Effect of Model Type on Disparity Size by Race/Ethnicity, Sex, and Sexual Orientation

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1 Introduction

Racial and Ethnic disparities have been long documented in the United States through a variety of different models. The three most common models used are the Total Difference (AHRQ), equivalent to the difference in unadjusted group means; the Residual Direct Effect (RDE), which is the coefficient from a full regression of an outcome racial/ethnic categories; and the Institute of Medicine (IOM) approach, which only ajdusts for differences in health but not socio-economic factors. The AHRQ and RDE models have also been used to measure disparities in health treatment among sexual orientations and sex/gender, but the IOM method was specifically developed to measure racial/ethnic disparities. In general, the AHRQ model may overstate the disparity between groups as it does not include any control variables, but is advantageous for understanding of the magnitude of the disparity. On the contrary, the RDE model includes controls for health status and socioeconomic status (SES), which may understate the disparity if the disparity is correlated with health status or SES. However, the RDE finds the disparity that is solely due to discrimination and not differences in health or SES. The IOM is a sort of middle ground between the AHRQ and RDE models as it gives the racial/ethnic groups that are being compared the same health status while allowing SES to be correlated with race/ethnicity.

One goal of this paper is to apply the IOM method to measure disparities due to sex or sexual orientation as I am not aware of any such research that has done this. In this paper specifically, I will look at the disparity in mental health treatment when comparing the size of the disparity between models. There is concern that on average, White adults are more likely to receive mental health treatment than their non-White counterparts. Additionally, men and heterosexuals are less likely to seek out mental health treatment than women and sexual minorities respectively. Comparing the size of the disparity between models can help develop an understanding of the driving force behind the disparity and develop policies to appropriately address the disparity.

2 Literature Review

2.1 Race and Ethnicity

Much research has been done on racial and ethnic disparities in the healthcare system, including the mental healthcare system in the United States. Recent research has found that Blacks and Latinos were less likely to initiate care, have adequate episodes of mental health care, or have an episode of psychotropic drug use for a mental health condition only

than Whites (Cook, et al., 2014). Whites were twice as likely as Blacks and Hispanics to receive mental health related visits, and were over twice as likely to have a prescription for a mental health condition (Biener and Zuvekas, 2019). The type of care also differed among racial groups as Blacks and Hispanics are less likely to receive outpatient mental health care than Whites (Cook, et al., 2014). Blacks were more likely to see a mental health specialist compared to Latinos, while Latinos were more likely to go to a primary care practitioner for mental health reasons (Olfson et al., 2023). Blacks were also significantly more likely to have a mental health related visit within the emergency room or impatient unit compared to Whites (Cook et al., 2014).

Differences in the length of treatment conditional on receiving any treatment could be due to stigma related to receiving mental health care, losing pay from work to receive treatment, and from having differing levels of satisfaction of care (Cook et al., 2014). The disparities in mental health care are thought to be due to systemic and social factors. For instance, many mental health specialists do not accept patients with Medicaid, which disproportionately affects Blacks and Hispanics (Olfson et al., 2023). Disparities still exist even when the data are stratified by health insurance coverage. Biener & Zuvekas (2021) found that when stratified by health insurance coverage Whites were still five percentage-points more likely to have a mental health visit than Blacks and six percentage-points more likely than Hispanics. They also found that for all racial groups, the probability of using a mental health service increased as psychological distress increased. However, the probability for Whites increased at a faster rate than Blacks or Hispanics regardless of health insurance coverage, leading to a widening disparity as psychological distress increased. This may suggest that the mental healthcare system has problems, such as not being culturally adequate or reflecting and meeting the needs of Black and Hispanics with mental health conditions.

While the papers all found similar results, it is important to note that these similarities could be due to the similarities in the papers' methods and data with the exception of Olfson et al., which used the same data, but a different method. All of the papers above use the Institute of Medicine (IOM) framework to define disparities and they all use data from different years of the Medical Expenditure Panel Survey (MEPS). The papers also happen to use very similar, if not identical, methods for defining different types of mental health care and different levels of mental distress.

Unlike the other papers, Olfson et al. used the a stepped regression model where the authors started by just measuring the unadjusted differences in outpatient mental health treatment of Black and Hispanic adults from White adults. In the unadjusted or AHRQ model, they found that on average Black and Hispanic adults were 13.1 and 13.8 percentage points, respectively, less likely to receive mental health treatment than White adults. When fully adjusting for racial/ethnic group, sex, perceived mental health status, education level, family income, health insurance, and employment statu using the RDE framework, they found the disparity only decreased slightly (Olfson et al., 2023).

2.2 Gender

There is a significant difference between men and women across diagnosis groups of severe mental illnesses for perceived unmet need for mental health treatment with men having a decreased likelihood of perceived unmet need for mental health treatment (Manuel et al., 2018). Women are more likely to receive treatment than men across different intervention types for mental health, but they are also 1.5-3 times as likely to

have a depressive disorder than men. The difference between men and women in rates of depressive disorders is not due to help seeking behavior or willingness to report symptoms, but a real gender difference in mental health (Sherbourne et al., 2004).

Men have been found to receive less mental health treatment than women in both general health and specialist mental health visits, but are more likely to receive mental health treatment through emergency care (Hauenstein et al., 2006). The gap in accessing mental health services among men might be due to the fact that men are slower to recognize signs of distress as a mental health need. Women are also more likely to have more knowledge about depression and the efficacy of medicine for depression, which could be why they may be more likely to have received care for a mental disorder than men (Manuel et al., 2018). Women may also be less likely to use emergency services for mental health care because they are more likely to delay healthcare due to high costs (Hampton and Lenhart, 2022).

