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SOCIAL NETWORKS AND SOCIAL WELFARE  
DISPARITIES AMONG SEXUAL MINORITIES

By

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MAY 2020

SOCIAL NETWORKS AND SOCIAL WELFARE  
DISPARITIES AMONG SEXUAL MINORITIES

Abstract

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May 2020

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Currently there is a deficit in economics literature on the labor market outcomes of sexual minorities. Previous studies have provided evidence that homosexual and bisexual individuals endure worse mental and physical health, and, lesbian women excluded, face wage penalties associated with their identity. There are numerous studies on the association between social capital and quality of health, as well as showing correlation between health and economic status. This thesis attempts to build evidence of a linkage between the social capital, health, and labor market outcomes of sexual minorities. The results of this paper imply that excluding social capital measures from a model will lead to overestimates on the economic effects of identifying as a sexual minority.

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# 1. Introduction

Investigating social welfare disparities among sexual minorities is still a relatively new and underdeveloped research area for economists. Since the first paper exploring the wages of sexual minorities was published in 1995, it has been well documented that homosexual men generally face a wage penalty while homosexual women generally receive a wage bonus comparative to their heterosexual counterparts. Labor market outcomes for bisexual men and women are recorded less frequently, but when studied, it is generally understood that bisexual men face a wage penalty that is more severe than that faced by homosexual men, and bisexual women either face a small penalty, or their labor market outcomes are insignificantly different than heterosexual women's. When looking at health outcomes, it is apparent that bisexual men and women consistently have worse health outcomes than both their homosexual and heterosexual counterparts, especially in the context of mental health. The underlying causes of these disparities are currently unclear, and is what this current research attempts to explore.

## 2. Literature Review

### 2.1 Discrimination

The seminal paper investigating the relationship between sexual orientation and income was M.V. Lee Badgett's "The Wage Effects of Sexual Orientation Discrimination," published in 1995. This pioneering econometric study used data from the General Social Survey from years 1989-1991 to examine economic differences by sexual orientation. After taking into consideration differences in occupation, education, and several other measures of skill and demographic information, her results showed that sexual minority men are expected to earn between 11% to 27% less than their heterosexual counterparts (Badgett, 1995). Also, sexual minority women were expected to earn less than their heterosexual counterparts, albeit, this difference was not statistically significant. Although revolutionary, this work was far from perfect. Badgett only considered discrimination as a source of economic inequality, yet was unable to know if individuals' sexual identities were disclosed to their employer, which is a necessary condition for discrimination. Furthermore, she pooled together the homosexual and bisexual respondents, separating them only by gender, which could have potentially biased the results. If bisexuals earn less than homosexuals, this could have pulled average earnings down and overstated the penalty homosexuals face. In fact, results from Aksoy, Carpenter, and Frank's paper "Sexual Orientation and Earnings: New Evidence from the United Kingdom," supports this.

Using nationally representative data from the 2012-2014 U.K. Integrated Household Sur-

vey and Annual Population Survey, they were able to determine that compared to heterosexual men, homosexual men face a wage penalty, and bisexual men face an even steeper penalty. Compared to heterosexual women, homosexual women face a wage bonus, and bisexual women face a small wage penalty. Even more interesting about these results, is that this gay male wage penalty and lesbian wage bonus is almost entirely driven by partnered individuals. This implies that single homosexuals have labor market outcomes very close to their heterosexual counterparts, and differences only arise once they enter a domestic partnership. Furthermore, within these domestic partnerships, the gay male penalty is received almost entirely by the partner who does not identify as the head-of-household. The partnered homosexual men who are listed as the head-of-household in fact make significantly more than the non head-of-household partner. There is also evidence, though statistically insignificant, that lesbian head-of-household partners receive most of the lesbian wage bonus, and the non-head-of-household lesbian partners earn less (Aksoy, Caprener, Frank 2017). This lends credence to the Becker Household Specialization model.

## 2.2 Household Specialization

According to Becker, a household can best maximize its utility not by all members equally participating in the labor market and household activities, but rather having individuals *specialize*. So, in a two person household, it would be optimal for one to complete all domestic tasks, and one participate in the labor force. Because of the gender wage gap, it would be the rational decision for a woman in a heterosexual couple to focus more on domestic work and a man in a heterosexual couple to focus more on earning a wage (Heckman, 2014). Thus, on average, homosexual women will be more focused on labor market activities than heterosexual women, and homosexual men will be less focused on labor market activities than heterosexual men.



## 2.3 Bisexual Differences

This household specialization would aptly explain the observed differences in homosexual wages, but it doesn't quite make sense with bisexuals. One would expect that because bisexuals are more likely to be in a same sex couple than heterosexuals, and less likely than homosexuals, their focus on labor market activities, and thus their wages, would fall between their homosexual and heterosexual counterparts. However, that is not the observed trend. They find that the bisexual male wage penalty is greater than the homosexual male wage penalty, and it is faced by both partnered and unpartnered bisexual men equally. Furthermore, partnered bisexual women did not show significant differences in wage from heterosexual women, but unpartnered bisexual women did show a significant wage penalty (Aksoy, Carpenter, Frank, 2017).

