Substance Use and Depressive Symptoms as Mediators of Forgone Medical Care Among US Female Sexual Minorities

Topic to Be Studied

Research suggests that, compared with exclusively heterosexual peers, sexual minority [SM] individuals in the United States experience disparities in medical care access and utilization, such as lower likelihood of having health insurance, higher likelihood of being unable to afford desired care, and, for females in particular, reduced uptake of routine and preventative medical care (1–5). Risk of underutilization of medical care among sexual minorities may be particularly apparent during emerging adulthood (ages 18-24), as within the United States, this age group has traditionally been the least likely to be insured, regardless of sexual orientation (6–8). Sexual minority emerging adults are additionally more likely to experience health risks, such as depression, suicidal ideation, substance use, and sexually transmitted infections (STI) and HIV (2, 5–7), which in the adolescent literature, has been associated with medical care underutilization (9–11).Taken together, these circumstances raise the question of whether SM emerging adults are at 'double risk' for health care underutilization. However, to date, the association between sexual orientation and forgone care has not been examined in this age group.

To address this gap, the present study examines the association between sexual minority status (SMS) and the risk for forgone medical care—defined as choosing not to seek medical care when needed during the previous year—among a nationally-representative cohort of emerging adult females, and investigates whether the link between SMS and forgone care is mediated by four health risk variables (depressive symptoms, tobacco use, illegal drug use, and heavy drinking).

Theoretical Focus

This study is guided by *minority stress theory*. Minority stress theory holds that racial and sexual minorities are more likely to experience poor health outcomes than majority individuals as a result of experiencing higher numbers of repeated, lifelong stressors. The convergence of these multiple proximal and distal stressors can negatively bias one's ability to process their external environment, decreasing coping mechanisms and ultimately manifesting in negative health outcomes such as depression, anxiety, and suicidal ideation (12). Pascoe and Richman's Perceived Discrimination and Health Model builds on these ideas by proposing that stressors can lead to risky health behaviors (e.g., substance abuse), which in turn lead to poor physical and mental health outcomes (13).

In this study we apply these ideas by examining linkages between sexual minority status and forgone care (i.e., the negative health outcome), and testing depressive symptoms and substance use as potential mediators (risky behaviors) that develop as a result of cumulative minority stressors. By examining the roles of depressive symptoms and substance use as potential mediators of the association between sexual orientation and forgone care, this paper aims to develop a more 'holistic' picture of minority stress and subsequent health, by quantifying how mental and physical health risks serve as intermediary pathways between minority identity and poorer health outcomes.

Data

We use data from Add Health, a prospective study following a nationally representative probability sample of adolescents in grades 7-12 during the 1994-1995 school year. To date, one in-school and four in-home interviews have been completed. Data for the present analysis are primarily from the in-home interview at Wave III (2001; respondents aged 18-26), though some demographics were collected at Wave I/baseline. As preliminary analyses indicated lack of association between sexual orientation and forgone care for males, the present analysis was conducted with females only. All Add Health procedures were approved by the non-Biomedical Institutional Review Board (IRB) at the University of North Carolina at Chapel Hill; present analyses were deemed exempt. Inclusion criteria for the present analysis were participation in Waves I and III (n=15,170), female biological sex (n=8,030), a valid sampling weight (*n*=7,563), and complete data on all analysis variables (n= 6,701).

Research Methods

Measures

Outcome: Past-year forgone medical care. Dichotomously coded based on the prompt *"Has there been any time in the past 12 months when you thought you should get medical care, but you did not?"* Respondents answering '*Yes'* were the index group, and those answering '*No'* were the referent. 13 respondents (0.16%) who did not answer, or stated they did not know, were excluded.

Explanatory Variable: Sexual Minority Status (SMS): A binary variable (Sexual minority[SM]/Exclusively heterosexual [EH], EH=referent) was constructed from questions assessing different indicators of sexual orientation; respondents had to provide answers on all indicators to be included for analysis. Respondents were considered a sexual minority if they endorsed an SMS response on at least one of the following indicators: Attraction (ever experiencing romantic attraction to a person of the same biological sex, regardless of reported attraction to the other sex); Behavior (reporting a non-zero number of lifetime same-sex sexual partners, regardless of number of reported other-sex partners); and Identity (describing their identity as anything other than '*100% heterosexual'* from a scale that included '*Mostly heterosexual,' 'Bisexual,' 'Mostly homosexual,' '100% homosexual;'* and *'Not sexually attracted to males or females'*).

Mediators:

Depressive symptoms: A truncated version of the Centers for Epidemiologic Studies Depression Scale (CES-D) is included in the Add Health Questionnaire. A continuous variable was constructed by summing responses from the 9 CES-D questions, then standardizing the distribution to have a mean of zero and variance of one. Higher scores indicate more depressive symptomology.

Heavy Drinking/Binge Drinking: Dichotomously coded (yes/no; no=referent), reflecting if respondents reported drinking ≥5 alcoholic drinks in a single occasion, at least 1-2 times/week in the prior year.

