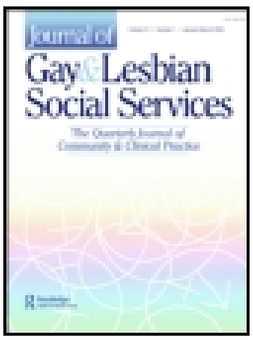

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Understanding co-occurring depression symptoms and alcohol use symptoms among cisgender sexual minority women

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ABSTRACT

Sexual minority women (SMW; e.g., lesbian, bisexual) experience depression and alcohol use disorder at approximately twice the rates of heterosexual women. Though discrimination is a common explanation for these disparities, little is known about the mechanisms through which discrimination contributes to these disparities. Past research has found that the strategies that individuals use to regulate their emotions in response to discrimination may influence their depression symptoms and alcohol use symptoms. The current study proposes and validates a model to test whether alcohol use, suppression of emotion expression, and social support explain the relationships between discrimination and depression/alcohol use symptoms of cisgender SMW. A national sample of 1,782 cisgender SMW completed an online survey in 2017 through The PRIDE Study. Structural equation modeling was used to test model hypotheses. Discrimination was associated with lower levels of social support, but discrimination was not associated with higher levels of alcohol use or suppression. Social support, alcohol use, suppression, and discrimination were all significantly associated with depression symptoms. This study makes an important contribution to the literature by evaluating mechanisms that may potentially drive depression and alcohol use symptoms among cisgender SMW, focusing on mechanisms that can be intervened upon using existing evidence-based practices.

KEYWORDS

Sexual minority women; depression; alcohol use disorder; discrimination

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Sexual minority women (e.g., lesbian, bisexual, gay, pansexual, queer, and same-gender loving women) consume alcohol with greater frequency and in higher quantities (Diamant, Wold, Spritzer, & Gelberg, 2000; Hughes & Eliason, 2002; McCabe, Hughes, Bostwick, West, & Boyd, 2009) and experience disproportionally higher rates of alcohol use symptoms than their heterosexual female counterparts (Cochran & Mays, 2000). Sexual minority women experience higher rates of depression than their heterosexual female counterparts (Cochran, Greer, & Mays, 2003; Gilman & Abraham, 2001). Though there are well-established associations between higher levels alcohol use (i.e., frequency and volume of alcohol consumption; Zemore et al., 2016), greater severity of alcohol use symptoms (i.e., distress and impairment related to alcohol consumption; American Psychiatric Association, 2013) and greater severity depression symptoms (i.e., distress and impairment related to feelings of sadness or lack of pleasure; American Psychiatric Association, 2013) among the general population (Boden & Fergusson, 2011; Zemore et al., 2016), these relationships are less established for sexual minority women. Furthermore, sexual minority women are more likely than their heterosexual female counterparts to concurrently engage in heavy drinking and experience depression (Pakula, Carpiano, Ratner, & Shoveller, 2016).

Discrimination serves as a common explanation for the disparities in alcohol use symptoms and depression symptoms between sexual minority women and their heterosexual counterparts (Cochran et al., 2003; Meyer, 2003). A substantial body of literature has linked discrimination to mental health problems, including depression symptoms and alcohol use symptoms, among racial and ethnic minority individuals (Araújo & Borrell, 2006; Hatzenbuehler, Nolen-Hoeksema, & Dovidio, 2009; Rivera, 2014) and sexual minority individuals (Meyer, 2003). Despite these advances in understanding the connection between discrimination and mental and behavioral health problems, there remains a paucity of research exploring the mechanisms through which discrimination influences the development and maintenance of mental health problems (Hatzenbuehler et al., 2009).

Hatzenbuehler et al. (2009) explored mechanisms that may explain the relationship between discrimination and emotional distress, identifying pathways linking discrimination (i.e., "Being treated with less courtesy and respect than other people, being called names or insulted, being threatened or harassed, and being avoided") to emotional distress. They argued that the relationship between discrimination and psychological distress was mediated by the emotion regulation strategies of rumination, suppression, and social support, utilized in response to an instance of discrimination. Hatzenbuehler et al. (2009) defined suppression as inhibiting emotional expression, rumination as repetitive thoughts related to distress, and social

support as reaching out to others after an instance of discrimination. They hypothesized that a greater number of instances of discrimination would be associated with higher levels of rumination, higher levels of suppression, and lower levels of social support; all of which would be associated with higher levels of psychological distress (Hatzenbuehler et al., 2009). In other words, the strategies used by sexual minority individuals to regulate their emotions following an instance of discrimination would correspond to their experience of longer-term distress.

