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Acknowledgements

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Disparities of Sexually Transmitted Infections and Vaccinations among Young Men who Have Sex with Men

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ABTRACT This study looks at the socio-demographic factors that are associated with vaccination and infection prevalence in a sample of young men who have sex with men (YMSM). Data were collected through a cross sectional questionnaire that surveyed 200 men between the ages of 16 and 24. Results indicated that there was a clustering of sexually transmitted infections (STIs) in the sample, with STIs significantly associated with one another. Also, the demographics of homelessness during the past 12 months and African American showed significant positive associations between STIs and negative associations between vaccinations. Results suggest the need for better access to healthcare among sub-groups of YMSM and further research on sexual networks among this population.

INTRODUCTION

Research on sexually transmitted infections (STIs) and immunizations in young men who have sex with men (YMSM) is limited. Most research investigating STIs focuses on HIV and does not take into perspective other STIs such as gonorrhea, syphilis, chlamydia, and the human papillomavirus (HPV). This is problematic because when individuals are infected with a STI, they are more likely to acquire or transmit HIV than those who are not infected with STIs (CDC, 2010). Furthermore, data reported by the Center for Disease Control (CDC) provide information on prevalence rates of STIs and their co-infection with HIV, but fails to mention other factors that may influence the acquisition of other STIs among YMSM (CDC, 2012). YMSM has been defined by different age ranges, from 13-19, 13-24, 15-22, 15-24, or 13 29, depending on differing theoretical approaches and epidemiologic reporting categories (see CDC, 2011; 2012; MacKellar, et al., 2001; Weinbaum, et al., 2008). Also, studies on immunizations in this population focus primarily on hepatitis B and there is not much information on other vaccinations such as those for the human papillomavirus, which causes cancer and genital warts.

Collecting information on STIs in the general population is pertinent because of the high rates that are seen throughout the country, especially in those ages 15 to 24 (Benson & Hergenroeder, 2005). Chlamydia and gonorrhea have the highest rates of occurrence in this age

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range of young adults and adolescents, but there is still a concern that rates are underreported and could be higher (Benson & Hergenroeder, 2005). Even more of a concern is the lack of data collected on lesbian, gay, and bisexual (LGB) youth because of the complications that arise when collecting accurate data (Benson & Hergenroeder, 2005).

Data are difficult to find on the young LGB population because of many unique challenges. Some LGB youth do not feel comfortable identifying as gay, which leads them to avoid seeking care when there are special health services available (Benson & Hergenroeder, 2005). There are also studies such as the Youth Risk Surveillance System (YRBSS) that collects data on sexual orientation, attraction, and behaviors but collects different information depending on what state is being surveyed (Benson & Hergenroeder, 2005). This makes it challenging to make comparisons of the information leading to missing data and inapplicable results (Benson & Hergenroeder, 2005). Most other surveillance efforts and studies do not monitor or ask about information on sexual orientation (Ciesielski, 2003).

For this study all data were collected in the city of Chicago where there has been a need to know more about STIs in the MSM population, and in particular YMSM. Between the years of 1997 and 2001 it was reported that Chicago had the second highest rates of syphilis in the United States (Ciesielski, 2003). By 2002 it was recorded that 62% of all syphilis cases in Chicago were from the MSM population (Ciesielski, 2003). Also, gonorrhea cases were rising with 50% of all cases in the MSM population in the year 2000, when only 20% of all cases were in the MSM population in 1994 (Ciesielski, 2003). While most of the STI data in Chicago has reported MSM as a risk category, age is typically not reported. The lack of age-specific data in this population means that prevalence of STIs and vaccinations among YMSM, and what factors may be associated with them are largely unknown.

The analysis described below arises from the lack of research exploring possible social determinants of STI prevalence and vaccinations among a convenience sample of YMSM in the scientific literature. This study aims to (1) describe STI and vaccination prevalence among a sample of YMSM in Chicago and (2) explore possible factors such as employment, homelessness, sexual orientation, and ethnicity that may be associated with STIs and vaccinations in this population.

