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Clustered Patterns of Behavioral and Health-Related Variables Among Young Lesbian Women

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Lesbian women are at increased risk for a variety of mental and physical health problems compared to heterosexual women. In order to inform treatment and prevention, the purpose of this study was to examine behavioral and health-related patterns among lesbian women and elucidate how these patterns are associated with general discrimination, sexual minority stress, affect, and social support. A sample of self-identified lesbian women (N = 436) completed an online survey from August 2014–March 2015. A latent profile analysis was conducted using measures of body mass index, hazardous alcohol use, binge eating, eating disorder risk, and exercise as indicators. A 5-class solution best fit the data and included two healthy groups: (a) low health risk, moderate exercise (54%), (b) low health risk + high exercise (22%); and three unhealthy risk groups: (c) obese + binge eating (14%); (d) disordered eating + hazardous alcohol use (5%); (e) disordered eating + high exercise (5%). The three unhealthy classes generally reported more general discrimination, sexual minority stress, social anxiety, negative affect, and lower social support compared to the healthy classes. These findings show that behavioral and health-related variables cluster together in several distinct patterns among lesbian women. In addition, general discrimination and sexual minority stress and associated psychosocial functioning may be related to these maladaptive behavioral and health-related patterns and may be important to consider in behavioral interventions.

Keywords: disordered eating; obesity; hazardous alcohol use; empirical classification

SEXUAL MINORITY WOMEN (SMW) suffer from increased mental and physical health burden compared to heterosexual women (Institute of Medicine, 2011). For example, obesity, disordered eating, and substance use are prominent among SMW (Austin et al., 2009; Mason & Lewis, 2014; Mason, Lewis, & Heron, 2017; McCabe, Hughes, Bostwick, West, & Boyd, 2009). Historically, health conditions and behaviors have been studied in isolation (e.g., examining predictors of individual health behaviors such as hazardous alcohol use, disordered eating, or obesity, separately) or in univariate prediction models of one another (e.g., examining how disordered eating is associated with obesity). However, recent research has illuminated positive associations among numerous health behaviors and conditions; specifically, research shows that disordered eating, substance use, physical activity, and obesity are all related to one another (Fouladi et al., 2015; Fox & Hillsdon, 2007; Hudson, Hiripi, Pope, & Kessler, 2007; Mason & Lewis, 2015a; Taranis, Touyz, & Meyer, 2011).

In light of this this co-occurrence of maladaptive health behaviors and conditions, a multiple health behavior change approach that focuses on changing several behaviors together (e.g., Prochaska, Spring,

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& Nigg, 2008) may be the most efficacious strategy for health behavior change. To better inform treatment and prevention using a multiple health behavior change approach, research has begun to examine the ways in which health behaviors and conditions cluster together (e.g., Busch, Van Stel, Schrijvers, & de Leeuw, 2013; Olson, Hummer, & Harris, 2017). Examining the clustering of health behaviors and conditions allows for identification of common risk and protective factors that can be incorporated into intervention and prevention programs that work toward improving multiple health behaviors and conditions. For instance, using data from the National Longitudinal Study of Adolescent to Adult Health, women were empirically classified into groups using a variety of behavioral variables (e.g., substance use, diet, physical activity; Olson et al., 2017). Three groups emerged, including a healthy behavior group, unhealthy behavior group, and mixed healthy and unhealthy behavior group, and the groups differed on demographic, social, psychological, and personality factors. While the approach of examining clusters of health behaviors has the potential to inform novel prevention and intervention strategies in sexual minority populations, it has seldom been utilized in sexual minority populations.

In a recent study using eating and weight control behavior and physical activity data from the College Student Health Survey, a latent class analysis was conducted with heterosexual women and SMW separately. Four classes emerged in both heterosexual women and SMW: (a) healthier eating habits, more physically active; (b) healthier eating habits; (c) moderate eating habits; and (d) unhealthy weight control (VanKim et al., 2015). This study provides preliminary evidence that eating behaviors and physical activity cluster into several different groups among SMW. An important extension of this research is to examine how a wider array of behavioral and health-related factors may cluster with eating, weight, and activity variables as well as studying how the derived classes may differ on psychological and social variables. Information about how behavioral- and health-related classes differ on psychosocial variables could inform potential targets for prevention and intervention of an array of unhealthy behaviors.

Models of health behavior among sexual minorities, including the minority stress model (Meyer, 2003) and psychological mediation framework (Hatzenbuehler, 2009), have described the role of general and sexual minority specific variables as risk and protective factors for maladaptive health behaviors. General factors include psychosocial variables and processes that are nonspecific to any one population (e.g., affect, poor emotion regulation, and lack of social support) and are related to increased substance use (Lehavot & Simoni, 2011) and disordered eating (Mason & Lewis, 2015b). Sexual -minority -specific factors include variables that are unique to sexual minority populations and may include sexual minority stressors—stressful experiences stemming from one's minority sexual identity. Sexual minority stress may be external, which includes discrimination and harassment enacted by others. Sexual minority stress may also be related to internalized aspects of sexual identity such as shame toward oneself (i.e., internalized homonegativity), concealment, expectations of rejection, acceptance concerns, difficulty processing one's identity, and uncertainty about identity (e.g., Mohr & Kendra, 2011).

