexual orientation interaction with race, bisexual and black was found to be significant compared to the baseline of white and lesbian/gay. Bisexuals who are black had a lower likelihood of drug abuse at .399 times compared to a lesbian or gay white person.

When reviewing our covariates related to experiences rather than demographics, some of the bullying categories along with childhood averse experience of sexual abuse were found to be statistically significant. Those who were sometimes bullied, the odds of drug addiction are 1.43 times than those who often received bullying as a child. Those who were rarely bullied, the odds of drug addiction are 1.56 times than those who often received bullying as a child. Those who were never bullied was not statistically significant. This is relatively surprising that those who received bulling often had a lower likelihood compared to those with only moderate bulling. One of the reasons for this finding may be that those with only moderate bulling are still involved in social circles and social pressures where they feel the need to abuse substances to fit in where those who were often bullied may lack social skills and social circles where drugs are prevalent.

However, this hypothesis would need to be further studied and analyzed through more qualitative measures to understand this difference among LGB persons, bullying and drug abuse.

Related to ACE, it is unsurprising that those who experienced sexual abuse as a child, were 1.835 times the odds of having a drug abuse problem compared to those who never experience sexual abuse as a child. This finding is in line with previous studies and literature of the general population, youth and women in the substance use disorder (SUD) literature.

TABLE 5: LOGISTIC REGRESSION RESULTS FOR DRUG ABUSE VARIABLE	***BETA (ROBUST SE)***	***ODDS RATIO (ROBUST SE)***
COHORT - MIDDLE	-0.396	0.673
	(0.211) *	(0.211) *
COHORT - OLDER	-0.433	0.649
	(0.223) *	(0.223) *
GENDER - MAN	-0.830	0.436
	(0.186) ***	(0.186) ***
GENDER – NON- BINARY / GENDER-QUEER	-0.582	0.559
	(0.336) *	(0.336) *
SEXUAL ORIENTATION - (2) BISEXUAL	0.834	2.301
	(0.225) ***	(0.225) ***
SEXUAL ORIENTATION - (3) OTHER SEXUAL MINORITY IDENTITY	1.247	3.480
	(0.315)***	(0.315)***
RACE - BLACK	0.458	1.581
	(0.339)	(0.339)
RACE - LATINO	0.235	1.265
	(0.296)	(0.296)
POVERTY - (1) YES IN POVERTY	0.143	1.154
	(0.241)	(0.241)
EDUCATION – (2) MORE THAN HS	-0.105	0.900
	(0.189)	(0.189)
HAPPINESS - (2) PRETTY HAPPY	0.195	1.215
	(0.221)	(0.221)
HAPPINESS - (3) NOT TOO HAPPY	0.384	1.468
	(0.269)	(0.269)
BULLYING - (2) SOMETIMES	0.361	1.435
	(0.196)*	(0.196)*
BULLYING - (3) RARELY	0.429	1.536
	(0.253)*	(0.253)*

TABLE 5: LOGISTIC REGRESSION RESULTS FOR DRUG ABUSE VARIABLE	*BETA (ROBUST SE)*	*ODDS RATIO (ROBUST SE)*
BULLYING - (4) NEVER	-0.326	0.722
	(0.277)	(0.277)
SEXUAL ABUSE - YES	0.607	1.835
	(0.182)***	(0.182)***
INCARCERATED PARENT – YES	0.055	1.056
	(0.258)	(0.258)
SUBSTANCE ABUSE BY PARENT - YES	-0.013	0.987
	(0.180)	(0.180)
IPV_ABUSE - YES	0.159	1.172
	(0.193)	(0.193)
SEXUAL ORIENTATION - (2) BISEXUAL: RACE - BLACK	-0.919	0.399
	(0.534)*	(0.534)*
SEXUAL ORIENTATION (3) OTHER SEXUAL MINORITY IDENTITY : RACE - BLACK	-0.627	0.534
	(0.745)	(0.745)
SEXUAL ORIENTATION - (2) BISEXUAL: RACE - LATINO	-0.472	0.623
	(0.475)	(0.475)
SEXUAL ORIENTATION (3) OTHER SEXUAL MINORITY IDENTITY : RACE - LATINO	-0.320	0.726
	(0.648)	(0.648)
CONSTANT	-1.159	0.314
	(0.335)***	(0.335)***
OBSERVATIONS	1,217	
LOG LIKELIHOOD	-733.32	
AKAIKE INF. CRIT.	1,514.63	
NOTE: * P < .10 ** P < .05 *** P < 0.01		

