The Independent Relationship Between Race and Long-Acting Reversible Contraception Usage

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Contraception methods are a staple in any comprehensive reproductive health service package. Not only do contraceptives prevent unwanted pregnancies, they are correlated with lessened health disparities among women[1]. Long-acting reversible contraceptive methods, or LARCs, provide effective contraception for long periods of time without requiring individual user maintenance. These LARCs, which include intrauterine devices (IUDs), injections, and subdermal implants, can be seen as the gold standard for contraceptive measures for these reasons.

Racial disparities have been well documented throughout the American healthcare system[2], and contraceptive usage within different racial communities follows a similar pattern[3]. Within this disparity in contraceptive usage, women of color, particularly Black and Hispanic women, are using LARCs less than white women[4]. The underlying issue within this disparity is its implication that Black and Hispanic women may not be receiving the same level of comprehensive reproductive health services. This indicates a significant reproductive health disparity between different racial groups of women because Black and Hispanic women are less subject to the same health benefits resulting from LARC use. These health benefits include

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[1]NCBI: Contraceptive Benefits and Risks https://www.ncbi.nlm.nih.gov/books/NBK235069/#:~:text=Oral%20contraceptives%2C%20for%20example%2C%20not,the%20risk%20of%20cardiovascular%20disease.

[2] NCBI: Understanding and Addressing Racial Disparities in Healthcare https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4194634/

[3] BIXBY Center (UCSF): Women of Color Need Improved Information and Access to Contraceptives https://bixbycenter.ucsf.edu/news/women-color-need-improved-information-and-access-effective-contraception

[4] NCBI: Racial and Ethnic Differences in LARC Use in the United States (2011-2015) https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5965256/

potentially more effective, longer-lasting and less maintenance-intensive contraception, dramatically reduced risks of unwanted pregnancies, and reduction of the health detriments associated with unwanted pregnancies (i.e. delayed access to prenatal care, mental health effects)[5].

Despite the well-recorded disparities in contraceptive usage between racial categories among women, we do not know if this is an independent relationship between solely racial backgrounds and using LARCs, or if there are other confounding social determinants that lead to Black and Hispanic women using less LARCs than white women. For example, women of color as a community statistically hold less wealth on average than white women[6], and studies have found a correlation between wealth and long-acting reversible and permanent contraceptive use[7]. Similarly, racial college achievement gaps have been persistent barriers to education for women of color[8], while education is also correlated with higher uses of LARCs[9]. The scope of potential factors contributing to the disparity in LARC usage is too broad to create an optimized solution. In other words, we cannot most effectively narrow this gap without first knowing if race itself correlates with LARC usage (implying the solution would revolve around mitigating racial stigma, differences, etc.) or if other factors, such as income or education, are more indicative of

[5] ASTHO: Long-Acting Reversible Contraceptives (LARC)
https://www.astho.org/LARC-Fact-Sheet/

[6] Center for Global Policy Solutions: The Wealth Gap for Women of Color
http://www.globalpolicysolutions.org/wp-content/uploads/2014/10/Wealth-Gap-for-Women-of-Color.pdf

[7] NCBI: Is Household Wealth Associated With the Use of Long-Acting Reversible and Permanent Contraceptives?
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4807748/

[8] Social Mobility Memos
https://www.brookings.edu/blog/social-mobility-memos/2017/12/04/black-women-are-earning-more-college-degrees-but-that-alone-wont-close-race-gaps/

[9] Science Direct: Contraceptive Method Use in the United States: Trends and Characteristics
https://www.brookings.edu/blog/social-mobility-memos/2017/12/04/black-women-are-earning-more-college-degrees-but-that-alone-wont-close-race-gaps/

LARC usage outcomes (implying the solution would best be addressed with greater income and education equity).

