Patterns of Alcohol Use and Consequences Among Empirically Derived Sexual Minority Subgroups

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ABSTRACT. Objective: The current study develops an empirically determined classification of sexual orientation developmental patterns based on participants' annual reports of self-identifications, sexual attractions, and sexual behaviors during the first 4 years of college. A secondary aim of the current work was to examine trajectories of alcohol involvement among identified subgroups. **Method:** Data were drawn from a subsample of a longitudinal study of incoming first-time college students at a large, public university ($n = 2,068$). Longitudinal latent class analysis was used to classify sexual minority participants into empirically derived subgroups based on three self-reported facets of sexual orientation. Multivariate repeated-measures analyses were conducted to examine how trajectories of alcohol involvement varied by

sexual orientation class membership. **Results:** Four unique subclasses of sexual orientation developmental patterns were identified for males and females: one consistently exclusively heterosexual group and three sexual minority groups. Despite generally similar alcohol use patterns among subclasses, certain sexual minority subgroups reported elevated levels of alcohol-related negative consequences and maladaptive motivations for use throughout college compared with their exclusively heterosexual counterparts. **Conclusions:** Elevations in coping and conformity motivations for alcohol use were seen among those subgroups that also evidenced heightened negative alcohol-related consequences. Implications and limitations of the current work are discussed. (*J. Stud. Alcohol Drugs*, 73, 290–302, 2012)

SEXUAL MINORITY INDIVIDUALS (i.e., those who endorse a nonheterosexual self-identification or same-sex sexual attractions or behaviors) tend to show higher levels of substance use (Bux, 1996; Marshal et al., 2009; Paul et al., 1991; Talley et al., 2010). Alcohol use disparities may be more pronounced for female sexual minority members (Corliss et al., 2008; Eisenberg and Wechsler, 2003; Marshal et al., 2008) compared with their male counterparts. These disparities are thought to contribute to increased risk of suicide attempts (Hegna and Wichstrøm, 2007; Russell and Joyner, 2001; cf. Silenzio et al., 2007) and ideation (Silenzio et al., 2007), elevated frequencies of risky sexual behaviors (e.g., Meyer and Dean, 1995; cf. Weatherburn et al., 1993), and other adverse consequences.

Several hypotheses attempt to explain vulnerability to alcohol misuse among sexual minorities (for reviews, see Bux, 1996; Hughes and Eliason, 2002), including coping with sexual prejudice (Hatzenbuehler et al., 2009; McKirnan and Peterson, 1988; Orenstein, 2001), permissive subcultural norms (Hatzenbuehler et al., 2008; McKirnan et al., 1996), risk-related alcohol expectancies (Hatzenbuehler et al., 2008; McKirnan and Peterson,

1988), and fewer incompatible role responsibilities (Hughes and Eliason, 2002). Importantly, variations in sexual orientation development processes may alter the relative likelihood of each explanation. Consequently, examinations of the patterns of alcohol use among diverse subgroups of sexual minority individuals may be helpful in understanding potentially distinct etiologic pathways of alcohol-related outcomes.

The majority of research examining sexual minority alcohol use has been cross-sectional (Amadio, 2006; Drabble et al., 2005; McCabe et al., 2009; Ridner et al., 2006; Rosario et al., 2004, 2008; Stall et al., 2001; Wong et al., 2008). Recently, longitudinal studies (Corliss et al., 2008; DeBord et al., 1998; Hatzenbuehler et al., 2008; Marshal et al., 2009; Rostosky et al., 2007, 2008; Skinner and Otis, 1996; Talley et al., 2010; Tucker et al., 2008) have examined temporal patterns of alcohol use among nonclinical samples of sexual minority individuals and compared those with patterns among sexual majority individuals. These longitudinal studies suggest that sexual minority individuals are at risk for alcohol involvement, and these patterns of use generally fluctuate over time.

Fewer studies (Corliss et al., 2008; Fergusson et al., 2005; Marshal et al., 2009; Talley et al., 2010; Tucker et al., 2008) have examined patterns of alcohol involvement among distinct subgroups of sexual minorities. Research is beginning to uncover the alcohol use behaviors and associated problems of a large class of "mostly straight" individuals (i.e., those who endorse primarily heterosexual self-identifications and some degree of same-sex sexual attractions and/or behaviors; Corliss et al., 2008).