METHODS

The data used for this study were collected in 2012 as a part of the Chicago Young Men's Health Study. This study looks at issues facing the YMSM population and was funded by the National Institute of Health. Recruitment of the participants included online advertisements via Facebook, the distribution of flyers at venues in the Chicago "Boystown" community on the city's North side, as well as peer recruitment. The study consisted of 200 young gay and bisexual males between 16 and 24 years old with an average age of 20.88 (SD=2.09). Of the participants 38% were African American, 26.5% Latino/Hispanic, 23.5% White, 2% Asian, 1% Native American/Alaskan Native, and 9% multiracial/other.

Participants completed an audio computer assisted survey interview (ACASI) assessing a range of self-reported demographics, health behavior, and health status variables. We asked participants whether they had ever been homeless ("Have you ever spent one night or more in an emergency shelter, transitional housing facility, welfare hotel, or a public or private place not designed for sleeping (such as a car or park) because you were without a regular place to stay?") and if they had experienced any homelessness in the past 12 months. The survey took approximately an hour to complete and each participant was compensated $40.

Written consent was obtained for those ages 18 and older. Documentation of parental consent for participants younger than 18 was waived in order to avoid the selection biases present in recruiting only youth whose parents are both aware of and comfortable with their sexual orientation. The protocol was approved by the Institutional Review Board (IRB) of DePaul University. Under the federal government's "Common Rule" 45 CFR 46.408 (c), an IRB has the authority to waive parental permission if it determines that "a research protocol is designed

for conditions or a subject population for which parental or guardian permission is not a reasonable requirement to protect the subjects" and "an appropriate mechanism for protecting the children who will participate as research subjects is substituted" and "that the waiver is not inconsistent with Federal, State, or local law."

Data were analyzed using SPSS. Bivariate analysis was conducted between demographics and STI and vaccination variables using the Chi-square statistic. STI and vaccination variables were dichotomous (yes/no) variables assessing lifetime prevalence (i.e., "Have you ever had syphilis?" "Have you ever been vaccinated for hepatitis B?"). Variables that approached significance in the bivariate analysis were entered into regression models to determine significant predictors of each STI and vaccination variable of interest. Due to the low prevalence in the study sample, hepatitis A, B, or C were not analyzed in the bivariate or multivariate analyses.

RESULTS

Prevalence of STIs and vaccinations in the sample is reported in Table 1. Bivariate analysis using the Chi-square statistic indicated that STIs and vaccinations clustered in sub-groups of individuals. STIs with significant associations with one another were gonorrhea, chlamydia, and syphilis, and similarly there were significant associations among the three vaccinations of interest (see Table 2). In order to explore additional factors associated with STIs and vaccinations we excluded from the regression models bivariate associations with high significant associations. This included gonorrhea's significant association with chlamydia (X^2 =43.32, p <.001) and the clustering of the vaccinations for hepatitis A, hepatitis B, and HPV.

Multivariate analyses using logistic regression models revealed that experiencing any homelessness during the past 12 months was significantly associated with gonorrhea (O.R.=3.462, p<.01), chlamydia (O.R.=6.463, p<.01), and hepatitis B vaccinations (O.R.= .388, p<.01). Syphilis was a significant predictor of all three STIs, and being HIV positive was significantly associated with syphilis (O.R.=8.783, p<.001) and having been vaccinated for HPV (O.R.=3.158, p. <05).

DISCUSSION

This exploratory study found the prevalence of gonorrhea (12%), chlamydia (10%), syphilis (8%), and HIV (8%) in our sample. STI prevalence in our sample was similar to prevalence previously reported for adult MSM (CDC, 2012). Our mixed sampling methods may have resulted in a higher prevalence than expected among a younger population of MSM, as there was a high proportion of homeless participants in our sample, and homelessness was associated with several of the STIs. The STI prevalence in our study was clustered in a small sub-sample of participants, resulting in significant associations among the four STI variables of interest.

Prevalence of vaccinations was also found for hepatitis B (52%), hepatitis A (47.5%), and HPV (24%). Prevalence rates for hepatitis B vaccinations in other studies have been reported as 9% and 17.2% (MacKeller et al., 2001; Weinbaum et al., 2008), revealing that our sample had high vaccination rates. These rates may have been higher than other studies because of our sampling method or the increase of vaccination among the YMSM population. Prevalence rates of hepatitis A and HPV vaccinations in other studies were lacking therefore indicating the need for more studies such as ours that take into consideration these important vaccinations.