With the following research question as a framework for a secondary data analysis project:

> What is the independent relationship between race and long-acting reversible contraception usage among women in California ages 15-44, adjusted for age, coverage status, education levels, and income levels?

we can statistically determine if there is in fact an independent relationship between race/ethnicity and LARC usage, employing data derived from the 2017-2019 National Surveys of Family Growth (NSFG) as made available by the Center for Disease Control (CDC)[10]. Using a sample of women within the data ages 15-44, we will use logistic regression with Stata to examine relationships and interactions between race-ethnicity, income, and education categories for LARC usage. We will then compare solely race/ethnicity with LARC usage while adjusting for the remaining variables to determine if there is a significant independent relationship between the racial category of respondents and the probability of them using LARCs. In other words, we will test to see if an individual's race affects predictions about whether or not they use LARCs. Using Wald's Test, we will determine if race significantly alters our predictions of this condition. After such a relationship is determined or rejected, we can deliver the most accurate policy implementation or changes to address the issue. By adjusting for different identifying categories, as well as income and education, we can determine if these other social determinants are more

[10] CDC: NSFG 2017-2019 Public-Use Data Files
https://www.cdc.gov/nchs/nsfg/nsfg_2017_2019_puf.htm

effective at predicting whether or not an individual uses long-acting reversible contraceptives than race alone.

With new knowledge about the relationship between race/ethnicity and LARC usage, we can determine potential ways to address the problem of unequal LARC usage as an aspect of reproductive health disparities most effectively. This would allow us to make policy recommendations accordingly. Should we determine that race holds no significant independent effect on the prediction of an individual using LARCs, systems-level barriers on outside factors, such as education and income, are more indicative of the likelihood of women of color to use LARCs. This would mean that in order to specifically address the issue of health disparities in contraceptive use, we would need to address the systems-level issues that women of color face. Otherwise, if race is a significant predictor in whether or not an individual uses LARCs, we may need to examine means of directly working with women of color to assess racial disparities in reproductive health care, particularly by understanding their own reasons for not using LARCs. Ultimately, this research could illuminate potential solutions to the modern disparities in long-acting reversible contraceptive use, and as such, help to improve the equity of current reproductive health services for women of color, ensuring that their communities are not disproportionately left out of LARC health benefits.

Methods:

The public use data from the 2017-2019 National Surveys of Family Growth (NSFG) was utilized for this project. We chose to use their data instead of the data from similar studies for a few key reasons. Firstly, the NSFG is a branch of the CDC, a very reputable health organization, and as such is subject to high standards of peer-reviewing. The data examined also had an

incredibly large sample size (roughly 6,000 participants within the data selected), meaning the data potentially has effective resistance to respondent outliers. With the data coming from a governmentally funded organization, it is continuously updated in increments of two years, so if significant findings are found within this research, further research can later examine the effect of race on LARC usage over time. Finally, as public use data, it is accessible and the findings described later can be replicated easily to maintain accountability and transparency with these results.

The NSFG has two separate sets of data available from the surveys given to female respondents: one based on responses to questions about pregnancy and the other being general survey response data. While both datasets have information about respondent LARC usage, the general response data was not confined to LARC usage within certain time constraints, like use of LARCs between pregnancy. Therefore, we opted to use the general response data for the purposes of this project. After downloading the 2017_2019_FemRespData.dat file and the Stata code that NSFG provides to decipher the .dat file, we examined their descriptions and options for the parameters of interest; race, age, coverage status, education, and income.

We had to manipulate the original race categories to include the relevant communities, particularly hispanic respondents, as a subcategory of race in our regression. The survey provided three options within its data to describe race: black, white, and other. To find out if people were hispanic, the survey also provided a question about whether or not respondents were hispanic. Therefore, to combine these two fields and differentiate non-white hispanic people, the racial categories for this project consist of non-hispanic black, non-hispanic white, and non-white hispanic respondents, as well as other non-white racial groups that are not described by these identifiers such as indigenous people, under the category “other”. In total, there were 1,710

non-white hispanic respondents, 2,513 non-hispanic white respondents, 1,451 non-hispanic white respondents, and 467 respondents who identified with the non-white other category. These will be the formal categories we use for describing race as a parameter of interest for our regression. Our variable for LARC usage was described based on whether or not they had used any form of long-acting reversible contraception with "yes" or "no". Their answers produced the variable that we used as the dependent variable for the logistic regressions.

For the purposes of this project, we examined coverage and age simply. Coverage status was purely whether or not they had healthcare coverage. The age of respondents ranged from 15-44 years old, taken at the time of their survey response. Education was coded through the number of years respondents had been through education at the time of the survey, ranging from 9 years to 19 years. Income was described as a range of values from "below $96/week or $417/month" to "$1,923 or more/week or $8,333+/monthly." All of these parameters were seen as potentially confounding variables, and thus were included in the final logistic regression.