The model proposed by Hatzenbuehler et al. (2009) may hold promise for understanding risk factors for alcohol use, alcohol use symptoms (i.e., consequences of alcohol use involving clinically significant impairment and distress, such as relationship conflict; American Psychiatric Association, 2013), and depression symptoms among sexual minority women. Previous research has found that the relationship between alcohol use (i.e., amount of alcohol consumed) and alcohol use disorder symptoms (e.g., failing to meet responsibilities, interpersonal problems, alcohol-related health problems; American Psychiatric Association, 2013) is not consistent across populations. Disadvantaged populations—specifically women, racial minorities, and low-income individuals—experience greater mental and physical health problems, at the same level of alcohol consumption relative to non-disadvantaged populations (Centers for Disease Control and Prevention, 2016; Holmila & Raitasalo, 2005; Zapolski, Pedersen, McCarthy, & Smith, 2014; Zemore et al., 2016). For instance, through a review of the literature, Zapolski et al. (2014) find that although African-American individuals consume less alcohol than their white counterparts, they experience greater levels of alcohol-related problems (e.g., interpersonal problems and alcohol-related health problems). Factors such as racism (e.g., greater surveillance of African-American individuals and discrimination in healthcare) may help to explain these findings. Though alcohol use can provide immediate relief from distress in the form of emotion regulation, it is associated with longer-term distress (e.g., heightened levels of depression symptoms and alcohol use symptoms; Boden & Fergusson, 2011). Suppression has been found to moderate the relationship between the volume of alcohol consumed and alcohol use symptoms, predicting higher levels of alcohol use symptoms at the same volume of alcohol consumption (Norberg et al., 2016). No known research has investigated the role of social support in moderating the relationship between alcohol use and alcohol use symptoms; however, being married (an aspect of social support) weakens the association between alcohol use and alcohol use symptoms for other marginalized groups (Ross, 1995; Sherbourne & Stewart, 1991).Though less is known about this relationship among sexual minority women, alcohol use is a common strategy for emotion regulation (Berking et al., 2011) and a

common response to discrimination for sexual minority women (Lehavot & Simoni, 2011). Taken together, the findings that 1) marginalized populations experience heightened alcohol use symptoms at the same level of alcohol consumption, 2) suppression and social support may serve to moderate this relationship, and 3) sexual minority women commonly use alcohol in response to discrimination, suggest that suppression and social support are plausible moderators in the relationship between alcohol use and alcohol symptoms among sexual minority women.

Though suppression and social support may moderate the relationship between alcohol use and alcohol use symptoms, all three variables (alcohol use, suppression, and social support) likely have a direct relationship with depression. A meta-analysis that employed principles of causality (i.e., temporal order, reversibility, and plausible mechanism) to specify the relationship between alcohol use and depression symptoms argued that alcohol use likely causes depression, based on the proportion of comorbidity where alcohol use precedes the onset of depressive symptoms (temporal order), abstinence from alcohol use leads to a significant reduction in depressive symptoms (reversibility), and biological mechanisms whereby alcohol use serves as a depressant (plausible mechanism; Rehm et al., 2003). Greater levels of suppression directly predicted greater levels of depression symptoms (Campbell-Sills, Barlow, Brown, & Hofmann, 2006; Wegner & Zanakos, 1994; Werner, Goldin, Ball, Heimberg, & Gross, 2011). Mickelson (2001) reported that social support mediated the relationship between perceived stigma (a construct closely associated with discrimination) and depression, arguing that greater levels of stigma were associated with lower levels of social support, which were, in turn, associated with greater levels of depression symptoms.

Purpose and hypotheses

This study tested an adapted version of the model created by Hatzenbuehler et al. (2009) with the goal of describing linkages between discrimination, alcohol use symptoms, and depression symptoms for cisgender sexual minority women. This model proposes that, as sexual minority women experience more instances of discrimination, they engage in higher levels of suppression of emotion expression, engage in higher levels of alcohol use, and have lower levels of social support. Each of these responses may increase sexual minority women's risk for experiencing depression symptoms. We hypothesized that engaging in greater levels of alcohol use, engaging in higher levels of suppression, and having lower levels of social support will increase sexual minority women's risk for alcohol use symptoms. Further, we hypothesized social support and suppression to

moderate the relationship between alcohol use and alcohol use symptoms. The proposed model also includes alcohol use as an emotion regulation strategy, in addition to the emotion regulation strategies of suppression (Hayes & Feldman, 2006) and social support (Hogan, Linden, & Najarian, 2002), all of which are proposed mediators of the relationship between discrimination and depression symptoms. Furthermore, the proposed model includes both depression symptoms and alcohol use symptoms in place of the former construct of psychological distress. Though other minority stress processes are controlled for in the model (e.g., concealment), this model specifically focuses on the emotion regulation mechanisms (i.e., alcohol use, suppression, and social support) potentially used in response to instances of discrimination. This model focuses on these emotion regulation mechanisms because there are evidence-based interventions that target the mechanisms of suppression, social support, and alcohol use (e.g., Bowen et al., 2009; Magill & Ray, 2009; Teasdale et al., 2000), and thus, this model may be particularly valuable for informing the development of interventions for sexual minority women experiencing depression symptoms and alcohol use symptoms.

The current study proposes and validates a model to test whether alcohol use, suppression, and social support explain the relationship between discrimination and depression symptoms/alcohol use symptoms for cisgender sexual minority women. This study advances the following hypotheses:

a. More instances of discrimination will be associated with higher levels of suppression, higher levels of alcohol use, and lower levels of social support.
b. More instances of discrimination will be associated with a greater number of depression symptoms.
c. Higher levels of alcohol use will be associated with a greater number of alcohol use symptoms.
d. Higher levels of suppression will strengthen the relationship between alcohol use and alcohol use symptoms, whereas higher levels of social support will weaken this relationship.