Carpenter's work on sexual minorities and inequality continues in his 2005 paper "Self Reported Sexual Orientation and Earnings: Evidence from California." The data used in this paper comes from the 2001 California Health Interview Survey. After controlling for the marriage premium he finds little evidence that gay men or lesbian women are paid differently than their heterosexual counterparts at all (Carpenter 2005). Again this reinforces the Becker household theory, except for the fact that the theory would predict that men who expect to partner with men under invest in human capital, and gay men are more likely than heterosexual men to have a college education. Furthermore, bisexuals do not fit into the theory in this study either. There is marginal evidence that bisexual men and women both earn less than their heterosexual and homosexual counterparts. This is consistent with evidence from another healthcare source, the National Health Interview Survey (NHIS).

The NHIS is one of the major data collection programs of the National Center for Health Statistics (NCHS), which is part of the Centers for Disease Control and Prevention (CDC). In the Fall of 2019 I had used the NHIS from years 2013-2018 to explore income inequality among sexual minorities. The NHIS asks respondents directly about sexual identity, eliminating

the necessity to link people to sexual orientations via behavior or partnerships, which would leave out bisexuals and unpartnered sexual minorities. The survey is primarily used as an instrument for gauging health and wellbeing status, so it offers a rich set of variables on respondents' mental and physical health, as well as their socioeconomic status (including level of education and income) and core demographics (including age, sex and race). Of the surveyed individuals in the NHIS, 1.7% self identify as homosexual (either gay or lesbian) and 0.9% identify as bisexual. Among these groups, heterosexuals are most likely to be employed and earn the highest incomes, followed by homosexuals, and finally, bisexuals. Homosexuals and bisexuals are more likely to have higher levels of education than their heterosexual peers. After running an ordinary least squares regression, I saw a statistically significant negative effect on both employment status and income level for bisexuals. Results from this regression are reported in Table 1, available in the Appendix.

The NHIS also underscored another important theme in research on sexual minorities: they have significantly worse health outcomes than heterosexuals. Dr. Francisco Perales, an Australian researcher at the University of Queensland, uses a nationally representative health survey in his paper "The health and wellbeing of Australian lesbian, gay, and bisexual people: a systematic assessment using a longitudinal national sample." He finds that homosexual individuals report significantly worse results in 11 out of 20 categories used to measure mental and physical health than their heterosexual counterparts. Bisexuals reported significantly worse outcomes than heterosexuals in 18 out of 20 categories. In 16 categories, bisexuals fared significantly worse than homosexuals. The biggest disparities faced by bisexuals are in emotional health, mental health, and social functioning. This ties in with another paper by Carpenter, "Sexual Orientation and Outcomes in College," in which he finds that bisexual individuals have the fewest amount of close friends, and are less likely to have an advisor in the faculty of administration they feel they can ask for help, when compared to gay,lesbian and heterosexual individuals (Perales 2018). This would appear to suggest that social networks, mental and physical health, and income are all inherently tied together in

this story of the unique adversity faced by bisexuals.

## 2.4 Social Capital Theory

It is clear that there is a pervasive pattern throughout the literature that shows bisexual individuals are struggling to keep up with their heterosexual and homosexual counterparts. What makes bisexual individuals different than homosexuals? Neither discrimination nor household specialization seem to be able to explain it. Another economic theory that has implications on both the economic and health outcome disparities of sexual minorities is the Social Capital Theory (SCT), developed by economists such as Robert Putnam and Pierre Bourdieu. Putnam purports that social capital is essentially the value that social connections have for individuals and societies. He asserts two kinds of social capital and two kinds of social ties: bonding and bridging. Bonding refers to the intensity of within-group connections, and bridging refers to how well connected individuals are to members outside of their group. Horizontal ties are relationships between peers, such as friends and community members, whereas vertical ties are relationships that have a power dynamic, such as a community member and a community leader. Bourdieu's work focuses more on how social capital can be used to maintain power. He shows how social capital is related to various other forms of capital, such as cultural, human, and economic, and how these can exaggerate already existing inequalities ( Willis et al., 2016). There have been studies examining health and well-being outcomes in lesbian, gay, and bisexual individuals under the framework of SCT ( Fredriksen-Goldsen et al., 2013; Erosheva et al., 2016 ), as well as in non-sexual minorities.