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Fergusson et al. (2005) used latent class analysis to identify three classes of individuals in emerging adulthood (i.e., roughly ages 18–25; Arnett, 2000), which were labeled “exclusively heterosexual,” “predominately heterosexual,” or “predominately homosexual,” based on endorsements of sexual orientation; no significant differences in rates of alcohol dependence were found between classes. Corliss and colleagues (2008) used sexual orientation self-identification/sexual attraction to examine alcohol use outcomes during late adolescence into emerging adulthood. Higher levels of alcohol involvement were found among mostly straight men and women as well as among bisexual women compared with their exclusively heterosexual counterparts. By contrast, gay male and lesbian alcohol use was inconsistently elevated. These findings suggest that bisexual and mostly straight persons, and especially sexual minority women (Corliss et al., 2008; Hatzenbuehler et al., 2008; Marshal et al., 2008; McCabe et al., 2005; Rosario et al., 2004; Ziyadeh et al., 2007), report elevated alcohol involvement during adolescence and emerging adulthood.

We sought to classify individuals into sexual orientation subgroups based on three facets of sexual orientation (i.e., self-identification, sexual attraction, and sexual behavior). The use of multiple facets to classify individuals is appealing for at least two reasons. First, theoretical (Sell, 1997) and empirical (Marshal et al., 2009; Savin-Williams and Ream, 2007) distinctions between self-identifications, sexual attractions, and sexual behaviors have not been adequately incorporated into the literature despite recognition that these facets are not isomorphic with each other. Second, studies have presumed that sexual orientation can be durably assessed at a single time point or can be inferred based on participants’ previous endorsement of at least one dimension of sexual orientation, without considering that sexual orientation development might be particularly dynamic during periods (i.e., adolescence, emerging adulthood; Ott et al., 2011) that are generally marked by identity exploration and change (Arnett, 2000; Schulenburg and Maggs, 2002).

Previous studies have assessed same-sex sexual attractions and behaviors once at the beginning of a study period (Sell, 1997); sexual minority self-identification, sexual attractions, and behaviors once at the end of the study period (Marshal et al., 2009); confounded or combined reports of sexual minority self-identification and same-sex sexual attractions at one (Corliss et al., 2008) or two (DeBord et al., 1998; Rostosky et al., 2007) assessment occasions; or combined a one-time assessment of self-identification with at least one report of a same-sex partner in one’s past (Hatzenbuehler et al., 2008). Corliss et al. (2008), for example, created a “hierarchical coding scheme” to collapse assessments of sexual orientation measured at three waves into a single variable or treated these three assessments as a time-varying covariate (i.e., a variable-centered approach), depending on the analytic strategy.

Critically, longitudinal latent class analysis (LLCA) does not require the reconciliation of facets of sexual orientation over time and permits the data to guide classification based on trajectories without superimposing preconceived notions on how these distinct facets are distributed in subclasses of individuals.

Current study

We used LLCA to classify emerging adults based on three facets of sexual orientation. The indicators used—including self-identification, sexual attractions, and sexual behaviors—are recognized facets of sexual orientation (Sell, 1997). The primary aim was to develop an empirically determined classification of sexual orientation trajectories based on participants’ reports of these facets during each of the first 4 years of college. A secondary aim was to examine how patterns of alcohol use and related outcomes differ by subclass of sexual orientation development.

Method

Participants

Data were drawn from a study of substance use and health behaviors (Sher and Rutledge, 2007). For precollege assessment, 3,720 (88%) of 4,226 incoming first-time college students completed a paper-and-pencil questionnaire in the summer orientation preceding college matriculation. First-time college students were administered a web-based survey each fall (October/November) and spring (March/April) over the subsequent 4 years. Data for the current analyses are limited to individuals who responded to questions regarding sexual orientation on assessments beginning in the first year of college ($n = 2,068$). Participants were 62% female, 90.5% White, and a mean of 18.75 ($SD = .47$) years of age on average at the first assessment.

Measures

Sexual orientation. We assessed three facets of sexual orientation: (a) self-identification (i.e., self-labeling of sexual identity), (b) sexual attraction (i.e., degree of opposite- vs. same-sex sexual attractions), and (c) sexual behavior (i.e., degree of opposite- vs. same-sex sexual activity).

To assess self-identification, participants were asked: “How would you describe your sexual orientation?” Response options were the following: 1 = *exclusively homosexual*, 2 = *primarily homosexual*, 3 = *equally homosexual and heterosexual*, 4 = *primarily heterosexual*, and 5 = *exclusively heterosexual*. Sexual attractions and behaviors were assessed with single, 7-point items asking participants, respectively, “To which group are you sexually attracted?” and “With which group do you engage in sexual

behavior?" (1 = *opposite sex only*, 2 = *opposite sex mostly*, 3 = *opposite sex somewhat*, 4 = *both sexes equally*, 5 = *same sex somewhat*, 6 = *same sex mostly*, and 7 = *same sex only*).