Our statistically significant covariates for this study using logistic regression include all categories for cohort (age groups), gender, and sexual orientation. Sexual orientation: race covariate for bisexual and black was significant at the 10% level. Also bullying for 3 of the 4 levels was significant along with those who experienced sexual abuse as a child.

5. Discussion and Recommendations

5.1. Key Results

Our findings suggest interesting perspectives to add to the nascent literature of specific factors affecting drug use among LGB adults. Additional focus and outreach on anti-bullying initiatives

and LGBQ youth who suffered sexual abuse is required to prevent and mitigate drug abuse in adulthood. The presence of Sexuality Gender Associations (SGA) were found to be statistically significant interaction to reduce the odds of heavy episodic drinking behavior and victimization in LGBTIQ+ youth aged 13-50 across all 50 U.S. states. (Poteat et al., 2021) While this study focused specifically on drinking behavior and did not analyze substance abuse of drugs and illicit substances, this research presents promising finding to minimize substance abuse behavior. Protective factors such as the presence of a GSA could help to reduce some of the proximal stressors that are associated with substance abuse. (Poteat et al., 2021)

Given the high levels of sexual abuse among LGB populations and the odds that this will increase substance abuse behavior in this population, additional targeting for comprehensive sexual education for youth in schools may help to increase reporting of sexual abuse and allow for proper referral mechanisms for support including psychosocial, legal, and health services. "A systematic review of childhood sex abuse curricula in the U.S. and Canada concluded that one of the most common effects was increased knowledge of a resource person to whom children would report abuse." (Goldfarb & Lieberman, 2021)

Further outreach may be needed in particular for LBQ women and non-binary persons given the higher odds of drug abuse among them. Increased attention and funding should include women and non-binary targeted programs while ensuring no one gets left behind so that drug abuse treatment and prevention programs allow enrollment for all LGB persons. For example, Lesbian, Bisexual, Queer and Transexual (LBQT) women living with HIV have been described invisible and have shared structural and discriminatory practices which have made them feel excluded from HIV programs. (Logie et al., 2012) "Reproducing the Sexuality Binary" research paper, shared bisexual experiences in U.S. gay and heterosexual spaces and found that many bisexual persons feel rejected or excluded from both spaces potentially leading to stigma, internalized biphobia and other social and emotional problems. (Weier, 2020) This could help to understanding some of the underlying factors attributed to the results of higher drug abuse among bisexual persons. Further support is needed for bisexual persons and other sexual orientations such as gender queer or pansexual as they have the highest odds of drug addiction.

5.2. Limitations

This study has some limitations in the study design that may impact analysis and results including the original DUDIT classifications including lower thresholds for those born as female. Another factor is the age of the sample, given this study is focused on generational differences among three distinct age cohorts to understand the historical contexts in which they have come of age LGB youth (under 18) are not included and ages that do not fall in the three cohort categories.

Hispanics may also be underrepresented in the study as the eligibility criteria was assessed through phone interviews conducted by Gallup and participants must have had enough basic English language skills in order to determine phone eligibility. The United States has a large number of Spanish speakers especially among the Latino ethnic group. Also, in terms of race, Asians, Native Americans and other ethnic minorities were excluded from the survey as it was not possible to have enough of a sample size to ensure the data by nationally representative of LGB ethnic minorities. Therefore, this study and the findings are not representative of Asian and other ethnic minorities in the United States at the time of data collection.

