



Substance use among adolescent sexual minority athletes: A secondary analysis of the youth risk behavior survey☆



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ABSTRACT

Aims: While a robust literature exists regarding substance use patterns among adolescent athletes, no studies have examined substance use among adolescent sexual minority athletes; a subpopulation of adolescents that may experience greater rates of substance use due to their marginalized status within the context of sport.

Methods: This study uses data from the Youth Risk Behavior Survey (2009–2013). Adolescents (N = 26,940) from four states were included in the analyses that assessed past 30-day cigarette use, alcohol use, binge drinking and marijuana use among sexual minority athletes, heterosexual athletes, heterosexual non-athletes, and sexual minority non-athletes.

Results: Approximately 4% of the sample included athletes who identified as a sexual minority (3.7% males and 5.3% females). While the bivariate analyses found that sexual minority athletes had higher past 30-day prevalence rates of substance use when compared to heterosexual athletes and non-athletes, these rates were similar to sexual minority non-athletes. Moreover, when demographic characteristics and history of substance use were included in the multivariate analytic models, many of these differences were no longer statistically significant. These results were generally consistent for both males and females.

Conclusions: The results of the study suggest that the context of sport may not be an additional site for stress among adolescent athletes who identify as a sexual minority, and subsequently may have little impact on substance use behaviors. However, participating in sport may not serve as a protective context for adolescent sexual minorities given that substance use behaviors may be learned and reinforced.

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1. Introduction

A number of studies over several decades have provided robust evidence that participation in sport is positively associated with adolescents' academic achievement and health (Farb & Matjasko, 2012; Pate, Heath, Dowda, & Trost, 1996; Pate, Trost, Levin, & Dowda, 2000). While these findings suggest that involvement in sport has a positive influence on adolescent development, other studies have highlighted an important paradox suggesting that involvement in youth sport may be associated with certain health compromising behaviors (Kwan, Bobko,

Faulkner, Donnelly, & Cairney, 2014; Lisha & Sussman, 2010). In particular, research on the association between adolescent sport participation and substance use finds that participation in sport is associated with adolescent athletes being at a greater risk of alcohol consumption, binge drinking, use of smokeless tobacco, and performance enhancing drugs (Kwan et al., 2014; Lisha & Sussman, 2010).

These research findings that focus on adolescent sport participation and substance use reveal a type of health-paradox suggesting that adolescent athletes are engaging in harmful behaviors that would negatively influence both their overall health and strong athletic performance. Although this appears contradictory, previous research has noted that participation in sport may put some adolescents at risk for substance use because of increased access to different types of substances when they are injured (e.g., prescription pain medication) (Veliz, Boyd, & McCabe, 2013, 2015; Veliz et al., 2014), the stress associated with athletic participation (e.g., self-medicating with alcohol) (Marcello, Danish, & Stolberg, 1989; Reardon & Creado, 2014; Tricker, Cook, & McGuire, 1989), and the exposure to normative behaviors that can facilitate the use of different types of substances (e.g., drinking cultures) (Hughes & Coakley, 1991). Despite explanations regarding adolescent

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sport participation and substance use, none of these studies have considered how the sexual identity of athletes could be an additional risk factor that could increase the likelihood of engaging in substance use (Veliz, Epstein-Ngo, Zdroik, Boyd, & McCabe, 2016).

Studies suggest that sexual minority youth have a high prevalence of substance use behaviors and compromised mental health (Bostwick et al., 2014; Russell, Driscoll, & Truong, 2002; Russell & Fish, 2016). Moreover, there is evidence that the increased risk of substance use and mental health disorders may be the result of the discrimination, stigma and victimization that sexual minorities face within social environments that devalue their sexual identity or orientation (Hatzenbuehler, McLaughlin, Keyes, & Hasin, 2010; Meyer, 2003; Rosario et al., 2014). Although there is greater acceptance of sexual minorities both within the U.S. and the larger social arena of sport than in years past (Anderson, 2009, 2011; Bush, Anderson, & Carr, 2012; Smith, 2011), the institution of sport still rests on an ethic firmly based on heterosexual norms of masculinity and femininity; for instance, ‘play through pain’ or ‘you throw like a girl’ (Anderson, 2000; Griffin, 1998; Hughes & Coakley, 1991). Studies that examine sexual minority athletes who are open about their sexual identities have found that these athletes felt pressure to maintain a heteronormative ideal that involved a self-silencing of their sexual identity among their teammates and coaches (Anderson, 2009, 2002). Furthermore, acceptance of sexual minority athletes within the context of sport has been found to be contingent upon their performance on the playing field; sexual minority athletes must use their athletic prowess to mediate the stigma associated with their sexual identity (Anderson, 2005). Despite significance progress over the past decade (Anderson, 2011), sexual minority athletes continue to be embedded in a heteronormative social environment where administrators, coaches, teammates, parents, and fans expect authentic athletic performances that are in sync with norms of heterosexuality. In other words, sexual minority athletes face multiple layers of stress in managing a stigmatized identity within the social context of sport while dealing with the additional pressure of being an athlete.