A substantial literature shows that both external (with victimization, discrimination, and teasing primarily being assessed) and internalized sexual minority stress (e.g., internalized homonegativity, difficulty processing one's identity, concealment, acceptance concerns [expectations of rejection], identity uncertainty) are associated with greater likelihood of engaging in a variety of unhealthy behaviors, including disordered eating and substance use (e.g., Lehavot & Simoni, 2011; Mason, Lewis, & Heron, 2018), as well as poor psychosocial functioning and symptoms of depression and anxiety (Cramer, Burks, Golom, Stroud, & Graham, 2017; Mohr & Kendra, 2011). Negative aspects of sexual identity (e.g., expectations of rejection and internalized homonegativity) were also related to more physical symptoms (Denton, Rostosky, & Danner, 2014). Mereish (2014) found that experiences of heterosexist discrimination were associated with higher body mass index (BMI) in a sample of lesbian women. In contrast, Mason and Lewis (2015) found no relation between internalized sexual minority stress and BMI except that greater outness was related to a higher BMI among lesbian women. Overall, little research has examined associations between sexual minority stress and physical activity, but Brittain, Dinger, and Hutchinson (2013) found that neither degree of connection to the lesbian community nor outness was related to physical activity.

Although most previous research has focused on negative sexual identity as a type of minority stress, aspects of positive sexual identity have also been examined. For example, identity affirmation was negatively associated with symptoms of depression, anxiety, and sadness (Mohr & Kendra, 2011). In one previous study identity superiority was positively associated with substance abuse and

symptoms of depression and anxiety (Cramer et al., 2017).

The psychological mediation framework (Hatzenbuehler, 2009) suggests that sexual minority stress leads to reduced social and coping resources (e.g., lower social support and more isolation, poor emotion regulation) and increased psychological distress and emotion-related psychopathology. According to the psychological mediation framework, sexual minority stress may lead to maladaptive health behaviors and patterns among sexual minority individuals via general psychological and social processes that are common to individuals of all sexual orientations. In general, studies have found that social and coping resources and emotion-related psychopathology are negatively impacted in individuals with disordered eating (Hudson et al., 2007), substance use problems (Grant et al., 2016), and obesity (Jorm et al., 2003; Lo Coco, Gullo, Scrima, & Bruno, 2012). However, a weakness of studies on both general and sexual-minority-specific variables is that these studies typically examine a single health behavior rather than health behavior patterns or clusters.

Although associations between general and sexual-minority-specific risk and protective factors and health behaviors among SMW have been found, how empirically defined health behavior groups may differ on general and sexual-minority-specific risk and protective factors has not been examined. Therefore, the purpose of the current study was to empirically classify a sample of lesbian women based on BMI and health behaviors (i.e., disordered eating + hazardous alcohol use, and physical activity), and to determine how these groups differ on general and sexual-minority-specific risk and protective factors including affect, social support, discrimination, internalized sexual minority stress, and attitudes toward one's identity.

Method

PARTICIPANTS AND PROCEDURE

A sample of 436 lesbians was recruited through Facebook advertising and LGBT listservs to complete an online survey. Eligibility criteria included self-identification as a cisgender lesbian woman, age 18–30 years, and located in the United States. The data used in this study were part of a larger study focused on the daily correlates of binge eating in lesbian women. For that study, to increase the probability of recruiting women who engaged in a high degree of binge eating (at least once weekly) we limited the sample to young women aged 18–30 as eating disorder pathology (such as binge eating) tends to occur in the past 12 months more in younger women. We specifically recruited cisgender lesbian women as there is evidence that study variables (e.g., minority stress, mental health, BMI, hazardous alcohol use, and binge eating) vary as a function of sexual and gender identity (see Austin et al., 2009; Bostwick, Boyd, Hughes, & McCabe, 2010; Cochran & Mays, 2009). Also, the 2011 Institute of Medicine report asserts that it is important to not combine sexual and gender minority subgroups (i.e., lesbian, bisexual) together as differences between subgroups will be obscured.

The mean age of the sample was 21.97 years (SD = 2.88) and the mean BMI was 26.26 kg/m^2 (SD = 7.54; range = 11.15–62.31). Divided into BMI categories, 7.4% of participants were underweight (BMI $<$ 18.5 kg/m^2), 46.9% were normal weight (BMI $\geq$ 18.5 and $<$ 25 kg/m^2), 21.1% were overweight (BMI $\geq$ 25 and $<$ 30 kg/m^2), and 24.6% were obese (BMI $>$ 25 kg/m^2). Most participants were White (77.3%), followed by those who endorsed two or more races (13.7%). About 12% of participants were of Hispanic, Latin, or Spanish origin and 88% were not. Most participants reported some postsecondary education: some college (44.6%); associate's degree (9.0%); bachelor's degree (17.0%); master's degree (11.3%); doctoral/professional degree (2.1%). Participants were fairly open about their sexual orientation, with 85.3% of women (n = 372) reporting that relative to other lesbian/gay individuals, they were "out of the closet most of the time" or "completely out of the closet."