A total of four logistic regressions were performed with the data, each with larcs as the dependent variable, using variations between the parameters above to assess their impact on the significance of the independent relationship between race and LARC usage, as well as a baseline logistic regression examining the relationship between them without adjustments for any of the other parameters.

Results:

The first linear regression was performed as a baseline to examine the relationship between race and LARC usage without adjusting for the other potentially confounding variables (figure 1). Within the regression, we used the probability of the non-hispanic white females using LARCs as the control, meaning this odds ratio for other racial groups would be compared to this.

The odds ratio of the non-hispanic white group is therefore 1.00 and not pictured within the figure. With this baseline regression, race had a significant impact on the probability of the non-hispanic black group, non-white hispanic group, and other non-white racial categories. Notably, the most significant relationship was between other non-white racial categories, followed by the non-hispanic black group and then the non-white hispanic group. This agrees with previous work and affirms evidence that all non-white racial groups have some form of disparity in using LARCs.

Baseline Relationship Between Race and Probability of Using LARCs

```
Logistic regression                             Number of obs     =      6,141
                                                LR chi2(3)        =      27.22
                                                Prob > chi2       =     0.0000
Log likelihood = -2992.7844                     Pseudo R2         =     0.0045

------------------------------------------------------------------------------
       larc | Odds Ratio   Std. Err.      z    P>|z|     [95% Conf. Interval]
------------+-----------------------------------------------------------------
    rscrrace |
 Other race  |   .4288268   .0863337    -4.21   0.000     .2890104     .636283
Black or Af  |   .7839594   .0668604    -2.85   0.004     .6632823    .9265925
    Hispanic |   .8376377   .0656241    -2.26   0.024     .7184051     .976659
             |
       _cons |   .2705061   .0122453   -28.88   0.000     .2475397    .2956034
------------------------------------------------------------------------------
Note: _cons estimates baseline odds.
```

Figure 1: Logistic regression with LARC use as a dependent variable and race as the only parameter. A significance level of 0.05 was used. Non-hispanic white respondents were used as the control probability.

While this does tell us some information about the ways race and LARC use interact with each other, it does not describe potential reasons for why we find this significant relationship. Similarly, without accounting for the other confounding variables, we have no way of knowing whether or not this is an independent relationship.

When adjusted purely for whether or not respondents had coverage, we find the significance of these relationships was held for only two of the three different groups. This suggests LARC usage within the non-white hispanic group may be influenced more heavily by their coverage status than race itself. Further, it appeared having coverage was a significant determinant of whether or not someone was using LARCs. Therefore, there may not be an independent relationship between having a non-white Hispanic racial category and not using LARCs, it could be due to underlying factors tangential to or co-constructed by race.

Relationship Between LARC Use and Race, Adjusted for Coverage

```
Logistic regression                             Number of obs     =      6,141
                                                LR chi2(4)        =      33.27
                                                Prob > chi2       =     0.0000
Log likelihood = -2989.7572                     Pseudo R2         =     0.0055

------------------------------------------------------------------------------
                larc | Odds Ratio   Std. Err.      z    P>|z|     [95% Conf. Interval]
---------------------+--------------------------------------------------------------
             rscrrace |
  Other race groups  |   .4263771   .0858603    -4.23   0.000     .2873333    .6327057
Black or African Amer..  |   .7881766   .0672647    -2.79   0.005     .6667763    .9316802
            Hispanic  |   .8695837   .0693486    -1.75   0.080      .743753    1.016703
                      |
             covered  |   1.278277    .130003     2.41   0.016     1.047264    1.560248
               _cons  |   .2161074   .0224697   -14.73   0.000     .1762651    .2649557
------------------------------------------------------------------------------
Note: _cons estimates baseline odds.
```

Figure 2: Logistic regression between LARC use and race, with coverage status as a parameter of interest. Set at a significance level of 0.05. While the significance of the relationship between LARC use in non-white hispanic group is still pertinent at a significance level of 0.1, it is therefore not significant with our metric. Non-hispanic white respondents were used for baseline probability.

