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# Sexual orientation and sex differences in socioeconomic status: a population-based investigation in the National Longitudinal Study of Adolescent to Adult Health

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## Background

Health inequalities by sexual orientation have been widely documented in every domain of health,<sup>1–4</sup> including: violence victimisation,<sup>5–9</sup> tobacco use,<sup>10–11</sup> suicidality,<sup>12–15</sup> poor mental health<sup>16–19</sup> and healthcare barriers.<sup>20</sup> HIV/AIDS has exacted a prolonged toll on gay and bisexual men.<sup>21–22</sup> Obesity<sup>23–24</sup> and disability,<sup>2–25</sup> have, more recently, emerged as lesbian health concerns.

Socioeconomic status (SES) is a fundamental contributor to health and disease across the life course,<sup>26–28</sup> and varies by sexual orientation; however, SES is often treated as a statistical control and is rarely discussed as a potential mediator of health inequities experienced by sexual minorities (SM). Inadequate economic resources are associated with poor health<sup>28–32</sup> through both material and psychosocial pathways that increase exposure to hazards and decrease exposure to health-promoting resources.<sup>26–33</sup> Consistent with a socioeconomic gradient in health, several,<sup>25–34–35</sup> but not all,<sup>2</sup> population-based studies report higher rates of poverty among SM compared with heterosexuals. Yet, these findings vary by sex,<sup>25–34</sup> sexual orientation,<sup>25–34–35</sup> selection of statistical controls<sup>34</sup> and place.<sup>2–25–35</sup> For instance, nationally, higher poverty rates were found among female same-sex couples than among married different-sex couples, whereas, among males, poverty rates were lower among same-sex couples.<sup>34</sup> However, after adjusting for education, employment and demographic characteristics, poverty rates were *higher* for same-sex male couples compared with married different-sex couples.<sup>34</sup>

In addition to variability in findings that used income-based measures of economic status, peer-reviewed research has yet to examine sexual orientation differences in assets, financial hardship and subjective social status—aspects of SES that have been linked to health in general population samples.<sup>28–30–36–38</sup> Understanding the breadth and nature of sexual orientation differences in SES is essential to reducing health inequities, particularly as the size of the SM population grows<sup>39</sup> and ages. The current study addresses these gaps in knowledge and examines a comprehensive array of SES indicators across sexual orientation groups, separately by sex, in a large, population-based sample.

## Methods

### Sample

The National Longitudinal Study of Adolescent to Adult Health (Add Health) is a nationally representative, longitudinal study of US adolescents initiated in 1994 and conducted by the Carolina Population Center at the University of North Carolina. In the 1994–1995 academic year, a total of 20 745 adolescents enrolled in grades 7–12 completed baseline in-home surveys. Add Health, whose methods have been well-described elsewhere,<sup>40</sup> is currently in the field with the wave V survey. The current study focused on outcomes measured in the young adulthood/wave IV survey, conducted in 2008–2009 when respondents were aged 24–34 years. Eligibility for the current cross-sectional study was limited to those who completed baseline and wave IV surveys (n=15 701; 80.3% of original baseline sample) and for whom a wave IV sampling survey weight was available (n=14 800). Missingness due to the lack of a Wave I sampling weight was administrative in nature,<sup>41</sup> and thus, was ignorable<sup>42</sup> in relation to the analyses presented in this manuscript. The final analytic sample included 14 051 respondents (93.7% weighted, of those eligible) who provided data on sexual orientation and covariates.

### Measures

#### *Sexual orientation*

Sexual orientation identity was embedded in the computer-assisted self-interviewing portion of the interview which has been shown to increase disclosure of 'sensitive' subject matter.<sup>43</sup> Respondents who selected *bisexual, mostly homosexual or 100% homosexual* options as their sexual orientation identity at wave IV were classified as SM while those who selected *100%*

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*heterosexual* were classified as heterosexual. Self-reported *mostly heterosexuals* (n=1368) were classified as sexual minorities if they reported one or more lifetime same-sex sexual partners (n=528); otherwise, they were grouped with heterosexuals (n=840).

Prior to grouping all SM, we conducted a sensitivity analysis to determine whether bisexually identified individuals should be grouped with other SM (vs treated separately) given that bisexuals in Washington state and Massachusetts<sup>25 35</sup> were found to have the lowest SES of all sexual orientation groups. In multi-variable regressions, we observed that the pattern (direction and magnitude of associations between sexual orientation and SES indicators) was similar in models that included and excluded bisexuals (n=214). Consequently, we created one SM group.

## Sex

Respondents were classified as male or female based on their responses to a wave I question, "What is your sex?"

## Wave IV SES

Educational attainment was parameterised as <high school (HS)/ graduate equivalence degree (GED), HS/GED, some college or vocational education and ≥bachelor's degree. Wave IV employment status was coded as currently employed (10 or more hours per week for pay), unemployed, homemaker, student and other (not employed due to disability, temporary parental leave, activity military service or incarceration). Personal income in the prior year, before taxes and deductions and including non-legal sources, was categorised as <US\$10 000, US\$10 000– US\$24 999, US\$25 000–US\$49 999 and ≥US\$50 000. Respondent-reported annual household income and size were used to create an ordinal measure of percentage poverty. Annual household income, also collected categorically, was recoded to the mid-point for each income range or, for those who selected the highest category (≥US\$150 000), to the 95% percentile of 2007 annual family income (US\$197 216).<sup>44</sup> Recoded income was divided by size-specific poverty thresholds<sup>45</sup> to obtain percentage of the federal poverty level (FPL) (ie, the 'income- to-needs ratio').<sup>46</sup>

Receipt of public assistance in adulthood was indicated if the respondent, or anyone in their household, had received public assistance, welfare payments or food stamps since their last interview in 1995 (wave II) or 2001–2002 (wave III). Economic hardship in the prior 12 months was indicated by endorsement of any of six indicators, created for Add Health, unless otherwise noted. These were: went without phone service, did not pay full amount of the rent or mortgage, did not pay full gas, electricity or oil bill, evicted from house or apartment, had gas/electricity/ oil utility service shut off or were worried whether food would run out before being able to buy more because they did not have enough money.<sup>47</sup> Current homeownership was indicated by a yes to the question, "Is your house, apartment, or residence owned or being bought by (YOU AND/OR YOUR SPOUSE/ PARTNER)?" The MacArthur Scale of Subjective Social Status SES Ladder<sup>48</sup> was used to assess subjective social status. Respondents were asked to indicate where they fell on a ladder from 1 to 10 (1 being 'the people who have the least money and education, and the least respected jobs or no job') relative to other people in the USA.

