

# Same-sex marriage legalization and employment outcomes among sexual minority adults in the U.S. Medical Expenditures Panel Survey

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# Abstract

## Background

Social science theories suggest that the legalization of same-sex marriage may lead to improved economic opportunities among sexual minorities. However, empirical evidence pertaining to this issue is scarce. We examined the association between state-level same-sex marriage legalization between 2004 and 2014 and employment outcomes among sexual minority men and women aged 18 years or older (N = 274) in 2015 using the U.S. Medical Expenditures Panel Survey.

## Results

Legalization of same-sex marriage in the U.S. was associated with increased odds of employment among sexual minorities in regression models adjusting for individual-level sociodemographic factors, household-level characteristics, county-level economic and demographic factors, and state-level public attitudes towards sexual minorities. In addition, there was some evidence that the legalization of same-sex marriage may be associated with greater earnings and income among sexual minorities. There were no significant positive associations between same-sex legalization and any of the outcomes when the same analyses were repeated among heterosexual individuals (N = 10,330).

## Conclusions

Our findings provide partial evidence that the legalization of same-sex marriage may have improved socioeconomic outcomes among U.S. sexual minorities.

## Background

The significance of legalizing same-sex marriage for individuals who identify as sexual minorities is hard to overstate. Massachusetts was the first state to do so in 2004, and by the end of 2014, nearly half of all states had passed similar legislation. In June of 2015, the U.S. Supreme Court ruled in *Obergefell v. Hodges* that the Constitution guarantees same-sex couples equal rights to marry, thus legalizing same-sex marriage across all U.S. states. About 1.1 million lesbian, gay, bisexual, and transgender (LGBT) people in the U.S. were married to a same sex partner in 2017<sup>1</sup>. While public support for same-sex marriage has increased over time<sup>2,3</sup>, in a 2019 poll almost a third of the U.S. public continued to oppose it<sup>3</sup> and some state legislatures have considered a range of anti-LGBT religious exemption bills after 2015<sup>4</sup>. Thus, studying the impact that same-sex marriage legalization has had on society remains of significant public interest.

Our study aims to expand the limited evidence on the association between same-sex marriage legalization and employment outcomes. Using the nationally representative Medical Expenditures Panel

Survey (MEPS) we investigated whether the legalization of same-sex marriage was associated with greater employment and income among U.S. sexual minorities aged 18 years or older. Specifically, we examined the association between the legalization of same-sex marriage which took place gradually between 2004 and 2014 across U.S. states and employment status, individual wage income, individual unearned income, and total individual and household income in 2015 among sexual minorities.

Evidence of the potential impact of same-sex marriage legalization on employment and income can inform policies in the U.S. related to the economic impact associated with expanding or limiting the rights of sexual minorities. It is also relevant for other countries where same-sex marriage remains illegal and the rights of sexual minorities are severely restricted. As one of the key components of socioeconomic status income also strongly correlates with health outcomes. We hypothesized that the benefits of same-sex marriage legalization in the long run may translate into improved socioeconomic opportunities and employment outcomes among sexual minorities in the U.S.

## Conceptual Framework

There is a strong theoretical foundation for hypothesizing an association between same-sex marriage legalization and employment outcomes through several pathways. First, marriage could lead to labor specialization and changes in productivity. Becker's theory of the family<sup>5</sup> posits that due to specialization of labor one partner may reduce their labor force participation and increase their household production (such as providing childcare and other services to the family) while the other may increase their labor force participation and work productivity. Studies based on the U.S. National Longitudinal Survey of Youth (NLSY) report a wage premium associated with marriage<sup>6,7</sup> and additional premium associated with fatherhood<sup>7</sup> and have further shown that some of that premium is likely caused by increases in human capital and productivity<sup>7</sup>. Bartlett and Callahan<sup>8</sup> have reported that role specialization and perceived need are the main predictors of the wage differential associated with marriage among white men. Related research has shown that married men and women are more likely to receive professional training compared to their unmarried counterparts<sup>9</sup>, which may lead to human capital accumulation and greater productivity and income.

Second, independently from the effects of productivity changes, marriage may affect how employees are perceived and treated at the workplace which, in turn, may impact earnings. In an experiment by Jordan and Zitek<sup>10</sup>, employees perceived married male job applicants more suitable and married female applicants less suitable by employees with expectations for lower performance, compared to their single counterparts. However, it has also been suggested that income may be endogenous<sup>11-14</sup>; for example, people with higher income may be perceived as more attractive marriage partners. These associations have been conceptualized and tested among heterosexual couples but there is a lack of evidence on whether they might extend to sexual minorities.

