Brief Report

Prevalence and Correlates of Tobacco Use Among a Sample of MSM in Shanghai, China

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Abstract

Introduction: Men who have sex with men (MSM) have higher smoking rates than the general population in the United States, but less is known about smoking among MSM in developing countries. Thus, we examined the prevalence and correlates of smoking among MSM in China.

Methods: We conducted a cross-sectional study of 404 MSM in Shanghai, China (half of whom were male sex workers), recruited through respondent-driven sampling. Assessments included sociodemographics; tobacco, alcohol, and drug use; the Center for Epidemiological Studies Depression Scale (CES-D); the Social Provisions Scale (SPS); and the Lesbian, Gay, and Bisexual Identity Scale (LGBIS).

Results: Smoking prevalence was 65.9% in this sample. Recent smoking (i.e., in the past 3 months) was significantly associated with lower education, greater alcohol use, and higher LGBIS scores, after controlling for important sociodemographics. Among smokers, smoking ≥10 cigarettes per day (CPD), in comparison with <10 CPD, was related to older age and lower LGBIS scores and marginally related to heavy alcohol use. Although bivariate analyses indicated a relationship of CES-D and SPS scores to recent smoking, these factors did not contribute to the regression models.

Conclusions: Smoking rates among MSM in China are higher than MSM in the United States and men in China. Less comfort with one's sexual orientation was related to smoking, particularly light smoking. Heavier alcohol consumption, lower education, and older age were also associated with smoking. Future research should confirm these findings and examine mediators and moderators of these relationships in order to inform cessation interventions and tobacco control policy.

Introduction

Cigarette smoking is the second leading risk factor for death worldwide, causing 4.83 million deaths annually (Ezzati & Lopez, 2003a; Lopez, Mathers, Ezzati, Jamison, & Murray, 2006). Half occurred in low- and middle-income countries (Ezzati & Lopez, 2003a; Lopez et al., 2006), who are in early stages of the tobacco epidemic and thus likely to experience an increase in smoking-related deaths (Ezzati & Lopez, 2003a, 2003b; B. Q. Liu et al., 1998).

China is the world's leading producer and consumer of tobacco (Milenkovich, 2004; United States Department of Agriculture, 2004). Smoking rates in China are high, with higher smoking rates among men and women (Yang, 2008). For example, smoking prevalence in Beijing is 56% among men and 6% among women (S. Lee et al., 2009). Smoking is related to mortality among the Chinese (Chen, Xu, Collins, Li, & Peto, 1997; Lam, He, Li, He, & Liang, 1997; Niu et al., 1998; Yuan et al., 1996), with 673,000 smoking-attributable deaths annually (Gu et al., 2009).

One subpopulation at high risk for smoking is gay men or men who have sex with men (MSM). High smoking rates have been documented among MSM in North America (Austin et al., 2004; D'Augelli, 2004; Greenwood et al., 2005; Lampinen, Bonner, Rusch, & Hogg, 2006; McKirnan, Tolou-Shams, Turner, Dyslin, & Hope, 2006; Tang et al., 2004), but extremely limited research has examined smoking among MSM in developing countries. Given that different cultural factors may influence smoking, research must examine prevalence and correlates of smoking among MSM more globally.

The Chinese culture may be particularly important in understanding smoking among MSM. First, like other socially marginalized communities, MSM may face higher stress or

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depression related to discrimination, resolving sexual identity, and challenges in eliciting social support, particularly among Chinese MSM. Same-sex sexual relationships are regulated by social factors (Choi et al., 2003; J. X. Liu & Choi, 2006; Pilcher, 2003). Within East Asian societies, concern about "shaming" the family (P. Liu & Chan, 1996) may impede developing a "gay" or "bisexual" identity, thus hindering the coming out process (P. Liu & Chan, 1996) as well as disclosure to oneself (T. Lee, 2000). Because smoking is related to increased stress (Sheahan & Garrity, 1992), these factors are critical. In addition, behaviors associated with smoking, such as alcohol and drug use (Shiffman & Wills, 1985), may be higher among MSM, both in Western societies (Greenwood et al., 2001; Stall, Greenwood, Acree, Paul, & Coates, 1999) and in China (Wong et al., 2008). Finally, since the 1980s, the tobacco industry has targeted the gay market (Elliot, 1997; Goebel, 1994; Lipman, 1992). Thus, many factors may play a role in increased smoking among Chinese MSM.