## Covariates

A number of self-reported sociodemographic characteristics, associated with both sexual orientation and SES, were treated as potential confounders. These included: age (24–27, 28–29, 30–34 years) and wave I race-ethnicity, which was coded hierarchically as any Hispanic ethnicity, black, Asian or Pacific Islander or American Indian or self-reported 'other' race and white. Parental education at wave I was defined as the highest attainment obtained by a parent/guardian (less than a HS diploma, HS or GED, some college, vocational school or post-HS training, >bachelor's degree) as reported by the respondent or the parent/guardian. Receipt of public assistance in childhood was indicated if anyone in the household received 'public assistance, welfare payments or food stamps' before the respondent was 18. Data were collected at wave III or at wave IV if wave III data were missing. Wave IV Census region (Northeast, Midwest, South, West) and wave IV urbanicity were based on the respondent's Census tract. Census tracts with density below 1000 people/square mile, as per 2009 American Community Survey 5-year estimates, were characterised as rural<sup>49</sup>; all others were categorised as urban.

## Statistical Analysis

Descriptive analyses were conducted to compare the distribution of SES indicators and covariates across sexual orientation groups separately by sex (table 1). Sex-stratified multinomial and binary logistic regression models were fit for each SES indicator to generate relative risk ratios (probability ratios) or ORs, respectively, using the following model-building approach: a) crude (model 1 as shown in table 2); b) adjusted for covariates (age, race-ethnicity, highest parental education, receipt of public assistance <age 18 years, urbanicity and Census region (model 2), c) adjusted for education plus all covariates (model 3) and d) adjusted for employment status, education, plus all covariates (model 4). This model-building approach allowed us to examine associations between sexual orientation and SES, with and without adjustment for education and employment status. In order to provide information about the SES distribution of each sexual orientation group, adjusting for potential confounders, but not accounting for factors on the casual pathway (ie, education and employment status), predicted probabilities (categorical outcomes) and average values (continuous outcome) for each SES indicator were computed separately by sexual orientation using the *margins* command in STATA, following model 2 and reported in table 3.

In order to explore potential effect modification by racial minority status (operationalised as black or Latino) versus the dominant group (white, non-Hispanic), SM by racial minority interaction terms were added to model 2 regressions.

**Table 1** Demographic and socioeconomic characteristics of wave IV National Longitudinal Study of Adolescent to Young Adult Health participants (n=14 051) by sexual orientation and sex

	Females (n=7518)						P values	Males (n=6533)						P values
	All		heterosexual (n=6757)		sexual minority (n=761)			All		heterosexual (n=6238)		sexual minority (n=295)		
	n	%	n	%	n	%		n	%	n	%	n	%	
<b>demographics</b>														
Age (years), wave IV														
24–27	2428	38.2	2134	37.5	294	43.9	<0.001	1816	34.4	1737	34.5	79	32.0	0.85
28–29	2810	34.3	2516	33.9	294	37.7		2460	33.4	2340	33.4	120	34.6	
30–34	2280	27.5	2107	28.6	173	18.4		2257	32.2	2161	32.1	96	33.4	
Race-ethnicity, wave IV*														
White, non-Hispanic	3994	66.5	3559	66.2	435	69.6	0.27	3573	66.6	3420	66.7	153	64.6	0.15
Hispanic	1182	11.4	1077	11.4	105	11.4		1057	12.0	992	11.8	65	17.3	
Black, non-Hispanic	1717	16.0	1553	16.4	164	12.5		1264	14.7	1211	14.8	53	12.4	
Other, non-Hispanic	625	6.1	568	6.0	57	6.5		639	6.7	615	6.8	24	5.7	
Parental education, wave I														
<HS diploma	984	12.0	894	12.0	90	12.2	0.84	764	11.9	725	11.8	39	14.1	0.09
HS diploma/GED	1936	28.0	1734	28.0	202	28.3		1598	26.5	1519	26.5	79	25.4	
Some college or vocational school	2155	29.3	1933	29.1	222	30.8		1949	30.4	1878	30.8	71	21.9	
≥Bachelor's degree	2443	30.7	2196	30.9	247	28.7		2222	31.2	2116	30.8	106	38.6	
Number of household members, including respondent (mean)	3.34		3.35		3.24		0.21	3.06		3.08		2.57		<0.001
Received household assistance before age 18 years, wave III or IV	1413	18.6	1220	17.8	193	26.1	<0.001	1073	17.1	1016	17.1	57	17.9	0.31
Urbanicity, wave IV†														
Rural	3871	57.3	3517	57.7	354	53.8	0.17	3327	55.1	3214	55.6	113	43.9	0.013
Urban	3647	42.7	3240	42.3	407	46.2		3206	44.9	3024	44.4	182	56.1	
Geographic region, wave IV														
Northeast	957	13.0	863	13.0	94	12.9	0.40	766	12.8	717	12.5	49	17.9	0.25
Midwest	1726	29.2	1536	29.1	190	30.2		1504	27.6	1450	27.5	54	28.3	
South	3065	40.6	2775	41.0	290	37.3		2662	42.0	2544	42.3	118	35.6	
West	1770	17.2	1583	16.9	187	19.7		1601	17.7	1527	17.7	74	18.3	
<b>socioeconomic status</b>														
Educational attainment														
<HSDiploma or GED	437	7.1	363	6.5	74	12.5	<0.001	574	9.7	553	9.8	21	7.6	0.004
HS diploma or GED	985	13.6	884	13.5	101	14.7		1225	21.2	1194	21.7	31	10.5	
Some college or vocational education	3345	44.4	2942	43.7	403	51.0		2863	41.4	2733	41.3	130	44.3	
≥Bachelor's degree	2751	34.8	2568	36.3	183	21.8		1871	27.6	1758	27.2	113	37.6	
Wave IV employment status‡														
Employed	5829	76.7	5282	77.4	547	70.2	0.002	5589	84.8	5333	84.9	256	84.6	0.04
Unemployed	417	5.5	343	5.1	74	9.4		454	7.0	439	7.1	15	5.5	
Homemaker	686	9.9	616	9.7	70	11.2		18	0.2	16	0.2	§	§	
Student	248	3.5	223	3.5	25	3.4		145	2.1	136	2.1	9	3.9	
Other	338	4.4	293	4.2	45	5.8		327	5.8	314	5.8	4.7	13	
Personal income														
<US\$10 000	1663	24.1	1478	23.9	185	26.1	<0.001	685	11.5	651	11.3	44	16.3	0.04
US\$10 000–US\$24 999	1781	25.0	1536	24.1	245	32.6		1147	18.6	1081	18.4	66	24.0	
US\$25 000–US\$49 999	2814	37.5	2585	38.3	229	29.9		2688	41.3	2566	41.4	122	39.0	
≥US\$50 000	1109	13.4	1018	13.7	91	11.4		1881	28.6	1824	28.9	57	20.7	
Poverty-to-income needs ratio														