Third, same-sex marriage legalization may improve employment outcomes indirectly, through a wide range of positive marriage-related benefits, including companionship, increased commitment<sup>15</sup>, emotional support and perception of equality and equal rights<sup>16</sup>, and expressive and assertive value<sup>17</sup>. Further, marriage provides legal benefits and financial stability to same-sex couples<sup>15, 16</sup>, leads to higher rates of health insurance, lower taxation, social security, and immigration benefits<sup>17</sup>. Studies of heterosexual couples have also shown that marriage increases coping resources<sup>18</sup>, serves as a mental health protective factor<sup>19, 20</sup>, and increases overall happiness<sup>21</sup>, psychological and subjective well-being<sup>21, 22</sup>, all of which might predict employment and income.

Finally, same-sex marriage legalization may improve employment outcomes independent of the effect of marriage. A large body of research has documented hiring discrimination and inequalities in earnings associated with sexual orientation. Gay men have been shown to earn less and lesbians more, compared to otherwise similar heterosexual men and women<sup>10, 23, 24</sup>. Similarly, Waite et al.<sup>25</sup> as well as Cerf<sup>26</sup> report that partnered gay men earn less than their coupled heterosexual counterparts and both, single and coupled lesbian women earn more than heterosexual women. Waite et al.<sup>25</sup> also report that bisexual men and women earn significantly less than all other sexual orientation groups. In addition, the minority stress theory<sup>27</sup> suggests higher risk for psychological distress among sexual and other minorities, and research extending that theory has linked minority stressors with increased psychological distress and reduced work satisfaction among sexual minorities<sup>28</sup>. Therefore, in a social and policy climate where sexual minorities perceive or experience work discrimination and are at greater risk for psychosocial stressors, legalization of same-sex marriage may contribute to an overall culture of inclusivity, reduced work discrimination, and perceptions of equality, which may translate into greater employment opportunities, work performance, productivity and income.

The empirical evidence to date on employment, earnings and income associated with same-sex marriage is limited and mixed. A study in Sweden<sup>29</sup> found that entering into a registered partnership was associated with 12% and 15% reduction in earnings among women and men, respectively. A recent study<sup>30</sup> based on the American Community Survey found that same-sex marriage legalization in the U.S. was associated with higher rates of employment among both men and women, a 2.8% increase in hourly earnings among men, but not with a change in earnings among women.

Unearned income may be also be affected by legalization of same-sex marriage through tax benefits (e.g., lower taxes and greater savings which could be invested leading to a stream of future income), access to family business income, qualifying for government benefits (such as disability and social security income), benefits through a spouse's employer (including worker's compensation and retirement plan in the event of a spouse's death), and more generally marriage increases financial stability making it more likely to invest in income generating assets. These expected associations stem from the existing laws that provide direct financial benefits to married couples, yet there is scarce evidence that they carry over to same-sex couples. However, a U.S. based study projects that same-sex marriage will lead to an increase in unearned (retirement) income among the bottom three-fifths but a decrease in the top two-

fifths of the income distribution<sup>31</sup>. Taken together, these findings point to the need to generate additional evidence of the long-term aggregate effect of same-sex marriage legalization on employment and income among U.S. sexual minorities.

## Methods

### Study Population

The Medical Expenditures Panel Survey (MEPS) is a nationally representative survey of the U.S. civilian, non-institutionalized population administered annually, made up of a set of large-scale surveys with families and individuals from across the U.S., their medical providers (including doctors, hospitals, and pharmacies), and employers from across the country. MEPS participants are a subset of the previous year's National Health Interview Survey (NHIS). In 2013 NHIS assessed sexual orientation for the first time, which became available in the 2014/15 MEPS survey panels. In NHIS, sexual orientation is assessed using the item: "Which of the following best represents how you think of yourself?" Five response options were provided: (1) Lesbian or gay, (2) Straight, that is, not lesbian or gay, (3) Bisexual, (4) Something else, and (5) 'I don't know the answer'. Our analyses were based on 2015 data from MEPS/NHIS respondents, age 18 years or older who identified as sexual minorities, including lesbian, gay, and bisexual individuals (N = 274) and (for comparison) heterosexual individuals (n = 10,330). To increase our confidence in identifying the population of SM, we looked at the sex distribution of the partners of SM respondent who reported living with a partner and found that all except one were of the same sex.

### Primary predictor

The main predictor in all regression models was the number of years since same-sex marriage was legalized in U.S. states between 2004 and 2014. The decision to model number of years as a continuous predictor was based on our prior expectation of cumulative economic benefits of legalizing same-sex marriage over time. Longer 'exposure' is hypothesized to be associated with increased odds of employment and greater income.