2.3 Sexual Orientation

Both sexual minority women and men are more likely than their heterosexual counterparts to have seen a mental health professional independent of their scores of psychological distresses. However, when looking at just sexual minorities or just heterosexuals, there were differences in mental health care use between men and women. Heterosexual women are significantly more likely to have seen a mental health professional compared to heterosexual men, but there was no statistically significant difference between sexual minority men and women. Sexual minorities may have higher rates of seeing a mental health professional because of stigma along with difficulty in relationships with family (Platt et al., 2018). Baams et al. (2018) looked specifically at college students and found results similar to Platt et al. (2018). Sexual minority students were found to be more likely to have seen some type of mental health professional, receive a mental health service, and report suicidal ideation than heterosexuals. However, this study cannot be generalized to the entire college population and likewise to the general United States population. Studies on mental healthcare service utilization between sexual minorities and heterosexuals is limited as there have not been many nationwide studies. Most of the nationwide research is either over a decade old and/or limited in the amount of sexual minority respondents. The National Health Interview Survey (NHIS) collects data on U.S. resident civilian adult population data health, health care utilization, and health-related behaviors, but they did not start collecting sexual orientation data until 2013 (Baams et al., 2017; Platt et al., 2018).

3 Methods

To evaluate the disparities between groups, this paper will use four different models. By using four different models, the disparities can be understood from four different perspectives that are all important for contextualizing the disparity. This means that the different models will also have different policy implications that can better address the disparities.

3.1 AHRQ (Total Difference)

The first of these models is know as the total difference approach, or the Agency for Healthcare Research and Quality (AHRQ) model. The AHRQ model measures a health disparity by taking the entire difference in outcome between the groups of interest. This approach does not adjust for differences in outcomes due to differences in health status or SES, and is best used to understand the overall magnitude of the disparity between groups. The regression using this approach can be written as follows:

$$MHT_i = \alpha_1 + \beta_1 Group_i + \varepsilon_i, \tag{1}$$

In equation (1) above, the *Group* represents the race/ethnicity, gender, or sexual orientation variable, α represents the average mental health treatment among the group being compared against, and β represents the disparity between the groups. The *Group* variable provides the average difference between each disadvantaged[1] group and the advantaged group they are being compared to.

3.2 Modified AHRQ

The second of these models is what will be called a modified AHRQ model that models racial/ethnic groups, gender, and sexual orientation differences in one model as shown below in equation (2). In equation (2), *Race* represents the categorical variable of race/ethnicity, *Sex* represents if a respondent is male or female, and *Sexuality* represents the categorical variable of sexual orientation.

$$MHT_i = \alpha_1 + \beta_1 Race_i + \beta_2 Sex_i + \beta_3 Sexuality_i + \varepsilon_i, \tag{2}$$

The adaption of the AHRQ method was done because the traditional AHRQ method does not allow for comparisons of race/ethnicity, sex, and sexual orientation in one model. One downside of this model is that it does not show interactions between race/ethnicity, but such a model also comes with the downside of with five racial/ethnic groups, two sexes, and three sexual orientations there are 62 different comparisons that could be made. Using such a model would be more appropriate in determining which combination of race/ethnicity, sex, and sexual orientation has the highest or lowest use of mental health treatment such as (Forrest et al., 2023) did. That said, this model has the advantage of providing a more intersectional view on disparities by acknowledging that race/ethnicity, gender, and sexual orientation are intersecting identities that cannot be separated from each other.

3.3 Residual Direct Effect

The third model used in this paper is the residual direct effect (RDE), which controls for any covariates selected. Most commonly, the RDE controls for health, SES, and social determinants of health, along with any other variable a researcher believes biases the

[1]When measuring disparities for race/ethnicity and gender, the advantaged group is clear, but for sexual orientation it is not clear if bisexual or gay/lesbian is the advantaged group. Instead, heterosexuals are considered the advantaged group to be compared against because they likely have a different outcome that gay/lesbian or bisexual. Heterosexuals are also not considered a minority groups, and there is also a larger sample of heterosexuals, which gives better statistical precision in the analysis.

outcome of interest. This method provides the most conservative estimate of disparity and gives the size of the disparity due to only a change in a given characteristic. For this paper, the model for this method can be written as follows:

$$MHT_i = \alpha_1 + \beta_1 Race_i + \beta_2 Gender_i + \beta_3 Sexuality_i + \beta_4 Health_i + \beta_5 SES_i + \beta_6 SDH_i + \varepsilon_i, \tag{3}$$

where *Health*, *SES*, and *SDH* represents different variables related to health status, SES, and social-determinants of health respectively.

3.4 IOM

The fourth and final model used is referred to as the IOM approach as it was developed by the Institute of Medicine, now known as the National Academy of Medicine, in their *Unequal Treatment* report in 2003. In this method, disparities due to differences in health are considered just while differences due to SES and social determinants of health are considered unjust. Implementing this approach will help understand how much of a disparity exists between groups due to unjust differences. (Clemans-Cope et al., 2023). The IOM method can be derived by by first expressing the mean utilization of the advantaged and disadvantaged group as a linear combination of health characteristics (H) and socioeconomic factors (S):

In the equation below Y represents the outcome of interest, H represents the health characteristics, and S represents the socioeconomic factors,

$$\bar{Y_a} = \bar{H}'_a \hat{\beta}_a + \bar{S}'_a \hat{\gamma}_a \tag{4a}$$

$$\bar{Y_d} = \bar{H}'_d \hat{\beta}_d + \bar{S}'_d \hat{\gamma}_d, \tag{4b}$$

where $\hat{\beta}$ is a vector containing coefficient estimates for each H characteristic, and $\hat{\gamma}$ is a vector containing coefficients for each S and the model constant term.