5.3.Strengths

This study also has a number of strengths as the Generations survey is the first LGB nationally representative survey. This research is also one of the first of its kind to look at within group analyses of drug abuse analyzing demographic and trauma related factors for LGB persons. Some of the findings are consistent and reinforce existing research of the general populations. It also provides new evidence and knowledge of LGB specific findings related to drug abuse factors. This will be helpful for future researchers interested in LGBT health and substance abuse along with policymakers interested in reducing health disparities for LGBT persons in the United States and in other contexts.

The Generations Survey is the first nationally representative LBQ longitudinal survey in the United States. Detailed survey information and large number of variables are available for selection and use of the original data set to support future research.

6. Conclusion

Lesbian, Gay, Bisexual (LGB) and other sexual minorities experience higher levels of substance abuse compared to their heterosexual counterparts. Although the LGB population is a diverse

group of persons with a range of demographics and childhood experiences that impact the upbringings and resulting lifelong health problems including substance abuse. This research is one of the first to look at in-group risk factors for drug abuse issues of LGB adults contributing to a new literature to help shed light on who within the LGB groups are most at risk for developing drug abuse problems and becoming drug dependent adults. This paper finds that women, non-binary, and bisexuals are most at risk of developing drug dependence within this group. It also confirms that similar to the general population, those who experience bullying and sexual abuse have higher odds of developing a substance abuse problem.

7. Reproducible Research and Code

All data and reproducible code for this project may be found on GitHub. A folder and accompanying data are accessible at https://github.com/mrkusen/LGB_Drug_Abuse/.

8. Disclaimers

This study is a secondary analysis of data from the **Generations: A Study of the Life and Health of LGB People in a Changing Society, United States, 2016-2019 (ICPSR 37166).** The study was funded by United States Department of Health and Human Services. National Institutes of Health. Eunice Kennedy Shriver National Institute of Child Health and Human Development (R01HD078526), United States Department of Health and Human Services. National Institutes of Health. Office of Behavioral and Social Sciences Research (3R01HD078526-01A1S1), United States Department of Health and Human Services. National Institutes of Health. Office of Research on Women's Health (3R01HD078526-02S1).

The study protocol was reviewed by the Gallup IRB, the UCLA IRB and the IRBs of collaborating institutions through reliance on UCLA IRB. Collaborating institutions have included Columbia University, the University of Texas at Austin, the University of California, Santa Cruz, the University of California, San Francisco, the University of Arizona, the University College London, UK, and the University of Surrey, UK.