Experiencing any homelessness in the past 12 months was the demographic that was most strongly associated with STIs and lack of vaccinations. The results showed that those who experience homelessness in the past year were more likely to have reported lifetime gonorrhea and chlamydia infection while correspondingly less likely to have been vaccinated. These findings can be seen as a contradiction to the high vaccination rates in the study population, but can most likely be explained through barriers to healthcare among persons experiencing homelessness. Lack of access to healthcare may reduce access to vaccinations and STI treatment that prevent spread of STIs among sexual partners. Research that has been done on lesbian, gay, and bisexual homeless youth shows that

they have higher rates of risky sexual behavior (Cochran et al., 2002). These behaviors include prostitution and survival sex, as well as higher number of sexual partners and more unprotected intercourse (Cochran et al., 2002). Homeless youth also see barriers to receiving immunizations, such as stigma that may come from receiving them (Rew et al., 2005).

Being African American was significantly associated with HIV infection (O.R.=7.625, $p<.05$). African American ethnicity was also strongly associated with homelessness and unemployment in the bivariate analyses, suggesting that lack of access to health care, stable housing, and employment may place groups of African American YMSM at heightened risk for STIs and lack of vaccinations.

The significant clustering of STIs in our sample suggests that sexual networks may help spread STIs among YMSM in Chicago. Those that are directly or indirectly sexually connected to one another are considered to be in a sexual network (Wohlfeiler & Potterat, 2005). These connections are important to how STIs are transmitted from one individual to the next and sustained even though an individual's risk behavior may not resemble those of other individuals in their sexual network (Wohlfeiler & Potterat, 2005). More research is needed to identify sexual networks among YMSM in Chicago in order to target prevention efforts to communities with high STI rates.

Our study has several limitations. The cross sectional design was not able to infer causation but only explore associations among STI prevalence, vaccinations, and participant characteristics. The data came from a convenience sample of YMSM recruited through a variety of recruitment methods, which prevented us from constructing a population-based sample and therefore limits our ability to specifically estimate prevalence in the YMSM population. The clustering of STIs in a small sub-sample of our participants further limited the specific estimates as seen in the wide confidence intervals. The wide confidence intervals and relatively large standard errors are a reflection of the lack of variance in STI prevalence across the entire sample and a result of the relatively small sample size. Self-reporting was also a limitation because of recall bias of those that were infected, as they may not remember what STIs they had acquired during their lifetime. Reporting bias could have been prevalent because of the stigma that is associated with sexually transmitted infections.

Further research on immunizations and STIs in the young MSM community is required in order to prevent sexually transmitted infections from continuing to spread. In absence of specific information on STIs and demographics for population based data for the YMSM community, this study provides useful data to inform for future research. Our results suggest that targeted prevention, screening, and immunization efforts should be prioritized for YMSM who experience homelessness, and STI infections continue to disproportionately affected African American YMSM.

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Table 1. Participant Characteristics, STIs, and Vaccination Prevalence

	M	SD
Age	20.88	2.09
Race/Ethnicity	**n**	**%**
African American	76	38
Latino/Hispanic	53	26.5
White/Caucasian	47	23.5
Multiracial /other	18	9
Asian American	4	2
Native American/Alaskan Native	2	1
Sexual Orientation		
Gay	124	62
Bisexual	57	28.5
Other (Queer, Trade, Two-Spirit, Other)	19	9.5
Homelessness		
Ever Experienced Homelessness	93	46.5
Any Homelessness, Past 12 Months	79	39.5
Employment		
Unemployed	123	61.5
Employed Part Time	52	26
Employed Full Time	25	12.5
Sexually Transmitted Infections Prevalence		
Gonorrhea	24	12
Chlamydia	20	10
Syphilis	16	8
HIV	16	8
Human Papilloma Virus (HPV)	11	5.5
Hepatitis B	3	1.5
Hepatitis A	2	1
Hepatitis C	1	.5
Vaccinations Prevalence		
Hepatitis B	104	52
Hepatitis A	95	47.5
Genital Warts/Human Papilloma Virus	48	24