### Outcomes

In order to test our hypothesis that same-sex marriage legalization predicts greater employment and income, we evaluated three binary outcomes: 1) employment status in 2015 (partly or fully employed = 1, unemployed = 0); 2), receipt of unearned income from government or 3) receipt of any unearned income from private sources. We also evaluated 4 continuous outcomes: 1) annual individual wages, 2) total individual unearned and 3) total individual income (earned and unearned) and 4) annual total household income as continuous outcomes. These outcomes were based on self-reports measured during the MEPS interviews conducted in 2015. The analytical dataset provided by MEPS already contains imputed values for any missing data using sequential hot deck imputations<sup>32</sup>.

### Regression models

We used separate logistic regression models to estimate the odds of being employed, receiving unearned income from government or from private sources. For modeling continuous outcomes we were guided by the econometric literature which has evaluated the performance of a range of models for cost data<sup>33,34,35</sup>. For large samples it has been found that OLS models perform well in terms of accuracy and overall model fit. For moderate to small samples, GLM models with a log link and gamma distribution<sup>34,35</sup> have been recommended. In the lack of a clear recommendation as to what the best models for our moderate sample size of 274 observations would be, we used three different models: (i) generalized linear models (GLM)<sup>33</sup> using a log link (income data were skewed, but after a log transformation were approximately normally distributed) and a Gamma distribution; in these models observations with zero income were assigned a value of \$1 allowing a logarithmic transformation (models among earners, excluding observations with zero income, produced consistent results and are not shown), (ii) ordinary least squares (OLS) linear models on the untransformed data, and (iii) multinomial logistic regression models based on quartiles of the income distribution, using the lowest quartile as the reference, as these models have the advantage of being less sensitive to outliers and to distributional assumptions of the outcomes. Models of unearned income did not produce significant effects and are not presented; instead we show models of total (combined earned and unearned) individual and household income.

## Covariates

The a priori choice of covariates was based on potential factors that were expected from theory to predict employment and income and possibly confound the main effect. Specifically, all regression models controlled for covariates: (i) at the person level, including age (< 21, 21–44, 45–64, ≥ 65), sex, level of completed education (‘≤ 8th grade’, ‘9–12th grade, no high school diploma or GED’, ‘GED or high school’, ‘> high school, college(no 4 year degree), associate degree’, ‘4-year college degree, bachelor’s degree’, ‘Master’s, doctorate, or professional degree’), race (‘white’ vs. non-white), and ethnicity (‘Hispanic’ vs. other), (ii) at the household level, including household size and whether living with a same-sex partner, (iii) at the county-level, including per-capita average income, unemployment rate, proportion of the population below the poverty level, median home value, population density, % foreign born, % urban population, and median age. These variables were extracted from the Area Health Resources File (AHRF) developed by the U.S. Health Resources and Services Administration were included in an effort to control, to the extent possible, for geographic differences in the U.S. population’s income, wealth, and demographics, (iv) at the state level, including public attitudes towards lesbians, gay men, and bisexuals in each state. Public attitudes towards sexual minorities may impact voting behavior related to legalization of same-sex marriage, and may also be associated with employment discrimination. We used a previously developed social climate index<sup>36</sup>, a single score based on the following constructs: “approval of marriages for same-sex couples, approval of adoption rights for same-sex couples, approval for laws that protect lesbians and gay men from employment discrimination, and beliefs that homosexuality is a sin.” Our models included 17 independent variables (the primary predictor and 16 covariates). Each covariate was significant in some but not in all models. In sensitivity analyses we also evaluated the influence of variable selection on the main associations; we present models in which, the primary predictor, and only statistically significant confounders were included. Finally, to assess potentially similar associations that

may exist among heterosexual individuals, who are not directly impacted by the legalization of same-sex marriage, we repeated all analyses described above using the 2015 MEPS sample consisting of all adult respondents who did not identify as a sexual minority. Our hypothesis was that there would be no association between same sex-legalization and any of the outcomes in this sample. Analyses adjusted for the sampling design and incorporated survey weights provided by MEPS to generate nationally representative estimates of the U.S. civilian non-institutionalized population.

## Results

In 2015, 274 MEPS respondents identified as a sexual minority (i.e., lesbian, gay, or bisexual). Their mean age was 44.4 years (standard error (SE) = 1.1), 45.2% were female, and 43.6% had a 4 year college or a higher degree. The majority were white (78.5%), followed by Black/African American (12.3%), and Asian (5.3%). About 15.3% reported Hispanic ethnicity. About one in five lived with a same-sex partner, and their average household size was 1.8 (SE = 0.08) (Table 1).