Previous literature documents that individuals in extensive and well connected social networks experience better well-being and mental and physical health outcomes than those who are isolated, with limited social connections. Fredriksen-Goldsen et al. found that among older lesbian, gay, and bisexual adults as social network size increases, the likelihood

of poor general health, disability, and depression decrease. Similarly, Erosheva et al. find that smaller network sizes are associated with being below the federal poverty level. Erosheva also examined network diversity as a tool to measure the bridging component of social capital. While this is an imperfect measure, their results are still telling of an interesting and potentially very relevant story. They find that having a female identity is strongly associated with having a more diverse social network, which they argue signifies more connections outside of one's own group. This could potentially help explain the lesbian wage advantage, and why bisexual women fare better than bisexual men. If women are better connected to outsiders, then they could use their connections and their female partners' connections to find work, and may have an easier time obtaining a high paying job than other women. However, bisexual individuals' wages are not perfectly explained. Although the authors draw no conclusions on this fact, they do find that of bisexual individuals surveyed, they find that only 52% indicated social ties to other bisexual individuals. This could lead to feelings of isolation and otherness, decreasing their bonding social capital, and thus leaving bisexuals as more vulnerable to worse social welfare outcomes. Because women are better connected, bisexual women may feel less isolated than bisexual men do.

SCT framework has also been used to examine economic growth, crime, and education outcomes. However, to my knowledge no studies presently use Social Capital Theory to explain economic disparities among sexual minorities. Thus, this paper attempts to be the first to do so. Using a rich dataset with social network variables as well as multiple measures of sexual orientation, my work builds onto the existing literature by exploring this potential connection, and serves as a call to action for future researchers to utilize Social Capital Theory when investigating sexual minorities' social welfare disparities.

## 3. Data

The National Longitudinal Study of Adolescent to Adult Health (Add Health) is the largest and most comprehensive longitudinal study of a nationally representative sample of adolescents ever undertaken. Beginning with an in-school survey administered in 1994, data was collected from students in grades 7-12 as well as their romantic partners, friends, parents, siblings, and school administrators. The study was designed in a series of five waves. Wave I took place in 1994 and included the initial school-based survey as well as in-home interviews. About 90,000 students completed the in-school survey, and a subset of about 20,000 completed the in-home interview. Subsequent waves follow up with the initial participants in a series of in-home interviews throughout the following decades. Wave V has data from as recent as 2018, although not publicly available.

The primary appeal of using Add Health is the wide range of data on the individual level, including multiple different measures of sexual orientation, mental health patterns, and information on friendship and social connections. In Wave I, respondents were asked to nominate up to 5 of their closest female friends and 5 of their closest male friends<sup>1</sup>. From the in-school data and friendship nominations, the researchers at the University of North Carolina Chapel Hill were able to construct several network variables that are of particular interest to this study. These variables allow us to understand the scope of individuals' social ties, giving us measures of how many friends they nominated, how many times they were

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<sup>1</sup>Add Health recommends that analyses that involve pairs of respondents, e.g. friends, to compute the joint inclusion probability of each pair, and use the inverse as regression weight. Regressions reported in this paper all use single-level Wave IV weights.

nominated themselves, the reach of their friend group, and the centrality in their social connections. These are integral in considering the effects social capital can have on the mental health and economic outcomes of sexual minorities.

Before describing these variables it is necessary to define two terms in the context of the network data: *ego*, and *alter*. Ego refers to the respondent, so the student who completed the survey in school in 1994. Alter refers to students in the same school, or school district as the ego, who is eligible to be nominated by the ego. The network variables used in this study are *in-degree*, *out-degree*, *Bonacich centrality*, *reach*, and *influence domain*. In-degree is defined as the number of times the ego is nominated by other students in their school district, and conversely, out-degree is defined as the number of people in the school district the ego nominates. Bonacich centrality is a measure of the ego's centrality in social networks. A very basic understanding of centrality can be gathered from graph theory; the most important vertices within a graph are those with the most connections to other points. Analogously, centrality measures social importance, or popularity. Bonacich centrality is weighted by the centrality of those with whom the ego sends ties. The mathematical definition is provided as:  $BCENT(\alpha, \beta)_i = \alpha(I - \beta X)^{-1} X 1$  where  $\alpha$  is a scaling vector,  $\beta$  is the weight,  $I$  is the identity matrix,  $X$  is the total friendship network, and 1 represents a column of ones. Reach is intuitively the number of alters an ego can reach in the total friendship network, and conversely, influence domain is the number of alters who can reach the ego.

In Waves III and IV, the in-home interviews ask a variety of in-depth questions about the individuals' mental and physical health, including their sexual history. Also in these waves the survey includes a direct question asking the respondent to self identify as one of the following sexual orientations: heterosexual, homosexual, bisexual, or other. The exact question from the survey is "Please choose the description that best fits how you think about yourself" with the following options: "(1) 100% heterosexual (straight), (2) mostly heterosexual (straight), but somewhat attracted to people of your own sex, (3) bisexual that is, attracted to men and women equally, (4) mostly homosexual (gay), but somewhat

attracted to people of the opposite sex, (5) 100% homosexual (gay), (6) not sexually attracted to either males or females” (Harris, 2009). Only 0.5% of all respondents reported no sexual attraction, and were excluded from my analysis as it is beyond the scope of this thesis to include individuals who do not identify as either heterosexual, homosexual, or bisexual. Sabia (2014), who also used Add Health in his analysis, coded bisexuals as anyone identifying with categories 2, 3, or 4. However, I take issue with this classification strategy, as I believe it would over count the amount of bisexuals. Sabia correctly criticized Add Health’s survey question explicitly conflates sexual attraction to sexual orientation, and using this definition of bisexuality leads 19% of females and 4.8% of males to be identified as bisexual. This is way above averages in other datasets, such as the General Social Survey (GSS). The 2008 GSS found 0.7% of males and 2.8% of females identified as bisexual. I code heterosexual to be in categories 1 or 2, bisexual to be category 3 only, and homosexual to be in categories 4 or 5.