These high smoking rates are alarming because MSM are affected disproportionately by smoking-related health problems. For example, smoking is associated with development of anal cancer (Chin-Hong & Palefsky, 2002; Daling et al., 2004). Additionally, MSM are at increased risk for HIV/AIDS (Centers for Disease Control and Prevention [CDC], 2009), and smoking is related to reduced health-related quality of life in HIV-infected persons and increased incidence of bacterial pneumonia and other AIDS-defining illnesses, malignancies, and mortality (Crothers et al., 2005; Kirk et al., 2007; Kohli, Lo, & Homel, 2006; Miguez-Burbano, Ashkin, & Rodriguez, 2005). Thus, targeting smoking prevention and cessation among MSM is critical.

Given the aforementioned research and gaps in the literature, we aimed to determine the prevalence and correlates of smoking in a community-recruited cohort of urban-dwelling Chinese MSM in Shanghai.

Methods

Procedures

The current study was part of a larger cross-sectional study examining HIV, sexual transmitted infections, and sexual risks among Chinese MSM in Shanghai. Eligibility criteria included (a) male, (b) aged 18 years or older, (c) able to give consent, and (d) had sex with men in the last 12 months (oral, anal, or both).

The sample size of 404 participants and an estimated 55% smoking prevalence among men given prior literature provided an estimated sampling error of approximately 5%. This sample size also allowed for 98% power to detect a difference of 10% between our sample and the general population.

Recruitment was done using respondent-driven sampling (Heckathorn, 2002) during Spring, 2008. Eight seeds (four gay-identified and four non–gay-identified MSM) were selected in consultation with a nongovernmental organization (Shanghai Leyi), which provides sexual risk prevention targeting MSM. Each seed was asked to recruit up to three of his peers. Recruited participants were verbally informed of the nature and purpose of the study. All eligible participants consented to the study. This research was approved by the appropriate academic institutional review boards in the United States and China.

Measures

Sociodemographic Characteristics

Participants reported birth date, present legal residency or "Hu-kuo" (Shanghai vs. other), ethnicity (Han vs. other), education level (less than high school, high school or equal, or more than high school), monthly income (<1,000 Yuan, Y1,000–2,999.99, Y3,000–Y4,999.99, or ≥Y5,000; US$1.00 = ~Y6.83), current marital status (never married, married with spouse, divorced, widowed, or cohabiting with a significant other), and sexual orientation (openly gay, closeted gay, openly bisexual, closeted bisexual, heterosexual, or other).

Smoking Status and Level

Participants were asked, "Have you ever used cigarettes/tobacco?" Those indicating ever using were asked to report the average number of cigarettes per day (CPD) in the past three months. This variable was dichotomized as: (a) any smoking in the past three months versus no smoking and (b) smoking <10 CPD (light smoking) versus ≥10 CPD (moderate to heavy smoking). Prior research has defined "light smoking" as <10 CPD (Okuyemi, Ahluwalia, Richter, Mayo, & Resnicow, 2001; Okuyemi et al., 2002). In this sample of smokers, 59.7% smoked ≥10 CPD and 40.3% smoked <10 CPD, justifying this dichotomization.

Drug and Alcohol Use

Participants reported the number of alcoholic drinks (beer, wine, or liquors) per day and the use of any drugs (ecstasy, heroin, marijuana, opium, ice toxic, methamphetamine, cocaine, tranquilizers, or stimulants) in the past three months. Moderate alcohol use was defined as drinking 1–2 drinks/day (62.9% of the sample) and heavy alcohol use as >2 drinks/day (10.6% of the sample; U.S. Department of Health and Human Services & U.S. Department of Agriculture, 2005).

Depressive Symptoms

The Center for Epidemiological Studies Depression Scale (CES-D)—Short Form(Poulin, Hand, & Boudreau, 2005) was used to screen for depressive symptoms. The CES-D short form consists of 12 items assessing number of days during the past week participants experienced symptoms reflecting *DSM* criteria for depression. Cronbach's alpha for the CES-D in this study was .85.

Social Provisions

The Social Provisions Scale (SPS) assesses the functions of one's social relationships (Weiss, 1974). The six provisions include guidance, reliable alliance in times of stress, reassurance of worth, attachment, social integration, and opportunity for nurturance. Higher scores indicate higher levels of social support. The SPS demonstrates reliability and validity, as well as appropriate factor structure (Cutrona & Russell, 1987). Cronbach's alpha for the SPS in this study was .84.