While little is known about sexual minority athletes, they may be at heightened risk for substance use as a consequence of cultural and environmental factors associated with being part of a stigmatized and marginalized population. For instance, sexual minorities experience higher rates of childhood victimization, childhood sexual abuse, harassment, bullying and violence (McCabe, Bostwick, Hughes, West, & Boyd, 2010; Robert, Coulter, Herrick, Friedman, & Stall, 2016; Rosario et al., 2014). These experiences likely operate as stressors and in turn, may contribute to substance use and mental health problems.

The contention that increased stress may lead to poorer health outcomes is supported by a vast body of literature (Avison & Turner, 1988; Dohrenwend, 2000; Wheaton, 1990). In particular, Ilan Meyer’s minority stress model describes how social stigma, prejudice, and discrimination can adversely affect the mental health of sexual minorities and lead to heightened risk for substance abuse disorders and other negative outcomes (Meyer, 2003). An underlying assumption of this model is that minority stress is unique and additive to the general stressors that all people experience. As stated by Meyer, it is excess “social stress” that leads to greater rates of substance use and mental health disorders among sexual minorities (Meyer, 2003).

Accordingly, this study hypothesizes that adolescent sexual minority athletes – lesbian, gay and bisexual – may experience more “social stress” than their peers because they are embedded in a social environment where administrators, coaches, teammates, parents, and fans expect authentic athletic performances that are in sync with norms of heterosexuality (Anderson, 2000; Messner, 1990). The multiple layers of stress unique to sexual minority athletes, are hypothesized to place this group at higher risk for substance use when compared to their peers (i.e., heterosexual athletes, heterosexual non-athletes, and sexual minority non-athletes). Using data from the state Youth Risk Behavior

Survey for 2009, 2011, and 2013, we assessed sexual minority athletes and predict they have higher odds of past 30-day cigarette use, alcohol use, binge drinking, and marijuana use.

2. Method

2.1. Sample

This study uses data from the 2009, 2011, and 2013 state Youth Risk Behavior Survey (YRBS). The state YRBS uses a two-stage, cluster sample design to capture a representative sample of 9th through 12th graders (in public high schools) within the specified jurisdictions (i.e., state). The average overall response rate in the state YRBS was about 60%. Additional information regarding the YRBS is provided by the Centers for Disease Control and Prevention (Brener et al., 2013).

The sample for the current study was restricted to four states (i.e., Arizona, Hawaii, Illinois, and Rhode Island) between 2009 and 2013 due to the state’s health/education agency not giving permission to include these data in the combined state YRBS data set (Brener et al., 2013). The unweighted sample size based on these restrictions resulted in 26,940 respondents. Respondents with missing data on any of the variables used in the study (7775 respondents had missing data on at least one item) were retained by using multiple imputation (please refer to data analysis section for more details). Accordingly, the weighted four state YRBS sample was 42.7% male, 53.7% White, and 4.5% athletes who identified as a sexual minority (3.7% male sexual minority athlete; 5.3% female sexual minority athlete). Weighted percentages for all of the variables used in the study are provided in Table 1. Moreover, weighted percentages from the national YRBS sample between 2009 and 2013 are provided to document the consistency in the estimates provided from the state YRBS sample (see Table 1).

2.2. Measures

2.2.1. Past 30-day substance use

The questions used to construct the major dependent variables assessed past 30-day cigarette use, past 30-day alcohol use, binge drinking during the past 30 days, and past 30-day marijuana use. These four questions had multiple ordinal response categories that ranged from “0 days” to “all 30 days”. For the analyses, each of the four questions were recoded to construct dichotomous measures to assess past 30-day prevalence of tobacco use, alcohol use, binge drinking, and marijuana use.