MEASURES

SCOFF (Morgan, Reid, & Lacey, 1999)

The SCOFF is a 5-item eating disorder screening tool that assessed eating disorder risk. Questions include: Do you make yourself *sick* because you feel uncomfortably full?; Do you worry that you have lost *control* over how much you eat?; Have you recently lost more than *one* stone (14 pounds) in a 3-month period?; Do you believe yourself to be *fat* when others say you are too thin?; and Would you say that *food* dominates your life? A sum score was calculated for use in analyses with scores ranging from 0 to 5. Higher scores indicated more eating disorder risk. The SCOFF has been shown to be adequate in detecting cases of eating disorders demonstrating validity as an eating disorder risk measure (Morgan et al., 1999).

Eating Disorder Inventory–Bulimia Scale (EDIB; Garner, Olmstead, & Polivy, 1983) and Eating Disorder Diagnostic Scale (EDDS; Stice, Telch, & Rizvi, 2000)

Binge eating in the past week was assessed with 5 items from the EDIB and 7 items from the EDDS.

We used items that assessed the components of binge eating (e.g., overeating, sense of loss of control over eating) apart from the affective (e.g., guilt, shame) and compensatory aspects (e.g., purging). Participants responded to items from these measures using a Likert scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). Convergent validity of this combined scale of binge eating has been evidenced by several studies by positive medium-to-large associations with food-related cognitions, body image concerns, and negative affect in heterosexual and lesbian samples (Mason & Lewis, 2015c; 2016). The Cronbach's alpha for the current study was .94 for the combined scale.

Alcohol Use Disorders Identification Test (AUDIT; Saunders, Aasland, Babor, de la Fuente, & Grant, 1993)

The 10-item AUDIT assessed hazardous alcohol use by assessing typical patterns of alcohol use and alcohol-related problems. The first eight items are scored on a scale from 0 (*never*) to 4 (*4 or more times a week*) and the remaining to items are scored as 0 (*no*), 2 (*yes, but not in the last year*), and 4 (*yes, during the last year*). Although the AUDIT is sensitive and specific as an alcohol screening tool (Allen, Litten, Fertig, & Babor, 1997) in the current study it was used as a continuous measure. It has adequate reliability and validity as a unidimensional measure (Carey, Carey, & Chandra, 2003). The AUDIT is strongly associated with other measures of problematic drinking (Hays & Merz, 1995). In previous research with lesbian women, the AUDIT demonstrated concurrent validity by its positive correlation (r = .50) with drinking -to -cope motives (Lewis, Mason, Winstead, Gaskins, & Irons, 2016). The Cronbach's alpha in the current study was .73.

International Physical Activity Questionnaire (IPAQ; Ainsworth et al., 2000)

The IPAQ measured physical activity over the past 7 days. Participants were instructed to indicate the number of days over the past week they engaged in moderate physical activity and vigorous physical activity separately. Moderate and vigorous activity were used separately as they may distinguish different groups. The IPAQ demonstrates appropriate test-retest reliability, strong correlations between short and long forms, and correlations between administration method (i.e., telephone versus self-report; Craig et al., 2003). In addition, positive associations have been documented between the IPAQ and objective measurement of physical activity; however, correlation strength varies (Lee, Macfarlane, Lam, & Stewart, 2011).

Short Positive and Negative Affect Schedule (S-PANAS; Mackinnon et al., 1999)

The S-PANAS was used to measure negative affect and positive affect in the past week (Mackinnon et al., 1999). The S-PANAS included five negative affect items (i.e., distressed, upset, scared, nervous, and afraid) and five positive affect items (i.e., active, alert, attentive, determined, and inspired). Consistent with previous studies (e.g., Hatzenbuehler, Nolen-Hoeksema & Dovidio, 2009; Lewis, Milletich, Derlega, & Padilla, 2014), "shamed" was substituted for "scared." Participants indicated on a scale ranging from 0 (*very slightly/not at all*) to 4 (*extremely*) how much they felt each affect item. Items were summed to create separate negative and positive affect scores. The revised S-PANAS has demonstrated good psychometric properties in samples of SMW (Lewis et al., 2014). Cronbach's alphas in the current study were .77 and .84 for positive and negative affect, respectively.