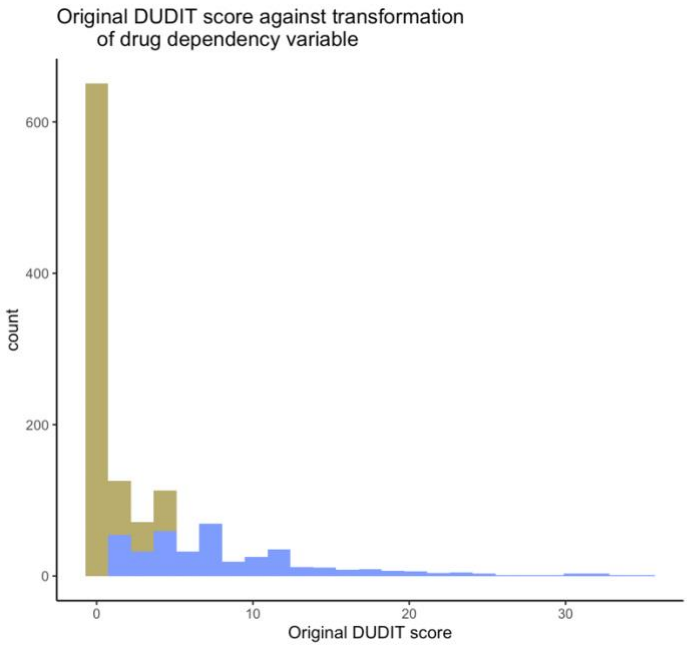
Appendix 1: Logistic Regression Results

Logistic Regression Results		
Variable	*Beta (robust se)*	*Odds Ratio (robust se)*
COHORT - middle	-0.396 (0.211)*	0.673 (0.211)*
COHORT - older	-0.433 (0.223)*	0.649 (0.223)*
Gender - man	-0.830 (0.186)***	0.436 (0.186)***
Gender – non- binary / gender-queer	-0.582 (0.336)*	0.559 (0.336)*
sexual orientation - (2) Bisexual	0.834 (0.225)***	2.301 (0.225)***
sexual orientation - (3) Other sexual minority identity	1.247 (0.315)***	3.480 (0.315)***
Race - black	0.458 (0.339)	1.581 (0.339)
Race - Latino	0.235 (0.296)	1.265 (0.296)
Poverty - (1) Yes in poverty	0.143 (0.241)	1.154 (0.241)
Education – (2) More than HS	-0.105 (0.189)	0.900 (0.189)
Happiness - (2) Pretty happy	0.195 (0.221)	1.215 (0.221)
Happiness - (3) Not too happy	0.384 (0.269)	1.468 (0.269)
Bullying - (2) Sometimes	0.361 (0.196)*	1.435 (0.196)*

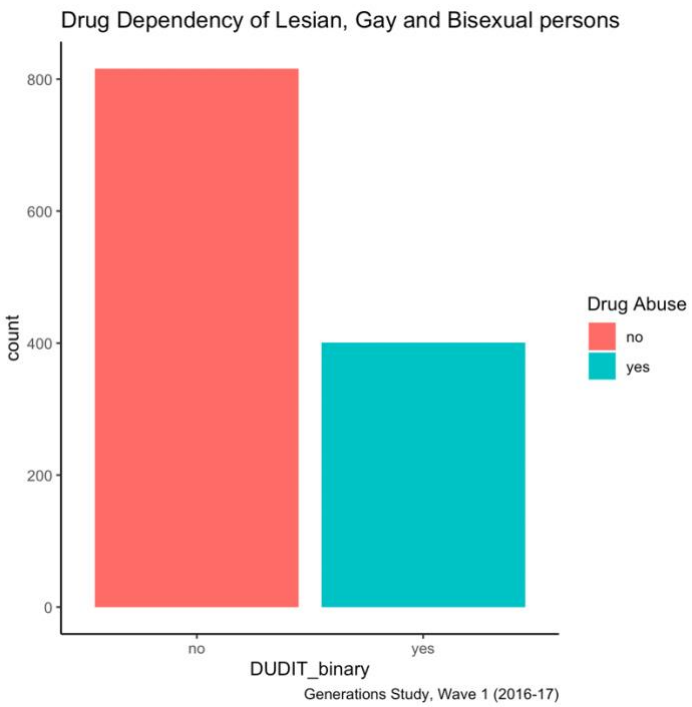
Bullying - (3) Rarely	0.429 (0.253)*	1.536 (0.253)*
Bullying - (4) Never	-0.326 (0.277)	0.722 (0.277)
sexual abuse - Yes	0.607 (0.182)***	1.835 (0.182)***
Incarcerated parent – Yes	0.055 (0.258)	1.056 (0.258)
Substance abuse by parent - Yes	-0.013 (0.180)	0.987 (0.180)
IPV_abuse - Yes	0.159 (0.193)	1.172 (0.193)
sexual orientation - (2) Bisexual: Race - black	-0.919 (0.534)*	0.399 (0.534)*
sexual orientation (3) Other sexual minority identity : Race - black	-0.627 (0.745)	0.534 (0.745)
sexual orientation - (2) Bisexual: Race -Latino	-0.472 (0.475)	0.623 (0.475)
sexual orientation (3) Other sexual minority identity : Race - Latino	-0.320 (0.648)	0.726 (0.648)
Constant	-1.159 (0.335)***	0.314 (0.335)***
Observations	1,217	
Log Likelihood	-733.319	
Akaike Inf. Crit.	1,514.638	
Note:	*p < .10 **p<.05 ***p<0.01	