Using the Oaxaca-Blinder framework of assigning the disadvantaged group the same distribution of health status as the advantaged group through setting $H_a = H_d$, which leads to a definition of disparities consistent with the IOM as shown in equation (4) below.

$$(\bar{Y_a} - \bar{Y_d})_{IOM} = \bar{H'}_a \left(\hat{\beta}_a - \hat{\beta}_d\right) + \bar{S'}_a \left(\hat{\gamma}_a - \hat{\gamma_d}\right) + \left(\bar{S'}_a - \bar{S'}_d\right) \hat{\gamma_d}, \tag{5}$$

Implementing this approach will help understand how much of a disparity exists between groups due to unjust differences. There are some issues the Oaxaca-Blinder decomposition has relating to the number of variables included in the regression. Including too many covariates, particularly ones that relate to SES, may understate the unjust differences. On the opposite end, including too few variables may overstate the disparities that are unjust. However, for the IOM method the allocation of controls does not matter because they are summed together at the end. As long as the health characteristics are accounted for, there should not be issues.

4 Data

4.1 Data Source

The data comes from the 2010-2019 National Survey on Drug Use and Health (NSDUH) collected by the Substance Abuse and Mental Health Services Administration (SAMHSA). The NSDUH collects nationally representative data on substance use disorders and treatment along with mental illness and mental health treatment collected by the Substance Abuse and Mental Health Services Administration. Currently the NSDUH uses a mixed mode approach that includes responses from surveys administered both on the web and in-person, but prior to 2020 the NSDUH was only administered in-person. Comparisons to the 2020 and 2021 were considered, but were not possible due to data missing from the second and third quarters in 2020 along with web responses not being consistent with in-person responses (NSD, 2023).

4.2 Sample

Data from the years 2010-2014 will not be included in the sample as the NSDUH did not start collecting data on sexual orientation until 2015. Responses that did not answer the question(s) related to any of the variables for any reason will also be excluded from the sample. Any individual respondents with non-responses or refusals to variables of interest and covariates will also be excluded from the sample.

4.3 Variables

4.3.1 Any Mental Health Treatment

The outcome of interest is if a respondent received any mental health treatment in the past year. Any mental health treatment is defined as having received inpatient mental health treatment, outpatient mental health treatment, a prescription for a mental health condition, or any combination of the three. One downside of measuring if a respondent received mental health care or not, is that it does not measure if the respondent received the appropriate amount of care. However, perceived unmet need can be measured against if the respondent received any mental health treatment. Of the respondents who received mental health treatment in the past year, approximately 23% of them had unmet need for mental health treatment while only approximately 4.4% of those who did not receive any mental health treatment last year said they had unmet need for mental health treatment.

4.3.2 Race/Ethnicity

The NSDUH asks several questions related to race and ethnicity. The first of these questions asks respondents if they are of Hispanic, Latino, or Spanish descent with a follow up on their specific ethnicity if they answered yes. Then all respondents are asked their race, and if they answer Asian, then they are directed to a question that asks about their specific ethnicity. However, the specific ethnicities of Asians and Hispanics are not available in the publicly available NSDUH data. No other questions about ethnicity besides those who are Asian or Hispanic are asked in the NSDUH.

There is sufficient data on respondents who are categorized as Hispanic, Black/African American, and White, but not for individuals who are Asian, American Indian/Alaskan

Native, Native Hawaiian/Pacific Islander, and those who identify as more than one race. Asian, American Indian/Alaskan Native, and Native Hawaiian/Pacific Islander respondents will be combined into one group called "AAIPI" (Asian, American Indian, Pacific Islander). This is not say that people of those groups are homogeneous, but to get some understanding of mental health treatment rates among these groups that are often overlooked.

4.3.3 Sex

It is important to clarify that sex and gender are not the same thing, and that prior to 2023 the NSDUH only has data on a respondents's sex. In the NSDUH questionnaire respondents are not asked what their sex is, but by having the interviewer categorize their sex for them. This means that people, particularly those who have a more fluid gender expression or do not necessarily present as their identified gender may be assigned the wrong sex. One issue this presents in the data is that the question that asks about sexual attraction is dependent on what the respondent's sex is imputed as. For example, if a respondent is categorized as 'female' then they will be asked if they will be given the option "I am only attracted to males" that is converted into "I am only attracted to the opposite gender" in the code. If a respondent identifies as a lesbian woman, but is categorized as male, then saying "I am only attracted to females" would be converted to "I am only attracted to the opposite gender" in the code. While the variable on sexual attraction is not a variable of interest in calculating disparities due to being highly correlated with sexual orientation, it can help give an estimate about the error in gender assignment.

Looking further by race/ethnicity shows if the proportion of respondents who identified as a given sexual orientation and race/ethnicity aligned with what sexual attraction varied among different racial/ethnic groups. It is not expected that respondents who said they were gay/lesbian would respond "I am solely attracted to the opposite gender" nor would it be expected that respondent's who said they were heterosexual to respond "I am solely attracted to the same gender". The latter occurred less than 0.5% for all races except for Black and AAIPI which still occurred less than 1% of the time. However, for the former only occurred less than 1% of the time for White respondents, and occurred around 3.8% of the time for Hispanic and 3.9% for Black respondents. (talk about racial stereotypes affect gender and then what this means for analysis).