State Social Anxiety Questionnaire (Kashdan & Steger, 2006)

A modified version of the 7-item State Social Anxiety Questionnaire assessed state social anxiety in the past week. Participants responded to items on a 5-point scale ranging from 1 (*very slightly/not at all*) to 5 (*extremely*). A sample item is, "I was afraid that others did not approve of me." Respondents used a past week time frame when completing items. Items were summed with higher scores indicating more social anxiety. The original measure developed by Kashdan and Steger (2006) utilized a daily time frame and demonstrated construct validity of this (as a daily state measure) with positive correlations of .41 to .48 with measures of emotion suppression, negative affect, and depressive symptoms in college men and women and an inverse correlation of -.47 with positive affect; reliability was also acceptable with an alpha of .91. This scale does not appear to have been used in previous published studies of lesbians. The Cronbach's alpha for the current study was .93.

Multidimensional Scale of Perceived Social Support (MSPSS; Zimet, Dahlem, Zimet & Farley, 1988)

The MSPSS assessed general levels of support from friends and support from family. Participants responded to 12 items on a Likert scale ranging from 1 (*very strongly disagree*) to 7 (*very strongly agree*). The MSPSS has been used previously with sexual minority individuals and is moderately, negatively associated with social anxiety and self-concealment evidencing validity of the measure (Potoczniak, Aldea, & DeBlaere, 2007). The Cronbach's alphas for the current study were .94

for support from friends and .93 for support from family.

Lesbian, Gay, and Bisexual Identity Scale (LGBIS; Mohr & Kendra, 2011)

The LGBIS is a 27-item measure that assessed eight dimensions of LGB identity. Participants responded to each item by reflecting on how they feel now using a Likert scale ranging from 1 (*disagree strongly*) to 6 (*agree strongly*). The Acceptance Concerns subscale measured concern and worry about others' views of one's sexual identity (e.g., "I often wonder whether others judge me for my sexual orientation"; α = .80 [alphas are from current study]). The Concealment Motivation subscale assessed one's desire to carefully control what others know about his/her sexual identity (e.g., "My sexual orientation is a very personal and private matter"; α = .83). The Identity Uncertainty subscale measured uncertainty about sexual orientation (e.g., "I keep changing my mind about my sexual orientation"; α = .90). The Internalized Homonegativity subscale assessed negative feelings or shame about one's sexual identity (e.g., "If it were possible, I would choose to be straight"; α = .84). The Difficult Process subscale measured one's perception of a difficult sexual identity development process (e.g., "Admitting to myself that I'm an LGB person has been a very painful process"; α = .84). The Identity Superiority subscale assessed feelings that LGB individuals are better than heterosexuals (e.g., "I look down on heterosexuals"; α = .81). The Identity Affirmation subscale measured positive identification as an LGB person (e.g., "I'm proud to be part of the LGB community"; α = .91). The Identity Centrality assessed the extent to one's sexual identity is central to one's self-image (e.g., "To understand who I am as a person, you have to know that I'm LGB"; α = .84). A validation study of the LGBIS showed that each of the subscales demonstrated adequate construct and convergent validity and reliabilities > .70 (Mohr & Kendra, 2011).

Everyday Discrimination Scale (EDS; Williams, Yu, Jackson, & Anderson, 1997)

The EDS measures nine types of general discrimination that could be experienced on a day-to-day basis over the course of the year (e.g. "I was treated with less courtesy than others"). Respondents indicated on a 6-point Likert-type scale ranging from 1 (*never*) to 6 (*almost every day*) the degree to which each discriminatory act occurred on each day. A previous study showed positive associations between the EDS and both perceived stigma and externally rated prejudice events among LGB adults (Frost, Lehavot, & Meyer, 2015). The Cronbach's alpha for the current study was .91.

STATISTICAL ANALYSES

A latent profile analysis (LPA) was conducted via Mplus 7.4 (Muthén & Muthén, 2015) using measures of BMI, hazardous alcohol use, binge eating, eating disorder risk, and physical activity as indicators. LPA is a person-centered statistical approach that derives profiles based on continuous indicators. The three-step procedure in Mplus was used to conduct the LPA (Asparouhov & Muthén, 2014). In the first step, model fit statistics were used to decide on the number of groups/classes. Models were estimated with the number of classes added iteratively (starting with a one-class solution). The best-fitting model was determined using a number of model fit statistics including log likelihood (LL), Akaike information criterion (AIC), Bayesian information criterion (BIC), sample-size-adjusted BIC (aBIC), Lo-Mendell-Rubin likelihood ratio test (LMR), bootstrap likelihood ratio test (BLRT), and entropy. Lower AIC, BIC, and SSA-BIC values indicated better fit, and larger entropy values indicated better classification accuracy. Significant ($p < .05$) LMR and BLRT statistics also indicated better model fit. In evaluating the number of classes, we took into account the proportion of the sample in each class. Solutions that included only a small proportion of the sample in some classes may not be meaningful or generalizable. In the second step, most-likely class membership was obtained; this accounted for the estimated probability that an individual can belong to each of the possible classes. Third, chi-square analyses were conducted to model auxiliary outcome variables. We used discrimination, sexual minority stress, affect, social anxiety, and social support as outcomes.