2.2.2. Sexual identity and athletic participation

The major independent variable was combined from two questions that measured sexual identity and athletic participation. With respect to sexual identity, respondents were asked the following: “Which of the following best describes you? A. Heterosexual, B. Gay or lesbian, C. Bisexual, D. Not Sure.” The responses for this question were coded into a dichotomous measure that included ‘heterosexual’ (i.e., Heterosexual) and ‘sexual minority’ (i.e., Gay or lesbian, Bisexual, and Not Sure). Athletic participation was measured with the following question: “During the past 12 months, on how many sports teams did you play? (include any teams run by your school or community groups).” This question had four response categories ranging from “0 teams” to “3 or more teams”. This question was recoded as a dichotomous measure that included non-athlete (i.e., 0 teams) and athlete (i.e., 1 team, 2 teams, 3 or more teams). Both of these measures for sexual identity and athletic participation were combined to construct four mutually exclusive categories: sexual minority athlete, heterosexual athlete, heterosexual non-athlete, and sexual minority non-athlete.

2.2.3. Control variables

Several additional variables were included in the analysis to account for potential confounding factors: sex of respondent, grade level of

respondent, race/ethnicity, age of initiation of cigarette use, age of initiation of alcohol use, age of initiation of marijuana use, suicide ideation, and year respondent participated in the YRBS (i.e., cohort year). See Table 1 for more details regarding how these measures were coded for the analyses.

2.3. Data analysis

The analyses used binary logistic regression to compute both odds ratios (OR) and adjusted odds ratios (AOR) to examine the association between sexual minority athletes and the prevalence of past 30-day substance use. It should be noted that sexual minority athletes were used as the reference group given that it is hypothesized that heterosexual athletes, heterosexual non-athletes and sexual minority non-athletes will be at a lower risk of substance use (i.e., lower odds of substance use). Moreover, additional analyses were run separately for males and females due to some research indicating that sport may provide a refuge for female sexual minority athletes due to the high value placed on the expression of masculine behaviors within the context of sport (e.g., aggression) (Cunningham, 2012).

All Statistical analyses were carried out using Stata 14 in order to account for the complex sample survey design (Stata Corp, College Station, Texas) and estimates provided in the bivariate and multiple binary logistic regression analyses used the svy command (i.e., svyset PSU [pweight = weight], strata(stratum)). Finally, given missing data within the YRBS sample, multiple imputation was used to impute missing observations (Raghunathan, Lepkowski, Van Hoewyk, & Solenberger, 2001). In particular, sequential regression imputation was used to impute missing values; several separate imputations with the full YRBS sample used chained multinomial, logistic, and ordered logit models in STATA's - mi impute chained - procedure (10

imputations, 5 burn-in iterations each; - augment - option was used in the presence of perfect prediction).

3. Results

The sample included 4.5% sexual minority athletes, 52.6% heterosexual athletes, 37.8% heterosexual non-athletes, and 5.1% sexual minority non-athletes. With respect to sex, 3.7% of males were sexual minority athletes and 5.3% of females were sexual minority athletes.

Table 2 provides the bivariate analyses between athletes and non-athletes sexual identity and past 30-day prevalence of substance use. Among all respondents, sexual minority athletes had higher past 30-day prevalence rates for cigarette use, alcohol use, binge drinking, and marijuana use when compared to heterosexual athletes and heterosexual non-athletes. However, no differences in these past 30-day prevalence rates were found between sexual minority athletes and sexual minority non-athletes. Examining males and females separately, we found that female sexual minority athletes had higher past 30-day prevalence rates for each of the four substances when compared to heterosexual athletes and non-athletes, but had similar prevalence rates when compared to female sexual minority non-athletes. Similar results were found among the sample of males.

Table 3 provides the multiple logistic regression analyses for all respondents in the sample. When controlling for various demographic variables and substance use history, only a few differences in past 30-day prevalence of substance use remained statistically significant between sexual minority athletes and their peers. Sexual minority athletes were found to have higher odds of past 30-day cigarette use when compared to heterosexual athletes (AOR = 0.490; 95% CI = 0.366, 0.658) and heterosexual non-athletes (AOR = 0.746; 95% CI = 0.570, 0.977), but had similar odds in past 30-day cigarette use when compared to

Table 1
Sample characteristics.