The 2023 NSDUH will ask respondents about their sex and their gender, but the 2015-2019 data only has a person's sex. A person's sex and gender do not always align and both gender and sex are not just limited to purely male and female. There are intersex people who do not fit into having a sex of just male or female. While many people may identify with the sex they were assigned at birth, not everyone does and gender is a spectrum of have people may identify or choose to express themselves. Based on how the NSDUH recorded 'sex' I will refer to it as gender as gender is more social (like perception of gender) and the interviewer could not know a person's sex without asking them.

The difference between women and men in mental health treatment can be calculated as the difference in having different health needs (just) and discrimination by gender (unjust). However, no models appear to exist that would help control for the difference in treatment rates between men and women, but it may be possible to find how much could be explained by different needs or discrimination. This would be difficult to model using data from the NSDUH as there are no questions in the NSDUH that capture this data on discrimination a respondent faces.

4.3.4 Sexual Orientation

When asking about sexual orientation, the NSDUH only gives options of heterosexual, bisexual, and gay/lesbian. However, there are people who do not identify as heterosexual, but would not describe themselves as bisexual or gay/lesbian. As discussed in the previous section, responses to the question about sexual orientation and sexual attraction do not always align with what is expected, so it will be assumed that the reported sexual identity is the person's true sexual orientation.

In addition, some respondents refused to answer the question about sexual orientation, with Black, AAIPI, Hispanic, and Other refusing than Whites. The differences in refusal rates could be due to language barriers, or non-Whites are more likely to identify their sexual orientation in a survey (nonresponse). Cross tabbing sexual orientation with sexual attraction shows that most people refuse to both questions, and do not just refuse to answer the question about sexual orientation. This would provide evidence that the higher rates of refusal are more likely to be due to a language barrier. Not all who refused to answer both questions may have done so because of a language barrier, some may have refused is they identified as asexual and felt none of the responses reflected their identity. For the purpose of this analysis, those who refused to answer the question about sexual orientation were not included in the sample, but future analysis may look into those who refused as their own group.

4.4 Health Covariates

4.4.1 Kessler Distress Scale

The Kessler 6 (K6) distress scale ask six different questions related to a person's mental status and scores them on a scale of 0 to 4 with zero being that they never felt that way in the past month and four being that they felt that way all the time. The score of each question is summed up to give a total score of 0 to 24. A person is considered is to have no mental distress if they have a total score less than 12, moderate mental distress if they have a total score of 12 to 17, and severe mental distress if they have a total score of 18 or higher. It is expected that people who have moderate or severe moderate distress will have higher rates of mental health treatment than those with no mental distress, which is why it is included as a control. The K6 scale has been validated and is shown to be consistent and reliable (Prochaska et al., 2012).

4.4.2 Age

People aged 65 years and above are excluded from the sample as they tend to have Medicare for health insurance. Health insurance is known to affect access to healthcare, so those 65 and older would skew the data due to having Medicare. There would also not be a sufficient sample of individuals aged 65 and older who have private insurance to compare against. Additionally, respondents who were younger than 18 were excluded from the sample as they were not asked about their sexual orientation, and I am only interested in disparities in mental health treatment among adults. Modeling disparities among children is different than adults as children tend not to have jobs, and their health insurance is typically through their parents. Children also typically need a parent's permission or support to receive mental health treatment, which adds an additional barrier that can be difficult to control for.

There is a concern with people aged 18-25 as there is a risk with psychiatric drugs to treat mental illness as they can make those younger than 25 more suicidal. This means respondents aged 18-25 may be less likely to receive a prescription for a mental health disorder than their counterparts who are aged 26-64 years. However, it is likely that respondents aged 18-25 who would receive a prescription for a mental health disorder but do not due their age would still receive outpatient therapy to treat their mental health disorder. Therefore, they would still be captured as having any mental health treatment.

4.4.3 Self-Rated Health

The question about a respondent's health status asked respondents to rate their health as "fair/poor", "good", "very good", or "excellent". Respondents who have poorer health may be more likely to need mental health treatment than those who have better health, which is why it is included as a control variable.

4.5 SES Covariates

4.5.1 Marriage

Respondents who are married may have better access to mental health treatment than those who are not married due to them being more likely to have health insurance. The NSDUH asks respondents if they are married, divorced, separated, or never married. This question has the disadvantage of not capturing people who are cohabitation, but that will not have a substantial impact on the relationship with mental health treatment as the relationship is driven mostly by access to health insurance.

4.5.2 Education

Education is categorized into those who did not receive a high school diploma or equivalent, have a high school diploma/GED, have some college credit, or college graduate or higher. While the NSDUH further divides higher education by undergraduate, professional school, masters, and doctorate degree, the pubicly available data groups these all into college graduate or higher. Controlling for education level helps reduce bias as it is expected to vary among race, gender, and sexual orientation. Also, a higher education level tends to be positively correlated with income, which can play a role in whether an individual recieves mental health treatment or not.

4.5.3 Income

To measure a respondent's household income relative to the number of people in their household, the ratio of their household income to the federal poverty line was used. This has the advantage over just using their household income the same household income holds different weight for households with different numbers of household members. Respondents are categorized as being below the federal poverty line, up to 200% the federal poverty line, and over 200% the federal poverty line. However, the disadvantage of this variable is that it is categorical, and not continuous, meaning a household that is 200% the federal poverty line would be in the same group as a household that is 1000% the federal poverty line, even though they would be likely to have completely different standards of living.

