Cigarette Smoking as Part of a Syndemic among Young Men Who Have Sex with Men Ages 13–29 in New York City

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ABSTRACT *The prevalence of cigarette smoking among young men who have sex with men (YMSM) is significantly higher than among their heterosexual peers. We undertook an analysis to examine cigarette smoking in relation to demographic factors and other risk behaviors among 580 YMSM, ages 13–29, in New York City. Cross-sectional data were collected as part of larger study of risk behaviors using palm devices and targeted active recruitment strategies across all five boroughs of the city. Multivariate modeling suggests that Asian or Pacific Islander and White YMSM are more likely to report cigarette smoking than other racial and ethnic groups, as are men reporting a middle class socioeconomic status. In addition, smoking was related to the likelihood of using a variety of illicit substances, as well as alcohol and pharmaceuticals without a prescription, during the period of assessment. YMSM who smoke cigarettes reported a greater number of casual sex partners and a greater number of transactional sex partners than non-smokers. Episodic analysis of sexual behaviors with casual partners indicated that smokers were more likely to engage in illicit drug and alcohol use immediately before or during sex than did non-smokers. These findings are understood as part of a larger syndemic among YMSM, and suggest that smoking prevention and cessation programs should be embedded as part of larger more holistic health and wellness programs targeting YMSM.*

KEYWORDS YMSM, Gay and bisexual, Cigarette smoking, Tobacco, Sexual risk, Drug use, Syndemic

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INTRODUCTION

There are limited data on the patterns of cigarette smoking among gay, bisexual, and other young men who have sex with men (YMSM). However, a set of behavioral studies indicated that YMSM are more likely to smoke than their heterosexual male peers.^{1–5} In 2001, Ryan et al. conducted a meta-analysis and found that of four published studies, the prevalence of cigarette smoking among YMSM (ages, 13–21) was between 41.5% and 59.0% as compared with the national average among 13–21-year olds of between 28.0% and 35.0%.^{6–10} Despite these alarming findings, since 2001 there has been a dearth of research conducted on cigarette smoking with regard to YMSM.

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Previous research has linked cigarette smoking to elevated levels of stress.^{11–13} It has been suggested that like other socially and economically marginalized communities, YMSM face a disproportionate amount of stress due to discrimination and homophobia.^{6,14,15} Also, as bars and clubs have historically functioned as significant contexts for socialization among YMSM,¹⁶ and because bars and clubs are sites that have long been associated with cigarette smoking, this structural factor has been linked to elevated smoking rates among YMSM.⁶ Finally, the tobacco industry has targeted the gay market through advertisements, sponsorship, and promotional events, potentially explaining the high rates of smoking in this segment of the population.^{6,17–20}

Unfortunately, the deleterious health effects of cigarette smoking are not the only cause for concern. Researchers have found that smoking is strongly related to alcohol and illicit drug use.^{4,6,21} In turn, numerous studies have documented the associations between alcohol/drug use and high-risk sexual behavior.^{22–26} Engaging in high-risk sexual behaviors, such as unprotected anal intercourse, places YMSM at an elevated risk for HIV transmission and other sexually transmitted infections (STIs). Stall et al. illustrated a significant association between cigarette smoking and HIV seroconversion among gay and bisexual men, providing additional evidence for a relation between cigarette smoking and contracting HIV and other STIs.⁴

The abovementioned research indicates the interactions of cigarette smoking, alcohol/substance use, and high-risk sexual behavior in YMSM. To this end, the current investigation will employ the theory of syndemic production^{27,28} to better understand the synergistic relationship between these risk behaviors. In order to truly understand why more YMSM are smoking, it is of paramount importance that one has the ability to first comprehend the systematic co-occurrence of these psychosocial and behavioral phenomena. Syndemics theory posits that illicit drug use, sexual risk-taking behavior, and mental health burden are mutually reinforcing, thus exacerbating all three conditions among YMSM.^{27–30} Moreover, these conditions are viewed as socially produced ills, in part explained by the discrimination and victimization experienced by YMSM.^{14,15,31–34} The socially induced mental health burden that YMSM experience both predisposes them to, and exacerbates the formation of, maladaptive behaviors including illicit drug use and unprotected sexual behavior. For example, YMSM may experience lower levels of self-esteem, and higher levels of anxiety, stress, and depression.^{15,35} YMSM may also experience psychosocial states such as internalized homophobia,^{36,37} negative body image,³⁸ and stigma.³⁹ The disproportionate prevalence of these internal states is not surprising given that marginalization, homophobia, and discrimination are social realities for YMSM, which may in turn lead to the development of maladaptive behaviors including cigarette smoking.