Materials and methods

Participants

This study utilized data collected through The PRIDE Study, a national, large-scale, longitudinal health study of adults who are at least 18 years old; identify as lesbian, gay, bisexual, transgender, queer, genderqueer (LGBTQ) or as another sexual and/or gender minority; can read and understand

English, and reside in the United States or its territories (Lunn et al., 2019). All data were collected via The PRIDE Study's 2017 Annual Questionnaire that participants accessed through The PRIDE Study's online portal. Participants were recruited by The PRIDE Study through community partnerships (e.g., centers and service providers oriented toward the LGBTQ community who distribute recruitment materials to their constituents), events (e.g., LGBTQ Pride events, conferences focused on LGBTQ issues), and online channels (e.g., Facebook ads). This study was approved by the Institutional Review Board at the University of California, San Francisco (#16-21213) and at Stanford University (#48707) and deemed exempt from review as secondary data analysis by the University of California, Berkeley and the University of Kansas.

For this study, inclusion criteria were that participants must: (1) identify as women and be assigned female at birth; (2) identify as sexual minority (e.g., lesbian, bisexual, pansexual, same-gender loving or queer); and (3) be at least 18 years of age. Participants were excluded if they (1) identified as a man, non-binary, or transgender or were assigned male at birth; (2) identified as heterosexual, questioning, or asexual (asexual respondents were excluded from this analysis as their experiences of discrimination may differ from the experiences of other sexual minority individuals, likely due to societal and medical perceptions that sexual activity is necessary for health and wellness; Bogaert, 2015); (3) completed none of the model measure items, and/or (4) endorsed diagnosis of a psychotic disorder.

Measures

Mental health outcomes

Alcohol use symptoms were measured using the dependence and consequences subscales of the Alcohol Use Disorder Identification Test (AUDIT; Bohn, Babor, & Kranzler, 1995), which are comprised of items 4–10 of the AUDIT. The AUDIT dependence (3 items) and consequences (4 items) subscales closely resemble the symptoms of alcohol use disorder described in the *Diagnostic and Statistical Manual of Mental Disorders 5* (American Psychiatric Association, 2013). The dependence and consequences subscales were combined into a total scale score (maximum range: 0–28)[1] to assess *alcohol use symptoms* (present study Cronbach's $\alpha = 0.75$). *Depression symptoms* were measured using the Patient Health Questionnaire-9 (PHQ-9), a validated nine-item measure of depression symptoms (Kroenke, Spitzer, & Williams, 2001; present study $\alpha = 0.87$). Response options for each item in the PHQ-9 range from Not at all (0) to Nearly every day (3) (maximum range $= 0 - 27$).

Discrimination

Discrimination was measured using 11 items about exposure to seven types of prejudice or discrimination (within the contexts of employment, education, healthcare, housing, medical services, hospitality services, or interactions with law enforcement or strangers) and three types of victimization (physical attacks or injuries, violence from a romantic partner, and unwanted sexual contact). These items were adapted and expanded from the National HIV Behavioral Surveillance surveys (Centers for Disease Control and Prevention, 2019). Items had binary response options of no (0) or yes (1), resulting in a range of 0–11 (present study $\alpha = 0.60$).

Emotion regulation strategies

Suppression was measured using the Emotion Regulation Questionnaire (ERQ) expressive suppression subscale (Gross & John, 2003; present study $\alpha = 0.82$). *Social Support* was measured using the emotional support subscale of Patient-Reported Outcomes Measurement Information System (PROMIS, 2018; present study $\alpha = 0.93$). *Alcohol use* was measured using the AUDIT quantity-frequency subscale (i.e., items 1–3). The AUDIT quantity-frequency subscale consists of three items asking about regularity and amount of alcohol consumption (Meneses-Gaya et al., 2010; present study $\alpha = 0.61$). Response options range from Never (0) to Daily or almost daily (4).

Demographic variables

Demographic characteristics linked to mental health outcomes considered in this study were controlled for: sexual minority identity (Fredriksen-Goldsen, Kim, Barkan, Muraco, & Hoy-Ellis, 2013); race/ethnicity (Riolo, Nguyen, Greden, & King, 2005); and gender (Shilo & Savaya, 2012). Demographic information was collected from single items on participants' profiles in The PRIDE Study portal. Sex assigned at birth was collected with a question providing binary options of "female" and "male." Ethnicity was collected through binary options of yes and no to the question of if the participant is Hispanic, Latino, or of Spanish origin. Gender identity, sexual orientation, and race were all based on questions with multiple options. For each item, participants could check all that apply or enter an alternative response in an open field.

Proximal minority stress processes control variables

Internalized homophobia was controlled for in the model, as it is a crucial minority stressor that has been linked to mental health symptoms among sexual minority populations (Meyer, 2003). Internalized homophobia was measured using the Internalized Homophobia Scale (IHP-R; Herek, Gillis,

& Cogan, 2009), an abbreviated five-item measure of internalized homophobia based on a longer measure developed for gay men (present study $\alpha = 0.69$). *Concealment* was also controlled for in the model, as it is a crucial minority stressor that has been linked to mental health symptoms among sexual minority populations (Meyer, 2003). Concealment was measured using the six-item concealment subscale of the Nebraska Outness Scale (NOS; Meidlinger & Hope, 2014). The concealment subscale focuses on the respondents' level of avoidance discussing sexual orientation-related issues (present study $\alpha = 0.82$).