My sample size is 2,392, a small subset of all respondents. Publicly available data exists only on 3,080 individuals who completed the friendship nominations in the in-school survey in Wave I as well as both in-home surveys in Waves III-IV. The remaining difference comes from missing or incomplete data on income, employment, sexual orientation, and/or background characteristics.

## 4. Empirical Strategy

I begin with an approach closely mirroring that of Sabia (2014), Carpenter (2005, 2008, 2009) and Badgett (1995), using OLS regressions to estimate coefficients of the equations:

$$\log(wage_i) = \alpha + \beta_1(Gay_i) + \beta_2(Bi_i) + \beta_3\mathbf{X}_i + \epsilon_i \quad (4.1)$$

and

$$employed_i = \alpha + \beta_1(Gay_i) + \beta_2(Bi_i) + \beta_3\mathbf{X}_i + \epsilon_i \quad (4.2)$$

where  $\mathbf{X}_i$  is a vector of individual characteristics. Initially, this vector included age and age squared, and then was augmented with the respondent's highest level of education, and whether they are currently in school, or planning to return to school. There is a possibility that adolescent family background could influence the decision of an individual to identify as a sexual minority as well as their earnings in adulthood (Carpenter 2005). Thus, to reduce omitted variable bias, family level characteristics were added as well, including family size, parent's education, and parent's income. It is important to note that Add Health only has data available for the parent who completed the in-home survey designed for parents, which was usually the student's mother.

Also, mental health, religiosity, risky behaviors and appearance characteristics were added to the vector of characteristics. There is evidence that appearance and body weight (French et. al. 1996; Cawley 2004; Sabia and Reese 2012) are linked to sexual orientation and



earnings. Furthermore, links between sexual orientation and income have been found in religiosity (Ahnrold et. al. 2011), psychological wellbeing (Lippa 2008; mueller and Plug 2006), and risky behaviors (Hamilton and Hamilton 1997; Stall et. al. 1999). Appearance variables include the respondent’s height and weight, physical health on a 1-5 scale, and respondent’s physical attractiveness on a 1-5 scale. Both of these questions were asked Waves I-IV. Religiosity is also measured on a 1-5 scale from a question asked during all waves. Risky behaviors measured include the number of cigarettes smoked in the last 30 days, the amount of alcohol consumed in the last 12 months, and the amount of marijuana used in the last 12 months. Mental health characteristics included are controls for depression and anxiety disorders.

After the initial four regressions, I appended the model to include a vector of social network variables. The new equations became

$$\log(wage_i) = \alpha + \beta_1(Gay_i) + \beta_2(Bi_i) + \beta_3\mathbf{X}_i + \beta_4\mathbf{S}_i + \epsilon_i \quad (4.3)$$

$$employed_i = \alpha + \beta_1(Gay_i) + \beta_2(Bi_i) + \beta_3\mathbf{X}_i + \beta_4\mathbf{S}_i + \epsilon_i \quad (4.4)$$

where  $\mathbf{S}_i$  include’s the respondent’s in-degree, out-degree, centrality, reach, and influence domain.

The first outcome variable, wage, comes from Wave IV of Add Health. Income data also exists from Wave III; however, because of the sample population’s young age, it is more useful to look at trends in later wages. Following the work of Sabia (2014), I constructed the wage variable using two questions from the Wave IV in home interview, “In [the current year], how much income did you receive from personal earnings before taxes, that is, wages or salaries, including tips, bonuses, and overtime pay, and income from self-employment?” and “How many hours a week do you usually work at [your current] job?” (Harris 2009). I divided reported income by the average number of hours worked per week multiplied by

50. Add Health does not ask how many weeks an individual works per year, so 50 is a rough estimate applied to all respondents, following Sabia's example. The second outcome variable, employed, was also modeled after Sabia's work and is derived from Wave IV of Add Health. Employment is a binary variable equal to 1 if the respondent indicated that they are working for pay at least 10 hours per week, and 0 otherwise. Thus, the second equation gives us the probability of employment. Because both outcome variables are measured from one wave of the data, all observations are weighted by the public-use grand sample weight for Wave IV from Add Health.