Table 1  
 Characteristics of the 2015 U.S. MEPS sexual minority sample (n = 274)

<b>Characteristics</b>	<b>Estimate<sup>1</sup></b>
<i>Individual-level</i>	
Age, mean (se)	44.4 (1.1)
Female, n (%)	142 (45.2)
Education, n (%)	
≤ 8th grade	6 (1.4)
9–12th grade, no high school diploma or GED	16 (2.8)
GED or high school	65 (22.0)
> high school, college(no 4 year degree),associate degree	87 (30.2)
4-year college degree, bachelor's degree	66 (29.2)
Master's, doctorate, or professional degree	34 (14.4)
White, n (%)	191 (78.5)
Black, n (%)	52 (12.3)
Asian, n (%)	17 (5.3)
Multi-racial, n (%)	11 (3.3)
American Indian/Alaska Native, n (%)	3 (0.6)
Hispanic ethnicity, n (%)	59 (15.3)
<i>Family-level</i>	
Household size, mean (se)	1.8 (0.08)
Living with same-sex partner	54 (21.7)
<i>County-level</i>	
Percent Urban Population, mean (se)	88.0 (1.1)
Per Capita Personal Income, mean (se)	\$50,070 (1,675)
Percent Persons in Poverty, mean (se)	15.0 (0.5)
Unemployment rate, 16+, mean (se)	6.0 (0.2)

<sup>1</sup> Estimates incorporate sampling weights

<sup>2</sup> Source: Hasenbush et al. 2014; se = standard error

Characteristics	Estimate <sup>1</sup>
Population Density per Sq Mile, mean (se)	3502 (829)
Percent Foreign Born Pop, mean (se)	14.5 (0.8)
Median Home Value, mean (se)	\$262,629 (14,325)
Median Age, mean (se)	36.9 (0.3)
<i>State-level</i>	
Social climate index <sup>2</sup> , mean (se)	63.1 (0.8)
<sup>1</sup> Estimates incorporate sampling weights	
<sup>2</sup> Source: Hasenbush et al. 2014; se = standard error	

Table 2 shows the distribution of the main predictor. A total of 47.4% lived in a state where same-sex marriage was illegal as of 2014, 19.3% in a state where same-sex marriage was legal for part of 2014 but not the entire year, and about 33.3% in a state where same-sex marriage was legalized for longer than one year between 2004 and 2014.

Table 2  
Time since legalization of same-sex marriage in individuals' state of residence as of 2014

Number of years	N(%)
0 years (not legal as of 2014)	130(47.4)
Less than 1 (legalized in 2014)	53(19.3)
Between 1 and 2 (legalized in 2013)	77(28.1)
Between 2 and 5 (legalized in 2007–2012)	7(2.6)
More than 5 (legalized before 2007)	7(2.6)

Table 3 shows the distribution of the outcomes. Most (70.2%) were employed in 2015, and their average wage, unearned and total income were \$44,250, \$9,916 and \$53,934, respectively. Household total income was \$63,519. About half of respondents' unearned income was from government (\$4,342) and the other half from private (\$5,574) sources. The adjusted associations between same-sex marriage legalization with employment outcomes for the sexual minority sample in the 2015 MEPS are shown in Table 4. The adjusted associations between same-sex marriage legalization with employment outcomes for the sample of heterosexual individuals are shown in Table 5.

Table 3  
Outcomes in the 2015 U.S. Medical Expenditures panel Survey sexual minority sample

<b>Outcome</b>	
Employed, n (%)	182 (70.2)
Annual income	
Person's wage income, mean (se) / median	\$44,250 (4,039) / \$29,076
Person's unearned income from government sources, mean (se) / median	\$4,342(904)/ \$0
Person's unearned income from private sources, mean (se) / median	\$5,574 (1,316)/ \$0
Person's total income, mean (se) / median	\$53,934 (4,495)/ \$36,726
Se = standard error	

Table 4

Association between legalization of same sex marriage (number of years since legalization as of 2014) and economic outcomes in the 2015 U.S. MEPS sexual minority sample<sup>1</sup>

Outcome	All (n = 274)		Men (n = 132)		Women (n = 142)		p-value (Men vs. women)
	Estimate	95% CIs	Estimate	95% CIs	Estimate	95% CIs	
Employed (OR)	1.43**	1.03–1.99	2.60	0.94–7.19	1.03	0.98–1.08	< 0.01
Received government unearned income (OR)	1.11	0.90–1.38	0.95	0.59–1.52	1.15	0.85–1.55	0.18
Received private unearned income (OR)	1.07	0.77–1.48	0.89	0.63–1.25	1.34	0.93–1.93	0.79
Individual wage annual income							
Model 1:GLM <sup>2</sup>	0.10	-0.06-0.27	0.15	-0.05-0.35	0.05	-0.03-0.12	0.12
Model 2: OLS	\$7,332*	2,395–12,269	\$7952*	1,656–14,247	\$7,435*	1,710–13,160	0.58
Model 3: Multinomial logit							
2nd quartile vs. lowest quartile (OR)	0.86	0.54–1.35	1.26	0.36–4.35	0.58	0.18–1.87	0.14

<sup>1</sup> Controlling for age, sex, education, race, ethnicity, household size, whether person lived with same-sex partner, county-level factors (percent urban population, per capita personal income, poverty rate, unemployment rate, population density, percent foreign born population, median home value, and median age), and a state-level social climate index reflecting public attitudes towards lesbians, gay men, and bisexuals.