Results

The model fit statistics for solutions from 1-class to 6-classes are shown in Table 1. A 6-class solution displayed the best fit with the lowest values on model fit statistics. However, one of the classes had < 5% of the sample within the class. Thus, we settled on a 5-class solution in order to have more stable results. The 5-class solution included the following groups: (1) low health risk + moderate exercise (54%; $n = 236$), (2) obese + binge eating (14%; $n = 59$), (3) disordered eating + hazardous alcohol use (5%; $n = 21$), (4) disordered eating, high exercise (5%; $n = 24$), and (5) low health risk + high exercise (22%; $n = 96$). Figure 1 depicts class values on the profile indicators and Table 2 displays each classe's value on indicators.

Table 1
Model Fit Statistics for Latent Profile Analysis

Number of Classes	BIC	aBIC	AIC	LL	Entropy	LMR Test
1	13745.2	13707.1	13696.2	-6836.1	-	-
2	13360.5	13300.2	13283.0	-6622.5	.919	417.4, $p < .001$
3	13328.4	13245.9	13222.3	-6585.2	.821	73.0, $p = .025$
4	13299.5	13194.8	13165.0	-6549.5	.827	69.7, $p = .240$
5	13275.1	13148.1	13111.9	-6516.0	.866	66.2, $p = .047$
6	13253.5	13104.3	13061.8	-6483.9	.841	62.7, $p = .541$

Note. BIC = Bayesian information criteria; aBIC = adjusted Bayesian information criteria; AIC = Akaike information criteria; LL = log liklihood; LMR = Lo-Mendell-Rubin.

Comparisons of classes on auxiliary variables are displayed in Table 3. For the sexual minority specific variables, the disordered eating + hazardous alcohol use and disordered eating + high exercise classes reported more discrimination than the low health risk + high exercise class. The obese + binge eating; disordered eating + hazardous alcohol use; and disordered eating + high exercise classes had more acceptance concerns than the two healthy classes, and the obese + binge eating and disordered eating + hazardous alcohol use classes also had a more difficult identity process than the low health risk + high exercise class. The disordered eating + hazardous alcohol use class reported greater concealment than the two healthy classes and more internalized homonegativity than the low health risk + high exercise class. The disordered eating + high exercise and obese + binge eating classes had greater uncertainty than the low health risk + high exercise class. Classes did not significantly differ on centrality or superiority. The low health risk + high exercise class reported the greatest level of affirmation, which was significantly higher than the low health risk + moderate exercise class.

For the general variables, the disordered eating + hazardous alcohol use and disordered eating + high exercise classes reported more negative affect than the two healthy classes and the obese + binge eating class; also, the obese + binge eating had more negative affect than the low health risk + high exercise class. The low health risk + high exercise reported more positive affect than each of the four other classes; no differences were found in positive affect among the other classes. The obese + binge eating; disordered eating + hazardous alcohol use; and disordered eating + high exercise classes reported more social anxiety than the two healthy classes. Finally, the low health risk + high exercise class reported more social support from friends than all other classes. In addition, the disordered eating + hazardous alcohol use class reported less social support from friends than the low health risk + moderate exercise and obese + binge eating classes. There were no significant differences in social support from family among the classes.

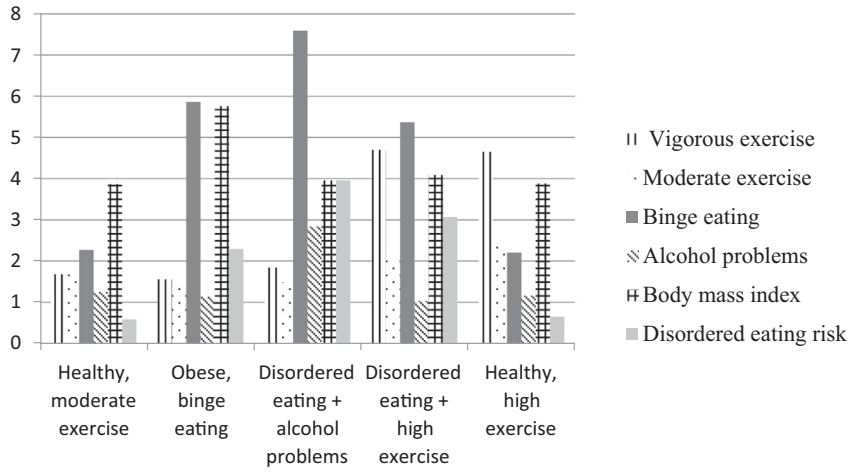

FIGURE 1 Standardized values for the five-group solution on profile indicators.