# 5. Results

## 5.1 Earnings

Table 5.1 shows the results from my OLS regressions following Equation 4.1, which estimates the relationship between wages and sexual orientation. Findings for women are listed in Panel A. Column 1 lists the raw correlation between sexual orientation and wage, with no controls. Relative to heterosexual women, identifying as homosexual is associated insignificantly with a 1% higher hourly wage ( $e^{0.01} - 1 \approx 0.010$ ), while identifying as bisexual is associated with a 13% lower hourly wage ( $e^{-0.139} - 1 \approx -0.129$ ) which is statistically significant at the 1% level. In column 2 controls for age are added, with minimal affect, though significance on the bisexual coefficient decreases. In column (3) education controls are added and we witness a large decrease in the bisexual penalty, earning 7.4% less per hour than heterosexual women ( $e^{-0.077} - 1 \approx -0.074$ ), and an increase in the lesbian wage bonus, earning 4.7% higher hourly wages ( $e^{0.046} - 1 \approx 0.047$ ) though estimates are statistically insignificant. When family and demographic controls were added to  $\mathbf{X}_i$  in equation 4.1, (column 4), the estimated wage effects for bisexual women does not change, but the lesbian wage bonus increases, earning 6.7% higher hourly wages ( $e^{-0.065} - 1 \approx -0.067$ ) than heterosexual women. Finally, column 5 reports the results from adding controls for appearance, religiosity, and risky behaviors to the regression model. The lesbian wage bonus is not affected, but the bisexual wage penalty decreases to a 3.8% lower hourly wage ( $e^{-0.039} - 1 \approx -0.038$ ) than heterosexual women, although remaining statistically insignificant.

**Table 5.1** Sexual Orientation and Log Wages

PANEL A: WOMEN					
	(1) sexual orientation	(2) + age	(3) + education controls	(4) +family demo- graphics	(5) + appear- ance and risky behaviors
Homosexual	0.01 (0.056)	0.014 (0.056)	0.046 (0.053)	0.065 (0.07)	0.066 (0.07)
Bisexual	-0.139*** (0.054)	-0.131** (0.053)	-0.077 (0.051)	-0.077 (0.057)	-0.039 (0.057)
$R^2$	0.004	0.01	0.121	0.111	0.142
$adj.R^2$	0.003	0.008	0.118	0.107	0.132
$N$	1507	1507	1505	1150	1150
PANEL B: MEN					
	(1) sexual orientation	(2) + age	(3) + education controls	(4) +family demo- graphics	(5) + appear- ance and risky behaviors
Homosexual	-0.061 (0.057)	-0.059 (0.057)	-0.098* (0.056)	-0.113* (0.067)	-0.137** (0.066)
Bisexual	-0.1 (0.093)	-0.097 (0.093)	-0.077 (0.091)	-0.094 (0.101)	-0.052 (0.1)
$R^2$	0.002	0.003	0.056	0.049	0.092
$adj.R^2$	0	0	0.053	0.043	0.08
$N$	1321	1321	1321	947	946

Standard errors in parentheses

\* ( $p \leq 0.1$ ), \*\* ( $p \leq 0.05$ ), \*\*\* ( $p \leq 0.01$ )

Panel B of Table 5.1 displays the estimates for wage effects of sexual orientation for men. Beginning with the bivariate regression in column 1, identifying as gay is associated with earning an hourly wage 5.9% ( $e^{-0.061} - 1 \approx -0.059$ ) lower than that of a heterosexual man, and a bisexual identity is associated with a steeper wage penalty, earning 9.5% lower hourly wages ( $e^{-0.1} - 1 \approx -0.095$ ) than heterosexual men. Similar to women, adding in age controls in column 2 affected the estimates very little. Upon adding additional controls to the model for education (column 3), the gay male wage penalty rises to 9.3%, and becomes statistically significant at the 10% level. Because gay males are, on average, more highly educated than their heterosexual counterparts, the increase in estimated penalty in column 3 suggests that without controlling for education, wage estimates for gay males will be negatively biased. The bisexual wage penalty falls to 7.4% and remains statistically insignificant. Adding additional controls for demographics and family characteristics in column 4 increases the bisexual wage

penalty to 8.9%, but still does not become statistically significant, and also increases the gay wage penalty to 10.6%, significant at the 10% level. Column 5 reports the estimates upon inclusion of appearance, religiosity, and risky behavior controls, and shows a large decrease in the bisexual wage penalty, 3.8%, and another increase in the gay wage penalty, to 12.8%, now statistically significant at the 5% level.

Altogether, the results in Table 5.1 are fairly consistent with the general trends in previous literature, showing some evidence of a lesbian wage bonus, and gay male and bisexual wage penalties. (Sabia 2014; Carpenter 2005; Badgett 1995; Allegretto and Arthur 2001; Aksoy, Carpenter, and Frank 2018). However, the lesbian and bisexual male coefficients are indistinguishable from zero, and the gay male penalty is larger in magnitude than the bisexual male penalty.