	National YRBS sample 2009–2013 (n = 45,418)	State YRBS sample 2009–2013 (n = 26,940)
	Weighted % (SE)	MI (10 imputations) weighted % (SE)
Sexual orientation and athletic status (a)		
Sexual minority athlete (ref.)	–	4.5% (SE = 0.003)
Heterosexual athlete	–	52.6% (SE = 0.010)
Heterosexual non-athlete	–	37.8% (SE = 0.009)
Sexual minority non-athlete	–	5.1% (SE = 0.003)
Did not participate in sport (past-year)	42.9% (SE = 0.008)	42.7% (SE = 0.011)
Participated in sport (past-year)	57.1% (SE = 0.008)	57.3% (SE = 0.011)
Smoked cigarettes (past 30 days)	17.1% (SE = 0.005)	16.8% (SE = 0.007)
Drank alcohol (past 30 days)	37.6% (SE = 0.006)	37.4% (SE = 0.009)
Binge drank (past 30 days)	22.6% (SE = 0.005)	22.5% (SE = 0.008)
Smoked marijuana (past 30 days)	20.9% (SE = 0.005)	23.5% (SE = 0.006)
Male (ref.)	50.7% (SE = 0.006)	50.8% (SE = 0.011)
Female	49.3% (SE = 0.006)	49.2% (SE = 0.011)
9th (ref.)	27.3% (SE = 0.005)	26.9% (SE = 0.019)
10th	25.7% (SE = 0.004)	25.8% (SE = 0.020)
11th	24.0% (SE = 0.003)	23.7% (SE = 0.014)
12th	22.9% (SE = 0.004)	23.4% (SE = 0.021)
White (ref.)	58.2% (SE = 0.018)	53.7% (SE = 0.023)
Non-White	41.8% (SE = 0.018)	46.3% (SE = 0.023)
Never had a cigarette or had first cigarette at age 13 or older (ref.)	89.9% (SE = 0.004)	89.7% (SE = 0.005)
Had first cigarette at 12 years of age or younger	10.1% (SE = 0.004)	10.3% (SE = 0.005)
Never drank alcohol or had first drink at age 13 or older (ref.)	80.1% (SE = 0.004)	80.1% (SE = 0.006)
Had first drink of alcohol at 12 years of age or younger	19.9% (SE = 0.004)	19.0% (SE = 0.006)
Never smoked marijuana or first used marijuana at age 13 or older (ref.)	92.2% (SE = 0.003)	91.1% (SE = 0.004)
Had first used marijuana at 12 years of age or younger	7.8 (SE = 0.003)	8.9% (SE = 0.004)
Suicide ideation (b)	Mean = 0.646 (SD = 1.08)	Mean = 0.676 (SD = 1.07)
Cohort year - 2013 (ref.)	30.0% (SE = 0.037)	43.2% (SE = 0.016)
Cohort year - 2011	33.9% (SE = 0.041)	30.2% (SE = 0.016)
Cohort year - 2009	36.1% (SE = 0.041)	26.5% (SE = 0.014)

*p < 0.05, **p < 0.01, ***p < 0.001; SE = standard error, SD = standard deviation, MI = multiple imputation, ref. = reference group. (a) The national YRBS sample does not include questions on sexual orientation. (b) Responses for suicide ideation were based on the sum of three dichotomous questions ("ever feel sad or hopeless", "ever consider suicide", "ever make suicide plan", and "ever attempt suicide") and ranged from 0 to 4 (Cronbach's α = 0.746). The mean and standard deviation are provided.

Table 2
Examining the association between sport participation and prevalence of past 30 day substance use.