In other words, non-white hispanic females may be less likely to have coverage, and therefore less of a probability of using LARCs. This pattern is not prevalent for non-hispanic black people in the study nor other non-white racial groups.

However, this still is not the full picture. The relationship between coverage and LARC use is also subject to confounding, specifically from another parameter of interest: income. When examined individually with race and LARC use, income has a massive impact on the significance of their independent relationship. With that lens, both the non-hispanic black and non-white hispanic groups had no significant relationship with LARC use. The relationship becomes nearly negligible within the non-white hispanic group. Therefore, it seems clear that income is more telling about the probability of an individual using LARCs than coverage or race within these groups. For other non-white racial groups, on the contrary, it seemed race still played an incredibly significant role in the likelihood of someone using LARCs. With the baseline odds ratio from non-hispanic white respondents being 1.00, other non-white race groups saw a substantial decline in the probability of them having used LARCs, at rougly 37% of the baseline odds. Having adjusted for both income and coverage status, the significance of this trend did not change. This suggests a strong independent relationship between the racial identity of respondents within the study and their likelihood of having used LARCs.

This significant relationship continues to be statistically upheld when we adjust the relationship for all of our parameters of interest at once. Age, income, education, and coverage status cannot collectively describe the disparity between LARC use and the racial identity of respondents within the other non-white racial categories.

LARCs and Race, Adjusted for Income

```
Logistic regression                             Number of obs     =      5,299
                                                LR chi2(4)        =      48.27
                                                Prob > chi2       =     0.0000
Log likelihood = -2698.2728                     Pseudo R2         =     0.0089

------------------------------------------------------------------------------
       larc | Odds Ratio   Std. Err.      z    P>|z|     [95% Conf. Interval]
------------+-----------------------------------------------------------------
    rscrrace |
 Other race..|   .3748446   .0827276    -4.45   0.000     .2432161    .5777104
Black or Af..|   .8652209   .0771312    -1.62   0.104     .7265166    1.030406
    Hispanic |   .9456046   .0792264    -0.67   0.504     .8024032    1.114363
             |
        earn |   1.040272   .0086206     4.76   0.000     1.023513    1.057306
       _cons |   .2120683   .0176913   -18.59   0.000     .1800803    .2497383
------------------------------------------------------------------------------
Note: _cons estimates baseline odds.
```

Figure 3: Logistic regression with LARC usage as the dependent variable and race as independent. Earnings (income) were used as the parameter of interest, at a significance of 0.05.

According to Figure 4, the most significant contributors to the disparity between LARC use and the non-hispanic black and non-white hispanic groups were age and income. When adjusted for income, coverage status no longer had such a stark impact on this relationship. While this relationship between coverage and LARC use is not negligible, and would be significant at a slightly higher significance level, it pales in comparison to the impact of income on the likelihood of using LARCs. Education, when adjusted for the other parameters, did not effectively impact this probability, meaning education levels do not accurately represent the racial disparity that we see with LARC usage.

Ultimately, this suggests racial disparities in LARC usage among non-hispanic black and non-white hispanic communities may be more representative of racial disparities in income that lead to a difference in LARC use. In other words, while there was clearly a racial disparity without accounting for other socioeconomic factors, there is not evidence to suggest this

relationship is independent among these communities. However, the same cannot be said for other non-white racial groups, where even all of these factors combined could not change the significant independent relationship between LARC use and respondents' racial identities.

Combined Independent Relationship Between LARC Use and Race

Logistic regression — Number of obs = 5,299; LR chi2(7) = 70.76; Prob > chi2 = 0.0000; Log likelihood = -2687.029; Pseudo R2 = 0.0130

larc	Odds Ratio	Std. Err.	z	P>|z|	[95% Conf.	Interval]
rscrrace						
Other race groups	.3702275	.0819235	-4.49	0.000	.2399473	.571244
Black or African Amer..	.8599946	.0771091	-1.68	0.093	.7213982	1.025219
Hispanic	.9733393	.0835879	-0.31	0.753	.8225555	1.151763
currcov	.9567322	.0256297	-1.65	0.099	.9077948	1.008308
AGE_R	.9826117	.0039927	-4.32	0.000	.9748171	.9904686
educat	1.008347	.0147529	0.57	0.570	.9798426	1.037681
earn	1.050302	.010361	4.98	0.000	1.03019	1.070807
_cons	.327446	.0715123	-5.11	0.000	.2134234	.5023856

Note: _cons estimates baseline odds.