Drug Use: Dichotomously coded (yes/no; no=referent) reflecting if respondents used any of the following substances at least once in the prior 30 days: marijuana; cocaine; inhalants, illegal drugs (LSD, PCP, ecstasy, mushrooms, speed, ice, heroin); or pills without a doctor's prescription.

Current Tobacco Use: Dichotomously coded (yes/no; no=referent) reflecting if respondents smoked at least 1 tobacco cigarette in the prior 30 days.

Demographic Covariates: ***Minority*** *Race/ethnicity* was dichotomized as 'non-Hispanic White (referent)' and 'Minority race/ethnicity,' based on self-report from Wave I. 'Minority race/ethnicity' included respondents who defined themselves as Hispanic, any race; non-Hispanic Black; non-Hispanic Other; Asian/Pacific Islander; or American Indian; cell sizes were too small in some race categories to allow for multiple non-White categories. *Age at Wave III* was continuous, and reported in years. *Parental education during adolescence* served as a proxy SES measure, and was defined as the highest education level achieved by the respondent's parents/guardians at the Wave I interview, and dummy-categorized as less than high school [HS]; HS diploma; Some college or post-HS education; College degree or higher [referent].

To reflect additional risk factors for underutilization of medical care, we measured if the respondent was *not currently in college* (yes/no, yes=ref), and whether respondent was *not currently working* (yes/no, yes=ref). To measure actual health insurance coverage, we included *current lack of health insurance*, a dichotomous variable reflecting coverage at the time of the Wave III interview (any form of health insurance/uninsured, insured=referent), and *past-year insurance coverage status* a categorical variable reflecting consistency of insurance coverage over the 12 months preceding the interview. The latter variable was dummy coded as 'fully insured' (coverage for 12 months and insured at interview); 'partially insured' (coverage for at least one month, but less than 12, regardless of current status); or 'fully uninsured' (covered zero months, currently uninsured). Fully insured served as the referent category.

Analysis Plan

Using a series of logistic and OLS regression models, we assessed whether depressive symptoms and various substance use variables mediate the association between SMS (SM vs. EH) and forgone care, following the Baron and Kenny causality approach (14). Statistical significance of the magnitude of indirect/mediated effect was assessed through bias-corrected bootstrap confidence intervals, using 1000 replicates. All analyses were conducted in STATA v12.0 adjusted for the covariates listed above, and accounting for the Add Health sampling design and weights.

Findings

Of the 6,701 female respondents include for analysis, 18% (n=1,188) were sexual minorities, with the remaining 82% defined as exclusively heterosexual. Forgone care was common, with slightly more than 22% of respondents (n=1,579) stating they had forgone care in the prior year. Table 1 presents beta coefficients and associated 95% confidence intervals (CI) from preliminary, 'first pass' results from the Baron and Kenny causality mediation testing, conducted separately for each potential mediator. All models are adjusted for the covariates listed above, and conducted using logistic regression (unless otherwise noted). In initial modeling, after adjusting for covariates but not potential mediators, SMS was a significant predictor of forgone care, such that odds of past year forgone care among SM females

were approximately twice the odds among EH females (Odds Ratio[OR]=2.01; 95% Confidence Interval [CI}=1.70-2.37). Depressive symptoms emerged as a strong, statistically significant mediator of the association between SMS and forgone care, such that when the association between SMS and forgone care was adjusted for depressive symptoms, the association was attenuated by just over 18% on the log-odds scale (Adjusted Odds Ratio [AOR]=1.67; 95% CI=1.39-2.02). Drug use was a weak mediator for the association between SMS and forgone care; when the SMS/forgone care association was adjusted for drug use, it was attenuated by approximately 6% (AOR=1.89; 95% CI=1.60-2.23). Tobacco and heavy alcohol did not fulfill causal criteria for mediation. A final model was constructed that included both depressive symptoms and drug use, resulting in a final adjusted estimate of the association between SMS and forgone care that was attenuated by over 22.5% (AOR=1.60; 95% CI=1.33-1.93) from the initial unmediated association. As depicted in Table 2, results derived from bias-corrected bootstrap methods largely replicated the causal mediation methods. When tested separately for each potential mediator, statistically significant indirect pathways from SMS to forgone care emerged for depressive symptoms (Indirect effect=.035; bias corrected CI= .026-.045) and drug use (Indirect effect=.01; bias corrected CI= .003 -.018), such that the total effect of SMS on forgone care (Total effect=.125; bias corrected CI=.091-.158) was mediated by 28.3%, and 8.14%, respectively.

Discussion

Our preliminary findings suggest that, even after controlling for sociodemographic characteristics and health insurance status, SM emerging adult females are significantly more likely than their EH female peers (and SM male peers) to have forgone needed medical care in the previous year. This replicates findings in the literature that SM adult and adolescent females are less likely to regularly access routine medical care or receive preventative reproductive health screens (15–18), though to date, it remains unclear why this association exists.