Table 2
Mean Comparisons Between Latent Classes on Profile Indicators

	LHR + ME (n = 236)	LHR + HE (n = 96)	Ob + BE (n = 59)	DE + AP (n = 21)	DE + HE (n = 24)
Vigorous exercise	1.85[a]	5.13[b]	1.70[a]	2.03[a]	5.17[b]
Moderate exercise	3.64[acd]	5.12[b]	2.85[ad]	3.13[acd]	4.39[bc]
Binge eating	21.56[a]	20.87[a]	55.55[b]	71.96[c]	50.92[b]
Hazardous alcohol use	6.19[a]	5.75[a]	5.90[a]	14.01[b]	5.09[a]
Body mass index	24.50[a]	24.56[a]	36.42[b]	25.04[a]	25.86[a]
Disordered eating risk	0.45[a]	0.51[a]	1.80[b]	3.10c	2.41[d]

Note. Means with different superscripts are significantly different. LHR + ME = low health risk and moderate exercise; Ob + BE = obese + binge eating; DE + AP = disordered eating and hazardous alcohol use; DE + HE = disordered eating and high exercise; LHR + HE = low health risk and high exercise.

Discussion

Using empirical classification methods, behavioral and health-related variables clustered together in five distinct patterns among lesbian women. Two classes represented healthy groups (i.e., low health risk + moderate-to-high physical activity) and accounted for 76% of the sample. The other 24% of the sample were represented by one of three unhealthy risk groups. The first group, which included 14% of the sample, was characterized by elevated BMI and binge eating. This class is consistent with binge eating disorder—i.e., a psychiatric disorder common among individuals with obesity (although binge eating disorder presents among individuals of diverse weights) that is characterized by recurrent binge eating (Brownley et al., 2016; Hudson et al., 2007; Kessler et al., 2013). The second risk group (5% of the sample) was characterized by disordered eating and hazardous drinking. This group is consistent with eating disorders more generally; however, of note, co-occurrence of alcohol problems and disordered eating is most common in bulimia nervosa (Hudson et al., 2007). The third risk group (5% of the sample) was characterized by disordered eating and high levels of exercise. This group is consistent with anorexia nervosa and bulimia nervosa where disordered eating is often coupled with compulsive, driven exercise; it is less consistent with binge eating disorder as individuals with co-occurring binge eating disorder and obesity tend to engage in low amounts of exercise (Barber, Ivezaj, & Barnes, 2018; Hrabosky, White, Masheb, & Grilo, 2007).

Table 3
Mean Comparisons Between Latent Classes on General Discrimination, Sexual-Minority-Specific, and General Risk and Protective Factors

	LHR + ME (n = 236)	LHR + HE (n = 96)	Ob + BE (n = 59)	DE + AP (n = 21)	DE + HE (n = 24)
Discrimination	23.74[ab]	21.05[b]	24.73[ab]	27.66[a]	27.17[a]
Sexual Minority Specific Factors					
Acceptance concerns	10.17[a]	9.81[a]	11.55[b]	13.38[b]	12.87[b]
Affirmation	15.59[a]	16.33[b]	15.38[ab]	14.81[ab]	15.07[ab]
Internalized homonegativity	5.49[ab]	4.90[b]	5.97[ab]	7.84[a]	5.78[ab]
Uncertainty	7.06[ab]	6.31[b]	7.78[a]	9.09[ab]	10.51[a]
Difficult process	9.88[ab]	8.44[a]	10.20[b]	11.53[b]	9.80[ab]
Concealment	8.51[a]	7.86[a]	8.41[ab]	10.69[b]	9.03[ab]
Centrality	21.49[a]	22.68[a]	22.72[a]	21.75[a]	20.31[a]
Superiority	6.22[a]	7.28[a]	6.78[a]	6.05[a]	5.70[a]
General Factors					
Negative affect	12.19[ac]	10.74[c]	13.36[a]	18.92[b]	16.73[b]
Positive affect	15.30[a]	17.91[b]	14.46[a]	13.83[a]	13.49[a]
Social anxiety	17.21[a]	15.59[a]	22.58[b]	25.41[b]	23.98[b]
Social support					
Family social support	17.77[a]	19.14[a]	16.50[a]	16.26[a]	19.24[a]
Friend social support	21.06[a]	24.64[c]	19.34[a]	17.70[b]	20.30[ab]

Note. Means with different superscripts are significantly different. LHR + ME = low health risk and moderate exercise; Ob + BE = obese + binge eating; DE + AP = disordered eating and hazardous alcohol use; DE + HE = disordered eating and high exercise; LHR + HE = low health risk and high exercise.

Class membership shows that the majority of lesbian women are resilient to negative health behaviors and conditions. Thus, with respect to the behaviors examined in the current study, most lesbian women are doing well. Qualitative research suggests that there are numerous positive aspects of being a lesbian woman that may be overlooked in research (Riggle, Whitman, Olson, Rostosky, & Strong, 2008). For example, some positive aspects identified through qualitative research include social (e.g., belonging to a community, creating families of choice) and intrapersonal (e.g., developing empathy, living authentically, personal insight; Riggle et al., 2008) aspects, which each may contribute to increased resilience. Also, our data show that co-occurring binge eating and obesity is the most common unhealthy behavioral pattern among lesbian women. This is consistent with the broader literature showing that binge eating disorder is the most prevalent eating disorder in the general population (Hudson et al., 2007; Udo & Grilo, 2018).