YMSM may be more vulnerable to the development of a syndemic, generally, and cigarette smoking specifically, as they transition from their homes and families, where their same-sex attractions and identity are often misunderstood and disregarded, to gay communities in large urban centers which are often defined by their own standards of appearance and behavior.^{27,28} In order to understand smoking among YMSM, it is paramount that one considers their varying social, emotional, and cognitive needs along the developmental continuum, especially with regard to the development of sexual identity across the lifespan,^{40–42} and to consider that YMSM who are adolescents (ages 13–17), may differ in their needs from those who are emerging adults (ages 18–24), and those who are young adults (ages 25–29).⁴³

Using the lens of syndemics theory, we examined the cigarette smoking patterns of an ethnically, racially, and socioeconomically diverse sample of YMSM ages 13–29, as well as the association of smoking with other maladaptive behaviors, and the potential antecedents of this behavior. Specifically, (1) we examine patterns of cigarette smoking; (2) delineate patterns of smoking in relation to key demographic states, including developmental stage; and (3) examine the association of smoking cigarettes with other health risk behaviors including alcohol and drug use and sexual risk taking. The development of a deeper understanding of the complex psychosocial patterns of cigarette smoking is integral to health promotion efforts targeting YMSM.

METHODS

Procedures and Participants

The current project was a cross-sectional survey of 580 gay, bisexual, and other YMSM recruited from the NYC metropolitan area. Eligibility criteria included being biologically male and male-identified, identifying as a man who has sex with men, and being between the ages of 13–29. Participants ages 18–29 ($N=540$) were recruited using active methods over 90 days during the summer of 2008 for completion of a quantitative survey using tacit consent (see Halkitis et al.).⁴⁴ Research staff employed targeted sampling procedures at various venues throughout the five boroughs of NYC, including several large community events, social venues, bars, dance clubs, and public spaces (parks, street corners, etc.). The sampling frame was stratified so that Black and Latino men accounted for at least two thirds of the sample, and so that 33% percent of the sample was between the ages of each 18–20, 21–25, and 26–29, respectively.

Measures

Demographic Characteristics. Participants self-reported age, race, HIV status, and sexual orientation. For analysis, we defined three age groups: 13–17-year olds (adolescents), 18–24-year olds (emergent adults), and 24–29-year olds (young adults). Race/ethnic categories were: African American/Black of African Descent, Hispanic/Latino, White, or Asian/Pacific Islander. A final group included those of mixed or other race.

Lifetime Sexual Behaviors. We asked participants whether they had engaged in any of the following behaviors with other men: oral intercourse, receptive anal intercourse, and insertive anal intercourse. In addition, participants indicated the number of casual male partners with whom they engaged in these behaviors, whether money was paid for their engagement (transactional sex), as well as the age in which each participant first engaged in these behaviors.

Episodic Sexual Behavior. We gathered episodic data for casual partners and for main partners when applicable. In each case, data were gathered for the two most recent sexual episodes. For each type of partner, we assessed whether the participant had engaged in unprotected oral intercourse, unprotected receptive anal intercourse, and unprotected insertive anal intercourse. For each episode we also gathered data with regard to the sexual partner's HIV serostatus, race, and age.

Analytic Plan

We first conducted a bivariate analysis examining associations between cigarette smoking and key demographic variables. Variables that were found to be significantly associated with cigarette smoking were then entered into a binary logistic regression analysis in order to ascertain which factors best predicted cigarette smoking among YMSM. We then constructed a point-biserial correlation matrix in order to illustrate the synergistic relationship between cigarette smoking, alcohol, and substance use. Finally, we conducted further bivariate analyses in order to examine the relationship between cigarette smoking and sexual risk taking in this population.

RESULTS

We considered the cigarette smoking patterns of our sample. The original study sample consisted of 580 young men, one of whom was eliminated from the analyses because greater than 50% of the data were missing. In addition, one participant did not respond to the smoking items, yielding a final analytic sample of 578. The sample is further described in Halkitis et al.⁴⁴

Smoking in Relation to Demographic Characteristics

Of the 578 YMSM, 36.3% ($n=210$) reported that they currently smoke cigarettes. Of the smokers, 44.3% ($n=93$) reported smoking less than five cigarettes per day, 37.1% ($n=78$) reported smoking more than five cigarettes but less than one pack (6–19 cigarettes) per day, 16.7% ($n=35$) reported smoking about one pack (20 cigarettes) per day, and the remaining 1.9% ($n=4$) reported smoking more than one pack per day.