**Table 1 Continued**

	Females (n=7518)						P values	Males (n=6533)						P values
	All		heterosexual (n=6757)		sexual minority (n=761)			All		heterosexual (n=6238)		sexual minority (n=295)		
	n	%	n	%	n	%		n	%	n	%	n	%	
<100%	834	13.0	732	12.8	102	14.1	0.04	457	8.5	427	8.4	30	10.8	0.75
100%–199%	1097	15.3	949	14.8	148	19.9		802	13.7	775	13.7	27	12.3	
200%–299%	1581	22.0	1422	22.0	159	22.3		1299	21.0	1250	21.1	49	18.1	
300%–399%	903	12.3	824	12.5	79	19.0		858	13.5	809	13.4	49	15.4	
≥400%	2656	37.3	2432	37.9	224	32.8		2699	43.4	2576	43.4	123	43.5	
Received public assistance since last interview	2071	29.0	1799	28.0	272	37.2	<0.001	1093	18.7	1042	18.7	51	19.9	0.53
Any economic hardship, past 12 months	1988	27.2	1707	26.0	291	37.2	<0.001	1389	22.4	1312	22.1	77	27.5	0.11
Home ownership	3172	44.8	2949	46.2	224	32.2	<0.001	2625	40.0	2554	40.7	71	23.7	<0.001
Subjective social status (mean)¶	4.97		5.02		4.59		<0.001	5.01		5.02		4.95		0.66

All n are unweighted counts. Percentages are weighted and reflect column percentages within sex and sexual orientation groups and may not sum to 100 due to rounding.

Design-based F-statistic of association between sexual orientation and covariate within each sex group unless otherwise noted.

\*Other, non-Hispanic includes Asian, Pacific Islander, American Indian and self-reported 'other' race.

†Urbanicity was defined using the population density of respondent's Census tract: rural defined as fewer than 1000 people/square mile; urban defined as 1000 people or more/square mile.

‡'Other employment' includes on disability, temporary parental leave, active military and incarcerated respondents.

¶Subjective social status on scale from 1 to 10, indicating where the respondent believed they fell relative to other people in the USA, with 1 being 'the people who have the least money and education and the least respected jobs or no job'.

§Cell size too small to report (eg, n≤3), per Add Health reporting requirements.

GED, graduate equivalence degree; HS, high school.

Because the 'other' racial-ethnic group was small and heterogeneous in terms of racial-ethnic identity, SES and group histories of racism, it was excluded from these analyses. The presence of a statistically significant interaction term at an alpha of 0.10 was used to determine the presence of possible effect modification (see online supplementary table A). Predicted probabilities were computed separately by sex, sexual orientation and racial minority/majority status and graphed for SES indicators where the association between sexual orientation and SES appeared to vary across racial minority/majority status. All analyses were conducted in STATA V.14.50 incorporating Add Health sampling weights and adjusting for the complex sampling design.

## Results

Characteristics of the analytic sample are presented in table 1. Most (92.7% weighted) of the respondents aged 24–34 years were heterosexual; however, 7.3% of respondents were categorised as SM because they reported *bisexual, mostly homosexual* or *100% homosexual* identities or reported one or more life-time same-sex sexual partners (if *mostly heterosexual*). A higher proportion of females (10.5%, n=761) were classified as SM than males (4.2%, n=295).

### Females

Among females, SM were over-represented among those who did not complete an HS or GED and were under-represented among those who completed >bachelor's degree compared with heterosexual females (table 1). Most females, across sexual orientation groups, were employed; however, SM females were somewhat under-represented among the employed and over-represented among the unemployed. SM females were slightly over-represented in the group reporting <US\$25 000 in personal annual income, as well as in the near poor (100%–199% FPL) and highest (≥400% FPL) economic status groups. SM females were also more likely to report receipt of public assistance since the last interview, as well as economic hardship in the prior year, compared with heterosexual peers. They were also less likely to be homeowners and reported lower mean subjective social status scores.

After adjusting for covariates, the risk of completing ≤bachelor's degree was significantly higher for SM females relative to heterosexual peers (table 2, model 2). In fact, the risk of not completing HS was three and a half times greater (relative risk ratio (RRR), 3.5, 95% CI 2.3 to 5.4), and the risk of completing a HS/GED or some college was twice as great (RRR 2.1, 95% CI 1.4 to 3.2; RRR 2.1, 95% CI 1.6 to 2.9, respectively). SM females were also more likely to be unemployed (RRR 2.2, 95% CI 1.5 to 3.3), to earn US\$10 000–US\$25 000 vs ≥US\$50 000 in the prior year (RRR 1.5, 95% CI 1.1 to 2.1), and to be near poor (100%–199% FPL; RRR 1.6, 95% CI 1.1 to 2.2) versus at ≥400% FPL. The odds of reporting public assistance since the last interview (OR 1.5, 95% CI 1.2 to 1.8) and any economic hardship in the prior year (OR 1.7, 95% CI 1.4 to 2.1) were elevated, while the odds of homeownership (OR 0.6, 95% CI 0.4 to 0.7) were reduced among minority versus heterosexual females. Subjective social status scores were an average of 0.4 points (95% CI –0.5 to –0.2) lower among SM females. Adjusting for respondent education (model 3) attenuated employment, receipt of public assistance and income-based indicators of SES; however, unemployment, homeownership, economic hardship and subjective social status remained statistically significantly different between SM and heterosexual females. Further adjustment for employment status (model 4) did not alter the pattern of results.

Among females, the association between sexual orientation and SES varied across racial minority versus majority groups for homeownership ( $F=3.80$ ,  $df(1, 128)$ ,  $p=0.053$ ) (figure 1). Differences in rates of homeownership by sexual orientation appeared larger among whites (38.5% SM vs 53.2% heterosexual) than among racial minorities (24.7% SM vs 30.4% heterosexual). Notably, rates of homeownership were lower among racial minorities and were the lowest among racial minority SM females.