Because of patterns of sparseness in participants' endorsements across the full range of response options, we created an ordered categorical variable to classify participants' sexual attractions and behaviors as: (1) *opposite sex only*, (2) *opposite sex mostly*, (3) *opposite sex somewhat/both sexes equally/same sex somewhat/same sex mostly*, and (4) *same sex only*.

Alcohol use. A single item at each assessment measured the frequency with which participants used alcohol in the previous 3 months on an 8-point scale (0 = *not in the past 3 months*, 7 = *more than 40 times*). Usual number of drinks consumed was assessed with one item, "In the past 3 months, when you were drinking alcohol, how many drinks did you usually have on any one occasion?" (0 = *did not drink in the past 3 months*, 10 = *12 or more drinks*). A combined quantity–frequency variable was created by multiplying these two indicators of usual quantity and frequency of alcohol use. Heavy episodic drinking was assessed with one item, "Over the past 30 days, on how many days did you drink five or more drinks in a single setting?" (0 = *didn't drink this amount in the past 30 days*, 7 = *every day*). Drunkenness was assessed with one item, "Over the past 30 days, on how many days have you gotten drunk on alcohol?" (0 = *didn't get drunk in the past 30 days*, 7 = *every day*).

Problematic alcohol involvement. A sum of 37 items consisting of negative consequences associated with drinking and symptoms related to alcohol dependence (consistent with the alcohol dependence syndrome described by Edwards and Gross, 1976) was calculated (see Sher et al., 1991). Participants were asked if, in the past 3 months, they had experienced alcohol-related consequences/symptoms (e.g., In the past 3 months, have you . . . "gotten in trouble at work or school because of drinking?"). Internal consistency, as measured by coefficient α , was .93 at all assessments.

Drinking motives. Coping, enhancement, social, and conformity drinking motives were measured at Years 1 (Wave 1), 2 (Wave 3), 3 (Wave 5), and 4 (Wave 7) with Cooper's (1994) Drinking Motives Questionnaire. This four-factor measure of motivations for alcohol use was derived by crossing two dimensions, reflecting valence (i.e., positive or negative) and course (i.e., internal or external) of desired outcomes from drinking. An example item assessing each motive is as follows: I drink . . . to forget my worries (coping) . . . because it gives me a pleasant feeling (enhancement) . . . to be sociable (social) . . . to get in with a group I like (conformity). Response options ranged from *strongly agree* (1) to *strongly disagree* (5) for each item, and the internal consistency was excellent for all subscales at each wave (all α 's > .94).

Statistical analyses

Longitudinal latent class analysis. Given that we were interested in whether certain trajectories of sexual orientation development were associated with certain patterns of alcohol involvement, LLCA was used to allow for the identification of unobserved trajectory classes (see Croudace et al., 2003, for additional discussion of LLCA and a technical appendix regarding model framework). Trajectories of sexual orientation development, which were identified using four yearly assessments of sexual orientation facets, spanning from the first year in college (Wave 2) to the fourth year in college (Wave 8), were classified using finite mixture models (McLachlan and Peel, 2000). Finite mixture models assume that patterns of endorsement of categorical indicators within a given sample arise from certain population groups, which can be represented via unobserved latent classes. Muthén (2002) has proposed a general modeling framework (i.e., Framework B) for mixture modeling with categorical observed and latent variables in which change over time can be modeled in piecewise fashion, using LLCA. The classes that are extracted from the current data are equivalent to a model that includes time (e.g., growth mixture modeling), but it does not impose a shape on the trajectories.

Input variables for LLCAs included facets of sexual orientation (self-identification, attraction, and behavior) assessed at four time points (Waves 2, 4, 6, and 8, corresponding to the first, second, third, and fourth years of college) for a total of 12 indicators. Information about the resultant class structure is conveyed through the likelihood of endorsing sexual orientation indicators within a particular class (item-response probabilities) as well as the proportion of participants in each class (latent class prevalence). We allowed the item-response probabilities to vary across time points, implying an agnostic approach to developmental trajectories. Class membership was fixed because this was determined by the pattern of item-response probabilities across all time points.

Based on evidence that men and women have distinct patterns of sexual orientation development (Diamond, 1998, 2003; Savin-Williams and Diamond, 1999; Yarhouse and Tan, 2004), as well as alcohol involvement disparities (e.g., Keyes et al., 2008), we opted to stratify analyses on gender. LLCAs were conducted separately for women ($n = 507$) and men ($n = 169$), whoever indicated any nonexclusively heterosexual self-identification or any degree of same-sex attractions or behaviors across the college years. Individuals who always indicated an exclusively heterosexual self-identification as well as opposite-sex-only attractions and behaviors over time were not included in the LLCA model building strategy and were pre-assigned to an exclusively heterosexual class (women: $n = 807$; men: $n = 573$).