We next considered key demographic variables in relation to cigarette smoking. These results are further shown in Table 1. Those who smoked ($M=22.34$ and $SD=3.50$) were equivalent in age to those who did not smoke ($M=22.38$ and $SD=3.80$). We also considered smoking in relation to developmental stage (adolescents, emerging adults, and young adults) and found no differences across stage. A greater proportion of men with a history of arrest were smokers, ($\chi^2(1)=20.00$ and $p<.001$), while currently being enrolled in school was associated with not smoking ($\chi^2(1)=7.84$ and $p<.01$).

Race/ethnicity was related to smoking ($\chi^2(4)=9.25$ and $p<.05$). Sub-analyses indicated that a smaller proportion of African American men (29.9%, $n=47$) smoked as compared with white men (40.9%, $n=45$; $\chi^2(1)=3.45$ and $p<.05$) and Asian Pacific Islander (API) men (47.1, $n=32$; $\chi^2(1)=6.11$ and $p<.01$), but there were no significant differences as compared with Latino (38.1%, $n=67$) or mixed race/ethnicity men (28.1%, $n=19$). Finally, smoking was related to perceived family socioeconomic status (SES; $\chi^2(2)=6.41$ and $p<.05$). More men who indicated middle income SES were smokers (41.38%, $n=108$) as compared with men of lower SES (29.05%, $n=43$; $\chi^2(1)=6.16$ and $p<.05$). Given the potential that perceived SES is related to race, we conducted an additional set of analyses and found that these were associated ($\chi^2(8)=44.69$ and $p<.001$). Specifically, while only 10.3% ($n=12$) of API men and 17.3% ($n=19$) of White men perceived lower familial SES, 27.4% ($n=43$) of African American men and 34.5% ($n=61$) of Latino men perceived lower familial SES. Analyses within race/ethnicity were also conducted but no relation to SES was noted when considering each race/ethnicity individually.

TABLE 1 Bivariate analysis of cigarette smoking by demographic characteristics among YMSM (N=578)

	Smoking (n=210)	Non-smoking (n=368)
	n (%)	n (%)
Race/ethnicity*		
Latino	67 (31.90)	109 (29.62)
White	45 (21.43)	66 (17.93)
African American	47 (22.39)	110 (29.89)
Asian/Pacific Islander	32 (15.24)	36 (9.78)
Mixed/other	19 (9.05)	47 (12.77)
Sexual orientation		
Gay	148 (70.48)	279 (75.82)
Bisexual	47 (22.38)	74 (20.11)
Other	15 (7.14)	15 (4.08)
Currently enrolled in school**	91 (43.33)	204 (55.43)
History of arrest***	65 (30.95)	56 (15.22)
HIV status (self-reported)	18 (8.57)	24 (6.52)
NYC native	126 (60.00)	196 (53.26)
Currently in relationship	42 (20.00)	94 (25.54)
Perceived family SES*		
Upper	59 (28.10)	110 (29.89)
Middle	108 (51.43)	153 (41.58)
Lower	43 (20.48)	105 (28.53)

*p<.05; **p<.01; ***p<.001

Multivariate Modeling. Based on the bivariate results, we built a multivariate binary logistic model to explain the likelihood of smoking. We included only those factors related to smoking (i.e., race/ethnicity, perceived SES, enrollment in school, and arrest history) as predictors in the model. For race/ethnicity, African American was set as the criterion group and for perceived SES, middle income was set as the criterion group. A significant model was achieved ($\chi^2(8)=47.14$ and $p<.001$; Naglekerke $R^2=10.8\%$). As shown in Table 2, being enrolled in school was related to a decreased probability of smoking (OR=0.63; 95% CI=0.44, 0.90) and having a history of arrest was related to an increased likelihood of smoking (OR=2.89; 95% CI=1.87, 4.45). In addition, compared with African American men, men of all other races/ethnicities with the exception of mixed race men had a higher likelihood of smoking (OR ranging from 1.75 to 2.72), and for perceived SES lower income men were less likely to smoke than middle SES men (OR=0.56; 95% CI=0.36, 0.88).