Total (n = 26,940)	Past 30 day cigarette use			Past 30 day alcohol use			Past 30 day binge drinking (5+)			Past 30 day marijuana use		
Sexual orientation and athletic status	(%)	OR	95% CI	(%)	OR	95% CI	(%)	OR	95% CI	(%)	OR	95% CI
Sexual minority athlete (ref.)	32.6%	1.00	–	53.2%	1.00	–	33.9%	1.00	–	40.1%	1.00	–
Heterosexual athlete	12.4%	0.292***	0.234, 0.364	35.9%	0.493***	0.389, 0.625	21.9%	0.547***	0.430, 0.695	19.8%	0.370***	0.303, 0.452
Heterosexual non-athlete	18.8%	0.480***	0.394, 0.586	36.4%	0.504***	0.414, 0.614	21.5%	0.533***	0.419, 0.677	25.2%	0.503***	0.411, 0.615
Sexual minority non-athlete	34.5%	1.09	0.804, 1.47	46.4%	0.761	0.580, 1.00	26.4%	0.698	0.493, 1.00	34.5%	0.786	0.591, 1.05
Males (n = 12,870)												
Sexual orientation and athletic status	(%)	OR	95% CI	(%)	OR	95% CI	(%)	OR	95% CI	(%)	OR	95% CI
Sexual minority athlete (ref.)	32.2%	1.00	–	50.6%	1.00	–	36.3%	1.00	–	44.5%	1.00	–
Heterosexual athlete	15.9%	0.399***	0.264, 0.602	36.4%	0.559**	0.369, 0.847	23.8%	0.550**	0.357, 0.85	24.6%	0.406***	0.273, 0.60
Heterosexual non-athlete	21.5%	0.576**	0.390, 0.852	34.6%	0.516***	0.356, 0.748	21.8%	0.489***	0.323, 0.742	27.5%	0.472***	0.323, 0.69
Sexual minority non-athlete	32.3%	1.01*	0.533, 1.90	40.7%	0.670	0.384, 1.17	27.2%	0.656	0.385, 1.12	33.1%	0.615	0.363, 1.04
Females (n = 14,070)												
Sexual orientation and athletic status	(%)	OR	95% CI	(%)	OR	95% CI	(%)	OR	95% CI	(%)	OR	95% CI
Sexual minority athlete (ref.)	30.8%	1.00	–	53.7%	1.00	–	30.6%	1.00	–	33.9%	1.00	–
Heterosexual athlete	7.6%	0.185***	0.134, 0.257	34.8%	0.460***	0.351, 0.603	19.3%	0.545***	0.389, 0.764	13.8%	0.313***	0.231, 0.422
Heterosexual non-athlete	15.9%	0.427***	0.328, 0.556	38.2%	0.534***	0.416, 0.687	21.1%	0.609***	0.452, 0.821	22.9%	0.579***	0.439, 0.763
Sexual minority non-athlete	35.5%	1.24	0.862, 1.79	49.9%	0.859	0.602, 1.23	26.3%	0.811	0.509, 1.29	35.0%	1.05	0.732, 1.50

OR = odds ratio; CI = confidence interval; ref. = reference group.

* p < 0.05.

** p < 0.01.

*** p < 0.001.

sexual minority non-athletes. With respect to past 30-day alcohol use, sexual minority athletes had higher odds of past 30-day alcohol use when compared to heterosexual non-athletes (AOR = 0.716; 95% CI = 0.551, 0.931), but had similar odds in past 30-day alcohol use when compared to heterosexual athletes and sexual minority non-athletes. Moreover, sexual minority athletes had higher odds of past 30-day marijuana use when compared to heterosexual athletes (AOR = 0.671; 95% CI = 0.513, 0.877), but had similar odds in past 30-day marijuana use when compared to heterosexual and sexual minority non-athletes. Sexual minority athletes had similar odds of past 30-day binge drinking when compared to the other three groups based on sexual identity and athletic status.

Table 4 shows the results of the multiple logistic regression analyses for both male and female respondents. Similar to the results presented in Table 3, very few significant differences were detected among the sample of males and females. Among males, male sexual minority athletes had greater odds of past 30-day binge drinking when compared to male heterosexual non-athletes (AOR = 0.601; 95% CI = 0.362, 0.999), but had similar odds when compared to male heterosexual athletes and male sexual minority non-athletes. Among females, female sexual minority athletes had greater odds of past 30-day cigarette use when compared to female heterosexual athletes (AOR = 0.316; 95% CI = 0.212, 0.472) and heterosexual non-athletes (AOR = 0.669; 95% CI = 0.464, 0.964), but had similar odds when compared to female

Table 3
Examining the association between sport participation and prevalence of past 30 day substance use (n = 26,940).