**Table 2** Sex-stratified regression analyses of associations between sexual orientation and socioeconomic status among wave IV National Longitudinal Study of Adolescent to Young Adult Health participants (n=14051)

	Model 1		Model 2		Model 3		Model 4	
	Point estimate	95% CI	Point estimate	95% CI	Point estimate	95% CI	Point estimate	95% CI
<b>Females (n=7518)</b>								
Respondent educational attainment, RRR (n=7518)								
<HSDiploma or GED	3.20***	(2.23 to 4.58)	3.50***	(2.27 to 5.38)				
HS diploma or GED	1.82**	(1.23 to 2.68)	2.12***	(1.40 to 3.20)				
Some college	1.95***	(1.48 to 2.56)	2.14***	(1.60 to 2.86)				
≥Bachelor's degree	Referent		Referent					
Employment status, RRR (n=7518)								
Employed	Referent		Referent		Referent			
Unemployed	2.05***	(1.38 to 3.04)	2.22***	(1.51 to 3.26)	1.92**	(1.29 to 2.85)		
Homemaker	1.27	(0.90 to 1.80)	1.19	(0.85 to 1.67)	1.04	(0.74 to 1.46)		
Student	1.06	(0.62 to 1.79)	0.98	(0.57 to 1.67)	0.94	(0.55 to 1.60)		
Other	1.52	(0.95 to 2.41)	1.50	(0.93 to 2.42)	1.32	(0.82 to 2.13)		
Personal income, RRR (n=7367)								
<US\$10 000	1.31	(0.93 to 1.83)	1.28	(0.90 to 1.81)	0.86	(0.57 to 1.29)	0.78	(0.49 to 1.25)
US\$10 000–US\$24 999	1.62**	(1.16 to 2.26)	1.51*	(1.09 to 2.11)	1.08	(0.74 to 1.57)	1.06	(0.74 to 1.52)
US\$25 000–\$49 999	0.93	(0.66 to 1.32)	0.91	(0.64 to 1.29)	0.75	(0.52 to 1.10)	0.76	(0.53 to 1.11)
≥ US\$50 000	Referent		Referent		Referent		Referent	
Poverty-to-income needs ratio, RRR (n=7071)								
<100%	1.27	(0.96 to 1.66)	1.32	(0.96 to 1.83)	0.89	(0.63 to 1.27)	0.83	(0.57 to 1.21)
100%–199%	1.55*	(1.09 to 2.19)	1.55*	(1.07 to 2.23)	1.17	(0.81 to 1.68)	1.15	(0.79 to 1.68)
200%–299%	1.17	(0.89 to 1.53)	1.18	(0.89 to 1.57)	0.95	(0.72 to 1.25)	0.95	(0.71 to 1.25)
300%–399%	1.00	(0.70 to 1.44)	0.99	(0.69 to 1.43)	0.88	(0.61 to 1.27)	0.89	(0.62 to 1.28)
≥400%	Referent		Referent		Referent		Referent	
Received public assistance since last interview, OR (n=7511)	1.52***	(1.23 to 1.88)	1.47***	(1.18 to 1.84)	1.22	(0.98 to 1.52)	1.18	(0.93 to 1.49)
Any economic hardship past 12 months, OR (n=7513)	1.69***	(1.35 to 2.10)	1.70***	(1.36 to 2.14)	1.46**	(1.15 to 1.85)	1.42**	(1.11 to 1.81)
Homeowner, OR (n=7510)	0.55***	(0.43 to 0.71)	0.56***	(0.44 to 0.72)	0.61***	(0.48 to 0.79)	0.62***	(0.48 to 0.81)
Subjective social status, β (n=7503)	-0.43***	(-0.61 to -0.26)	-0.36***	(-0.53 to -0.20)	-0.20*	(-0.35 to -0.04)	-0.16*	(-0.31 to -0.01)
<b>Males (n=6533)</b>								
Respondent educational attainment, RRR (n=6533)								
<HSDiploma or GED	0.56	(0.29 to 1.06)	0.51	(0.24 to 1.07)				
HS diploma or GED	0.35**	(0.20 to 0.63)	0.35**	(0.19 to 0.63)				
Some college	0.78	(0.50 to 1.20)	0.82	(0.53 to 1.26)				
≥Bachelor's degree	Referent		Referent					
Employment status, RRR (n=6533)								
Employed	Referent		Referent		Referent			
Unemployed	0.79	(0.39 to 1.59)	0.82	(0.40 to 1.68)	0.91	(0.44 to 1.87)		
Homemaker	†	†	†	†	†	†		
Student	1.89	(0.81 to 4.37)	1.81	(0.74 to 4.45)	1.62	(0.68 to 3.85)		
Other	0.81	(0.39 to 1.68)	0.83	(0.40 to 1.72)	0.90	(0.43 to 1.87)		
Personal income, RRR (n=6401)								
<US\$10 000	2.00*	(1.10 to 3.66)	2.22*	(1.18 to 4.20)	2.79**	(1.44 to 5.37)	2.87**	(1.40 to 5.87)
US\$10 000–US\$24 999	1.81*	(1.07 to 3.07)	2.10*	(1.18 to 3.74)	2.60**	(1.42 to 4.74)	2.48**	(1.29 to 4.75)
US\$25 000–US\$49 999	1.32	(0.81 to 2.13)	1.41	(0.86 to 2.33)	1.55	(0.93 to 2.61)	1.55	(0.92 to 2.62)
≥US\$50 000	Referent		Referent		Referent		Referent	
Poverty-to-income needs ratio, RRR (n=6115)								

<100%	1.28	(0.75 to 2.18)	1.39	(0.74 to 2.61)	1.81	(0.93 to 3.52)	1.82	(0.91 to 3.62)
100%–199%	0.89	(0.43 to 1.83)	0.95	(0.43 to 2.09)	1.13	(0.48 to 2.63)	1.11	(0.46 to 2.66)
200%–299%	0.86	(0.53 to 1.40)	0.92	(0.56 to 1.54)	1.05	(0.59 to 1.87)	1.04	(0.58 to 1.87)

**Table 2 Continued**

	Model 1		Model 2		Model 3		Model 4	
	Point estimate	95% CI	Point estimate	95% CI	Point estimate	95% CI	Point estimate	95% CI
300%–399%	1.14	(0.69 to 1.88)	1.22	(0.74 to 2.01)	1.33	(0.79 to 2.22)	1.31	(0.78 to 2.21)
≥400%	Referent		Referent		Referent		Referent	
Received public assistance since last interview, OR (n=6524)	1.08	(0.70 to 1.66)	1.14	(0.72 to 1.81)	1.30	(0.81 to 2.07)	1.28	(0.81 to 2.03)
Any economic hardship past 12 months, OR (n=6523)	1.33	(0.94 to 1.91)	1.39+	(0.97 to 2.00)	1.56*	(1.08 to 2.27)	1.56*	(1.07 to 2.28)
Homeowner, OR (n=6524)	0.45***	(0.32 to 0.63)	0.45***	(0.32 to 0.63)	0.41***	(0.29 to 0.58)	0.42***	(0.30 to 0.60)
Subjective social status, β (n=6519)	-0.06	(-0.34 to 0.22)	-0.13	(-0.42 to 0.16)	-0.24	(-0.52 to 0.05)	-0.24+	(-0.52 to 0.04)

Model 1: crude/bivariate association between sexual orientation (sexual minority relative to sexual majority (referent)) and socioeconomic outcome variable in column 1.