Smoking in Relation to Illicit Drug and Alcohol Use

Alcohol and Other Drug Use. As smoking cigarettes can be viewed as part of poly-drug use behaviors, we examined smoking in relation to the use of 15 illicit drugs, as well as the use of alcohol to intoxication. The use of marijuana, powdered cocaine, inhalant nitrates (i.e., poppers), Ecstasy, methamphetamine, hallucinogens, Adderall and/or Ritalin without prescription, and the use of alcohol to the point of intoxication were all found to be significantly associated with smoking cigarettes and are shown in Table 3. There were also several significant associations found

TABLE 2 Binary logistic regression of demographic characteristics on smoking

Variable	B	SE B	OR	95% CI
Race/ethnicity ^a				
Latino*	0.56	0.25	1.75	1.08, 2.84
White*	0.71	0.28	2.02	1.17, 3.49
Asian/Pacific Islander*	1.00	0.32	2.72	1.46, 5.06
Mixed/other	0.10	0.34	1.11	0.57, 2.17
History of arrest*	1.06	0.22	2.89	1.87, 4.45
Family income ^a				
Low*	-0.58	0.23	0.56	0.36, 0.88
High	-0.33	0.22	0.72	0.47, 1.10
Currently enrolled in School*	-0.46	0.18	0.63	0.44, 0.90

^aAfrican American and middle SES are criterion groups

* $p < .05$

between the other drugs/alcohol as indicated by correlations ranging from 0.08 to 0.67 (see Table 3).

Multivariate Modeling. Based on the bivariate results, we once again built a multivariate binary logistic model including only those alcohol and drug use factors that were found to be related to smoking (i.e., marijuana, powder cocaine, inhalant nitrates, Ecstasy, methamphetamine, hallucinogens, Adderall and/or Ritalin without prescription, and alcohol use to intoxication). A significant model was achieved ($\chi^2(8)=69.09$ and $p < .001$; Naglekerke $R^2=15.6\%$). Having smoked marijuana in the last three months was related to a higher likelihood of smoking cigarettes (OR=2.97; 95% CI=1.97, 4.48) as was the use of inhalant nitrates (OR=1.87; 95% CI=1.01, 3.46).

Smoking in Relation to Aggregate Sexual Behavior

We next considered differences between the two groups (smokers vs. non-smokers) in terms of aggregate level sexual behavior data. Specifically, we examined differences with regard to the age of onset for oral, anal receptive, and anal insertive sex with another man. Results are shown in Table 4. Those YMSM who indicated that they smoke cigarettes reported a younger onset age for both anal insertive ($t(576)=2.50$ and $p < .05$) and anal receptive intercourse ($t(576)=1.95$ and $p < .05$). No differences were noted for the age of first oral sex with another man.

Next, we examined the number of casual male sex partners in the last three months and found that smokers reported more casual partners than non-smokers ($t(576)=2.36$ and $p < .05$). In addition smokers reported a greater number of transactional sex partners (i.e., partners with whom they received money in exchange for sex) than non-smokers ($t(576)=2.02$ and $p < .05$).

Smoking in Relation to Alcohol, Drug Use, and Sex Risk Episodic Level Data

Of the 578 YMSM in the current study, 43.1% ($n=249$) reported engaging in sex with a casual partner in the last three months. Of those, 36.14% ($n=90$) reported smoking cigarettes. We then examined differences in sexual risk behavior, during

TABLE 3 Correlation matrix between smoking, illicit drug use, and alcohol to intoxication