4.5.4 County Type

County type is categorized into three categories of large metro, small metro, or nonmetro area in which areas are coded based on the 2013 Rural/Urban Continuum Code (NSD, 2023). There is evidence to suggest that people living in rural areas have less access to people in metropolitan areas (Kirby et al., 2019), so controlling for county type controls for the bias against nonmetro areas in mental health treatment.

4.5.5 Insurance

For health insurance status, respondents are categorized as having private health insurance, Tricare, Medicaid, Medicare, or being unisured. In the United States, health insurance tends to be correlated with receiving medical care, which is why it is included as a control. One limitation of the health insurance variable, particularly for those who have private insurance is that copay amounts are unknown. Higher copay rates have been shown to discentive people from getting care when they need it and pushing them more towards emergency room care, particularly for lower income individuals (SOURCE).

4.6 Social Determinants of Health

4.6.1 Religiosity

The NSDUH asks several questions on religiosity, such as how many religious services the respondent has attended in the past year, and if the respondent's religious beliefs affect their decisions. Running a regression on the number of religious services attended in the past year, race/ethnicity, sex, and sexual orientation shows the relationship between the number of religious services attended in a year and receiving any mental health treatment is not statistically significant.

However, including a variable for if a respondent's religious beliefs affects their decision along with race/ethnicity, sex, and sexual orientation shows there is a statistically significant negative affect on receiving any mental health treatment. The issue with this variable occurs when a variable for the category of a respondent's K6 score is added to the regression. When the K6 category variable is added, the religiosity variable is no longer statistically significant due to being negative correlated with K6 categories. On average, the more a respondent agrees that their religious beliefs affect their decisions, the more likely to be in the "mild" category for their K6 score.

Based on issues with the two religiosity variables described above, the decision was made to not include them in the regression models. It is important to note that this does not mean that how religious a person is does not have an impact on if they will have received any mental health treatment in the past year, but just that it was not true for this data. Part of this could be due to the questions on religiosity being grouped with questions asking about different crimes, which could influence how a person responds to those questions.

5 Results

5.1 Race/ethnicity

Figure 1 shows estimated racial/ethnic disparities in the use of any metal healthcare treatment using each modeling technique. No model type consistently had the largest or smallest disparity across all racial groups. Although, AAIPI had the largest disparities across all model types as shown in *Table 1* while other had the smallest disparities across all model types. Hispanics had a slightly larger disparity than Blacks for every model except the RDE model, in which they had on average about 1.6 percentage point smaller disparity than Blacks all else equal.

For non-Hispanic Blacks the model that measured the largest disparity was the modified AHRQ model with an average 11.8 percentage point difference from Whites and average 0.3 percentage point larger disparity than the AHRQ model. However, the AHRQ model measured the largest disparity for non-Hispanic AAIPI and Hispanics out of the model types used with disparities of an average 13.6 percentage points and 12.1 percentage points respectively. For non-Hispanic Others the IOM model measured the largest disparity with an average 5.1 percentage point difference from Whites, while the AHRQ model measured the smallest disparity from Whites with only an average 2.2 percentage point difference. For Black and Hispanic, the RDE model has the smallest disparities of all the models with an average 10.5 and 8.4 percentage point disparity respectively. For AAIPI the IOM model had the smallest disparity at 12.43 percentage points on average, which is only slightly more than the RDE model of 12.46 percentage points.

Figure 1: Disparities in Any Mental Health Treatment Relative to Non-Hispanic White

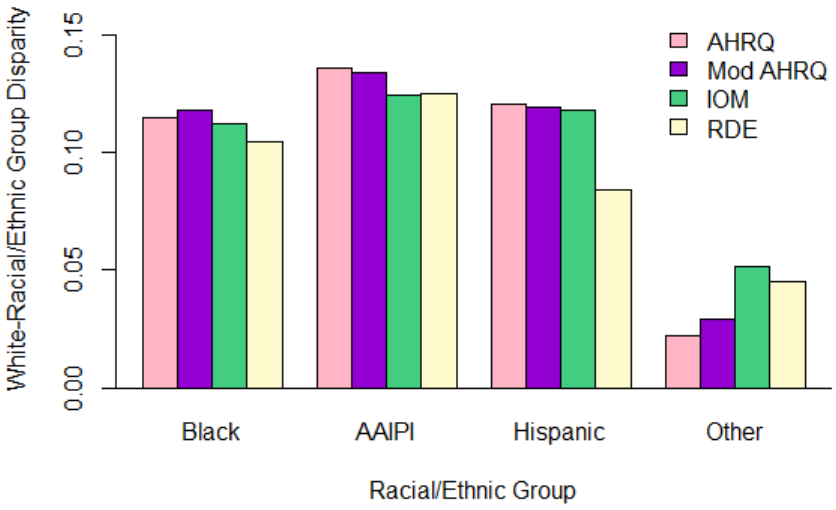

Table 1: Percentage Point Difference by Race/Ethnicity and Model Type

	AHRQ	Mod AHRQ	IOM	RDE
Black	0.115***	0.118***	0.112***	0.105***
	(0.006)	(0.006)	(0.006)	(0.005)
AAIPI	0.136***	0.134***	0.124***	0.125***
	(0.006)	(0.006)	(0.007)	(0.007)
Hispanic	0.121***	0.119***	0.118***	0.084***
	(0.004)	(0.004)	(0.005)	(0.004)
Other	0.022	0.029**	0.054***	0.045***
	(0.014)	(0.014)	(0.012)	(0.011)

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

5.2 Sex/Gender

The disparity between females and males is largest with the AHRQ model which shows women on average having a 10.3 percentage point higher likelihood of any mental health treatment in the past year. Controlling for any differences in sexual orientation and race/ethnicity in the AHRQ model reduces to the average disparity to 9.9 percentage points. Furthermore, the IOM method finds that even when assigning the same health status to men and women, women on average still have a 11.8 percentage point higher likelihood of any mental health treatment. The RDE method has the lowest average disparity of about 8 percentage points between women and men.