Appendix 2: Graphs

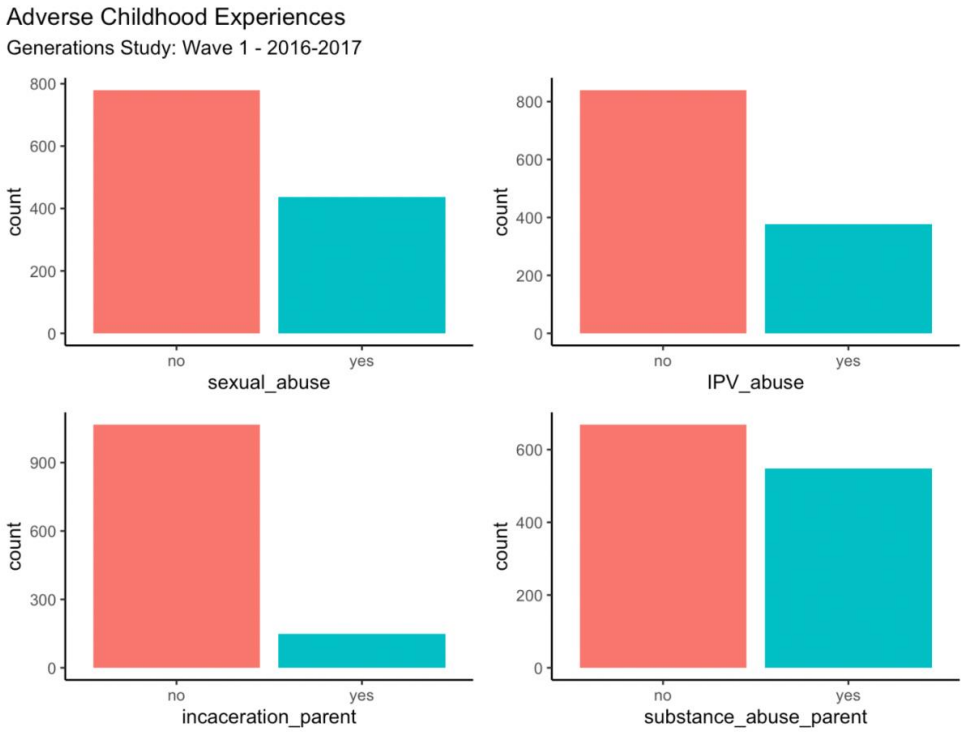
Graph 1



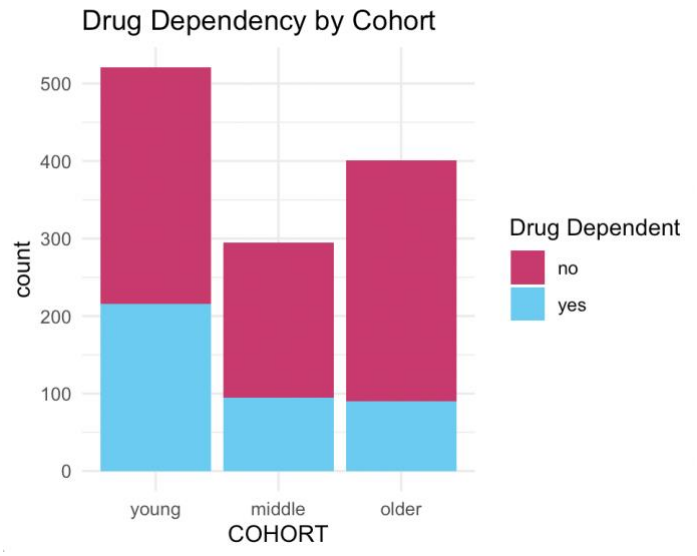
Graph 2



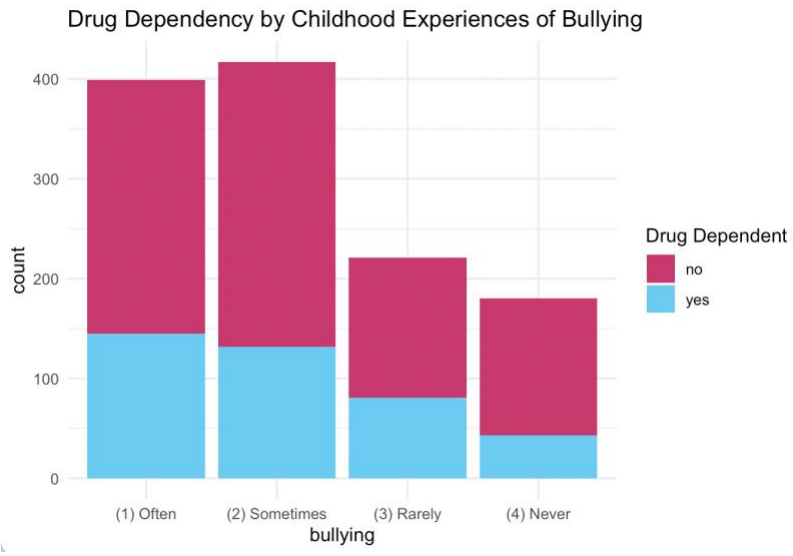
Graph 3



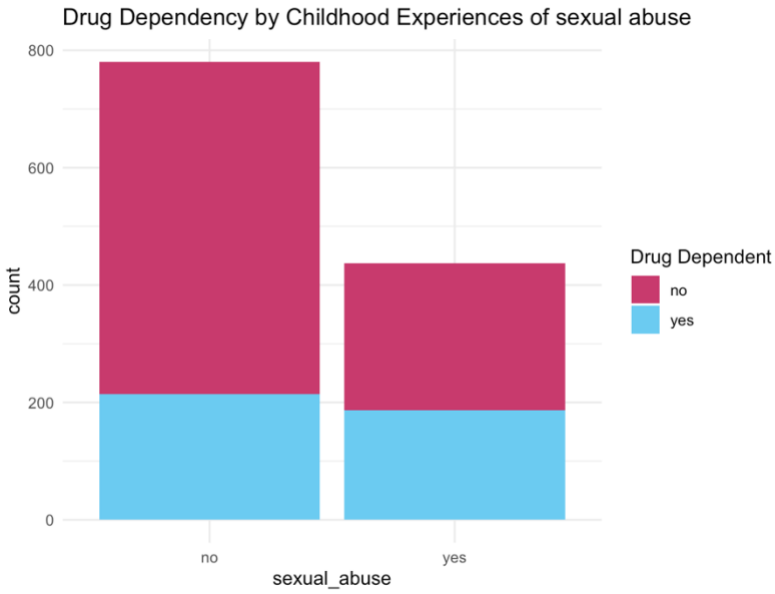
Graph 4



Graph 5



Graph 6



Appendix 3: Variables of Interest

See page 30-31

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New Variable Name	Construct Item	Question # in Baselin	Source	Variable Nam	Description	Label	Response Categories
	OUTCOME VARIABLE						
	DUDIT						
drug abuse	DUDIT	Q90-Q100	Berman, A.H., Bergman, H., Palmstierna, T., & Schlyter, F. (2003). The Drug Use Disorders Identification Test (DUDIT) Manual.Retrieved from:http://www.paihdelinkki.fi/sites/default/files/duditmanual.pdf	w1dudit	Drug Use Scale	DUDIT	Range Mean Standard Deviation
				w1dudit_i	Imputed Drug Use Scale	DUDIT with imputation	Range Mean Standard Deviation
				w1q90	Drug Use Scale_1	How often do you use drugs other than alcohol?	Never Once a month or less often 2-4 times a month 2-3 times a week 4 times a week or more often
				w1q91	Drug Use Scale_2	Do you use more than one type of drug on the same occasion?	Never Once a month or less often 2-4 times a month 2-3 times a week 4 times a week or more often
				w1q92	Drug Use Scale_3	How many times do you take drugs on a typical day when you use drugs?	0 1-2 3-4 5-6 7 or more
				w1q93	Drug Use Scale_4	How often are you influenced h	Never Less often than once a month Every month Every week Daily or almost every day
				w1q94	Drug Use Scale_5	Over the past year, have you felt that your longing for drugs was so strong that you could not resist it?	Never Less often than once a month Every month Every week Daily or almost every day
				w1q95	Drug Use Scale_6	Has it happened, over the past year, that you have not been able to stop taking drugs once you started?	Never Less often than once a month Every month Every week Daily or almost every day
				w1q96	Drug Use Scale_7	How often over the past year have you taken drugs and then neglected to do something you should have done?	Never Less often than once a month Every month Every week Daily or almost every day
				w1q97	Drug Use Scale_8	How often over the past year have you needed to take a drug the morning after heavy drug use the day before?	Never Less often than once a month Every month Every week Daily or almost every day
				w1q98	Drug Use Scale_9	How often over the past year have you had guilt feelings or a bad conscience because you used drugs?	Never Less often than once a month Every month Every week Daily or almost every day
				w1q99	Drug Use Scale_10	Have you or anyone else been hurt (mentally or physically) because you used drugs?	No Yes, but not over the past year Yes, over the past year
				w1q100	Drug Use Scale_11	Has a relative or a friend, a doctor or a nurse, or anyone else, been worried about your	No Yes, but not over the past year Yes, over the past year