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1-Cigarette	1															
2-Marijuana	0.31**	1														
3-Powder cocaine	0.19**	0.37**	1													
4-Crack cocaine	0.07	0.11*	0.12**	1												
5-Inhalant nitrates	0.21**	0.27**	0.39**	0.32**	1											
6-Ecstasy	0.12**	0.30**	0.37**	0.19**	0.36**	1										
7-Ketamine	-0.03	0.12**	0.26**	0.09*	0.18**	0.31**	1									
8-GHB	0.01	0.06	0.18**	0.67**	0.20**	0.22**	0.55**	1								
9-Methamphetamine	0.12**	0.08	0.27**	0.29**	0.25**	0.08*	0.27**	0.32**	1							
10-Heroin	0.08	0.07	0.15**	0.41**	0.16**	0.10*	0.25**	0.22**	0.37**	1						
11-Hallucinogens	0.14**	0.21**	0.33**	0.12**	0.26**	0.31**	0.16**	0.06	0.18**	0.35**	1					
12-Steroids	0.05	0.08	-0.04	0.12**	0.08	0.05	-0.01	-0.01	-0.02	-0.01	-0.02	1				
13-Viagra/Cialis	0.03	0.07	0.18**	-0.02	0.13**	0.23**	0.08*	0.07	0.13**	-0.01	0.05	0.11**	1			
14-Xanax/Valium	0.07	0.16**	0.33**	0.14**	0.24**	0.19**	0.25**	0.16**	0.17**	0.26**	0.01**	0.07	0.07	1		
15-Adderall/Ritalin	0.09*	0.18**	0.34**	0.15**	0.21**	0.20**	0.27**	0.17**	0.19**	0.13**	0.33**	-0.02	0.03	0.39**	1	
16-Alcohol to intoxication	0.14**	0.43**	0.18**	0.04	0.09*	0.13**	0.04	0.05	-0.03	0.04	0.08	0.02	0.07	0.10*	0.11**	1

*p<.05, **p<.01

TABLE 4 Bivariate analysis of cigarette smoking by sexual behavior among YMSM (N=578)

Variable	Smoking (n=210)	Non-smoking (n=368)	t(576)
	M (SD)	M (SD)	
Age of first oral sex	15.67 (3.46)	16.02 (3.93)	1.02
Age of first anal sex (Insertive)	17.45 (3.12)	18.24 (3.42)	2.50*
Age of first anal sex (Receptive)	16.83 (3.69)	17.52 (3.59)	1.95*
No. of casual sex partners (last 3 months)	4.44 (12.01)	2.71 (5.54)	2.36*
No. of transactional casual sex partners	2.74 (13.62)	0.78 (3.64)	2.02*

* $p < .05$

each of their last two sexual episodes with causal partners. Specifically, we examined the differences between smokers and non-smokers with regard to sexual risk taking behaviors and drug use before or during sex.

Table 5 illustrates sexual risk behavior among smokers and non-smokers during their past two episodes of sex. Cigarette smokers engaged in higher rates of smoking marijuana before or during sex ($\chi^2(1)=7.82$ and $p < .01$), drinking alcohol to intoxication before or during sex ($\chi^2(1)=4.96$ and $p < .05$), and using inhalant nitrates before or during sex ($\chi^2(1)=4.30$ and $p < .05$) during the last episode (episode 1) with a casual partner. With regard to the second to last episode (episode 2)

TABLE 5 Bivariate analysis of cigarette smoking by episodic sexual risk behavior among YMSM who engaged in sex in the last 3 months (N=249)

Variable	Episode 1		Episode 2	
	Smoking (n=90)	Non-smoking (n=159)	Smoking (n=90)	Non-smoking (n=159)
	n (%)	n (%)	n (%)	n (%)
Oral sex without condom	40 (44.44)	83 (52.20)	43 (47.78)	74 (46.54)
Receptive anal sex without condom	16 (17.78)	33 (20.75)	19 (21.11)	29 (18.24)
Insertive anal sex without condom	13 (14.44)	31 (19.50)	15 (16.67)	26 (16.35)
Smoked marijuana before/during sex**, ****	25 (27.78)	22 (13.84)	22 (24.44)	18 (11.32)
Drank alcohol to intoxication before/during sex*, ****	20 (22.22)	19 (11.95)	16 (17.78)	9 (5.67)
Used powder cocaine before/during sex	4 (4.44)	2 (1.26)	5 (5.56)	3 (1.89)
Used crack cocaine before/during sex	1 (1.11)	0 (0.00)	4 (4.44)	2 (1.26)
Used inhalant nitrates before/during sex*	10 (11.11)	7 (4.40)	6 (6.67)	6 (3.78)
Used ecstasy before/during sex	2 (2.22)	5 (3.14)	1 (1.11)	4 (2.52)
Used ketamine before/during sex	1 (1.11)	1 (0.63)	0 (0.00)	1 (0.63)
Used GHB before/during sex	1 (1.11)	2 (1.26)	0 (0.00)	0 (0.00)
Used methamphetamine before/during sex	1 (1.11)	1 (0.63)	1 (1.11)	2 (1.26)
Used heroin before/during sex	1 (1.11)	0 (0.00)	0 (0.00)	0 (0.00)
Used hallucinogens before/during sex	1 (1.11)	1 (0.63)	1 (1.11)	1 (0.63)
Used steroids before/during sex	1 (1.11)	0 (0.00)	1 (1.11)	0 (0.00)
Used Viagra/Cialis before/during sex	3 (3.33)	3 (1.89)	3 (3.33)	3 (1.89)
Used Xanax/Valium before/during sex	3 (3.33)	1 (0.63)	2 (2.22)	4 (2.52)
Used Adderall/Ritalin before/during sex ***	0 (0.00)	1 (0.63)	3 (3.33)	0 (0.00)