Figure 2: Disparities in Any Mental Health Treatment Relative to Female

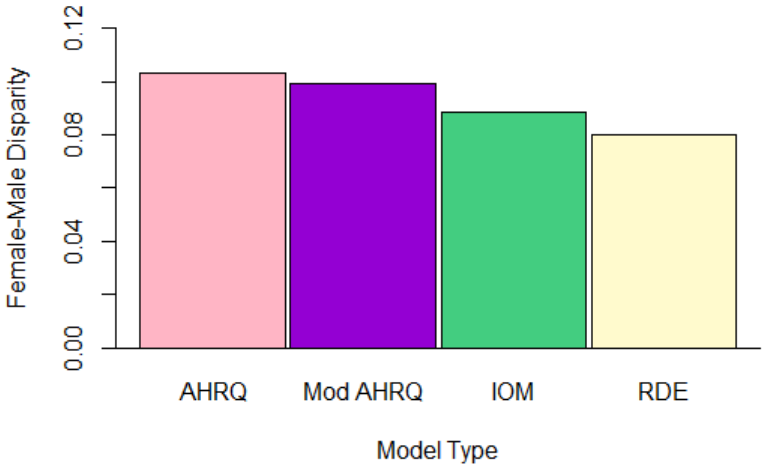

Table 2: Percentage Point Difference from Female by Model Type

	AHRQ	Mod AHRQ	IOM	RDE
Male	0.103***	0.099***	0.088***	0.080***
	(0.004)	(0.003)	(0.004)	(0.004)

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

5.3 Sexual Orientation

For gays/lesbians the largest and smallest disparities were from the modified AHRQ method the RDE model which found gays/lesbians on average have a 12.3 and 7.0 percentage points higher likelihood or recieving mental health treatment than heterosexuals respectively. There is an average 4.7 percentage point gap in the size of the disparity between the modified AHRQ and the IOM and an average 5.3 percentage point gap in the size of the disparity between the modified AHRQ and RDE. The AHRQ model has the second largest disparity of 11.6 percentage points on average, and the IOM had the third largest disparity of 7.6 percentage points on average.

For bisexuals, the AHRQ model found the largest disparity of bisexuals with an 18.9 percentage points higher likelihood of receiving mental health treatment than heterosexuals on average. This is a 11.5 percentage point larger gap than the IOM model which found the disparity in mental health treatment between bisexuals and heterosexuals to be about 7.4 percentage points. The second largest disparity between bisexuals and heterosexuals was found to be with the modified AHRQ method with a 16.5 percentage point disparity on average, and the third largest was with the RDE model which found an 8.2 percentage point disparity on average.

Across model types the Bisexual-Heterosexual disparity is larger than the Gay/Lesbian-Heterosexual disparity except for the IOM method. The difference in disparity size is much greater for the AHRQ and Modified AHRQ model than the IOM and RDE model which are 7.3 and 4.2 percentage points larger on average for the bisexual-heterosexual disparity than the gay/lesbian-heterosexual disparity respectively.

Figure 3: Disparities in Any Mental Health Treatment Relative to Heterosexuals

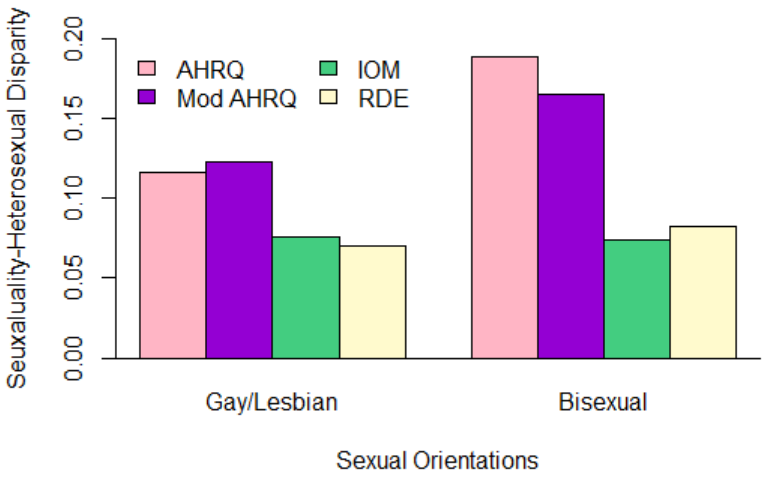

Table 3: Percentage Point Difference by Sexual Orientation and Model Type

	AHRQ	Mod AHRQ	IOM	RDE
Gay/Lesbian	0.116***	0.123***	0.076***	0.070***
	(0.015)	(0.015)	(0.014)	(0.014)
Bisexual	0.189***	0.165***	0.074***	0.082***
	(0.012)	(0.012)	(0.015)	(0.012)

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

6 Discussion

Racial/Ethnic disparities in healthcare are often attributed to differences in SES, which can be seen with the gaps between the IOM and RDE models being larger than the gaps between the AHRQ and IOM models for Black, Hispanic, and Other. The difference between the IOM and RDE for Hispanic is 3.4 percentage points which is much larger than the difference in disparity due to health of 0.3 percentage points as observed in the difference between the AHRQ and IOM models. The difference due to SES for Hispanics is also larger than any other groups and suggests that on average SES plays a larger role in determining if a Hispanic adult receives mental health treatment than other racial/ethnic groups. If Hispanic individuals had the same socioeconomic characteristics as their White counterparts they would have a more similar use of mental health treatment.