Sexual orientation and athletic status	Past 30 day cigarette use		Past 30 day alcohol use		Past 30 day binge drinking (5+)		Past 30 day marijuana use	
	A OR	95% CI	A OR	95% CI	A OR	95% CI	A OR	95% CI
Heterosexual athlete	0.490***	0.366, 0.658	0.843	0.615, 1.16	0.934	0.686, 1.27	0.671**	0.513, 0.877
Heterosexual non-athlete	0.746*	0.570, 0.977	0.716*	0.551, 0.931	0.765	0.558, 1.05	0.828	0.631, 1.09
Sexual minority non-athlete	1.26	0.875, 1.83	0.752	0.537, 1.05	0.683	0.453, 1.03	0.877	0.618, 1.24
Control variables								
Female	0.645***	0.552, 0.754	1.14*	1.03, 1.27	0.914	0.813, 1.03	0.668***	0.595, 0.749
10th	1.44***	1.16, 1.80	1.77***	1.49, 2.94	1.59***	1.30, 1.95	1.47***	1.21, 1.78
11th	2.27***	1.88, 2.74	2.52***	2.16, 2.94	2.71***	2.29, 3.22	2.04***	1.73, 2.40
12th	3.09***	2.48, 3.86	4.07***	3.45, 4.79	4.22***	3.35, 5.30	2.55***	2.05, 3.17
Non-White	0.447***	0.382, 0.523	0.658***	0.589, 0.735	0.532***	0.466, 0.607	0.949	0.826, 1.09
Had first cigarette at 12 years of age or younger	4.19***	3.38, 5.20	1.99***	1.62, 2.45	2.06***	1.70, 2.48	1.702***	1.36, 2.14
Had first drink of alcohol at 12 years of age or younger	1.73***	1.42, 2.10	3.15***	2.69, 3.68	2.28***	1.98, 2.62	1.45***	1.29, 1.63
Had first used marijuana at 12 years of age or younger	3.35***	2.74, 4.10	2.79***	2.24, 3.49	3.02***	2.38, 3.83	6.83***	5.67, 8.23
Suicide ideation (a)	1.34***	1.26, 1.42	1.31***	1.24, 1.38	1.24***	1.16, 1.32	1.30***	1.23, 1.37
Cohort year - 2011	1.40***	1.15, 1.70	1.12	0.956, 1.31	1.15	0.955, 1.38	1.09	0.916, 1.29
Cohort year - 2009	1.51***	1.20, 1.91	1.22*	1.02, 1.46	1.29*	1.04, 1.60	0.872	0.720, 1.06

AOR = adjusted odds ratio; CI = confidence interval; ref. = reference group. (a) This measure was treated as continuous variable.

* p < 0.05.

** p < 0.01.

*** p < 0.001.

Table 4
Examining the association between sport participation and prevalence of past 30 day substance use (a).

Sexual orientation and athletic status	Past 30 day cigarette use		Past 30 day alcohol use		Past 30 day binge drinking (5+)		Past 30 day marijuana use		
	AOR	95% CI	AOR	95% CI	AOR	95% CI	AOR	95% CI	
Males (n = 12,870)									
Heterosexual athlete	0.784	0.450, 1.36	0.881	0.531, 1.46	0.847	0.494, 1.45	0.750	0.463, 1.22	
Heterosexual non-athlete	0.952	0.553, 1.64	0.663	0.425, 1.03	0.601*	0.362, 0.999	0.732	0.448, 1.20	
Sexual minority non-athlete	1.38	0.629, 3.04	0.703	0.365, 1.35	0.672	0.376, 1.20	0.704	0.372, 1.33	
Females (n = 14,070)									
Heterosexual athlete	0.316***	0.212, 0.472	0.816	0.588, 1.13	0.995	0.692, 1.43	0.626*	0.432, 0.908	
Heterosexual non-athlete	0.669*	0.464, 0.964	0.809	0.595, 1.10	0.957	0.684, 1.34	1.02	0.714, 1.47	
Sexual minority non-athlete	1.23	0.782, 1.92	0.833	0.557, 1.25	0.743	0.454, 1.22	1.08	0.688, 1.70	

AOR = adjusted odds ratio; CI = confidence interval; ref. = reference group. (a) All models control for race, grade, age of initiation of cigarette use, age of initiation of alcohol use, age of initiation of marijuana use, suicide ideation, and year respondent participated in the YRBS (results not shown).

* $p < 0.05$.

** $p < 0.01$.

*** $p < 0.001$.

sexual minority non-athletes. Moreover, female sexual minority athletes had greater odds of past 30-day marijuana use when compared to female heterosexual athletes (AOR = 0.626; 95% CI = 0.432, 0.908), but had similar odds when compared to female heterosexual and sexual minority non-athletes.