<sup>2</sup> Estimates are on a log scale

\*p < .05, \*\* p < .01

OR = odds ratio

GLM = Generalized linear model using a log link and gamma distribution

OLS = Ordinary least squares

Outcome	All (n = 274)		Men (n = 132)		Women (n = 142)		
3rd quartile vs. lowest quartile (OR)	1.00	0.69–1.47	1.65	0.91–3.00	0.60	0.17–2.12	0.15
4th quartile vs. lowest quartile (OR)	1.38*	1.04–1.84	2.67*	1.25–5.69	1.23	0.84–1.78	0.01
Individual total annual income							
Model 1:GLM <sup>2</sup>	0.05	-0.03-0.14	0.06	-0.03-0.15	0.07	-0.03-0.15	0.49
Model 2: OLS	\$8,222**	1,112–15,332	\$11,221*	1,646–20,796	\$6,616	-981-14,213	0.29
Model 3: Multinomial logit							
2nd quartile vs. lowest quartile (OR)	1.14	0.80–1.62	1.99	0.63–6.32	1.24	0.81–1.89	0.86
3rd quartile vs. lowest quartile (OR)	0.93	0.72–1.20	4.18*	1.30-13.44	0.34*	0.15–0.73	0.13
4th quartile vs. lowest quartile (OR)	1.25	1.00-1.57	5.19*	1.42–19.02	1.13	0.80–1.59	0.85
<sup>1</sup> Controlling for age, sex, education, race, ethnicity, household size, whether person lived with same-sex partner, county-level factors (percent urban population, per capita personal income, poverty rate, unemployment rate, population density, percent foreign born population, median home value, and median age), and a state-level social climate index reflecting public attitudes towards lesbians, gay men, and bisexuals.							
<sup>2</sup> Estimates are on a log scale							
*p < .05, ** p < .01							
OR = odds ratio							
GLM = Generalized linear model using a log link and gamma distribution							
OLS = Ordinary least squares							

Table 5

Association between legalization of same sex marriage (number of years since legalization as of 2014) and economic outcomes in the 2015 U.S. MEPS sample who were not sexual minorities

Outcome, model <sup>1</sup>	All (n = 10330)		Men (n = 4493)		Women (n = 5837)		p-value (Men vs. women)
	Estimate	95% CIs	Estimate	95% CIs	Estimate	95% CIs	
Employed (OR)	1.04	0.99–1.10	1.10	1.01–1.20	1.00	0.94–1.06	0.49
Received government unearned income (OR)	1.03	0.98–1.08	1.01	0.94–1.09	1.04	0.98–1.10	0.57
Received private unearned income (OR)	0.98	0.93–1.03	0.97	0.92–1.02	0.98	0.91–1.05	0.84
Individual wage annual income							
Model 1:GLM <sup>2</sup>	0.01	-0.01-0.03	0.01	-0.02-0.04	0.005	-0.03-0.04	0.62
Model 2: OLS	\$35	-480-550	-\$150	-1012-712	\$291	-392-974	0.24
Model 3: Multinomial logit							
2nd quartile vs. lowest quartile (OR)	1.02	0.96–1.08	1.09	0.99–1.2	0.98	0.9–1.07	0.11
3rd quartile vs. lowest quartile (OR)	1.04	0.98–1.1	1.09	1-1.18	0.95	0.88–1.02	< 0.01
<sup>1</sup> Estimates show the association between each additional year of living in a state where same-sex marriage was legalized and outcomes, controlling for age, education, race, ethnicity, household size, whether person lived with a partner or spouse, county-level factors (percent urban population, per capita personal income, poverty rate, unemployment rate, population density, percent foreign born population, median home value, and median age), and a state-level social climate index reflecting public attitudes towards lesbians, gay men, and bisexuals.							
<sup>2</sup> Estimates are on a log scale							
*p < .05, ** p < .01							
OR = odds ratio							
GLM = Generalized linear model using a log link and Gamma distribution							
OLS = Ordinary least squares							