Analyses

Structural equation modeling was utilized to determine: (1) if the number of instances of discrimination were associated with the number of depression symptoms and alcohol use symptoms, (2) if those relationships were mediated by the hypothesized emotion regulation strategies, and (3) if the relationship between alcohol use and alcohol use symptoms was moderated by suppression and social support. Stata (version 15.1) was utilized for data cleaning, and MPlus (version 8) was utilized for structural equation modeling.

Pre-specified analytic strategy

Latent variables were defined in MPlus for depression symptoms, alcohol use symptoms, suppression, social support, alcohol use, concealment, and internalized homophobia. Interaction terms were utilized to test the significance of latent interaction variables as predictors of alcohol use symptoms. The model controlled for internalized homophobia, concealment, race/ethnicity, and sexual minority identity. The evaluation of model fit was based on the Root Mean Square Error of Approximation (RMSEA), Tucker-Lewis Fit Index (TFI), and comparative fit index (CFI). Model fit was assessed based on standard conventions of fit ($RMSEA \leq 0.06$; $CFI \geq 0.90$; $TFI \geq 0.90$; Harrington, 2009).

All of the study hypotheses were evaluated based on the results of significance tests for relationship between variables, using an alpha of 0.05. For this study, alcohol use, suppression, and social support were all classified as emotion regulation mechanisms. Depression symptoms and alcohol use symptoms were classified as mental health outcomes. As depicted in Figure 1, direct effects were assessed based on associations between individual predictors and outcomes; mediation was assessed based on specific indirect effects; and moderation was assessed through interaction terms.

Additional diagnostics and corrections

Modeling moderation of latent variable relationships in MPlus 8 does not permit the estimation of fit statistics or direct and indirect effects (Muthen,

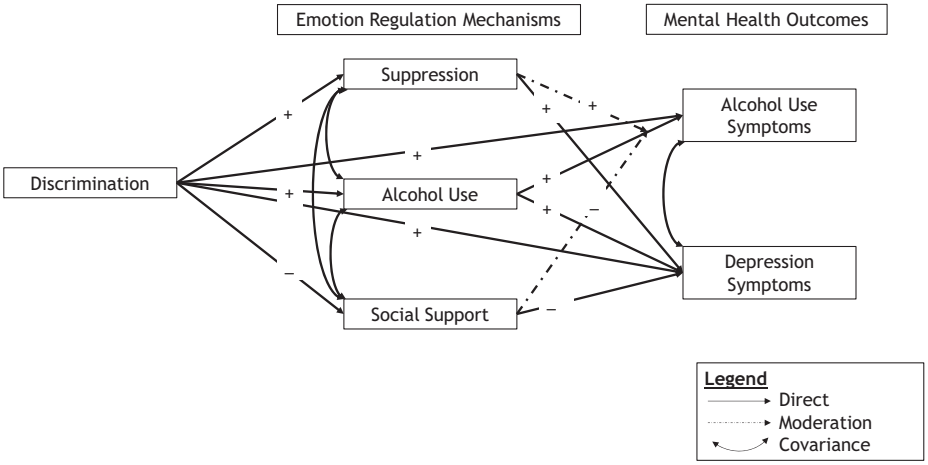

Figure 1. Proposed model of associations between discrimination, emotion regulation strategies, and mental health outcomes.

2005). To approximate these estimates, the model was run using observed variable emotion regulation mechanisms. Because the model did not initially converge, several steps were taken to improve model fit and achieve convergence. A confirmatory factor analysis was performed for each measure. Since the discrimination measure had not previously been validated, additional steps were taken in the construction of this measure. An exploratory factor analysis was performed, which identified a three-factor solution (violence, service discrimination, and healthcare discrimination). The harassment item was dropped due to low factor loadings on any of the three factors. The model was rebuilt with the stepwise addition of the remaining terms included in the full model. Even after specifying starting values, convergence in any model that included a latent interaction term for alcohol use and suppression was not possible. Thus, a separate model using an observed interaction term of alcohol use and suppression was utilized to test suppression as a moderator of the relationship between alcohol use and alcohol use symptoms. Neither suppression nor the interaction term significantly predicted alcohol use symptoms, so this was removed from the model. The complete model, with the exception of suppression and the interaction of suppression and alcohol use, was run using maximum likelihood with robust standard errors and converged successfully.

Results

Descriptive results

In total, 1,782 participants met inclusion criteria for this study. This sample had an average depression score on the PHQ-9 of $m = 7.43$ ($sd = 5.87$) and alcohol use and symptoms score on the AUDIT of $m = 4.56$ ($sd = 4.28$).

Table 1. Descriptive statistics.