Lesbian, Gay, and Bisexual Identity Scale

The Lesbian, Gay, and Bisexual Identity Scale (LGBIS) (Mohr & Fassinger, 2000) assesses sexual orientation identity, specifically domains of internalized homonegativity, the need for acceptance and privacy, identity confusion, and feelings of superiority. Items are rated on a 7-point Likert scale (1 = *disagree strongly* to 7 = *agree strongly*). This scale demonstrates acceptable reliability, internal consistency, and construct and convergent validity. Cronbach's alpha for the LGBIS in the present study was .62. Subscales of the LGBIS demonstrated similar relationships with

Table 1. Participant Characteristics

Variable	All participants ($N = 404$), M (SD) or N (%)	Nonsmokers ($n = 136$), M (SD) or n (%)	Current smokers ($n = 268$), M (SD) or n (%)	p Value
Sociodemographics				
Age (%)				
≤23 years	136 (33.7)	46 (33.8)	90 (33.6)	.79
24–30 years	132 (32.7)	47 (34.6)	85 (33.6)	
≥31 years	136 (33.7)	43 (31.6)	93 (34.7)	
Ethnicity (%)				
Han	386 (96.0)	133 (97.8)	253 (95.1)	.19
Other ethnicities	16 (4.0)	3 (2.2)	13 (4.9)	
Hu-kuo (%)				
Shanghai	82 (20.3)	31 (22.8)	51 (19.0)	.37
Other	322 (79.7)	105 (77)	217 (81.0)	
Education (%)				
< High school	148 (36.8)	43 (31.6)	105 (39.5)	<.001
High school or equal	161 (40.0)	45 (33.1)	116 (43.6)	
> High school	93 (23.1)	48 (35.3)	45 (16.9)	
Income (%)				
<1,000	25 (6.2)	14 (10.3)	11 (4.1)	.07
1,000–2,999	204 (50.6)	61 (44.9)	143 (53.6)	
3,000–4,999	115 (28.5)	40 (29.4)	75 (28.1)	
≥5,000	59 (14.6)	21 (15.4)	38 (14.2)	
Sexual orientation (%)				
Openly gay/bisexual	49 (12.1)	19 (14.0)	30 (11.2)	.51
Closeted gay/bisexual	321 (79.5)	108 (79.4)	213 (79.5)	
Other	34 (8.4)	9 (6.6)	25 (9.3)	
Participant type (%)				
Sex worker	200 (49.5)	60 (44.1)	140 (52.2)	.12
General MSM	204 (50.5)	76 (55.9)	128 (47.8)	
Marital status (%)				
Married	60 (15.0)	24 (17.9)	36 (13.5)	.24
Other	341 (85.0)	110 (82.1)	231 (86.5)	
Alcohol and drug use (%)				
Alcohol use/day in past 3 months				
No use	82 (20.3)	43 (31.6)	39 (14.6)	<.001
Moderate (1–2 drinks/day)	279 (69.1)	84 (61.8)	195 (72.8)	
Heavy (>2 drinks/day)	43 (10.6)	9 (6.6)	34 (12.7)	
Drug use in the past 3 months				
No	365 (90.3)	129 (94.9)	236 (88.1)	.03
Yes	39 (9.7)	7 (5.1)	32 (11.9)	
Psychosocial factors (SD)				
CES-D	10.5 (6.5)	9.5 (6.4)	11.1 (6.6)	.02
Social provisions	68.5 (6.9)	69.7 (6.5)	67.9 (7.1)	.01
LGBIS	4.0 (0.73)	3.8 (0.74)	4.1 (0.71)	.004

Note. CES-D = Center for Epidemiological Studies Depression Scale; LGBIS = Lesbian, Gay, and Bisexual Identity Scale; MSM = men who have sex with men.

smoking in the present study; thus, the total score was used rather than subscale scores.

Translation

Psychosocial measures (CES-D, SPS, and LGBIS) were translated and back translated in this study. These procedures have been used previously and have yielded valid measures of these constructs (He et al., 2007; Wong et al., 2008).

Data Analyses

Descriptive and bivariate analyses were conducted. Binary logistic regression was used to determine factors associated with (a) current smoking among participants and (b) smoking ≥10 CPD among smokers, with forced entry of important sociodemographics (age, education, sex worker vs. not) and psychosocial factors.

Results

Table 1 presents descriptive and bivariate results. Greater likelihood of smoking was related to lower education, drug use, greater alcohol use, higher CES-D scores, lower SPS scores, and higher LGBIS scores. In addition, correlations were found

Table 2. Logistic Regression Model Predicting Past Three Month Smoking Among Chinese MSM and Smoking ≥10 CPD Among Chinese MSM Smokers