* $p < .05$, ** $p < .01$ (Episode 1); *** $p < .05$, **** $p < .01$ (Episode 2)

with a casual partner, cigarette smokers also engaged in higher rates of smoking marijuana before or during sex ($\chi^2(1)=7.60$ and $p<.01$), drinking alcohol to intoxication before or during sex ($\chi^2(1)=9.58$ and $p<.01$), and using Adderall or Ritalin before or during sex ($\chi^2(1)=5.39$ and $p<.05$).

DISCUSSION

Previous studies have indicated that cigarette smoking rates are higher among YMSM than they are among young heterosexual males.^{4,6} Data from the current analysis suggest that just over one third (36.3%) of the YMSM in NYC currently smoke cigarettes. It has been hypothesized that the disproportionate amount of stress experienced by YMSM due to discrimination and homophobia is one explanation for these elevated smoking rates.^{6,15}

In 1995, Meyer suggested that stress, or more specifically, minority stress, is experienced when non-heterosexuals, living in a heterosexist society, are subjected to chronic stigmatization and marginalization from their family, peers, and society. Meyer suggests that while his findings were specific to gay men, they could also be applied to other minority statuses.¹⁴ While the minority stress model may elucidate the elevated rates of cigarette smoking among YMSM, our data indicate that dual- and multiple-minority individuals were less likely to smoke than were single-minority individuals in NYC. Specifically, only 38.1% of those YMSM who identified as Latino, 29.9% of those who identified as African American, and 28.8% of those who identified as Mixed/Other reported smoking. These smoking rates were significantly lower than the 40.5% of White YMSM that reported smoking.

In addition, we found that YMSM who perceived their familial SES as lower were less likely to smoke than YMSM who perceived their familial SES as middle class. The current data suggest that while the minority stress model may help to explain cigarette smoking among YMSM, there are likely other social, cultural, contextual, and economic factors at play that must be taken into account. Of particular significance to the findings of the study is the high cost of cigarettes in New York City, which likely influence the ability of YMSM of lower SES to purchase cigarettes, and which explains the greater likelihood of those who identify as middle class to smoke. Furthermore, the relation between race/ethnicity and cigarette smoking is also confounded by SES, in that those who identify as White or API are more likely to smoke cigarettes but also are less likely to perceive their familial SES as lower class.

Syndemics theory may provide another manner in which to consider the elevated rates of smoking among YMSM that builds upon a minority stress model.^{27–29} Of the YMSM assessed in our study, those who reported that they smoke cigarettes also reported significantly higher rates of drinking to intoxication, illicit drug use, and high-risk sexual behavior. According to syndemics theory, illicit drug use, mental health burden, and sexual risk taking interact synergistically compounding the effects of all three.^{28,29} The current results are consistent with syndemics theory in that patterns of maladaptive behaviors emerged and tended to present in synergistic fashion with one another in this population of 13–29-year-old YMSM.

The current data suggest that cigarette smoking is part of a syndemic experienced by some YMSM in NYC. Specifically, YMSM who reported smoking cigarettes were more likely to use marijuana, powder cocaine, inhalant nitrates,

Ecstasy, methamphetamine, hallucinogens, Adderall or Ritalin without prescription, and to use alcohol to the point of intoxication. The use of each additional drug assessed was associated with the use of several other drugs, suggesting the presence of a synergistic relationship between cigarette smoking, illicit drug use, and alcohol use to intoxication among this sample.^{4,6,21}

YMSM who reported smoking cigarettes also reported engaging in significantly more high-risk sexual behavior than those who do not smoke. Specifically, smokers reported a younger age of onset for both insertive and receptive anal sex. Cigarette smoking YMSM also reported having significantly more casual sex partners, more transactional sex partners, and reported engaging in higher rates of alcohol and substance use immediately before or during sex than those who did not report smoking. These findings provide additional support for the notion that cigarette smoking may be part of a larger syndemic.^{24,28,29}