Outcome, model <sup>1</sup>	All (n = 10330)		Men (n = 4493)		Women (n = 5837)		
4th quartile vs. lowest quartile (OR)	1.02	0.96–1.09	1.04	0.93–1.17	1.02	0.96–1.09	< 0.01
Individual total annual income							
Model 1:GLM <sup>2</sup>	-0.001	-0.01-0.01	-0.002	-0.02-0.02	0.003	-0.02-0.02	0.05
Model 2: OLS	\$12	-560-584	-\$45	-870-779	\$103	-545-752	0.15
Model 3: Multinomial logit							
2nd quartile vs. lowest quartile (OR)	0.99	0.94–1.05	1.05	0.96–1.14	1.05	0.98–1.11	< 0.01
3rd quartile vs. lowest quartile (OR)	1.03	0.98–1.07	1.01	0.9–1.13	1.03	0.96–1.12	< 0.01
4th quartile vs. lowest quartile (OR)	1.01	0.95–1.08	1.01	0.91–1.12	1.06	0.99–1.14	< 0.01
<sup>1</sup> Estimates show the association between each additional year of living in a state where same-sex marriage was legalized and outcomes, controlling for age, education, race, ethnicity, household size, whether person lived with a partner or spouse, county-level factors (percent urban population, per capita personal income, poverty rate, unemployment rate, population density, percent foreign born population, median home value, and median age), and a state-level social climate index reflecting public attitudes towards lesbians, gay men, and bisexuals.							
<sup>2</sup> Estimates are on a log scale							
*p < .05, ** p < .01							
OR = odds ratio							
GLM = Generalized linear model using a log link and Gamma distribution							
OLS = Ordinary least squares							

## Findings related to sexual minorities

### Employment

An additional year since same-sex marriage was legalized was associated with significantly greater odds of employment (OR = 1.43 [95% CI 1.03–1.99]), but not with greater odds of receiving unearned income from government (OR = 1.11 [95% CI 0.90–1.38]) or private (OR = 1.07[95% CI 0.77–1.48]) sources. The

adjusted odds of being employed were much greater among men 2.60 (95%CI 0.94–7.16,) vs. women, 1.03 (95%CI 0.98–1.08), respectively with the difference in odds ratios between men and women being significant ( $p < 0.01$ ). The differences between men and women in the odds of receiving unearned income from government or private source were not statistically significant.

## Individual wage income

Among both, men and women, the associations between same-sex marriage legalization with individual annual wage income and individual annual total income were in the hypothesized positive directions, but only some reached statistical significance. In the GLM models, same-sex marriage legalization was not associated with a statistically significant change in individual wage income among sexual minorities. In the OLS linear models, an additional year since legalization was associated with \$7,332 [95% CI \$2,395-\$12,269] greater individual wage income among sexual minorities. In the logistic regression models based on quartiles, an additional year since legalization was associated with greater odds of individual annual wage income only in the 4th vs. the lowest quartile (OR = 1.38 [95%CI 1.04–1.84]) .

The associations between same-sex legalization and individual wage income were more pronounced among men vs. women across models, but these differences only reached statistical significance in the logistic model based on quartiles when comparing the highest vs. the lowest quartile ( $p = 0.01$ ).

## Individual total annual income

Among both, men and women in the GLMs, same-sex marriage legalization was not associated with a statistically significant change in individual total annual income. In the OLS models, an additional year since same-sex marriage legalization was associated with a statistically significant increase of \$8,222 [95% CI \$1,112-\$15,332]) in individual total annual income. These differences between model results may be due to the transformation of the data in the GLMs. Among both, men and women, the association between same-sex marriage legalization and the odds of being in different quartiles of the individual total annual income distribution was not statistically significant. None of the differences in individual total annual income between men and women were statistically significant. However, in the models contrasting quartiles among women, the odds of being in the 3rd vs. the lowest quartile was in the opposite direction of what was hypothesized (OR = 0.34[95% CI 0.17–0.73]).

## Household total annual income

Among both, men and women in the GLMs, same-sex marriage legalization was not associated with a statistically significant change in household total annual income. In the OLS models, an additional year since same-sex marriage legalization was associated with \$5,743 (95% CI -\$1,494, \$12,980) greater total household income, which was also not statistically significant. The associations between same-sex legalization and household total annual income appeared more pronounced among men vs. women in most models, with these differences being statistically significant only in the GLM and in the 3rd vs the lowest quartile of the multinomial logit model.