Model 2: adjusted for age, race-ethnicity, parental educational attainment at wave I, receipt of public assistance prior to age 18 years, wave IV urbanicity; wave IV Census region.

Model 3: adjusted for all model 2 covariates and respondent educational attainment.

Model 4: adjusted for all model 3 covariates and wave IV employment status.

\*P<0.05; \*\*p<0.01; \*\*\*p<0.001.

†Results not reported due to small cell size/instability of estimates.

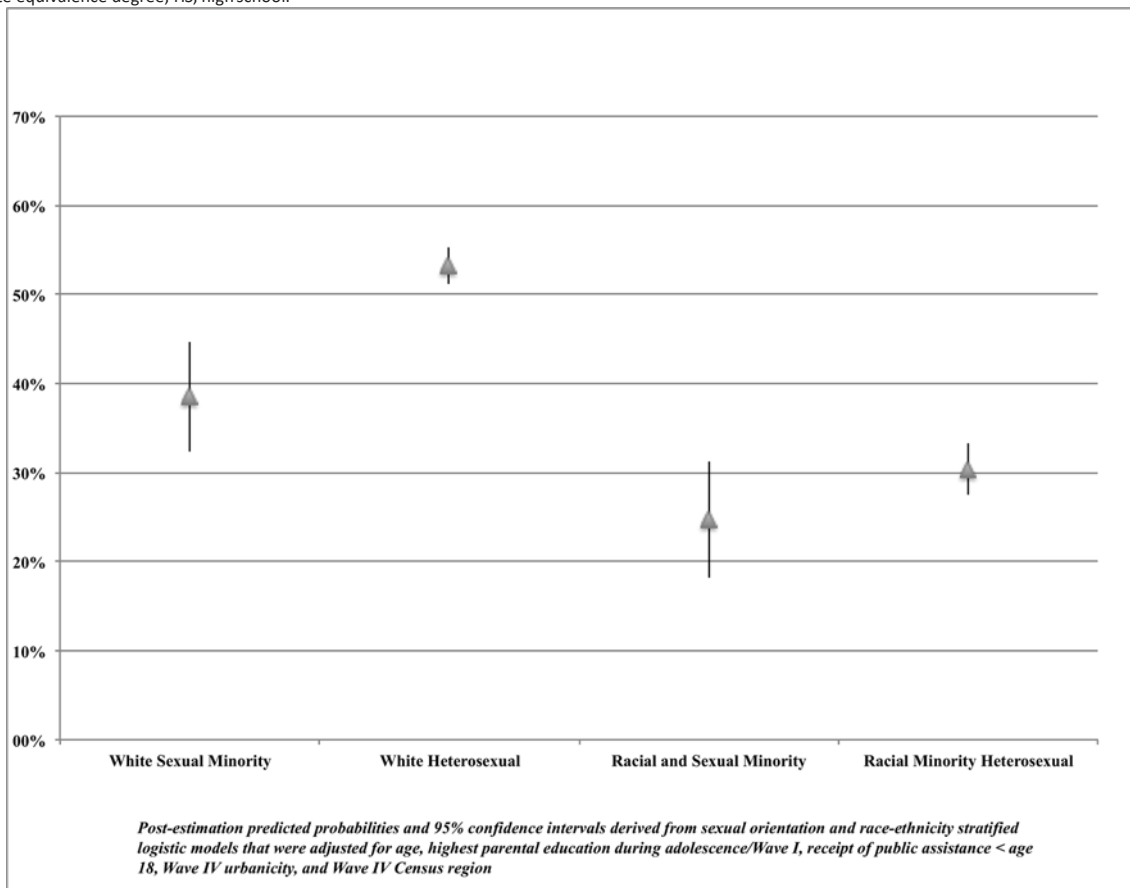
GED, graduate equivalence degree; HS, high school; RRR, relative risk ratio.

**Table 3 Sex-stratified fitted\*probabilities of socioeconomic outcomes by sexual orientation among wave IV National Longitudinal Study of Adolescent to Young Adult Health participants (n=14 051)**