Figure 4: Logistic regression with LARC use as dependent variable. The non-hispanic white group was used as control probability. Taken at a significance level of 0.05.

Discussion and Policy Implications:

Our findings suggest that there is not a significant independent relationship between race and LARC use for non-hispanic black groups or non-white hispanic groups when compared to non-hispanic white groups, but this relationship does hold up for other non-white racial groups. This is consistent with the findings of other publishings, although the addition of the independent relationship between other non-white racial identities (that are not black or hispanic) and LARC use has seemingly not been widely researched[11]. Further, it suggests income holds the most

[11] Science Direct: Racial/Ethnic Disparities in Contraceptive Use: Variation by Age and Experience https://www.sciencedirect.com/science/article/pii/S0002937814000969?casa_token=WnQXTW1m9YkAAAAA:tv5xIysUjvJ7IsK3RyNPo7Ipc1Sf0dSeX9IW9CGkkVk6AnKBmCt4THriL4R-Tk8A2TcR990sXA

weight in the probability of an individual from these racial categories having used any long-acting reversible contraception. This implies a few key notions: (1) there is a difference in economic standing between race groups, (2) this difference and socioeconomic barriers play a substantial role in the disparity of LARC use within these groups, and (3) addressing the disparity with LARC use in non-hispanic black and non-white hispanic communities may be most effective by addressing the income disparity. This could mean several policy changes could have lasting impact on shrinking these disparities in LARC use for non-hispanic black and hispanic communities, namely decreasing the costs of getting long-acting reversible contraception, and actively tackling income and wealth inequality in the United States. The cost of getting long-acting reversible contraception has a large range, which may be a deterrent for low-income women from getting them. For example, the cost of installing an IUD can be anywhere from free to $1,300[12]. That said, many health insurance plans make these installations much less expensive, and some providers do not cover them[13]. Standardizing the coverage of these effective contraception methods would lower their cost for consumers and could potentially help address the racial disparity.

With the independent relationship between LARCs and the racial identity other non-white racial groups still being significant after accounting for the same parameters as the other groups, there may be specifically racially motivated causes for this disparity. Further research needs to be done regarding this overarching racial category, not only to ensure autonomy for the different

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[12] Planned Parenthood: https://www.plannedparenthood.org/learn/birth-control/iud/how-can-i-get-an-iud#:~:text=Getting%20an%20IUD%20costs%20anywhere,on%20which%20kind%20you%20get.

[13] KHN: https://khn.org/news/contraceptives-birth-control-surprise-bills-women-shouldnt-get-a-bill-for-an-iud-but-sometimes-they-do/

demographics within the “other” category, such that we can explore potential reasons why this relationship exists. This independent relationship does not necessarily mean that discriminatory practices within reproductive health care services are causing people to not use long-acting reversible contraceptives, but it does not eliminate the possibility that these racial groups are responding to such experiences of discrimination.

While these findings are robust in the reputability and replicability of the data, there is room for improvement to further describe these relationships. To strengthen the findings of this work, it would be beneficial to find further individuals who fall outside of the three racial groups (effectively white, black and hispanic), as this group is notably smaller than the other demographics in the study, likely due to population demographic differences. Further, this data describes that this independent relationship exists, but does not highlight a causal relationship. To truly understand why this discrepancy occurs, the experiences of individuals from the other non-white racial identity category need to be highlighted and discussed from their perspective.

Ultimately, while further research and understanding is necessary to address the disparity in LARC use for women who do not identify as white, black, or hispanic, it is clear that addressing this disparity in the black and hispanic communities is a matter of addressing economic barriers, such as income and LARC costs. In conclusion, our findings contribute further information about the disparities in reproductive health services on the basis of race, identifying other confounding variables that influence the probability of women of different racial categories having LARCs. It remains imperative that health policies and social programs help eliminate these barriers to women of color at a local level, and that broader legislation is necessary to mitigate the long-felt socioeconomic disparities communities of color face, to shorten the racial disparity in reproductive health.