Some differences emerged between the healthy groups and the unhealthy risk groups with regard to sexual -minority -specific factors. The three risk groups reported more acceptance concerns than the healthy groups, and the disordered eating + hazardous alcohol use and obese + binge eating groups reported more difficulty processing sexual identity compared to the the low health risk + high exercise. This finding is consistent with literature showing that internalized sexual minority stress is a risk factor for mental and physical health problems and unhealthy behaviors (Hatzenbuehler, 2009; Lick, Durso, & Johnson, 2013).

Further, only the disordered eating + hazardous alcohol use group reported more motivation to conceal one's sexual identity compared to the healthy groups and more internalized homonegativity compare to the low health risk + high exercise group. Thus, concerns about concealment of sexual identity and internalized homonegativity may be particular risk factors for co-occurring substance use and disordered eating in lesbian women. Internalized homonegativity and concealment are the two primary facets of internalized sexual minority stress that have been shown to be associated with internalizing psychopathology. For example, concealment of sexual orientation among sexual minority individuals has been linked to increased psychiatric symptoms and cortisol levels (Juster, Smith, Ouellet, Sindi, & Lupien, 2013), and internalized homonegativity has been associated with numerous internalizing symptoms (Newcomb & Mustanski, 2010), which may increase risk for overall psychiatric morbidity.

Uncertainty of sexual orientation was particularly elevated among the disordered eating + high exercise class compared to the low health risk + high exercise class. Disordered eating may function to help women cope with stress arising from uncertainty about sexual orientation. Further, women who are uncertain about their sexual orientation may be more likely to internalize broader sociocultural norms about thinness as a standard of beauty, which may lead to more disordered eating in addition to high exercise.

Both the disordered eating + hazardous alcohol use and disordered eating + high exercise groups were differentiated from the healthy groups by elevated negative affect. This is consistent with the extant literature showing that eating disorders, notably anorexia nervosa and bulimia nervosa, are characterized by high levels of negative affectivity and co-occurring mood and anxiety disorders (Hilbert et al., 2014; Hudson et al., 2007). Also, the disordered eating + hazardous alcohol use and disordered eating + high exercise groups showed elevated negative affect in comparison to the obese + binge eating group, which demonstrates that negative affect even differentiates between maladaptive health patterns. This differentiation is congruent with the broader literature which has found that individuals with bulimia nervosa tend to have greater affective disturbance compared to those with binge eating disorder (Hudson et al.). Further, research shows those women with bulimia nervosa who engage in multiple impulsive behaviors report more affective disturbance than women with bulimia nervosa who do not (Myers et al., 2006). Consistent with research demonstrating an association between disordered eating and social anxiety (McLean, Miller, & Hope, 2007; Sawaoka, Barnes, Blomquist, Masheb, & Grilo, 2012), the three risk groups all showed elevated social anxiety in comparison to the healthy groups.

Social support from friends was particularly lower among the disordered eating, hazardous alcohol use group compared to the healthy groups. Less social support from friends may be associated with more difficulty coping with processing negative events, including sexual minority stress, which may then be associated with increased risk of co-occurring disordered eating and alcohol use (Lehavot & Simoni, 2011; Mason et al., 2017). No differences between groups were found for social support from family. Perhaps family support may not be a reliable resilience factor for behavioral health as family rejection is common among sexual minority individuals (McConnell, Birkett, & Mustanski, 2015). That is, many individuals who experience family rejection may be resilient to the

rejection whereas others may be at greater risk for engaging in pathological behaviors due to the rejection. Individual difference variables may be important for discerning who is most likely to be negatively impacted by lack of family support. Further, family rejection may be more saliently related to maladaptive behavioral patterns for adolescents compared to adults.

The low health risk + high exercise group was delineated by high levels of adaptive characteristics such as more positive affect and social support from friends compared to all other groups. In addition, the low health risk + high exercise reported more identity affirmation than the low health risk + moderate exercise group. There is a large literature showing a bi-directional association between positive affect and physical activity (e.g., Cameron, Bertenshaw, & Sheeran, 2017; Pasco et al., 2011). Thus, positive affect may bolster physical activity and vice versa. Also, social support from friends may increase positive affect (Dierk et al., 2006; Nauffal & Sbeity, 2013; Wang & Liu, 2000), which is an important predictor of physical activity (Cameron et al., 2017). Further, while we cannot infer causality, it is possible that individuals with more social support from friends may engage in more physical activity with their friends.