## 5.2 Earnings and Social Networks

I once again use OLS regressions to estimate the relationship between log earnings and sexual orientation, but now using a model allowing for social capital theory to be incorporated. Table 5.2 reports the estimates from equation 3, with a vector of social network variables. Panel A displays female estimates. Results are similar to that of Table 5.1; however, the magnitude of both the female bisexual wage penalty and lesbian wage bonus are lower. This would suggest that the wage effects of sexual orientation have been overstated without the inclusion of social network characteristics. The lesbian wage bonus ranges from an associated 1.0% to 5.23% higher hourly wages than heterosexuals, but never attains statistical significance. The bisexual wage penalty has a broader range, earning between 13.0% and 2.6% less than their heterosexual counterparts. Column 1 represents the bivariate regression estimates, and the bisexual coefficient has statistical significance at the 1% level. Adding the vector of social network variables in column 2 and controlling for age in column 3 reduces significance to the 5% and 10% levels respectively. Upon controlling for education, family

**Table 5.2** Sexual Orientation and Log Wages with Social Networks

PANEL A: WOMEN						
	(1) sexual orientation	(2) + network variables	(3) + age	(4) + education controls	(5) + family demo- graphics	(6) + appear- ance and risky behaviors
gay	0.01 (0.056)	0.007 (0.073)	0.012 (0.073)	0.028 (0.07)	0.049 (0.073)	0.051 (0.073)
bi	-0.139*** (0.054)	-0.118** (0.06)	-0.115* (0.06)	-0.056 (0.057)	-0.068 (0.057)	-0.027 (0.057)
$R^2$	0.004	0.035	0.037	0.129	0.131	0.161
$adj. R^2$	0.003	0.029	0.03	0.121	0.122	0.147
$N$	1507	1081	1081	1079	1061	1061
PANEL B: MEN						
	(1) sexual orientation	(2) + network variables	(3) + age	(4) + education controls	(5) + family demo- graphics	(6) + appear- ance and risky behaviors
gay	-0.061 (0.057)	-0.033 (0.07)	-0.035 (0.07)	-0.065 (0.069)	-0.078 (0.071)	-0.103 (0.07)
bi	-0.1 (0.093)	-0.077 (0.102)	-0.081 (0.102)	-0.082 (0.1)	-0.082 (0.101)	-0.038 (0.099)
$R^2$	0.002	0.034	0.034	0.073	0.068	0.111
$adj. R^2$	0	0.026	0.026	0.062	0.056	0.093
$N$	1321	899	899	899	877	876

Standard errors in parentheses

\* ( $p \leq 0.1$ ), \*\* ( $p \leq 0.05$ ), \*\*\* ( $p \leq 0.01$ )

characteristics, demographics, appearance, religiosity, and risky behaviors in columns 4-6 the bisexual estimate loses all statistical significance.

Panel B displays a similar pattern of reduced penalties among the male estimates. Associated hourly earnings for homosexual males range from 3.2% to 9.8% lower than that of their heterosexual counterparts. Bisexual males are expected to earn between 3.7% to 9.5% lower hourly wages than heterosexuals. However, all estimates for males are not statistically distinguishable from zero. Compared to the range of estimates for homosexuals (5.9% to 12.8%) and bisexuals (5% to 9.5%) from Table 5.1, it is clear that the estimates have decreased in magnitude, again indicating that omitting social capital from the model leads to overestimates in the wage effects of sexual orientation.

**Table 5.3** Sexual Orientation and Employment

PANEL A: WOMEN					
	(1)	(2)	(3)	(4)	(5)
	sexual orientation	+ age	+ education controls	+family demo- graphics	+ appear- ance and risky behaviors
gay	-0.022 (0.07)	-0.024 (0.07)	0.005 (0.069)	0.094 (0.088)	0.111 (0.088)
bi	-0.108* (0.062)	-0.11* (0.062)	-0.086 (0.06)	-0.049 (0.069)	0.005 (0.07)
$R^2$	0.002	0.003	0.05	0.038	0.066
$adj.R^2$	0.001	0	0.047	0.032	0.053
$N$	1250	1250	1248	947	947
PANEL B: MEN					
	(1)	(2)	(3)	(4)	(5)
	sexual orientation	+ age	+ education controls	+family demo- graphics	+ appear- ance and risky behaviors
gay	-0.136** (0.065)	-0.133** (0.065)	-0.162** (0.065)	-0.196** (0.077)	-0.202*** (0.077)
bi	0.058 (0.102)	0.064 (0.102)	0.069 (0.101)	0.036 (0.112)	0.07 (0.112)
$R^2$	0.004	0.006	0.029	0.03	0.044
$adj.R^2$	0.003	0.003	0.025	0.022	0.028
$N$	1100	1100	1100	777	776

Standard errors in parentheses

\* ( $p \leq 0.1$ ), \*\* ( $p \leq 0.05$ ), \*\*\* ( $p \leq 0.01$ )

### 5.3 Labor Force Participation

The results from OLS regression with employment as the outcome variable as modeled in Equation 2 are represented in Table 5.3. Panel A presents the estimates for women. The estimates in column 1 showing the raw correlation between employment and sexual orientation, indicate that lesbian women are 2.2% less likely to be employed than heterosexual women. Strikingly, this is directly at odds with the Household Specialization model, although not statistically significant. The column 1 estimate for bisexual women shows that a bisexual identity is associated with being 10.8% less likely to be employed, and are significant at the 10% level. Adding age to controls in column 2 minutely increases the magnitudes of both estimates and maintains the same level of statistical significance.