## Sensitivity analyses

Logistic regression models of the odds of employment (including men and women) using only statistically significant covariates (except the primary predictor) resulted in the inclusion of age, education and being of Hispanic ethnicity. In this model, each additional year since legalization of same sex marriage was associated with greater but not statistically significant odds of employment (OR = 1.16 [95%CI 0.88–1.53]). OLS models of individual wage income resulted in the inclusion of four statistically significant covariates in the final model: age, education, whether living with a same-sex partner, and % urban population. In this model each additional year since legalization of same sex marriage was associated with greater and statistically significant increase in annual wage income \$6,086 (95% CI \$1,593, \$10,580). OLS models of individual total income resulted in the inclusion of three statistically significant covariates: education, whether living with a same-sex partner, and % urban population. In this model each additional year since legalization of same sex marriage was associated with greater and statistically significant increase in individual total income \$7,000 (95% CI \$716, \$13,285). OLS models of family total income resulted in the inclusion of six statistically significant covariates: education, race, being of Hispanic ethnicity, family size, % urban population, and state-level climate index score sexual minorities. In this model each additional year since legalization of same sex marriage was associated with greater but not statistically significant increase in family total income \$6,070 (95% CI -\$1,696, \$13,836).

## Findings related to heterosexual individuals

In the aggregate sample of both men and women who did not identify as sexual minorities, same-sex marriage legalization was not associated with improved employment outcomes in any of the models, as hypothesized (Table 5). Same-sex marriage legalization was in fact associated with slightly lower, though borderline significant odds of being in the 2nd (OR = 0.94[95%CI 0.89–0.99] and the 4th (OR = 0.93[95%CI 0.89–0.98]) vs. the lowest quartile of household annual income. There were statistically significant differences between men and women in the odds ratios contrasting income quartiles in the GLM, OLS, and the multinomial logit models.

## Discussion

Our study adds to the limited evidence of the link between same-sex marriage legalization and employment and income – two key indicators of socioeconomic position and major social determinants of population health and health inequities<sup>37</sup> – among U.S. sexual minorities. We estimated the associations between legalization of same-sex marriage across U.S. states between 2004 and 2014 and employment and income in 2015 using a sample of MEPS/NHIS respondents who identified as sexual minorities (i.e., lesbian, gay, or bisexual individuals).

Same-sex marriage legalization was associated with a 40% higher likelihood of employment among sexual minorities - adjusting for individual, family and county level covariates, as well as for state-level public attitudes towards sexual minorities. Importantly, however, this estimate while still in the hypothesized direction was smaller and not statistically significant in sensitivity analyses where only

statistically significant covariates were included in the model. There was also some evidence of an association with annual wage and total income, which however should also be viewed with caution as estimates were not robust to alternative model specifications. The OLS models produced a statistically significant estimate; however, given the skewed distribution of income data, confidence in these estimates is arguably low in a sample size of  $n = 274$ . On the other hand, estimates from the GLM models, which may better account for non-normality, were not statistically significant.

We also found some evidence that legalization of same-sex marriage was predictive of being in the top quartiles of the wage and total individual income distribution among sexual minorities; this association appeared to be strongly driven by the subgroup consisting of men. In only one model – of total annual income - the association was in the opposite direction of what was hypothesized for women when comparing quartile 3 vs. 1. Additional sub analyses (not shown in Table 3) suggested that this increase in income may have been driven not only by the greater employment rates but also by an increase in earnings among those who were employed. Specifically, among employed sexual minorities, the association with each additional year since legalization with total earned income was not significant in the GLM models, but was associated with an increase of \$5,823 ( $p = 0.026$ ) in the OLS models, and with greater odds of being in the fifth vs. the first quartile of the income distribution ( $OR = 2.82, p = 0.003$ ).

We did not find evidence that legalization of same-sex marriage had an impact on unearned individual or household income. Individual unearned income may increase after marriage, due to spousal benefits from social security benefits, pension, and other sources<sup>31</sup>, however this effect would only affect the subgroup in our sample who were married and further, it may not have been observable within the time frame of our study, as spouses may qualify for such benefits after several years of marriage. Finally, any increase in individual unearned income through marriage may not necessarily translate into greater household unearned income. The lack of a difference in unearned income seemed to contribute to the lack of a significant effect for total household income.

Stronger associations were observed among men vs. women, although only some reached statistical significance. Our findings are consistent with Sansone<sup>30</sup>, who found that same-sex marriage legalization in the US was associated with higher rates of employment among both men and women, and an increase in hourly earnings among men, but not with a change in earnings among women. Stronger associations among men found in this study are also consistent with previous evidence of potentially stronger impact of marriage on earnings among men compared to women<sup>7, 10</sup>. The literature on income disparities among SM shows that income inequalities tend to impact men more than women<sup>25, 26, 41</sup>. It is therefore possible that compared to women, SM who are men may be benefiting more from SM marriage legalization and other legislation that promotes equality.