	Females (n=7518)				Males (n=6533)			
	heterosexual (n=6757)		sexual minority (n=761)		heterosexual (n=6238)		sexual minority (n=295)	
	Point estimate	95% CI	Point estimate	95% CI	Point estimate	95% CI	Point estimate	95% CI
<b>Educational attainment</b>								
<HSDiploma or GED	6.5%	(5.5 to 7.4)	11.1%	(8.1 to 14.0)	10.1%	(8.9 to 11.3)	8.0%	(3.5 to 12.4)
HS diploma or GED	13.5%	(12.0 to 14.9)	14.9%	(11.3 to 18.5)	21.9%	(19.9 to 23.9)	11.2%	(6.4 to 16.1)
Some college	43.6%	(41.7 to 45.6)	51.1%	(46.2 to 56.0)	41.1%	(38.9 to 43.2)	46.6%	(38.4 to 54.8)
≥Bachelor's degree	36.4%	(34.1 to 38.8)	22.9%	(18.4 to 27.5)	26.9%	(24.7 to 29.2)	34.2%	(26.6 to 41.8)
<b>Employment status</b>								
Employed	77.5%	(76.1 to 78.9)	70.6%	(66.3 to 75.0)	84.7%	(83.1 to 86.3)	84.0%	(78.5 to 89.5)
Unemployed	5.0%	(4.3 to 5.8)	10.0%	(7.0 to 13.0)	7.2%	(6.0 to 8.4)	5.9%	(2.0 to 9.7)
Homemaker	9.8%	(8.7 to 10.8)	10.5%	(7.7 to 13.3)	Not reported due to small cell size			
Student	3.5%	(2.9 to 4.2)	3.2%	(1.5 to 4.8)	2.1%	(1.6 to 2.5)	3.7%	(0.7 to 6.7)
Other	4.2%	(3.5 to 4.8)	5.7%	(3.4 to 8.0)	5.9%	(4.8 to 7.0)	4.9%	(1.7 to 8.1)
<b>Personal income</b>								
<US\$10 000	23.7%	(22.2 to 25.3)	26.0%	(21.9 to 30.0)	11.5%	(10.0 to 13.1)	16.3%	(10.4 to 22.3)
US\$10 000–US\$24 999	24.0%	(22.6 to 25.3)	31.1%	(26.5 to 35.7)	18.8%	(17.2 to 20.4)	25.5%	(18.4 to 32.7)
US\$25 000–US\$49 999	38.4%	(36.7 to 40.1)	30.5%	(25.7 to 35.3)	41.3%	(39.3 to 43.2)	38.8%	(31.4 to 46.1)
≥US\$50 000	13.9%	(12.5 to 15.2)	12.4%	(9.2 to 15.7)	28.4%	(26.5 to 30.4)	19.4%	(12.5 to 26.3)
<b>Poverty-to-income needs ratio</b>								
<100%	12.6%	(11.4 to 13.9)	13.9%	(10.8 to 16.9)	8.7%	(7.5 to 9.9)	11.5%	(6.6 to 16.4)
100%–199%	14.8%	(13.6 to 16.0)	19.4%	(15.4 to 23.5)	14.1%	(12.6 to 15.5)	12.7%	(5.6 to 19.9)
200%–299%	22.1%	(20.7 to 23.5)	22.4%	(18.5 to 26.2)	21.1%	(19.5 to 22.6)	18.8%	(12.6 to 25.0)
300%–399%	12.5%	(11.3 to 13.7)	10.8%	(8.0 to 13.6)	13.2%	(12.0 to 14.4)	15.5%	(9.3 to 21.8)
≥400%	38.0%	(35.7 to 40.2)	33.5%	(28.8 to 38.3)	42.9%	(40.5 to 45.3)	41.5%	(32.6 to 50.4)
Received public assistance since last interview	27.8%	(25.8 to 29.8)	34.9%	(30.3 to 39.5)	19.0%	(17.2 to 20.8)	20.9%	(14.4 to 27.5)
Any economic hardship past 12 months	25.9%	(24.0 to 27.7)	36.3%	(32.1 to 40.5)	22.4%	(20.9 to 23.9)	28.4%	(21.5 to 35.3)
Homeowner	46.4%	(44.7 to 48.1)	33.9%	(29.1 to 38.7)	40.3%	(38.3 to 42.2)	24.2%	(18.4 to 30.0)

Subjective social status (mean) 5.02 (4.95 to 5.10) 4.66 (4.49 to 4.83) 5.00 (4.93 to 5.08) 4.88 (4.60 to 5.15)

\*Adjusted for age, race-ethnicity, parental educational attainment at wave I, receipt of public assistance prior to age 18 years, wave IV urbanicity; wave IV Census region. GED, graduate equivalence degree; HS, high school.



**Figure 1** Predicted probability of homeownership by sexual orientation and race-ethnicity among females in the wave IV National Longitudinal Study of Adolescent to Young Adult Health sample (n=6989).

### Males

A larger proportion of SM males completed  $\geq$  bachelor's degree compared with heterosexual males (table 1). The vast majority of males (approximately 85%) were employed across sexual orientation groups. SM males were over-represented at lower levels of personal income, but did not statistically significantly differ on the household-size adjusted poverty-to-income needs ratio. SM males were less likely to be homeowners than their heterosexual peers.

After adjusting for covariates (table 2, model 2), the risk of having an HS/GED compared with  $\geq$  bachelor's degree was significantly lower (RRR 0.4, 95% CI 0.2 to 0.6) for SM males than heterosexual males. SM males were also more likely to earn <US\$10 000 (RRR 2.2, 95% CI 1.2 to 4.2) and US\$10 000–US\$25 000 (RRR 2.1, 95% CI 1.2 to 3.7) vs  $\geq$ US\$50 000 in the prior year than heterosexual males. The odds of homeownership (OR 0.4, 95% CI 0.3 to 0.6) were considerably lower among SM males. Adjusting for respondent education (model 3) magnified these inequities, indicating that, given high levels of education, SM males, on average, have fewer economic resources than expected and are at increased risk of economic hardship (OR 1.6, 95% CI 1.1 to 2.3.) Adjustment for employment status (model 4) did not alter the pattern of results.

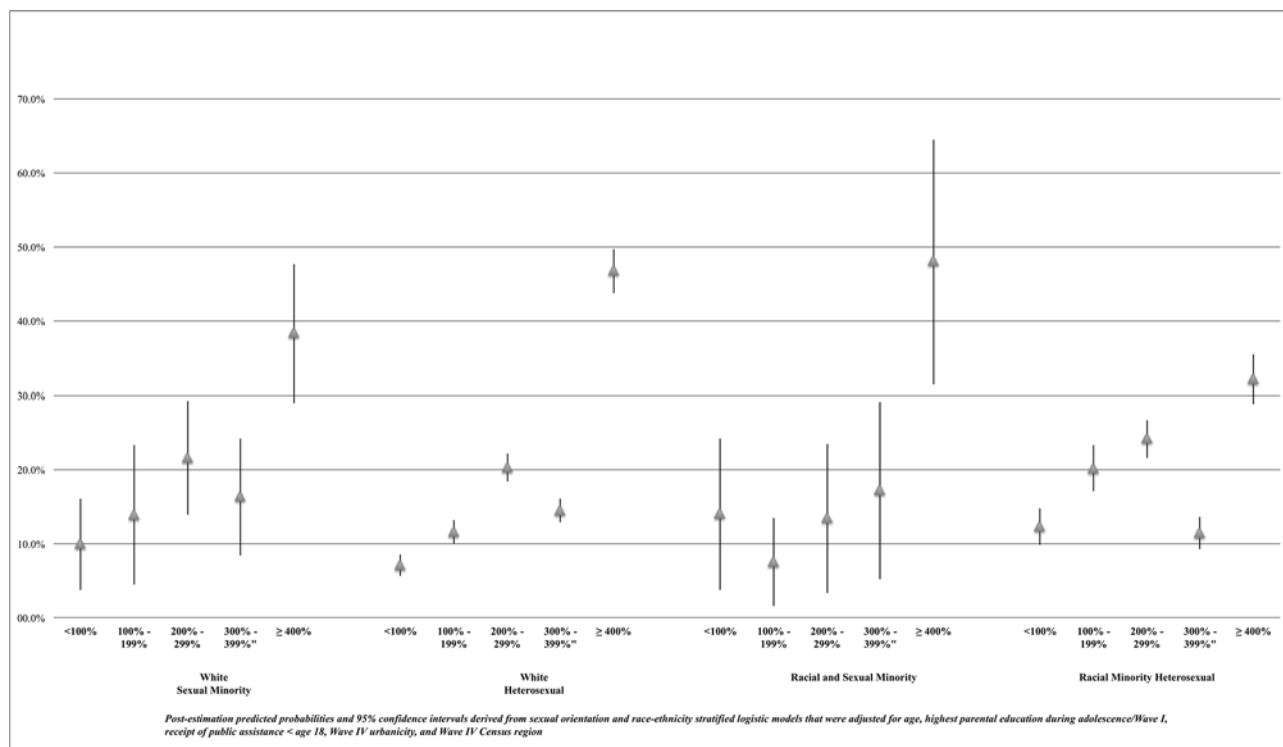
Among males, the association between sexual orientation and SES varied across racial minority versus majority groups for employment status ( $F=132.84$ ,  $df(4, 128)$ ,  $p<0.001$ ) and household poverty ( $F=2.43$ ,  $df(4, 128)$ ,  $p=0.0514$ ) (figure 2). Since most males, across sexual orientation and racial minority/majority groups, were employed (81.3%–85.0%), the other employment status categories included relatively few respondents and thus CIs around these estimates were quite wide. For instance, the predicted probability of unemployment was 4.0% (95% CI 0.5 to 7.5) for SM white males, 5.9% (95% CI 4.6 to 7.3) for heterosexual white males, 7.5% (95% CI –0.8 to 15.7) for racial minority SM males and 9.6% (95% CI 7.3 to 11.9) for racial minority heterosexual males. Given the instability of these estimates, and the lack of a clear pattern to report, no figure is included for employment. In contrast, the pattern observed for household poverty was clearer. The association between sexual orientation and household poverty was reversed across race, such that SM racial minority men were more likely to be living at  $\geq 400\%$  FPL than racial minority heterosexual men (48.0% vs 32.1%, respectively), whereas SM white men were less likely to be in the highest economic status group than their heterosexual white male counterparts (38.3% vs 46.7%, respectively).