Initially, one-class models were fit and successive models incorporated an increasing number of latent classes to

TABLE 1. Distribution of observed responses to sexual orientation facets across time

Measure	Males % (n)	Females % (n)	Total % (n)
Self-identification—Wave 2			
Exclusively heterosexual	91.9 (688)	87.4 (1,153)	89.0 (1,841)
Primarily heterosexual	5.1 (38)	9.1 (120)	7.6 (158)
Bisexual	0.1 (1)	0.8 (11)	0.6 (12)
Primarily homosexual	1.1 (8)	0.7 (9)	0.8 (17)
Exclusively homosexual	1.9 (14)	2.0 (40)	1.9 (40)
Sexual attraction—Wave 2			
Opposite sex only	94.3 (706)	87.1 (1,149)	89.7 (1,855)
Opposite sex mostly	2.8 (21)	10.5 (139)	7.7 (160)
Opposite sex/same sex some extent	1.3 (10)	1.7 (23)	1.6 (33)
Same sex only	1.6 (12)	0.6 (8)	1.0 (20)
Sexual behaviors—Wave 2			
Opposite sex only	96.4 (722)	94.9 (1,252)	95.5 (1,974)
Opposite sex mostly	0.5 (4)	3.6 (48)	2.5 (52)
Opposite sex/same sex some extent	1.3 (10)	0.4 (5)	0.7 (15)
Same sex only	1.7 (13)	1.1 (14)	1.3 (27)
Self-identification—Wave 4			
Exclusively heterosexual	89.3 (493)	85.5 (956)	86.8 (1,449)
Primarily heterosexual	5.1 (28)	8.4 (94)	7.3 (122)
Bisexual	0.9 (5)	0.6 (7)	0.7 (12)
Primarily homosexual	1.4 (8)	1.5 (17)	1.5 (25)
Exclusively homosexual	3.3 (18)	3.9 (44)	3.7 (62)
Sexual attraction—Wave 4			
Opposite sex only	92.2 (511)	85.2 (952)	87.6 (1,463)
Opposite sex mostly	3.2 (18)	12.0 (134)	9.1 (152)
Opposite sex/same sex some extent	2.7 (15)	2.2 (25)	2.4 (40)
Same sex only	1.8 (10)	0.5 (6)	1.0 (16)
Sexual behaviors—Wave 4			
Opposite sex only	93.9 (505)	93.9 (1,019)	93.9 (1,524)
Opposite sex mostly	1.5 (8)	4.2 (46)	3.3 (54)
Opposite sex/same sex some extent	2.4 (13)	1.0 (11)	1.5 (24)
Same sex only	2.2 (12)	0.8 (9)	1.3 (21)
Self-identification—Wave 6			
Exclusively heterosexual	88.6 (466)	86.1 (921)	86.9 (1,387)
Primarily heterosexual	5.7 (30)	9.3 (99)	8.1 (129)
Bisexual	0.4 (2)	0.6 (6)	0.5 (8)
Primarily homosexual	1.5 (8)	1.1 (12)	1.3 (20)
Exclusively homosexual	3.8 (20)	3.0 (32)	3.3 (52)
Sexual attraction—Wave 6			
Opposite sex only	91.6 (479)	82.8 (888)	85.7 (1,367)
Opposite sex mostly	4.2 (22)	14.8 (159)	11.3 (181)
Opposite sex/same sex some extent	1.5 (8)	1.9 (20)	1.8 (28)
Same sex only	2.7 (14)	0.5 (5)	1.2 (19)
Sexual behaviors—Wave 6			
Opposite sex only	94.9 (479)	94.5 (987)	94.6 (1,466)
Opposite sex mostly	1.2 (6)	3.8 (40)	3.0 (46)
Opposite sex/same sex some extent	0.8 (4)	0.7 (7)	0.7 (11)
Same sex only	3.2 (16)	1.0 (10)	1.7 (26)
Self-identification—Wave 8			
Exclusively heterosexual	89.7 (429)	85.7 (866)	87.0 (1,295)
Primarily heterosexual	5.4 (26)	11.6 (117)	9.6 (143)
Bisexual	0.2 (1)	0.4 (4)	0.3 (5)
Primarily homosexual	1.0 (5)	1.1 (11)	1.1 (16)
Exclusively homosexual	3.6 (17)	1.3 (13)	2.0 (30)
Sexual attraction—Wave 8			
Opposite sex only	90.4 (433)	79.4 (804)	82.9 (1,237)
Opposite sex mostly	4.4 (21)	17.6 (178)	13.3 (199)
Opposite sex/same sex some extent	2.5 (12)	2.3 (23)	2.3 (35)
Same sex only	2.7 (13)	0.8 (8)	1.4 (21)
Sexual behaviors—Wave 8			
Opposite sex only	93.4 (436)	93.5 (925)	93.5 (1,361)
Opposite sex mostly	1.9 (9)	4.1 (41)	3.4 (50)
Opposite sex/same sex some extent	0.6 (3)	0.8 (8)	0.8 (11)
Same sex only	4.1 (19)	1.5 (15)	2.3 (34)