Finally, there were no group differences for identity centrality (i.e., the degree to which LGB identity is central to one's identity) and identity superiority (i.e., a perspective that favors LGB individuals over heterosexual individuals). In the original LGBIS developmental article (Mohr & Kendra, 2011), it was notable that these two subscales were typically unrelated to affective constructs whereas most of the other identity subscales were somewhat associated with affective measures. Rather, identity centrality and superiority were associated with the desire to spend time with sexual minority or heterosexual individuals or importance to identity, which one would not expect, theoretically to be associated with health behaviors. Thus, it may not be surprising that we did not find group differences for these subscales.

PREVENTION AND INTERVENTION IMPLICATIONS

Evidence-based interventions for health behaviors and related conditions are typically grounded in general behavioral theories (e.g., cognitive behavioral theory; Cooper & Shafran, 2008). Our findings demonstrate that integrated facets of minority stress theory and the psychological mediation framework into these evidence-based interventions would be useful for lesbian women. Furthermore, there are specific areas to address dependent upon the presenting behavioral and health problems.

The low health risk + high exercise group displayed the healthiest psychosocial profile followed by the low health risk + moderate exercise group. Programs targeting physical activity may be useful in improving psychological health and reducing maladaptive behavioral symptoms among lesbian women. However, women with disordered eating symptoms may not unequivocally benefit from increased physical activity as excessive exercise may be associated with eating disorders (as seen with the disordered eating + high exercise class in the current study). Even so, exercise can be used as a therapeutic tool among individuals with disordered eating if exercise is introduced appropriately to treatment (see Cook et al., 2016, for guidelines).

Prevention programs that focus on a variety of psychosocial aspects (e.g., social support, affect, discrimination) may specifically be worth pursuing. In addition, programs that consider the role of sexual-minority-specific factors such as reducing and managing sexual minority stress and promoting positive, healthy sexual identity development may prevent a variety of maladaptive behavioral symptoms and psychiatric profiles. These prevention programs may be particularly useful in adolescence when sexual identity is developing. Targeting specific aspects of minority stress may be useful dependent upon the presenting behavioral profile. For example, one's perception of a difficult sexual identity development process may be useful to target in individuals with obesity and binge eating while uncertainty of one's sexual identity may be important to target among those with disordered eating and high exercise. Further, these results showed the acceptance concerns may be a facet of sexual minority stress that should be targeted among lesbian women with a variety of different behavioral and health patterns.

The disordered eating + hazardous alcohol use groups displayed the most consistent negative outcomes, particularly compared to the healthy groups, which is analogous to other studies finding greater psychopathology among women with comorbid eating disorder and alcohol dependence compared to either disorder alone (Bulik et al., 2004; Duncan et al., 2006). Studies have shown that women with comorbid eating disorders and substance use disorder are more likely to have borderline personality disorder, a history of suicide, and engage in other impulsive behaviors (Bulik et al., 2004; Sansone, Fine, & Nunn, 1994), which may increase negative outcomes for these women. Our findings also suggest that individuals with co-occurring disordered eating and hazardous alcohol

use may need more intensive interventions that address both problems. Also, interventions may try to consider how the behaviors are linked (e.g., substance use may function as a control mechanism to reduce urges to engage in bulimic behaviors [Bruce et al., 2011]).

LIMITATIONS AND FUTURE DIRECTIONS

In spite of the important contributions of this study, there are notable limitations. While we were able to empirically classify our sample into five distinct behavioral groups, there may be additional groups that we were not able to capture due to sample size. Also, two of the groups that we were able to capture were relatively small (i.e., 5% of the sample), which reduced power when examining differences on general and sexual -minority -specific risk and protective factors. In addition, we included a limited range of behaviors in the LPA. It may be useful to include other health behaviors in analyses in future studies such as unhealthy weight control behaviors (e.g., purging), drug use, and smoking. Also, the cross-sectional design of this study prevented our ability to infer causation. Future studies using longitudinal and ecological momentary assessment methods will facilitate our understanding of prospective associations. Another limitation is that women self-selected into this study through the Internet, and thus, our sample may not be representative of all lesbian women. Further, only lesbian women were included in this study; future research should attempt to replicate our 5-class solution in other lesbian samples as well as samples of other sexual and gender minority subgroups across age, race, and other demographic variables. Finally, in the current study, we focused on the sexual-minority-specific factors of discrimination and sexual identity but it is possible that there are other important sexual-minority -specific or general factors (e.g., weight stigma and teasing, racial discrimination) that independently and interactively increase risk for negative behavioral profiles. These relations should be considered in future studies.

CONCLUSION

An empirical classification process was used to classify lesbian women based on a diverse group of health behaviors. Three-quarters of the sample was classified into healthy groups. The unhealthy behaviors grouped into similar clusters found among nonsexual minority women. Consistent with minority stress theory, general and sexual-minority-specific factors were examined among these empirically determined groups. In general, the unhealthy groups reported more discrimination, more sexual minority stressors, more negative affect and social anxiety, less positive affect, and lower social support.

Conflict of Interest Statement

The authors have no conflicts of interest to disclose.

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