## Discussion

Socioeconomic inequities were observed among SM, particularly females, in the population-based Add Health sample. SM females were less likely to complete  $\geq$ bachelor's degree, were more likely to be unemployed, to be near poor, to receive public assistance and to report economic hardship. They also reported lower subjective social status, which is unsurprising given that their objective SES was lower than that of heterosexual women and of SM men in this study.

Many of the observed economic inequities among women appeared to be related to differences in educational attainment.



**Figure 2** Predicted probability of poverty-to-income needs ratio by sexual orientation and race-ethnicity among males in the wave IV National Longitudinal Study of Adolescent to Young Adult Health sample (n=5896).

Economic inequities were attenuated after adjusting for education—suggesting that promoting the achievement of SM girls and young women may serve to reduce economic inequalities— regardless of the temporal ordering between educational completion and the expression of SM status. Proximal or ‘midstream’ factors that may underlie this gap include sexual victimisation,<sup>6</sup> unplanned pregnancy<sup>51,52</sup> and differential discipline in secondary schools,<sup>53</sup> all of which are more common among SM women, and all of which are inversely associated with education.

Fewer significant sexual orientation differences in economic status emerged among males, which may be due to higher levels of education among minority males. In contrast to the pattern observed among females, SM males were more likely to complete college. This was an unexpected finding given that SM men report higher rates of school harassment than their heterosexual peers.<sup>54,55</sup> One potential explanation for this pattern may include an investment in academic achievement among SM males as a way to garner positive attention.<sup>56</sup> However, SM males were more likely to report lower personal incomes, and, after accounting for higher levels of education, were more likely to report economic hardship in the previous year, than their heterosexual counterparts. This pattern, observed previously in Add Health,<sup>57</sup> and as reported in a recent meta-analysis,<sup>58</sup> suggests that SM males experience wage discrimination.

Given the relationship between household composition and size-adjusted household economic status, post hoc descriptive analyses of household composition were conducted. SM females were more likely to live with a same-sex romantic partner (9% vs 0%) or with others (eg, relatives, roommates) (33.0% vs 27.1%) than with a different-sex partner (49.3% vs 63.8%) and were as likely to live alone (8.7% and 9.2%, respectively) as heterosexual women. A large, but somewhat smaller (55.9% vs 62.6%) proportion of SM females were living with a son/daughter under the age of 18 as compared with heterosexual women. These data suggest that lower personal incomes among SM women are the likely driver of their over-representation among the near-poor rather than differences in household composition.

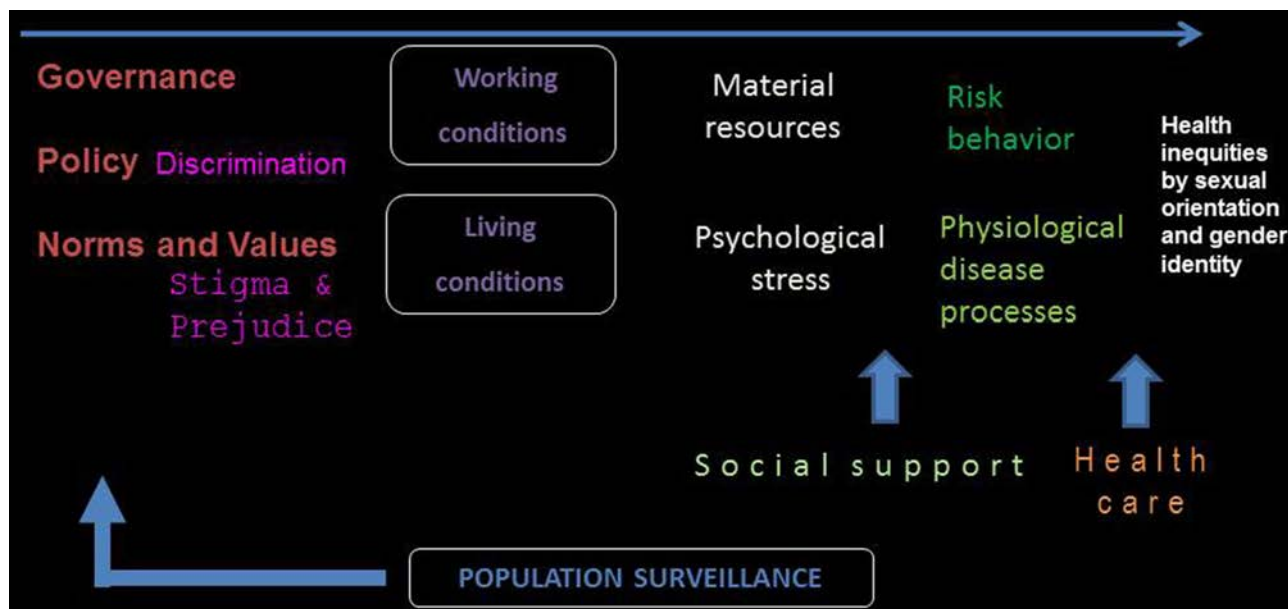
Among men, SM men were more likely to live with a same-sex partner (15.4% vs 0%) or to live alone (22.6% vs 12.6%) or with others (42.5% vs 30.0%) versus with a different-sex partner (19.5% vs 57.4%) than heterosexual peers. SM males were also far less likely to report living with a minor son/daughter (11.1% vs 41.1%) than their heterosexual counterparts. These data suggest that a lower likelihood of a (lower<sup>59</sup>) female wage earner and a child in the household, as reflected in smaller average household size,

among SM males may help to explain why personal income inequities were not sustained across household economic status.