Upon adding controls for education (column 3), the lesbian coefficient becomes a positive,

though indistinguishable from zero, and the probability of bisexual women being employed increases and loses statistical significance. It is worth noting that in the sample of Add Health respondents, lesbian and bisexual identities in women were associated with lower levels of education than heterosexual women. Adding family characteristics in column 4 and appearance, religiosity, and risky behavior controls in column 5 increase the probability of employment in both lesbian and bisexual women. In the final regression with the complete set of controls, lesbian women are expected to be 11.1% more likely to work than heterosexual women, and bisexuals are 0.5% more likely to work than heterosexual women, which does follow the Household Specialization model. However, both estimates remain statistically insignificant.

Panel B has the estimates for male labor force participation. The bivariate regression in column 1 shows that gay men are 13.6% less likely to be working for pay than heterosexual men in the Add Health sample. This estimate is significant at the 5% level. Adding controls for age (column 2) does not change the estimate much, but education (column 3), family demographics (column 4), religiosity, appearance, and risky behavior (column 5) controls all decrease the probability of employment among gay men. The column 5 estimate with full set of controls posits that homosexual men are 20.2% less likely to work full time than heterosexual men, and is significant at the 1% level. This huge disparity with high statistical significance is striking. Bisexual men's estimates are indistinguishable from zero, but range from 3.6% to 7% more likely to be employed than heterosexuals.

## 5.4 Employment with Social Networks

Table 5.4 shows the OLS estimates for Equation 4, a linear probability model including a vector of social network variables. The estimates for lesbian and bisexual women in Panel A are largely unchanged by the inclusion of social network variables. Including social network variables gives a positive estimate for homosexual women, which was previously only achieved



**Table 5.4** Sexual Orientation and Employment with Social Networks

PANEL A: WOMEN						
	(1) sexual orientation	(2) + network variables	(3) + age	(4) + education controls	(5) + family demo- graphics	(6) + appear- ance and risky behaviors
gay	-0.022 (0.07)	0.033 (0.089)	0.03 (0.089)	0.045 (0.088)	0.09 (0.093)	0.11 (0.092)
bi	-0.108* (0.062)	-0.083 (0.071)	-0.086 (0.071)	-0.064 (0.07)	-0.061 (0.07)	-0.002 (0.071)
$R^2$	0.002	0.008	0.009	0.042	0.041	0.072
$adj. R^2$	0.001	0	0	0.031	0.029	0.052
$N$	1250	885	885	883	866	866
PANEL B: MEN						
	(1) sexual orientation	(2) + network variables	(3) + age	(4) + education controls	(5) + family demo- graphics	(6) + appear- ance and risky behaviors
gay	-0.136** (0.065)	-0.198** (0.083)	-0.193** (0.083)	-0.22*** (0.082)	-0.253*** (0.085)	-0.259*** (0.085)
bi	0.058 (0.102)	0.05 (0.114)	0.06 (0.114)	0.043 (0.113)	0.037 (0.113)	0.07 (0.113)
$R^2$	0.004	0.02	0.022	0.046	0.046	0.061
$adj. R^2$	0.003	0.011	0.011	0.033	0.031	0.037
$N$	1100	736	736	736	719	718

Standard errors in parentheses

\* ( $p \leq 0.1$ ), \*\* ( $p \leq 0.05$ ), \*\*\* ( $p \leq 0.01$ )

after including educational controls. The bisexual estimates are now all less than zero, implying bisexual women are less likely to work full time than heterosexual women, as opposed to the small positive estimate in the previous full model shown in column 5 of Table 5.3. Apart from the bisexual raw correlation with employment status, none of the female estimates attained any statistical significance.

The estimates for men shown in Panel B are also closely mirror those in the previous table without social capital controls. Estimates for bisexual men are again all positive and indistinguishable from zero, ranging from 3.7% to 7% more likely to work than heterosexuals, compared to the previous range of 3.6% to 7%. For homosexual men, the magnitude of the estimates are larger with the added social network variables, indicating that a homosexual identity for men is associated with a lower probability of being fully employed than heterosexual men, ranging from 13.6% less likely in the bivariate regression in column 1 to 25.9% less likely with full controls in column 6, which is statistically significant at the 1% level.

## 6. Discussion

This paper explores disparities in labor market and health outcomes among sexual minorities and several channels through which these divergent trends operate. I present findings from several different potential channels through which the health and labor market outcome disparities of sexual minorities operate. I motivate Social Capital Theory as a potential key influencer of these disparities by presenting previous literature, and examine it further with Add Health data.

The findings of this thesis suggest that the inclusion of social capital measures could lead to more accurate and less biased estimates for the wage effects of sexual orientation. Upon adding the vector of social network variables to the regression, more variance in wages and employment were able to be explained by my models than with just individual and family level characteristics alone. This can be seen by the higher  $R^2$  and adjusted  $R^2$  values in Table 5.2 compared to Table 5.1, and in Table 5.4 compared to Table 5.3. Though the preferred specifications (Table 5.2, column 6; Table 5.4, column 6) does not yield statistically significant estimates, the results have meaningful implications for the hole in current literature exploring sexual minorities' labor market outcomes. My results show at the very least it is worthy of future research exploring the possible connection between sexual minorities' social capital and their economic outcomes.