Similar to Hispanic adults, Black adults have a larger gap between the IOM and RDE models than the AHRQ and IOM models with gaps of 0.6 and 0.3 percentage points respectively. However, despite having the same size gap between the AHRQ and IOM method, the gap between the IOM and RDE models is over five times larger for

Hispanic adults than Black adults. This suggests that discrimination plays a larger role in contributing to disparities in mental health treatment as even if Black adults having the same health characteristics and SES as their White counterparts, the disparity still persists.

AAIPI adults did not have any significant difference between IOM and RDE, but it is possible the differences in the SES of groups that make up AAIPI lead to SES not making a difference when they are grouped together. It is also possible that there is some historical or social factors that sway AAIPI individuals from receiving mental health treatment as even in the RDE model the size of the disparity is larger than any other model for the other racial/ethnic groups. On the opposite side of AAIPI respondents, respondents who identified as Other had the largest disparity in the IOM model, which was still smaller than the disparity measured for every model in the other racial/ethnic groups. This could be due to the respondents who choose Other are mostly individuals who are mixed race with one parent who is White. This would explain why the disparity from Whites is much smaller for Other than other racial/ethnic groups.

For men, the difference between the AHRQ and IOM models is 1.5 percentage points and the difference between the IOM and RDE models is 0.8 percentage points. Of the 1.5 percentage point difference between the AHRQ and IOM, 0.4 percentage points are due to difference in sexuality and race/ethnicity as that is the difference between the IOM and modified AHRQ model. This would suggest that difference between health characteristics of men and women is more of driving force behind disparities in mental health treatment than SES. However, even when controlling for health and SES, men are on average still 8.0 percentage points less likely to receive mental health treatment than women are. This difference may be due to traditional gender roles perceiving men as being less emotional than women causing men to feel more stigma for seeking mental health treatment than women.

Among both gay/lesbians and bisexuals, differences in health characteristics appear to matter most in reducing the disparity. While SES appears to make a slight difference in reducing the disparity for gays/lesbians, it actually increases the disparity for bisexuals. Controlling for health and socioeconomic characteristics still leaves heterosexuals being on average 7.0 and 8.2 percentage points less likely to receive mental health treatment than gay/lesbians and bisexuals respectively. Part of the reason gays/lesbians and bisexuals may seek mental health treatment on average more than their heterosexual counterparts could be due to having less support from family due to their family stigmatizing their sexuality. There is also a historical context of identifying as gay/lesbian or bisexual being considered a mental illness. This historical bias could lead to gays/lesbians and bisexuals to feeling like they need mental health treatment more often than their heterosexual counterparts.

7 Limitations

One of the largest limitations in this analysis has been there is no known level of appropriate care, so it is unclear if any groups may be overusing mental health treatment. Creating a standard level of appropriate care would be difficult with mental health treatment as there are many different factors that matter in deciding if a person should receive mental health treatment besides the amount of mental distress they face. For instance, a person could face high levels of mental distress, but do not need mental health

treatment as they have the skills to cope with the distress. However, a person who does not have the skills to cope with their distress may need mental health treatment even if it is a lower level of distress.

Another issue that hindered the analysis was that there are small samples of intersectional groups, which would limit the accuracy of the disparity estimates. With less than 5% of the respondents identifying as gay/lesbian or bisexual, subdividing by race/ethnicity and/or sex would severely limit the accuracy of the estimates and there may not even be enough individuals in the sample to even get a proper estimate, assuming there are actual individuals with a certain combination of characteristics. Additionally, non-White respondents were more likely to refuse to answer the question about sexual orientation and sexual attraction than White respondents. The issue is not one of privacy as the question is asked on the computer, so only the respondent knows what they answered. Part of this could be due to a language barrier and the respondents not understanding what the question meant. There could also be a cultural reasoning and non-Whites may feel less inclined to identify as gay/lesbian or bisexual as they feel that does not represent their sexuality, but they know they are not heterosexual. concerns of refusal rates

8 Policy Implications

8.1 Changes to the NSDUH

The NSDUH should consider oversampling Asians, Pacific Islanders, and Native Americans/Alaskans to allow for a large enough sample to get an understanding of the disparity in mental health treatment from Whites as they are often overlooked. Many publications on racial/ethnic disparities often only look at White, Black, and Hispanic individuals as there is not a large enough sample of people of other races. Grouping them together to get a larger sample will help get an estimate of a disparity, but would not acknowledge the differences between Asians, Pacific Islanders, and Native Americans/Alaskans. Additionally, the NSDUH should also over-sample Black and Hispanic individuals, so there are enough respondents to get intersectional estimates of disparities. While the NSDUH aims to be nationally representative of the United States, oversampling non-White populations may be more representative as it capture a more accurate reflection of the differences in non-White individuals.