In light of minority stress theory, we believe that the present study, which found that depressive symptoms and illegal drug use are mediators of this association, may offer a potential explanation. Though minority stress theory has often been used to explore outcomes among sexual and racial/ethnic minorities, our findings suggest that female biological sex may carry its own set of stressors, which in combination with sexual minority identification may serve to heighten emotional and/or psychological distress—e.g. depressive symptoms— leading to an increased risk for doption of negative coping mechanisms—e.g drug use—and subsequent increased risk for forgone care. In a study of lesbian- and bisexual-identifying women, Lehavot and Simoni (2011) found that higher levels of minority stress (measured as internalized homophobia, victimization, and concealment of sexual identity) were both directly and indirectly related to higher rates of negative mental health outcomes and substance abuse (19). Similarly, a meta-analysis of 28 papers noted higher rates of both depression and substance use and alcohol/drug dependence among sexual minority women compared with men (20), demonstrating robustness of a biological sex-specific minority stress association. However, as the present study never explicitly tested indicators of minority stress, future research is still needed before final conclusions can be drawn.

Ultimately, given that previous findings have separately noted an increased risk for forgone care among sexual minority adolescents and adults, our results suggest that for SM females, emerging adulthood, when individuals are transitioning into independence and developing life-long health behaviors, may serve as critical intervention window. Knowing that preventable/treatable health risks (depressive symptoms, drug use) may impact care decisions of SM females, clinicians, researchers, and other stakeholders looking to identify and assuage access/utilization barriers should prioritize screening for such behaviors during emerging adulthood, hopefully catching health risks and medical care underutilization habits before they become later-life or long-term health issues.

Table 1. Baron and Kenny causal mediation testing of the association between sexual minority status (sexual minority vs. exclusively heterosexual [referent]) and prior-year forgone care, as mediated by depressive symptomology and substance use, among female emerging adult respondents at Wave III of the National Longitudinal Study of Adolescent Health (n=6,701).

	Depression	Heavy Alcohol	Drugs	Tobacco
	β (95% CI)	*β* (95% CI)	*β* (95% CI)	*β* (95% CI)
Step 1: SMS Predicts Forgone Care	.70*** (.53-.86)	.70*** (.53-.86)	.70*** (.53-.86)	.70*** (.53-.86)
Step 2: SMS Predicts Selected Potential Mediator	.44 *** (.34-.54)†	.54** (.23-.85)	1.11*** (.93-1.30)	.65*** (.48-.82)
Step 3: Selected Potential Mediator Predicts Forgone Care	.48*** (.41-.55)	.21 (-.08 to .51)	.43*** (.27-.58)	.23** (.06-.41)
Step 4: SMS Predicts Forgone Care, Adjusted for Selected Potential Mediator				
Adjusted SMS	.52*** (.33-.70)	---	.64*** (.47-.80)	.67*** (.51-.84)
Mediator	.45*** (.38-.53)	---	.30*** (.15-.45)	.16 (-.02 to .34)
Percent Change ††	-18.12%		-6.01%	-2.20%
Step 5: SMS Predicts Forgone Care, Adjusted for Demonstrated Mediators				
Adjusted SMS	.47** (.29-.66)			
Depression	.45*** (.37-.52)			
Drug Use			.23** (.08-.39)	
Percent Change ††	-22.52%			

*β=regression beta coefficient; CI= confidence interval ; SMS=Sexual Minority Status * p<.05; **p<.01; ***p<.001*

† β from weighted logistic regression (and can be interpreted as log-odds ratios) except for depression as predicted by SMS, which was derived from OLS regression

†† Percent Change calculated as Unadjusted β- Adjusted β, to account for log-odds scale

All models adjusted for age, race, parental education, respondent current work status, respondent current education status, and current and past-year insurance status.

Table 2. Bias-corrected Bootstrap Direct and Indirect Effect of Sexual Minority Status (sexual minority vs. exclusively heterosexual [ref]) on prior-year forgone care, as mediated by depressive symptoms and substance use, among female respondents at Wave III of the National Longitudinal Study of Adolescent Health (n=6,701).

Dependent Variable	Independent Variable	Direct Effect (95% CI)	Indirect Effect (95% CI)	Total Effect (95% CI)	Percent of Total Effect Mediated
Forgone Care	SMS	.089*** (.049-.128)		.125*** (.091-.158)	28.27%
	Depressive Symptoms		.035*** (.026-.045)		
Forgone Care	SMS	.121*** (.083-.158)		.125*** (.091-.158)	2.89%
	Smoking		.004 (-.000 to .008)		
Forgone Care	SMS	.123*** (.087-.159)		.125*** (.091-.158)	0.89%
	Heavy Alcohol		.001 (-.000 to .004)		
Forgone Care	SMS	.114*** (.080-.155)		.125*** (.091-.158)	8.14%
	Drugs		.010 *** (.003 -.018)		

*CI= confidence interval; SMS= Sexual Minority Status * p<.05; **p<.01; ***p<.001*

Confidence Intervals derived from bias-corrected bootstrapping methods, accounting for Add Health survey weights

All models adjusted for age, race, parental education, respondent current work status, respondent current education status, and current and past-year insurance status.

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