determine the most parsimonious model that adequately fit the data. Consistent with Bandeen-Roche et al. (1997), we inferred the number of latent classes ignoring potential covariates to reduce the complexity of the analysis (i.e., we fit unconditional models). Underlying probability distributions were identified using full-information maximum-likelihood in Mplus, Version 6 (Muthén and Muthén, 1998–2010).

Goodness of fit was evaluated with an emphasis on the Bayesian information criteria (BIC), such that models with lowest values of BIC were chosen. We also present results for the Akaike information criteria (Lin and Dayton, 1997; cf. McLachlan and Peel, 2000). Relative entropy (range: 0–1) was used as an indicator of how accurately participants were classified into latent groups (Celeux and Soromenho, 1996), with higher values indicating a solution where each observed response pattern was likely to be assigned accurately to one latent class over others.

Class membership was assigned based on sexual minority individuals' highest probability of membership across classes. A categorical variable was created to indicate sexual orientation development class membership, and this variable was used in the repeated-measures analyses.

Repeated-measures analyses. Analyses were conducted to examine trajectories of alcohol involvement at yearly intervals based on sexual orientation development class membership. We used multivariate repeated-measures analysis (SAS Proc Mixed; SAS version 9.2; SAS Institute Inc., Cary, NC) to account for the non-independence of repeated assessments within individuals and missing data. We excluded individuals who were alcohol abstainers over all 4 years of college ($n = 25$; final $n = 2,031$). Means are adjusted for age at baseline, race, and ethnicity.

Results

Female models. Observed endorsements of sexual orientation items across all waves are provided in Table 1. Comparing BIC values, LLCA supported a three-class solution for women (Table 2). The entropy value for the female (.92) three-class solution indicated that the selected model provided relative certainty of appropriate classification into latent subgroups. Figure 1 presents estimated threshold values within each class of women. The

smallest identified class (Class 1; 1.6% of the female sample; $n = 21$) appears to be comprised of women whose sexual identities, behaviors, and attractions are predominately bisexual or homosexual over time (i.e., “lesbian/bisexual”). The second largest class (i.e., “mostly straight”) among the sexual minority subsample (Class 2; 9.7% of the female sample; $n = 128$) consists of women who consistently endorse primarily heterosexual self-identifications and opposite sex mostly sexual attractions, and whose sexual behaviors involve some same-sex partners. The largest class among the female sexual minority subsample (Class 3; 27.2% of the female sample; $n = 358$) is made up of women who largely begin college with exclusively heterosexual attractions/behaviors/identities but over time admit to increases in same-sex attractions/behaviors or a primarily heterosexual self-identification (i.e., “increasingly mostly straight”). Notably, their sexual behaviors remain predominately opposite sex only throughout college. Finally, there is a pre-assigned class of women (Class 4; $n = 807$; 61.4% of the overall sample) whose attractions/behaviors/identities are consistently “exclusively heterosexual” and stable over time.

Gender-specific trajectories of alcohol involvement outcomes, split by class membership, are presented in Figure 2. There was an omnibus Time $\times$ Class membership interaction found with regard to quantity–frequency of alcohol use, $F(9, 1307) = 1.87, p = .05$. Contrasts of this interaction suggested that during the first year of college, mostly straight women (Class 2) reported a higher quantity–frequency of alcohol use compared with exclusively heterosexual women ($p = .006$). Contrast analysis also showed that the mostly straight subgroup decreased in their quantity–frequency of alcohol use compared with their exclusively heterosexual peers from the first to the second year of college ($p = .003$). Regarding frequency of heavy episodic drinking, although there was no main effect of class membership, $F(3, 1307) = 0.69, p = .56$, and the omnibus Time $\times$ Class membership interaction was not significant, $F(9, 1307) = 1.52, p = .14$, follow-up contrasts comparing the drinking patterns of mostly straight women and exclusively heterosexual women suggested that the former group's heavy episodic drinking was primarily elevated during the first year of college ($p = .02$). No effects were significant with regard to frequency of drunkenness.