Sexual Orientation[a]	Frequency	Percent (%)
Lesbian	911	51.4
Gay	178	10.0
Bisexual	727	41.0
Pansexual	218	12.3
Queer	689	38.9
Same-Gender Loving	89	5.0
Total	2,812	

Race[a]	Frequency	Percent (%)
Asian	53	3.0
Black	59	3.3
White	1,667	94.5
Other	50	2.9
Total	1,829	

Ethnicity	Frequency	Percent (%)
Latino/a/x	125	7.1
Non-Latino/a/x	1,657	92.9
Total	1,782	

Age	Mean (SD)	Median	Range/IQR
	32.3 (11.3)	29.9	18–79.2 (23.9–37.1)

Note: [a]Respondents were allowed to provide multiple selections, so total exceeds the *N* of the study

Descriptive statistics about sexual orientation, race/ethnicity, and age can be found in Table 1.

Model results

In the initial model, fit statistics did not satisfy the conventional standards described above (RMSEA = 0.089; CI: 0.077–0.080; CFI = 0.649; TLI = 0.612). One approach for modifying a model to improve overall model fit is to consult the parameter estimates for individual relationships to identify non-significant relationships that may be contributing to poor model fit (Kelloway, 2015). Since the estimates for the coefficients of suppression and the interaction of alcohol use and suppression as factors associated with alcohol use symptoms were the lowest and corresponded with the highest p-values, they were removed from the model. The model was re-run with the removed relationships. All fit statistics exceeded the established standards (Table 2). Discrimination (standardized coefficient estimate, $\beta = 0.220$; $p < 0.001$), suppression ($\beta = 0.169$; $p < 0.001$), alcohol use ($\beta = 0.105$; $p < 0.001$), and social support ($\beta = -0.210$; $p < 0.001$) were all significantly associated with depression. Alcohol use ($\beta = 0.790$; $p < 0.001$) was significantly associated with alcohol use symptoms, but contrary to hypothesis and previous research, discrimination was not significantly associated with alcohol use symptoms, nor was the relationship between alcohol use and alcohol use symptoms significantly strengthened by suppression or

Table 2. Fit statistics[a,b].

Fit statistic	Coefficient	*p* Value/ 90% confidence interval
Chi-Square Test of Model Fit	1530.897	<0.001
RMSEA	0.025	0.023–0.026
CFI	0.960	NA
TLI	0.956	NA

Notes: [a]As described in the Methods section, these fit statistics are based on a model utilizing observed variables for the emotion regulation mechanisms included in the model.
[b]Model controls for internalized homophobia, concealment, race, and sexual minority identity.

Table 3. Associations with predictors and outcomes[a].

Outcome	Variable	Std. coefficient	Std. error	*p* Value
Depression symptoms	Discrimination*	0.220	0.041	<0.001
	Suppression*	0.169	0.030	<0.001
	Alcohol Use*	0.105	0.028	<0.001
	Social Support*	−0.210	0.034	<0.001
Alcohol use symptoms	Discrimination	0.051	0.027	0.053
	Alcohol Use*	0.791	0.030	<0.001
	Alcohol Use × Suppression[b,c]	−0.001	0.001	0.351
	Alcohol Use × Social Support*[,c]	−0.062	0.097	<0.001
	Suppression[b]	0.001	0.003	0.737
	Social Support	−0.028	0.043	0.515
Suppression	Discrimination	−0.004	0.034	0.909
Alcohol use	Discrimination	−0.049	0.035	0.053
Social Support	Discrimination*	−0.185	0.034	<0.001

Notes: $^{*}p < 0.01$.
[a]Model controls for internalized homophobia, concealment, race, and sexual minority identity.
[b]As described in the Methods section, these estimates are based on a model utilizing observed variables for the emotion regulation mechanisms included in the model. [c]Refers to an interaction term

Table 4. Direct and indirect effects for mental health outcomes[b].

Outcome	Effect type	Variable	Std. coefficient	Std. error	*p* Value
Depression Symptoms	Total*		0.278	0.039	<0.001
	Total Direct*		0.228	0.040	<0.001
	Total Indirect*		0.051	0.011	<0.001
	Specific Indirect	Suppression	−0.002	0.005	0.689
		Alcohol Use	−0.002	0.002	0.289
		Social Support*	0.055	0.010	<0.001
Alcohol Use Symptoms	Total		−0.009	0.039	0.825
	Total Direct		0.041	0.026	0.109
	Total Indirect		−0.050	0.034	0.144
	Specific Indirect	Alcohol Use	−0.042	0.030	0.163
		Suppression[a]	0.00	0.002	0.970
		Social Support	−0.008	0.012	0.526

Notes: $^{*}p < 0.01$.
[a]As described in the Methods section, these estimates are based on a model utilizing observed variables for the emotion regulation mechanisms included in the model. Coefficient included for reference. Coefficient was estimated in the initial poorly fitting model and was removed from subsequent analysis.
[b]Model controls for internalized homophobia, concealment, race, and sexual minority identity.

weakened by social support. Discrimination was associated with social support ($\beta = -0.185$; $p < 0.001$), but discrimination was not significantly associated with suppression or alcohol use. Social support appears to mediate the relationship between discrimination and depression (with a greater number of instances of discrimination being associated with lower levels of social support, which were associated with a greater number of depression