Although examining determinants of SES was beyond the scope of the present study, a social determinant of health framework, based on the Conceptual Framework for Action on the Social Determinants of Health<sup>60</sup> (figure 3), was used to guide our reflections about putative causes of observed SES patterns and their impact on health. Importantly, in this framework, norms and values that privilege the dominant group (heterosexuals) and stigmatise others (sexual minorities) shape living and working conditions, including risk of sexual assault, access to health services and the presence of children in the household. Daily conditions are themselves influenced by governmental and institutional (eg, school discipline) policy.

Working through potential contributors to lower rates of homeownership among SM, as an illustrative example, we consider upstream determinants of material resources (both savings and income) and access to loans. Employment discrimination by sexual orientation is prohibited in only 22 states,<sup>61</sup> is more commonly experienced by SM<sup>62</sup> and may contribute directly to economic status through earnings (joblessness, underemployment), as well as, indirectly, by limiting access to employer-provided health insurance.<sup>63</sup> Same-sex couples were not granted the right to marry across the USA until 26 June 2015<sup>64</sup>; marriage facilitates access to mortgage loans,<sup>65</sup> as well as health insurance coverage.<sup>66</sup> Medical expenses related to lack of insurance or poor coverage impact savings and are significant contributors to bankruptcy.<sup>67</sup> Strained parental relationships<sup>7 68 69</sup> may further reduce access to material support (eg, housing,<sup>70</sup> college tuition support, health insurance coverage, loans and gifts, loan cosignature) for SM. Intergenerational transfers are estimated to account for approximately 20% of personal wealth.<sup>71</sup> Lastly, a preference or need to live in more tolerant (eg, those with local non-discrimination protections), but expensive urban areas<sup>72 73</sup> may also impact economic resources and rates of homeownership.

Although an intersectional analysis that considers racial inequality as an important determinant of population patterns of SES was beyond the scope of the current paper, we did explore whether observed sexual orientation and SES patterns differed between racial minorities (black and Latino/as) and the majority (whites) separately for females and males. Patterns differed for 3 out of 16 SES indicators. Among women, sexual orientation inequities in homeownership were more pronounced for whites than racial minorities. Rates of homeownership were the lowest for SM racial minority women and highest for heterosexual white women. Among men, racial minority men were more likely to be in the highest household economic status group than were racial minority heterosexual men, whereas white SM men were less likely to be in the highest household economic status group compared with white heterosexual men. These patterns should be further explored in large population-based datasets, such as those collected by the US Census Bureau, that would also allow for more nuanced comparisons by race-ethnicity.



**Figure 3** Social determinants of population health.

This study is among the first to explore sex and sexual orientation difference in SES in a nationally representative sample. By using multiple indicators of SES collected by Add Health, our study offers a more comprehensive exploration of SES than has been previously explored in the peer-reviewed literature. Our sexual orientation measure builds on studies that relied on US Census surveys which identified SM on the basis of household composition and focused on same-sex versus different-sex married or cohabitating couples<sup>74 75</sup>—missing respondents who are single, may not be living with a partner and bisexuals in different-sex relationships. However, as reported above, only 9% and 15.4% of SM women and men, respectively, were living with same-gender partners, suggesting that the SM group identified through a measure that includes a broader array of

sexuality options (ie, mostly homosexual, bisexual, mostly heterosexual) identifies a broader group of SM than would be identified through a measure that includes a handful of identity-based options (eg, heterosexual, lesbian or gay, bisexual). These differences in the composition of this SM sample should be considered by readers when comparing findings with studies that used different sexual orientation measures.

Limitations of our study include a reliance on self-report measures; however, we have no reason to suspect systematic reporting bias by sexual orientation. We do not have data on when a SM identity was developed relative to our outcomes and, thus, issues of temporality may impact our results. For instance, models that include respondent education adjust for earlier life differences in SES across groups, which are appropriate if education concluded prior to the development of an SM identity, but may underestimate the effect of SM status on economic status when education was influenced by an individual's sexual identity. Findings may mask variability in the relationship between sexual orientation and SES across urbanicity and region<sup>76</sup>; however, exploring these potential differences was beyond the scope of the present study. Findings may also mask variability across gender identity or transgender versus non-transgender (cisgender) status<sup>77</sup>; however, current gender identity and assigned sex at birth were not collected in Add Health until wave 5 and these new data are not yet available. Lastly, the age of the Add Health cohort (36–44 years) may limit generalisability to other cohorts.

SES is a fundamental contributor to health across the life course<sup>26 27</sup> and varies by sexual orientation. Frameworks to analyse sexual orientation inequities in health should consider stigma<sup>78 79</sup> and both material and psychosocial pathways to health.<sup>33 80</sup> Discrimination, rejection and harassment arise as a consequence of stigma and give rise to what has been termed 'minority stress'<sup>17</sup>; however, an over-reliance on Minority Stress theory,<sup>1</sup> or on psychosocial theories<sup>81</sup> more broadly, to understand population patterns of health will overlook upstream drivers of these conditions. Data gaps should be addressed, specifically, sexual orientation (and gender identity) measures should be added to the Survey of Income and Program Participation, and to administrative systems that track usage of poverty reduction programmes, in order to evaluate the impact of public safety net programmes on the economic status of the population. Future studies should explore the impact of public policies such as marriage, non-discrimination protections and universal health insurance, on earnings and economic status across place and over time, in order to better elucidate the ways in which policies impact SES across sexual orientation groups. Finally, future research should focus on understanding how gender, racial and SM inequality manifests in population patterns of SES at various points in the life course to shed light how and when to intervene to reduce SES inequities and/or to improve the SES of specific population subgroups (eg, SM racial minority women).

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