Finally, it should be noted that additional binary logistic analyses (using the same control variables in the previous models) were also conducted to assess whether differences emerged across sexual minority athletes with respect to identifying as either gay/lesbian, bisexual, or unsure. No notable differences were found between these different groups of sexual minorities.

4. Discussion

This is the first large-scale study of U.S. adolescents to examine sexual minority athletes and their risk of substance use when compared to their peers (i.e., heterosexual athletes, heterosexual non-athletes, and sexual minority non-athletes). Using the minority stress theory to guide the analyses, it was hypothesized that sexual minority athletes would be at the greatest risk for past 30-day substance use due to the additional stress experienced within the heteronormative context of sport. Overall, the analyses did not find consistent support for this hypothesis. While the bivariate analyses suggested that sexual minority athletes may be at a greater risk of past 30-day cigarette use, alcohol use, binge drinking and marijuana use when compared to heterosexual athletes and non-athletes, the prevalence of past 30-day substance use was similar to their sexual minority peers who do not participate in athletics. Moreover, when control variables for demographic characteristics and history of substance use were incorporated into the analyses, many of these differences became non-significant. The lack of significant differences in the multivariate models was relatively consistent for both males and females. Moreover, no notable differences were found between different groups of sexual minority athletes (i.e., gay/lesbian athletes, bisexual athletes, and 'not sure' athletes) and past 30-day substance use, suggesting little heterogeneity within this sub-population of athletes who identify as sexual minorities.

While few differences in past 30-day substance use were found across subgroups based on sexual identity and athletic involvement (particularly with males), the results provide some insight on how the context of sport may be influencing substance use behaviors among adolescent females. Namely, involvement in athletics among sexual minority females may not be a protective factor against certain types of substance use (i.e., cigarettes or marijuana use). For instance, the multivariate analyses found that female heterosexual athletes had lower odds of past 30-day cigarette use

when compared to female sexual minority athletes. While studies examining cigarette use have found that athletes are at a lower risk to engage in cigarette use when compared to non-athletes (Kwan et al., 2014; Lisha & Sussman, 2010), other studies examining cigarette use among adolescent females have found that sexual minority females are more likely to increase cigarette smoking over time when compared to heterosexual females (Russell et al., 2002). The findings from this study suggest that involvement in athletics may not provide an optimal context to help reduce the risk of cigarette use within certain populations of adolescents and young adults who are at a greater risk to engage in this type of behavior.

Despite the ability of this study to capture a relatively large sample of adolescent sexual minority athletes, there are several limitations that must be noted. First, the study relied only on self-reported sexual identity to determine adolescents' sexual orientation. This is problematic given that sexual orientation can include other dimensions like attraction and sexual behavior (e.g., having sexual intercourse with someone of the same sex). Including multiple dimensions of sexual orientation can help determine if discordant forms of sexual orientation (e.g., men who have sex with men, but identify as heterosexual) lead to greater levels of stress, or lead to a greater risk of substance use. While the current study only accounts for self-reported identity, future studies should consider assessing multiple dimensions of sexual orientation among athletes to assess how concordant or discordant forms of sexual orientation influence substance use. Second, the state-level YRBS sample does not provide a nationally representative sample of adolescent sexual minority athletes. In fact, the sample used for this study consisted of respondents from only Arizona, Hawaii, Illinois, and Rhode Island. Given the limited coverage of adolescents in the U.S., the results from this study may vary if adolescents from different states were used in the analyses (e.g., Alabama, California, New York, or Texas). Although the sample used for this study may be limited to only several states, this is the only recent large scale study of adolescents that includes questions on athletic status and sexual identity that collects a large enough sample to assess substance use behaviors within this hard to reach population (i.e., sexual minority athletes).

In summary, the results of this study suggest that the context of sport may not be an additional site for stress among adolescent athletes who identify as a sexual minority, and subsequently may have little impact on substance use behaviors. However, participating in sport may not serve as a protective context for adolescent sexual minorities given that certain types of substance use behaviors may be learned and reinforced within the social arena of sport. Moreover, health sustaining practices may be ignored by sexual minority athletes due to a propensity to engage in certain types of substance use (i.e., cigarettes)

which the context of sport may have very little influence in reducing during adolescence.

Conflict of interest and financial disclosure

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