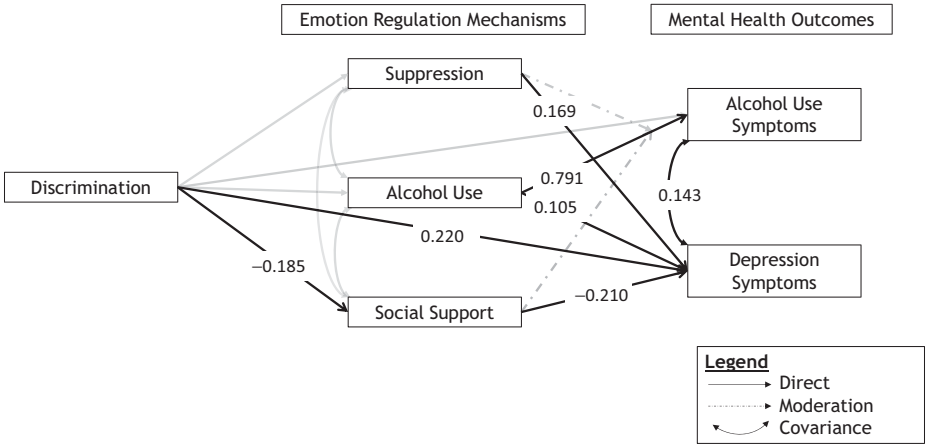

Figure 2. Significant results of full model.

symptoms; $\beta = 0.055$; $p < 0.001$). There was no evidence that either suppression or alcohol use mediates the relationship between discrimination and depression symptoms. Nor was there any evidence that alcohol use mediates the relationship between discrimination and alcohol use symptoms. These results are described in Tables 3 and 4 and depicted in Figure 2.

Discussion

We found that more instances of discrimination, higher levels of suppression, higher levels of alcohol use, and lower levels of social support were each associated with a greater number of depression symptoms. While little was previously known about the mechanisms through which discrimination may predict depression symptoms among sexual minority women, we identified social support as a mechanism that helps to explain this relationship, with lower levels of social support related to higher levels of depression. However, higher levels of suppression and higher levels of social support do not appear to strengthen or weaken, respectively, the association between level of alcohol use and number of alcohol use symptoms. As discussed in more depth in the *Future Directions for Research* section (below), social support is a multi-dimensional construct and sources of social support for coping with discrimination may not provide support for maintaining sobriety and vice versa (Paceley, 2016; Tracy, Munson, Peterson, & Floersch, 2010). This study did not distinguish between sources of social support and thus cannot determine the effects of particular sources of social support on alcohol use symptoms.

The findings of this study depart from the literature in several important ways. Firstly, discrimination was not associated with suppression, alcohol use,

or alcohol use symptoms (Hatzenbuehler et al., 2009; Heffernan, 1998; McKirnan & Peterson, 1988). One possible explanation is that past studies do not generalize to sexual minority women. Another possibility is important differences in how constructs were operationalized and measured across the current and past studies. For instance, we tested the association between the overall number of types of discrimination that the participant had experienced and their general level of suppression. Hatzenbuehler et al. (2009) tested whether participants reported more suppression on days when they had experienced an instance of discrimination compared to on days when they had not. This time-unit difference in measurement could explain these divergent findings. Another possibility is that including additional variables in the model (e.g., alcohol use or suppression) may have affected the strength of the relationships in this model. In the absence of a direct effect from discrimination to suppression, alcohol use, and alcohol use symptoms, significant mediation effects are improbable. However, though Hatzenbuehler et al. (2009) found discrimination to predict suppression, they did not find suppression to mediate the relationship between discrimination and their mental health outcome. This may suggest that suppression does not mediate the relationship between discrimination and mental health outcomes.

Secondly, the present study did not find evidence for higher levels of suppression and social support strengthening or weakening, respectively, the association between the level of alcohol use and the number of alcohol use symptoms. Identifying factors that strengthen or weaken the relationship between alcohol use and alcohol use symptoms is a severely underdeveloped area of the literature. This is a particularly critical area of research because it may provide insight into mechanisms, in addition to level of alcohol consumption, that could be targeted to reduce alcohol use symptoms. This study drew on the research of Zemore et al. (2016) and Norberg et al. (2016) to inform its hypotheses of the moderating effects of suppression and social support on the relationship between alcohol use and alcohol use symptoms. However, the lack of support for the moderating effects of suppression and social support do not directly contradict the extant literature because neither of these previous studies had explored these relationships among sexual minority women. One possible explanation is that the moderately high correlation between alcohol use and alcohol use symptoms ($R^2 = 0.62$) reduced the likelihood of finding a significant moderating effect of that relationship.

Future directions for intervention

Overall, discrimination and the proposed emotion regulation mechanisms were more strongly associated with depression symptoms than with alcohol

use symptoms. Thus, the focus of this discussion is on mechanisms that may be associated with depression symptoms among a sample of cisgender sexual minority women. Namely, higher levels of suppression, higher levels of alcohol use, and lower levels of social support were each found to be associated with a greater number of depression symptoms. Social support mediated the relationship between discrimination and depression (i.e., greater number of instances of discrimination with lower levels of social support were associated with a greater number of depression symptoms). Even though suppression and alcohol use did not mediate the relationship between discrimination and depression symptoms, higher levels of suppression and alcohol use were still associated with a greater number of depression symptoms and thus may be worthy targets of intervention. Each mechanism can be intervened with evidence-based treatments to reduce depression symptoms. The purpose of this section is not to fully establish an intervention that addresses the factors in the proposed model but rather to identify existing evidence-based practices that can potentially be applied to constructs in this model.