While the current analyses focused on the relation between cigarette smoking and other risk factors that are associated with syndemic production among YMSM (i.e., illicit drug use and sexual risk taking), it is important to note other associated factors. Having a history of arrest and not being enrolled in school were both found to be significantly associated with smoking among YMSM in NYC. These risk states may predispose YMSM to smoking as suggested by syndemics theory, which posits that psychosocial burdens likely lead to increased risk behaviors.^{29,30} Future studies could help to further elucidate the role of these problematic psychosocial factors with regard to the development of cigarette smoking as part of overall syndemic production among YMSM.

Limitations

The current exploratory study did not assess the mental health burden of participants. While previous research has found cigarette smoking to be highly associated with depression, anxiety, stress, hopelessness, and low self-esteem,^{4,11,36,45–48} this study did not specifically assess mental health. Because stress was not specifically assessed, one cannot determine the amount of stress that was experienced by single-, dual-, and multiple-minority individuals. Still, we recognize that such mental health burdens in addition to socioeconomic and contextual factors likely lead to the development of risk behaviors such as cigarette smoking and to syndemic production, in general. Future studies must elucidate the association between cigarette smoking, illicit drug use, sexual risk taking, and mental health burden in order to provide evidence that cigarette smoking is part of a complete model of syndemic production among YMSM.

It should also be noted that we undertook an exploratory analysis and conducted numerous bivariate tests to examine levels of association between cigarette smoking and other risk behaviors such as illicit drug use. We recognize that the abundance of significant findings may be the result of spuriousness and caution the reader to any interpretation of causation. However, we safeguard our results by relying primarily on non-parametric tests, which are not subject to inflation of errors when multiple comparisons are undertaken.

Additionally, because we did not assess the age of smoking onset and first use of drugs and alcohol, it is not possible ascertain the order in which these behaviors occurred. Therefore, it is currently not possible to evaluate the fit of a “stepping stone hypothesis” or “gateway drug theory”^{49,50} among this sample. Future studies should examine possible sequential patterns at play among this population. Finally, this NYC-based sample of YMSM ages 13–29 may not be

representative of YMSM in other regions or metropolitan areas. Future studies should seek to assess these behaviors among YMSM in other geographic locations, including non-urban areas.

Finally, this study sampled a highly diverse sample of YMSM from all boroughs of NYC, with over 60% identifying as men of color who were diverse in terms of perceived SES. However, it is important to note that this was a cross-sectional investigation that employed self-report strategies as part of a non-probability sample. In order to counter some of the weaknesses of this type of design, we gathered data using the computer assisted self-interview system which has been shown to increase the accuracy of self-report.⁵¹ It is also important to note that few studies have exclusively focused on the risk behaviors of YMSM ages 13–29, rather than as a subset of a larger study of MSM.

CONCLUSIONS

The findings of the current investigation are consistent with previous research indicating high prevalence of cigarette smoking and associated behaviors among YMSM. While the detrimental health effects associated with smoking are well known,^{52–54} the current study provides evidence for the association between cigarette smoking and behavioral risk for HIV and other STIs. These data suggest that cigarette smoking is part of a syndemic among YMSM. While the association between cigarette smoking, drug use, and early onset of sexual behaviors is in no way unique to YMSM,⁵⁵ this segment of the population is at greater risk for negative health outcomes when compared with their heterosexual peers. The current analysis illustrates that cigarette smoking is one easily identifiable indicator of those YMSM who are likely also at risk in terms of sexual behavior and mental health. Thus, in order for HIV prevention efforts to be more effective among YMSM, smoking prevention and cessation interventions should be integrated with HIV prevention messages for young men as part of a holistic wellness effort.

While the majority of HIV prevention research has sought to address factors such as HIV-health, mental health, sex behavior, drug use, and cigarette smoking, by examining each factor independently or in combination with other factors, it is integral that future prevention efforts begin to focus on gay men's health agenda at a more comprehensive level. Indeed, among YMSM these factors can overlap, often presenting a systematic pattern of behavior that ultimately places individuals at risk for health disparities and along these lines, HIV infection. It is paramount that while prevention efforts continue to target specific maladaptive behaviors for intervention, such as drug use, cigarette smoking, and unsafe sex, future efforts must also employ a holistic approach to health and well-being.

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