	Predictors of smoking			Predictors of smoking ≥10 CPD		
Variable	*OR*	95% *CI*	*p*	*OR*	95% *CI*	*p*
Sociodemographics						
Age						
≤23 years	Ref.	—	—	Ref.	—	—
24–30 years	1.14	0.65–2.01	.64	0.96	0.50–1.84	.90
≥31 years	1.31	0.68–2.51	.42	2.23	1.00–5.00	.05
Education						
< High school	Ref.	—	—	Ref.	—	—
High school or equal	0.96	0.57–1.61	.96	0.88	0.49–1.59	.68
> High school	0.43	0.23–0.80	.007	0.69	0.32–1.53	.36
Participant type						
Sex worker	Ref.	—	—	Ref.	—	—
General MSM	1.02	0.58–1.77	.96	1.17	0.59–2.31	.66
Alcohol and drug use						
Alcohol use in past 3 months						
No use	Ref.	—	—	Ref.	—	—
Moderate use	2.60	1.51–4.48	.001	0.76	0.35–1.63	.48
Heavy use	3.65	1.49–8.93	.005	2.69	0.89–8.19	.08
Drug use in past 3 months						
No	Ref.	—	—	Ref.	—	—
Yes	2.26	0.92–5.61	.08	1.82	0.77–4.32	.18
Psychosocial Factors						
CES-D	1.02	0.98–1.06	.40	1.01	0.96–1.05	.74
Social provisions	0.98	0.95–1.01	.24	1.00	0.96–1.04	.99
LGBIS	1.37	1.01–1.88	.04	0.61	0.41–0.90	.01

Note. CPD = cigarettes per day; CES-D = Center for Epidemiological Studies Depression Scale; LGBIS = Lesbian, Gay, and Bisexual Identity Scale; MSM = men who have sex with men; *OR* = odds ratio.

between CES-D and SPS scores ($r = -.26$, $p < .001$), CES-D and LGBIS scores ($r = .25$, $p<.001$), and SPS and LGBIS scores ($r = -.21$, $p < .001$).

As depicted in Table 2, smoking in the past three months was associated with lower education, greater alcohol use, and higher LGBIS scores. Among smokers, smoking ≥10 CPD versus light smoking was related to lower LGBIS scores and marginally related to older age and greater alcohol use.

Discussion

This study provides important findings, as little is known about smoking among sexual minorities outside of North America. Higher smoking prevalence was found among Chinese MSM (66%) versus MSM in North America (34%–55%; Greenwood et al., 2005; Lampinen et al., 2006) and versus the general urban male population in China (56%; S. Lee et al., 2009). The 10% higher rate among Chinese MSM versus non-MSM may reflect a ceiling effect since smoking rates among Chinese men are quite high. Thus, this study highlights a particularly high-risk underserved population that has received little attention.

This research identified important factors associated with smoking among Chinese MSM. First, as previously documented, lower education was associated with smoking (Zhu, Giovino, Mowery, & Eriksen, 1996) and older age was associated with heavier smoking (CDC, 1997; Thompson et al., 2007). Second, drinking was related to smoking and heavier drinking was associated with heavier smoking. Our findings support prior research on concurrent alcohol use and smoking (Bachman, Wadsworth, O'Malley, Johnston, & Schulenberg, 1997) and high prevalence of smoking and alcohol use among MSM in China (Ruan et al., 2009).

Interestingly, less comfort with one's sexuality was more highly correlated with smoking than depressive symptoms or social support. The Substance Abuse and Mental Health Services Administration (Kelly, 1995) listed five empirically based substance abuse-specific risk factors for the LGBT population, particularly lack of sense of self-worth, connectedness to social support, alternative ways to view being different, role models, and opportunities to socialize with other gays/lesbians outside of bars. Some of these risk factors are reflected by LGBIS. Further examination should focus on how specific aspects of gay identity contribute to health-risk behavior. The reasons for the connection between higher LGBIS scores and light smoking are unclear. Perhaps, there are different triggers for smoking among those who were more uncomfortable with their sexual identity, such as being in uncomfortable social situations or coping with situational stressors, rather than being addicted. Further examination of this phenomenon is warranted.

This research has implications for research and practice. Greater attention regarding health behaviors, particularly

smoking, among MSM in developing countries is warranted. There is also a need to include psychosocial assessments specific to the target population; in this case, the LGBIS proved to be a robust correlate of smoking. In practice, health care providers should understand the robust role of sexual identity in health behaviors among MSM. Moreover, practitioners might address smoking and drinking concurrently. Finally, smoking level is higher among older MSM in China, which may reflect a cohort effect or suggest that smoking consumption escalates as time since initiation increases. Therefore, early intervention is critical.

This study has some limitations. First, this sample was recruited through respondent-driven sampling and includes male sex workers; thus, this sample may not be reflective of the larger Chinese MSM population. The rates of alcohol and drug use were higher among sex workers than among the general MSM population; however, smoking prevalence was not significantly different between these groups. Additionally, although the CES-D has been validated in a Chinese sample (Boey, 1999), the SPS and the LGBIS must be validated in this population in future research. Finally, the cross-sectional nature of this study does not allow us to determine directionality of the relationships documented. Despite these limitations, these findings are important as a basis for future research.

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Declaration of Interests

None declared.

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