TABLE 2. Latent class analysis model fit statistics

Subsample	One class	Two class	Three class	Four class	Five class
Males ($n = 169$)					
BIC	3,242.95	2,888.50	2,863.99	2,958.73	3,070.19
AIC	3,120.89	2,641.24	2,491.54	2,461.07	2,447.34
Females ($n = 507$)					
BIC	8,579.05	7,761.30	7,648.09	7,692.56	7,806.30
AIC	8,409.91	7,418.79	7,132.21	7,003.31	6,943.69

Notes: **Bolded** text denotes “best-fit” model selection for each respective fit index. BIC = Bayesian information criterion; AIC = Akaike information criterion.

FIGURE 1. Estimated threshold values (in probability scale) within each latent class for sexual minority female participants ($n = 507$). Y = year.

FIGURE 2. Estimated means for alcohol use outcomes based on female and male sexual orientation development class memberships. C = class; incrs. = increasingly; excl. = exclusively.

FIGURE 3. Estimated threshold values (in probability scale) within each latent class for sexual minority male participants ($n = 169$). Y = year.

There was a main effect of class membership (that did not interact with time) with regard to negative alcohol-related consequences, $F(3, 1307) = 7.28, p < .001$. Across the college years, increasingly mostly straight ($p = .002$) and mostly straight ($p < .001$) women reported a higher number of negative alcohol-related consequences compared to exclusively heterosexual women. Similarly, increasingly mostly straight ($p = .08$) and mostly straight ($p = .02$) women tended to report higher negative alcohol-related consequences than lesbian/bisexual women.

Although no omnibus Time $\times$ Class interactions were significant for any motives, there were main effects with regard to coping motives, $F(3, 1252) = 2.86, p = .04$, and enhancement motives for drinking, $F(3, 1253) = 5.59, p < .001$, across the college years. Compared with exclusively heterosexual women, increasingly mostly straight women endorsed higher levels of using alcohol as a means for coping with negative affect ($p = .01$). Both mostly straight ($p < .001$) and increasingly mostly straight ($p = .007$) women endorsed higher levels of enhancement motives for drinking throughout college compared with exclusively heterosexual women. There were also main effects found with regard to conformity motives for drinking, $F(3, 1254) = 3.09, p = .03$, such that lesbian/bisexual women endorsed higher levels of this motive across time compared with mostly straight ($p = .02$), increasingly mostly straight ($p = .03$), and exclusively heterosexual women ($p = .009$). Increasingly mostly straight women tended to endorse higher levels of conformity motives across time than exclusively heterosexual women ($p = .08$). No results for social drinking motives were significant.

Male models. As shown in Table 2, comparing BIC values, analyses supported a three-class solution for men. The entropy value for the male (.97) three-class solution indicated that the model provided certainty of appropriate classification into latent subgroups. As shown in Figure 3, the smallest identified class (Class 1; 3.2% of the male sample; $n = 24$) appears to be comprised of men whose sexual identities, behaviors, and attractions are predominately and consistently bisexual or homosexual over time (i.e., "gay/bisexual"; see Figure 3). The second largest class of sexual minority men (Class 3; 3.5%; $n = 26$) is made up of men who start out college acknowledging a primarily heterosexual orientation and tend to increase over time in their endorsement of minority self-identifications and same-sex attractions and behaviors (i.e., "increasingly minority"). The largest class of sexual minority men (Class 2; 16.0% of the male sample; $n = 119$) consists of those who consistently endorse a "mostly straight" sexual orientation with a small degree of same-sex attraction and behaviors. Finally, there is a pre-assigned class of men (Class 4; $n = 573$; 77.2% of the overall sample) whose identities are "exclusively heterosexual" and whose attractions/behaviors are opposite sex only over time.

Next, we examined trajectories of alcohol involvement and associated outcomes for male participants. There was a main effect of class membership (that did not interact with time) with regard to quantity–frequency of alcohol use, $F(3, 731) = 4.04, p = .007$. Across the college years, mostly straight men reported a lower quantity–frequency of alcohol use than exclusively heterosexual men ($p = .001$). Specific contrasts suggested that increasingly minority men increased in quantity–frequency of alcohol use at a rate that was greater than their exclusively heterosexual counterparts from the third to the fourth year of college ($p = .02$). There were no significant differences based on class membership or interactions over time when examining other alcohol consumption outcomes (i.e., heavy episodic drinking, drunkenness).