Addressing the mechanisms of suppression and alcohol use

Extant research has found mindfulness-based cognitive therapy, dialectical-behavioral therapy, and acceptance and commitment therapy to be promising interventions to address both suppression and depression symptoms. Mindfulness-based cognitive therapy was effective in reducing suppression (Kumar, Feldman, & Hayes, 2008; Segal, Teasdale, Williams, & Gemar, 2002) and depression (Hofmann, Sawyer, Witt, & Oh, 2010; Kumar et al., 2008; Vøllestad et al., 2012). Dialectical-behavioral therapy was effective in reducing suppression (Feldman, Harley, Kerrigan, Jacobo, & Fava, 2009; Lynch, Morse, Mendelson, & Robins, 2003), alcohol use (Linehan, Bohus, & Lynch, 2007), and depression symptoms (Feldman et al., 2009; Lynch et al., 2003). Acceptance and commitment therapy was effective in reducing suppression (Forman, Herbert, Moitra, Yeomans, & Geller, 2007; Luoma, Kohlenberg, Hayes, Bunting, & Rye, 2008), alcohol use (Thekiso et al., 2015), and depression (Forman et al., 2007). Though each of these interventions utilize many techniques, they share the common techniques of imagery, focused breathing, and acceptance to address suppression, depression, and alcohol use and symptoms (Hayes, Strosahl, & Wilson, 2011). Though no known research specifically examines the relationship between focused breathing (e.g., focusing on the sensation of breathing or pacing breathing to a particular count; Linehan et al., 2007) and emotion regulation mechanisms (i.e., suppression and alcohol use), focused breathing was found to reduce symptoms of depression (Brown & Gerbarg, 2009). Though no known studies have specifically evaluated the effect of imagery

exercises (e.g., visualizing thoughts or feelings floating away on a leaf; Hayes et al., 2011) on suppression or alcohol use, imagery exercises were associated with reductions in depression (Blackwell et al., 2015; Brewin et al., 2009). The authors were unable to identify any studies that specifically evaluated the effects of acceptance interventions (i.e., encouraging clients to accept difficult situations rather than avoid or attempt to change them; Chambers, Gullone, & Allen, 2009). Instead, most acceptance interventions occurred in the context of composite interventions with many components (e.g., acceptance and commitment therapy or dialectical-behavioral therapy; Hayes et al., 2011; Linehan et al., 2007).

Addressing the mechanism of social support

Interpersonal therapy, a time-limited intervention initially developed in the treatment of depression, focuses on the resolution of a central interpersonal problem (e.g., social isolation or role disputes; Lipsitz & Markowitz, 2013). Lipsitz and Markowitz (2013) theorize that enhancing social support, by supporting clients in more effectively obtaining and accepting social support, is a core mechanism through which interpersonal therapy reduces depression symptoms. In a pilot study of a group interpersonal therapy intervention for depression, Petersen, Bhana, and Baillie (2012) found the intervention improved both social support and reduced depression symptoms. No known studies have specifically examined the effectiveness of interpersonal therapy with sexual minority women clients, but interpersonal therapy has been proposed as a promising intervention to resolve internalized homophobia among sexual minority individuals (Igartua et al., 2003). Though acceptance and commitment therapy does not directly target social support, one study of outcomes of acceptance and commitment therapy found a significant change on the subscale measuring social support from friends (but not on subscales measuring social support from family or significant others; Luoma et al., 2008). Of particular relevance to this study, in an intervention study of an application of acceptance and commitment therapy to internalized homophobia among a sample of sexual minority participants, Yadavaia and Hayes (2012) found participants who received acceptance and commitment therapy showed significant improvements in social support.

Limitations

This study is not without limitations. First, this study utilized cross-sectional data that precludes the time ordering of constructs, such as whether the incident of discrimination occurred prior to mental health outcomes. This limits the ability for causal inference (Boden & Fergusson,

2011). Second, the complexity of this model – namely the inclusion of moderated mediation and challenges with convergence – necessitated the use of multiple modeling approaches. We combined multiple analyses to evaluate model fit, which is not standard practice. However, given the similarities in coefficients and significance tests across these models, the authors believe the models were sufficiently similar to one another that such comparisons were appropriate. Third, there are limitations due to the sample. The sample was self-selected. This sample is less racially diverse than the general United States population. Whereas 95% of this sampled identified as white, only 77% of the United States population identifies as white (Census Bureau, 2018). This sample may not generalize to the general population of cisgender sexual minority women and may be more racially homogeneous than the general population of sexual minority women. This homogeneity may have minimized the ability to detect effects and contributed to some of the null results of this study, such as social support and suppression not moderating the relationship between alcohol use and alcohol use symptoms.