Additionally, the NSDUH should actively update the racial/ethnic groups, sex/gender, and sexual orientations with more options that better represent the United States population. For example, currently those who originate from the Middle East and North Africa (MENA) are classified as White, but people from MENA may prefer to have their own identity as they would not describe themselves as White and may not feel they are considered White by others. With regards to sexual orientation, there are many individuals who do not identify as heterosexual, but would not consider themselves as bisexual or gay/lesbian. Including options such as asexual and/or pansexual gives people to more accurately reflect how they feel about their sexual orientation. However, for the question regarding sexual orientation starting with the 2023 NSDUH, respondents now have the‘ option of writing in a different term to describe their sexual orientation. They are also providing the option of allowing the respondent to say they are unsure of their sexual orientation, or they do not understand what the question is asking. These options should help reduce refusal rates among non-White respondents. The 2023 NSDUH and future years will also ask two questions regarding sex and gender. The first question will

ask what sex the person was assigned at birth and what gender they currently identify as, with the option to choose multiple options of male, female, transgender, or write in another term to describe their identity as they see fit.

8.2 Future Research

When modeling disparities, researchers should consider taking an intersectional approach to acknowledge that the social identities of race/ethnicity, sex/gender, and sexual orientation all interact with each other. One recommended way to approach this is to standardize two of the social identities and compare among the third. For example, when looking at racial/ethnic disparities, a researcher may look at the effect of race/ethnicity for heterosexual males and also heterosexual females. Even standardizing one social identity to compare among the other may provide insight into the disparities. This would be something like looking at how mental health treatment use varies by race/ethnicity among females.

While the Urban Institute Report emphasizes the importance of having one definition of a disparity and sticking with it for the model you are using, I would argue that having different definitions of disparities can help find what the driving force behind the disparity is (Clemans-Cope et al., 2023). The analyses found that SES mattered a lot for Hispanic adults, but for Black adults discrimination was more of a factor in causing the disparity in mental health treatment from Whites. This is something that Olfson et al. does well in their research on disparities in outpatient mental health treatment along with looking at race/ethnicity and sex together. If the goal of the research is to recommend policies to reduce disparities, then having multiple models is key to doing so. However, if the goal of the paper is purely to measure the disparity in mental health treatment, then they should use the IOM method for racial/ethnic disparities as it acknowledges that SES is correlated with race/ethnicity in the United States, but does not allow differences in health to affect the disparity. One could argue that health is also correlated with SES and should not be controlled for, but those differences may already be captured in SES.

At this time, there is not sufficient enough research on disparities by sex/gender and sexual orientation to conclude what model may work best. Most research uses a simple or multivariate linear regression to measure the disparity, but those models may not be best. With sexual orientation, the disparities seem to be driven in large part by difference in health, so a model similar to the IOM that acknowledges sexual orientation is correlated with health status while controlling for SES may be the best approach. This type of model may also work for measuring disparities due to sex as sex is often considered a health variable. However, further research would be needed to test these models.

When measuring the overall disparity between groups, a modified AHRQ approach is best because it standardizes two of the social identifies to measure the third. Doing so provides a more intersectional approach by acknowledging that social identies should not vary by populations. For example, sex/gender and sexual orientation should not vary by race/ethnicity. Ultimately, the model a researcher uses should be how they want to define a disparity and be motivated by what their goals are for measuring this disparity while keeping their target audience in mind. For instance, if their target audience is policy makers who do not have a good understanding of models, then a simpler would be better for ease of understanding.

8.3 Diversity in Mental Health Treatment

Traditional mental health treatment methods tend to align more with western culture and struggles to acknowledge the impact of the discrimination marginalized individuals face affect their mental health. Individuals who have less traditionally western families, usually those who are non-White, may be less inclined to go to therapy if they know the skills learned in therapy are based around a traditional western family model. By increasing the diversity of people in mental health treatment jobs, people may be able to find a mental health professional that understand their perspective and culture. Increasing the diversity of mental health professionals may also allow for my diversity in how mental health treatment may be approached, which would benefit not just non-White individuals.

8.4 Alternatives to Traditional Mental Health Treatment

While increasing the diversity in the mental health treatment is important, it may still fail to recognize that the traditional mental health treatment model does not work for everyone and individuals may still face stigma for seeking it out. Creating alternatives involves also having a culture that acknowledges the importance of mental health. This could include allowing people to take time off work to deal with emotionally hard times, or relieving financial pressure people may face due to discrimination or struggling to pay bills. Additionally, it could mean removing the barriers to accessing mental health treatment such as lack of health insurance or income to afford treatment, no reliable public transport, or not having the physical ability to access mental health treatment available to them.

Alternatives also involve having important figures in one's life emphasize the importance of taking care of mental health. For example, men may look up their coach as a role model and someone to listen to, so coaches should have training to be able to help their teams (McKelley and Rochlen, 2007). Additionally, different cultures may have different ideas on a treatment that helps cure mental distress. This could be something like Native Americans who use peyote as a drug to help with mental distress, or having a sort of group therapy where people can recognize they have a community of people like them who can relate to what they are experiencing (Gone, 2008; Warner, 2003).

9 Conclusion

Looking at different model types to measure disparities can help determine what is causing the disparities and form appropriate policies towards reducing these disparities. Of course, regardless of model type, Whites, females, and sexual minorities continue to have a higher likelihood of receiving mental health treatment than their non-White, male, and heterosexual counterparts respectively. There are a variety of policies that could help reduce these disparities depending on if they are due to difference in SES, health, or just due to both current and past discrimination. Additionally, SAMHSA should work to make sure their survey reflects the diversity of the United States by constantly making sure their question options reflect the United States population, and ensuring there is a large enough sample for different sub groups of race/ethnicity, sex/gender, and sexual orientation.The analyses performed in this paper were done keeping in mind the social identities are constantly changing, and does best to make a start of looking at the diversity of disparities in the United States today.

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