## 7. Conclusion

The significance of this research is in the novel application of social networks to the economic effects of sexual orientation. Building off of the work of Erosheva et. al. (2016) and Sabia (2014) I used Add Health to examine the apparently intertwined relationship of health, economic status, and social capital. Results show that the addition of social network variables lead to smaller wage penalties for homosexual men and bisexuals and smaller wage bonuses for lesbian women. Specifically, wage penalties for gay men drop from between 5.9-12.8% less than heterosexual men to 3.2-9.8% less.

It would be remiss to not mention that this research was conducted amidst the COVID-19 global pandemic. There were several plans that I simply was not able to get to because of relocation away from campus, and thus the quality of the paper suffered. The most obvious shortcoming is that most results were not statistically significant. I was anticipating using Bayesian model selection to make my regressions rather than leaning heavily on the prior work of Sabia. The issue with this is his sample size was much larger than mine, as I was only able to use publicly available data from Add Health. Furthermore, because of restrictions in the public-use data, I was not able to add in as many community and school level controls as he did in his regressions. However, this thesis is not an insignificant contribution to the larger body of work on the economic outcomes of sexual minorities. Though my regressions were not statistically significant, they do show interesting results that support the linkage between social networks, health, and income and employment.

Economists need to take a more nuanced approach to the labor market outcomes of

sexual minorities. It's well known that social networks influence health and that health and economic status are related. However, in considering what makes sexual minorities different than their heterosexual counterparts, there is a failure to acknowledge that lesbian, gay, and bisexual people have different kinds of social relationships than heterosexuals. I wish for this thesis to serve as a call to action for further researchers, to include social capital in models of the economic effects of sexual orientation.

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## APPENDIX



**Table 1** National Health Interview Survey

	(1)	(2)	(3)	(4)	(5)	(6)
	years of education	employed	income	years of education	employed	income
Homosexual	1.034*** (19.29)	-0.0101* (-1.98)	0.0471* (2.18)	1.191*** (16.50)	-0.00795 (-1.17)	0.00275 (0.09)
Bisexual	0.396*** (5.50)	-0.0518*** (-7.52)	-0.383*** (-13.22)	0.471*** (3.56)	-0.0518*** (-4.06)	-0.390*** (-7.35)
Female				-0.0189 (-1.30)	-0.00196 (-1.31)	-0.180*** (-30.89)
Female × Homosexual				-0.356*** (-3.30)	-0.00531 (-0.52)	0.0581 (1.34)
Female × Bisexual				-0.101 (-0.64)	0.000545 (0.04)	0.0501 (0.79)
cons	13.67*** (1893.52)	0.939*** (1254.37)	2.286*** (786.50)	13.68*** (1273.69)	0.940*** (886.06)	2.384*** (552.99)
N	170472	106745	170472	170472	106745	170472

Standard errors in parentheses

\* ( $p \leq 0.05$ ), \*\* ( $p \leq 0.01$ ), \*\*\* ( $p \leq 0.001$ )

**Table 2** Background Characteristics by Sexual Orientation and Biological Sex

	Heterosexual		Homosexual		Bisexual	
	Male	Female	Male	Female	Male	Female
N	1061	1189	30	28	9	32
wage	18.49	16.19	18.19	12.95	14.34	11.08
employed	0.88	0.83	0.77	0.79	0.89	0.81
<i>Individual Characteristics</i>						
age	28.74	28.45	28.47	28.04	28.00	27.84
years of education	12.91	13.40	14.03	12.57	12.67	12.34
family size	4.26	4.33	4.32	3.94	4.14	4.20
religiosity	2.40	2.63	2.20	2.25	2.11	2.22
attractiveness	3.38	3.50	3.38	3.36	3.22	2.97
cigarette use	9.72	7.29	10.01	13.07	11.78	15.16
alcohol consumption	2.10	1.43	1.58	2.25	2.38	1.76
marijuana use	2.13	2.13	1.67	2.85	3.75	2.35
depression	0.10	0.22	0.17	0.36	0.22	0.47
anxiety	0.08	1.46	0.02	0.25	0.12	0.24
<i>Social Network Variables</i>						
in degree	4.31	4.97	3.26	4.06	3.57	3.58
out degree	4.38	5.04	4.16	5.25	5.00	5.00
reach	56.72	61.89	54.74	72.81	94.57	64.67
centrality	0.78	0.90	0.75	0.88	0.89	0.89
influence domain	435.84	460.09	408.53	452.19	399.43	429.75

*Note:* This table reports background characteristics of individuals in the sample from Add Health. The sample is restricted to those with available network data from Wave I in-school survey, as well as non-missing sexual orientation and baseline characteristic data. All means are unweighted.