Future directions for research

This study takes an important step in filling gaps in the literature around mechanisms through which discrimination may lead to disparities in depression symptoms and alcohol use symptoms among cisgender sexual minority women. This study is among the first to use a large-scale, national data set of sexual minority individuals, addressing a common critique of prior sexual minority research (Meyer & Wilson, 2009). Furthermore, because this was a survey designed to study sexual minority populations, it has more robust measures of sexual orientation and minority stress variables than most large-scale datasets, which permit more rigorous control variables (e.g., internalized homophobia, concealment, and sexual minority identities). Relatedly, the mental health outcome and emotion regulation mechanism measures are previously validated measures, many of which have been validated with samples of sexual minority individuals.

Though the evaluation of this model controlled for race/ethnicity and sexual orientation, we did not test how model fit and relationships compared across categories of race/ethnicity, sexual orientation, or gender identity. Future research should engage in multi-group analyses, comparing model fit across these axes of identity and their intersections. For instance, past research has found significant group-level differences in mental health and alcohol use problems between lesbian and bisexual women (Persson & Pfaus, 2015), so model fit should be compared across these groups. If model fit is poor for particular demographic groups, additional models

should be created that better capture the mechanisms driving mental health and substance use problems for these demographic groups.

Social support emerged as the only model construct that mediated the relationship between discrimination and depression. As Paceley (2016) identified through qualitative interviews with gender and sexual minority individuals, sexual minority individuals hold a range of social support needs, including social acceptance, emotional support (which included support in coping with/protection from discrimination), and support with sexual minority identity development. Furthermore, Paceley (2016) found that respondents received different types of social support from different community members (e.g., receiving emotional support from both heterosexual and sexual minority community members but primarily receiving sexual minority identity development support from sexual minority community members). Similarly, in a study of women accessing substance use treatment services, Tracy et al. (2010) found that the women reported experiencing emotional, tangible, and informational social support and that each type of social support offered unique benefits and drawbacks for their efforts to maintain sobriety. These two studies suggest that social support is a multi-dimensional construct that may relate differently to distinct aspects of life experiences (e.g., coping with discrimination vs. maintaining sobriety). As we continue to explore the relationship between social support and depression symptoms and alcohol use symptoms for sexual minority women, we must pursue a more nuanced understanding of these dimensions of social support and how dimensions of social support are associated with distinct aspects of identity, discrimination, and mental health/substance use outcomes and their intersections.

Stigma serves as a common explanation for the disparities in alcohol use symptoms and depression symptoms between sexual minority women and their heterosexual counterparts (Cochran et al., 2003; Meyer, 2003). Link and Phelan (2001) define stigma as the "co-occurrence of its components–labeling, stereotyping, separation, status loss, and discrimination." This study largely focused on discrimination, a type of stigma enacted in direct contact with individuals and institutions. The full construct of stigma is broader and can operate at multiple levels, including internally (Meyer, 2003). This study controlled for internalized homophobia (a form of internalized stigma) because greater levels of internalized homophobia were linked to greater depression symptoms and alcohol use symptoms (Amadio, 2006; D'Augelli et al., 1998; Igartua, Gill, & Montoro, 2003; Legate, Ryan, & Weinstein, 2012; Lehavot & Simoni, 2011). Given this crucial linkage, future research should explicitly examine the role of additional levels of stigma, including internalized stigma, and examine the role that targeting these additional levels of stigma should play in depression and alcohol use interventions for sexual minority women.

Conclusion

This study proposed and tested a model of co-occurring depression symptoms and alcohol use symptoms among cisgender sexual minority women whereby emotion regulation mechanisms (alcohol use, suppression, and social support) were proposed to explain the relationship between discrimination and depression symptoms/alcohol use symptoms. We found that social support mediates the relationship between discrimination and depression symptoms, with higher levels of discrimination predicting lower levels of social support and lower levels of social support, in turn, predicting greater levels of depression. Though they do not mediate the relationship between discrimination and depression, higher levels of alcohol use and suppression were associated with greater levels of depression. Our findings did not support mediation of the relationship between discrimination and alcohol use symptoms, nor moderation of the relationship between alcohol use and alcohol use symptoms. Our findings suggest that alcohol use, suppression, and social support may all be worthwhile intervention targets for depression for sexual minority women. Future research should examine a broader range of potential emotion regulation strategies that may drive co-occurring depression symptoms and alcohol use symptoms among sexual minority women to develop and evaluate interventions that target these mechanisms. These are critical steps in ensuring that clinicians can meet the needs of these vulnerable populations.

Note

1. All AUDIT items have response options ranging from 0 to 4. For items 4 – 8, responses options are Never (0 points), Less than monthly (1 point), Monthly (2 points), Weekly (3 points), and Daily or almost daily (4 points). For items 9 and 10, response options are No (0 points), Yes, but not in the last year (2 points), and Yes, during the last year (4 points).

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Disclosure statement

Dr. Juno Obedin-Maliver has consulted for Sage Therapeutics (5/2017), Ibis Reproductive Health (a non-for-profit research group; 3/2017-5/2018, 2020 - present), Folx, Inc (2020 – present), and Hims Inc. (2019 - present). Dr. Lunn has consulted for Hims Inc. (2019 - present) and Folx, Inc. (2020). None of these roles present a conflict of interest with this work as described here. The other authors have no conflicts of interest to report.

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