Appendix 3: Variables

	Independent Variables						
	Demographics						
Cohort	Cohort			cohort	Cohort	Cohort	Younger Middle Older
	Sex at Birth			w1sex	Sex at Birth_Survey	Sex at birth	Female Male
gender	Gender Identity			w1gender	Gender Identity Survey	Gender identity	Woman Man Non-binary/GQ
race	Race categorization on screener			screen_race	Race Screener	Race - screener	White Black/AA Latino/Hispanic
educcation	Education			geduc2	Education High School or Less	High School or Less	HS less More than HS
poverty	Poverty			w1poverty	Census Poverty	Census poverty	Not in poverty Yes in poverty
	Sexual Orientation						
sexual orientation	Sexual orientation i			w1sexminid	Sexual Minority Identity	Sexual minority identity	Lesbian/gay Bisexual Other sexual minority identity
	Bullying						
bullying	Bullying	Q162	Composite question created by Generations Study team based on various surveys about childhood bullying	w1q162	Childhood Bullying	How often, if ever, were you bullied before you were 18 years old?	Often Sometimes Rarely Never
	Happiness						
happiness	Happiness	Q3	PEW Research Center (2013). A Survey of LGBT Americans. Retrieved	w1q03	Happiness	Generally, how would you say things are these days in your life? Would you say that you	Very happy Pretty happy Not too happy
ACE	**Adverse Childhood Experiences**						
incarceration	Adverse Childhood Experiences (ACE)	Q151-Q161	CDC-BRFSS (2010). Adverse Childhood Experiences (ACE) module. Retrieved from: http://www.acestudy.org/	w1ace_inc	Adverse Childhood Experiences_Incarcerated Household	ACE incarceration household member	0 (no, event never occurred) 1 (yes, event occurred at least once)
				w1ace_inc_i	Imputed Adverse	ACE incarceration household member with imputation	0 (no, event never occurred) 1 (yes, event occurred at least once)
IPV				w1ace_ipv	Adverse Childhood	ACE household intimate partner violence	0 (no, event never occurred) 1 (yes, event occurred at least once)
				w1ace_ipv_i	Imputed Adverse	ACE household intimate partner violence with	0 (no, event never occurred) 1 (yes, event occurred at least once)
sexual abuse				w1ace_sex	Adverse Childhood	ACE sexual abuse	0 (no, event never occurred) 1 (yes, event occurred at least once)
				w1ace_sex_i	Imputed Adverse	ACE sexual abuse with imputation	0 (no, event never occurred) 1 (yes, event occurred at least once)
parental substance abuse				w1ace_sub	Adverse Childhood	ACE household substance abuse	0 (no, event never occurred) 1 (yes, event occurred at least once)
				w1ace_sub_i	Imputed Adverse	ACE household substance abuse with imputation	0 (no, event never occurred) 1 (yes, event occurred at least once)