Despite an absence of subgroup differences among male participants with regard to alcohol involvement over time, there was a significant interaction between class membership and time with regard to negative alcohol-related consequences, $F(9, 732) = 2.05, p = .03$. Results show that increasingly minority men reported higher negative consequences than their exclusively heterosexual counterparts, especially during the first ($p = .03$), second ($p = .04$), and fourth ($p < .001$) years of college. Contrast analyses suggested that increasingly minority men endorsed a greater increase in the number of negative consequences from the third to the fourth year of college compared with both exclusively heterosexual ($p < .001$) and mostly straight men ($p = .003$). Results also showed that increasingly minority men reported higher negative consequences than their mostly straight counterparts throughout college ($p = .007$), especially during the first ($p = .03$) and fourth ($p < .001$) years of college.

There were main effects (that did not interact with time) with regard to coping, $F(3, 681) = 3.19, p = .02$, and enhancement motives for drinking, $F(3, 681) = 2.60, p = .05$. Findings show that increasingly minority men reported higher coping motivations than their exclusively heterosexual counterparts across the college years ($p = .009$), especially during the second ($p = .003$), third ($p = .03$), and fourth ($p = .08$) years of college. Averaging over time, mostly straight men reported lower enhancement motivations for drinking than their exclusively heterosexual ($p = .06$) and gay/bisexual counterparts ($p = .01$). No results for conformity or social drinking motives were significant.

Discussion

The current study used LLCA, combining various facets of sexual orientation measured over 4 years, to identify sexual orientation development classes. For female sexual minority participants, classes were identified as lesbian/bisexual, mostly straight, and increasingly mostly straight women. Despite that both mostly straight and increasingly

mostly straight women endorsed varying degrees of sexual minority self-identifications and same-sex attractions, sexual behaviors among a majority of these women were largely exclusively opposite-sex oriented. For male sexual minority participants, classes were identified as gay/bisexual, mostly straight, and increasing minority men. Similar to Fergusson et al. (2005), current findings suggested that approximately 1.6% of young women and 3.2% of young men were classifiable as predominately bisexual or homosexual over the college years. The current data also supported previous observations that women exhibit a more fluid sexual orientation relative to men (Ott et al., 2011; Savin-Williams and Ream, 2007). Specifically, 38.6% of women in the current sample were classified into sexual minority latent classes compared with 22.8% of men (i.e., women had 113% higher odds of being classified into sexual minority classes compared with men).

These results extend previous work (Corliss et al., 2008; Marshal et al., 2009; Talley et al., 2010; Tucker et al., 2008) by examining patterns of alcohol involvement among individuals with diverse sexual orientations. Consistent with Fergusson et al. (2005), we used an empirically driven, "person-centered" approach (as opposed to a more "variable-centered" approach [Bates, 2000] or an a priori classification scheme) to identify subgroups of individuals. This approach allowed for a greater understanding of heterogeneity in sexual orientation development during emerging adulthood and suggested that patterns of sexual orientation development are dynamic and have complex relations with alcohol-related outcomes (Cicchetti and Rogosch, 2002). Contrasting previous findings (Marshal et al., 2008; McCabe et al., 2005, 2009), bisexual/lesbian women in the current report did not endorse elevated levels of alcohol use and consequences. We speculate that more normative patterns of alcohol use during the college years (Hatzenbuehler et al., 2008; McCabe et al., 2003) and previous lumping of mostly straight individuals under bisexual self-identification categories (see McCabe et al., 2011) are plausible explanations for these findings.

Women who entered college acknowledging a mostly straight sexual orientation experienced heightened levels of alcohol involvement primarily during the first year of college. However, this disparity was partially resolved as emerging adulthood progressed. Despite largely similar patterns of alcohol consumption over time, the aforementioned group of women—as well as those who initiated their sexual questioning subsequent to the first year in college (i.e., increasingly mostly straight)—consistently reported heightened negative consequences from alcohol use over the 4 years of college. Elevations in alcohol-related consequences were also reliably apparent in the subgroup of men who were increasing in their endorsements of same-sex attractions/behaviors and minority self-identifications across the college years, and these consequences seemed to accelerate toward the end

of college. Women and men whose sexual orientation was in flux during the college years (i.e., increasingly minority men and increasingly mostly straight women) were those most likely to endorse using alcohol as a means to cope with negative affect or to fit in with a desired social group.