Table 2. Chi-Square Analyses

Chi-Square															
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
1. HPV Vaccine															
2. Hepatitis A Vaccine	38.94*** (N=179) §														
3. Hepatitis B Vaccine	34.73*** (N=179) §	139.02*** (N=183) §													
4. Gonorrhea	4.01 (N=174)	3.031 (N=168)	2.11 (N=169)												
5. Chlamydia	0.15 (N=174)	1.40 (N=168)	1.43 (N=169)	43.32*** (N=183) §											
6. Syphilis	0.09 (N=174)	0.11 (N=168)	0.19 (N=169)	14.44*** (N=183)	12.72** (N=183)										
7. HIV positive test result	4.48 (N=172)	2.18 (N=166)	1.27 (N=166)	1.95 (N=165)	1.17 (N=165)	17.30*** (N=165)									
8. African American	0.20 (N=190)	3.49 (N=184)	6.77** (N=185)	7.23* (N=183)	2.86 (N=183)	7.12* (N=183)	12.15*** (N=178)								
9. White/ Caucasian	5.47* (N=190)	3.66 (N=184)	7.32** (N=185)	4.155* (N=183)	2.73 (N=183)	1.49 (N=183)	2.13 (N=178)	37.66*** (N=200)							
10. Latino/ Hispanic	2.41 (N=190)	0.06 (N=184)	0.46 (N=185)	0.42 (N=183)	0.17 (N=183)	0.51 (N=183)	2.00 (N=178)	44.20*** (N=200)	22.15*** (N=200)						
11. Employment	1.79 (N=190)	6.67* (N=184)	10.13** (N=185)	6.81* (N=183)	6.14 (N=183)	0.66 (N=183)	2.51 (N=178)	13.54*** (N=200)	27.817*** (N=200)	.7 (N=200)					
12. Ever Homeless	0.25 (N=190)	7.86** (N=184)	10.01** (N=185)	10.69** (N=183)	12.26*** (N=183)	3.00 (N=183)	0.23 (N=178)	20.92*** (N=200)	15.71*** (N=200)	3.23 (N=200)	40.93*** (N=200)				
13. Any Homelessness, last 12 months	0.44 (N=190)	9.40** (N=184)	14.87*** (N=185)	10.60** (N=183)	14.59*** (N=183)	3.54 (N=183)	0.12 (N=178)	17.36*** (N=200)	12.99*** (N=200)	2.62 (N=200)	30.86*** (N=200)	150.24*** (N=200)			
14. Gay	2.33 (N=190)	6.10* (N=184)	4.55* (N=185)	3.19 (N=183)	7.12* (N=183)	0.27 (N=183)	1.63 (N=178)	9.23** (N=200)	11.48*** (N=200)	2.88 (N=200)	7.75* (N=200)	29.70*** (N=200)	31.99*** (N=200)		
15. Bisexual	1.33 (N=190)	2.5 (N=184)	3.68 (N=185)	2.39 (N=183)	7.80** (N=183)	0.71 (N=183)	1.22 (N=178)	2.97 (N=200)	12.05*** (N=200)	.15 (N=200)	11.29** (N=200)	23.68*** (N=200)	24.62*** (N=200)	130.07*** N=200	

*p≤.05, **p≤.01, ***p≤.001

§excluded from regression models due to high chi-square value

Table 3. Logistic Regression Models

							95% Confidence Interval	
	Est.	**S.E.**	**X^2**	**df**	***p***	**O.R.**	**Lower**	**Upper**
Model 1: Gonorrhea								
Syphilis	1.737	.590	8.667	1	.003	5.683	1.787	18.069
Homeless, past 12 mos.	1.346	.492	7.481	1	.006	3.462	1.464	10.079
Model 2: Chlamydia								
Syphilis	1.650	.627	6.927	1	.008	5.209	1.524	17.802
Homeless, past 12 mos.	1.866	.593	9.910	1	.002	6.463	2.022	20.657
Model 3: Syphilis								
HIV-positive	2.173	.662	10.764	1	.001	8.783	2.398	32.164
Gonorrhea	1.739	.610	8.129	1	.004	5.691	1.722	18.809
Model 4: HIV-Positive								
Syphilis	1.907	.654	8.500	1	.004	6.735	1.868	24.275
African American	2.104	.693	7.043	1	.008	8.202	1.734	28.807
Model 5: HPV Vaccine								
HIV-positive	1.192	.563	4.473	1	.034	3.293	1.091	9.935
Model 6: Hepatitis A Vaccine								
Homeless, past 12 mos.	-.931	.306	9.223	1	.002	.394	.216	.719
Model 7: Hepatitis B Vaccine								
Homeless, past 12 mos.	-.946	.332	8.140	1	.004	.388	.203	.744