## Strengths and limitations

A strength of this study is that it assessed the temporal association between the number of years since same-sex marriage was legalized between 2004 and 2014 and outcomes measured in 2015 in a

nationally representative sample. Another strength is that unlike other studies for example based on the American Community Survey<sup>30</sup>, sexual orientation in NHIS/MEPS is identified through self-reports and was further verified by confirming the sex of the respondent's spouse. Our study is also one of the few that evaluates the association between same-sex marriage legalization and unearned income. All analyses also adjusted for county-level geographic differences in income, employment, and population demographics. In order to address the possibility that the observed associations may have also been observed in the general population reflecting underlying economic and societal patterns, we repeated all analyses using the 2015 MEPS sample of all adult respondents who did not identify as sexual minorities. The lack of significant positive associations in this sample for individual outcomes further strengthens the argument that improved outcomes among sexual minorities might be attributable to the legalization of same sex marriage. The significant negative associations between the latter and quartiled household income (for the 2nd and 4th quartiles but not the 3rd, compared to the lowest quartile) among heterosexual individuals, is difficult to interpret, given potentially significant heterogeneity in this large sample.

In spite of these strengths, this study was based on observational design and only establishes associations rather than causal pathways. Because of the relatively modest sample of only 274 respondents our analyses aggregated gay or lesbian individuals with their bisexual counterparts which may conceal important variations between these two groups which have been reported by others<sup>24</sup>.

Another limitation is that GLM findings were in some cases non-significant while, for the same outcomes (individual wage and individual total income), on the OLS findings were significant. Further, sensitivity analyses also showed some dependency, particularly of the odds of being employed, related to the selection of covariates. These inconsistencies raise questions about robustness and model dependency, and point to the potential value of repeating these analyses in larger samples of sexual minorities.

Another limitation of this study is that while we adjust for household size and whether living with same-sex partner, we do not specifically adjust for number of children in the household.

We are also not differentiating whether same-sex marriage was legalized via a court ruling vs legislative process, an important distinction which may correlate with the evolution of public attitudes in a given state. Finally, our sample excluded those who identified as 'something else' and it is possible that we undercount the true number of individuals who are sexual minorities. Each of these limitations could have an impact on the validity of our estimates.

Same-sex marriage legalization may lead to improved employment outcomes through the effect of marriage and/or cohabitation or through indirect pathways related to reduced discrimination<sup>10, 23, 24</sup>, and psychological distress<sup>27</sup>. However, the limitations of our data prevented us from explicitly distinguishing between these two pathways. Specifically, estimating a temporal mediating effect of marriage/cohabitation and outcomes would require that data on marriage/cohabitation are available prior to measuring the outcomes, rather than in the same year as in our data. For the same reason, we

were also unable to disentangle the possible reverse causality where employed and/or wealthier people may be more likely to marry. Additionally, analyzing outcomes only from one year did not allow us to employ more robust design, such as difference-in-difference estimation. Additional research using later years of MEPS data could provide a more robust test of the associations between legalization of same-sex marriage and income. Another study limitation is that we are unable to test the association between same-sex marriage legalization and economic outcomes for transgender individuals since the NHIS does not include a question on gender identity.

## Study Implications

Overall, results from this study suggest no association or a positive association between income outcomes and years of same-sex marriage legalization, with only some reaching statistical significance. Employment is associated with better health<sup>38, 39</sup> and there is overwhelming evidence that earnings and wealth strongly correlate with lower prevalence of mental and physical illnesses, better health outcomes and lower mortality<sup>39, 40</sup>. Therefore, through employment and higher income same-sex marriage legalization may result in improved socioeconomic status and, in turn, population health outcomes among sexual minorities. Employment and greater income among sexual minorities can also be expected to lead to lower healthcare utilization and costs driven by improvement in health. Finally, greater income leads to increased government tax revenue and therefore, same-sex marriage legalization may have a broader spill-over economic benefit for the overall U.S. population. These implications of legalizing same-sex marriage should be considered in discussions related to adoption of new legislation more broadly, related to sexual minority rights. Our study focused on the effect of same-sex marriage legalization only, but is consistent with earlier studies that have shown benefits associated with antidiscrimination state and local policies in the U.S.<sup>42</sup>

Beyond the U.S. same sex is still not legally recognized in most countries and as of 2020 30 countries mostly in Western Europe had legalized same sex marriage<sup>43</sup>. At the same time, LGBTQ rights organizations have grown in political and social influence globally and some same-sex marriage bills are under consideration by several governments around the World. Our findings point to the societal economic benefits that legalization of same-sex marriage may provide to sexual minorities as well as to state economies.

Future research should explore the potential role that mediators, such as human capital accumulation and the economic environment, may play in explaining the mechanisms of the associations found in this study. Future analyses using larger samples may reduce sampling uncertainty and allow stratification by race and ethnicity.

## Declarations

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## Data Availability

The data that support the findings of this study are available from The Agency for Healthcare Research and Quality, but restrictions apply to the availability of these data, which were used under license for the current study, and so are not publicly available.

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