Rather than focusing on self-described bisexual, gay, and lesbian individuals, public health efforts that target sexual minority subgroups must seek to include those who identify as mostly straight as well as those who admit to same-sex behaviors and attractions but who do not ascribe to a sexual minority identity category. Ultimately, a developmental perspective that appropriately considers temporal relations and natural fluidity among facets of sexual orientation is necessary to characterize distinct sexual orientation development trajectories and direct intervention efforts during adolescence and early adulthood.

Despite alcohol consumption patterns that were largely similar among sexual orientation groups, current results suggest that sexual minorities—especially those whose sexual orientation is in flux during the college years—are unduly affected by alcohol-related negative consequences and elevations in maladaptive motivations for alcohol use (i.e., coping, conformity). The sexual identity development process is inherently stressful for some persons (Thompson and Morgan, 2008). Indeed, sexual questioning is often accompanied by increased feelings of alienation and isolation (Glover et al., 2009; Savin-Williams and Diamond, 1999; Thompson and Morgan, 2008; Yarhouse and Tan, 2004). We speculate that some sexual minority individuals may use alcohol to cope with negative affectivity or to fit in with a desired social group as they grapple with issues inherent in sexual identity development processes. These negative reinforcement motives may contribute to problematic alcohol consequences (Carey and Correia, 1997; Cooper, 1994; Read et al., 2003). Other potential explanations for disparities among sexual orientation subgroups with regard to alcohol-related consequences may be pertinent. For example, negative consequences among sexual minority individuals may be exacerbated by concurrent use of alcohol with other illicit substances (McCabe et al., 2006).

Limitations

Although LLCA is a powerful tool for identifying latent classes of individuals (McCutcheon, 1987), classifications are limited by the samples from which they are derived and are based on an assumption of uniformity of class structure across time. Despite the relatively large sample used in the current research, low base rates of bisexuality and homosexuality at this developmental stage most likely resulted in a combined class of individuals who endorsed relatively similar patterns of sexual minority orientation facets. It is possible that much larger samples would have

identified more fine-grained subgroups of bisexual and predominately gay or lesbian persons. Current findings may be more reliable for the larger, mostly heterosexual and increasingly minority subgroups. Our findings should be replicated within a larger sample, ideally with a greater proportion of sexual minority individuals, to either validate or elaborate the diversity of sexual-identity development patterns during this period.

Second, the study was limited in that the sample was not drawn from the general population but instead from first-time college students matriculating at a large, public midwestern university. It is unclear whether these results will generalize to other collegiate or noncollegiate populations. We note, however, that the sampling frame was the entire incoming class of 2002. Additionally, every effort was made to assess individuals who had dropped out of school, thereby strengthening the interpretability of the data as representative of this period of young adulthood and not as a study of individuals who remain in their institution of initial enrollment.

Conclusions

Despite these limitations, the current study provides important information to a growing literature (Corliss et al., 2008; Marshal et al., 2009) examining intricacies of substance use behaviors among a diverse array of individuals, depending on sexual orientation. Indeed, variations in sexual orientation have been a topic of increasing interest in the study of sexuality (Ott et al., 2011; Thompson and Morgan, 2008), including with regard to alcohol use (Marshal et al., 2008; McCabe et al., 2011; Midanik et al., 2007). The extant literature has relied on entrenched variable-centered approaches or long-held assumptions that conceptualize sexual orientation as largely immutable or one-dimensional. Adequately characterizing sexual orientation development during emerging adulthood by using both a longitudinal framework and a multivariate approach will allow for a better conceptualization of sexual minority subgroups and greater consistency in our understanding of associated patterns of alcohol involvement.

Persons working with sexual minority youth and young adults have been aware of disparate patterns of alcohol use behaviors among sexual minority individuals compared with exclusively heterosexual persons (Marshal et al., 2009; Talley et al., 2010). Those working with at-risk populations need to know that any degree of same-sex attractions, behaviors, or self-identifications may confer risk for elevations in problematic alcohol consequences and maladaptive motivations for use. Indeed, those at greatest risk may not be individuals who decisively self-identify as exclusively heterosexual or homosexual, but those who are mostly straight or actively engaged in sexual questioning with varying degrees of same-sex attractions and behaviors

as well as fluid self-identifications. If at-risk individuals can be screened, then specific intervention efforts to reduce alcohol misuse or maladaptive motives for use can be tailored to these subpopulations (Marlatt and Gordon, 1985; Marlatt and Witkiewitz, 2002; Neighbors et al., 2006). Regardless, there is evidence that emerging adulthood may be a developmental period characterized by more normative alcohol use, regardless of sexual minority status (Hatzenbuehler et al., 2008). Ultimately, this developmental period may be ideal for identifying characteristics of sexual minority individuals that may predict whether their alcohol use will become increasingly pathological or developmentally limited.

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