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Evidence for a Syndemic in Aging HIV-positive Gay, Bisexual, and Other MSM: Implications for a Holistic Approach to Prevention and Healthcare

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Abstract

The theory of syndemics has been widely applied in HIV prevention studies of gay, bisexual, and other MSM over the last decade. Our investigation is the first to consider the applicability of the theory in a sample of aging (ages 50 and over) HIV-positive MSM, which is a growing population in the United States. A sample of 199 men were actively recruited and assessed in terms of mental health and drug use burden, as well as sexual risk behaviors. Bivariate and multivariable analyses indicate a high level of association between psychosocial burdens (i.e., drug use and mental health) and same-sex unprotected sexual behaviors, providing initial support for the applicability of the theory of syndemics to this population. Further support can be seen in participants' narratives. Findings suggest the mutually reinforcing nature of drug use, psychiatric disorders, and unprotected sexual behavior in older, HIV-positive, gay, bisexual, and other MSM, highlighting the need for holistic strategies to prevention and care among this population of older and sexually active individuals. In short, the generation of gay men who came of age in the late 1970s and 1980s, "the AIDS Generation," are continuing to mature such that further efforts must be enacted to meet the multidimensional nature of these men's physical, mental, and sexual health needs.

Keywords

HIV-positive men; gay, bisexual and MSM; aging; syndemic; sexual risk-taking; drug use; mental health

INTRODUCTION

Current predictions in the United States indicate that by 2015 approximately 50% of persons living with HIV will be over 50 years old (Luther and Wilkin 2007). This represents a dramatic increase, given that in 2005 people age 50 and older represented approximately 24% of those living with HIV (Centers for Disease Control and Prevention (CDC) 2008). Furthermore, men who have sex with men (MSM) are disproportionately impacted by the HIV/AIDS epidemic. Although MSM represent 2%-10% of the population in the United States, more than 50% of those living with HIV are MSM (CDC 2011). Evidence shows that the alarming trend of HIV rates among individuals age 50 and older is present even among, gay, bisexual, and other MSM (Luther and Wilkin 2007). These reasons underscore the need to study this population.

The increasing prevalence of HIV among older adults is due, in part, to improvements in antiretroviral therapies (ART), which have resulted in decreased morbidity and mortality among HIV-positive individuals (Manfredi 2004; Palella et al. 1998), as well as due to the reality that older individuals continue to seroconvert, including at age 50 and later (CDC 2011; Shah and Mildvan 2006). Thus, the population of aging HIV-positive gay, bisexual, and other MSM in the United States includes both long-term survivors, diagnosed prior to the advent of antiretroviral therapy (ART) in 1996 (Palella et al. 1998; 2006), and more recent seroconverts diagnosed after 1996. Those infected and diagnosed before 1996, received treatment after years of ill health and of witnessing large numbers of friends and/or partners dying. This delineation between the experiences of long-term survivors and recent seroconverts is important due to the very different personal histories whose effects on physical health, mental health, substance use, and sexual behaviors remain understudied.

Although sexual activity may decrease with age, older adults continue to be sexually active well into the later decades of life (Lindau et al. 2007). Furthermore, although people may decrease their sexual risk-taking upon learning of an HIV-positive diagnosis (Marks et al. 2005), HIV-positive MSM continue to engage in sexual risk-taking and substance use after their seroconversion (Purcell et al. 2001; van Kesteren et al. 2007). For example, Lovejoy and colleagues (2008), in exploring the sexual-risk behaviors of HIV-positive individuals over 50, found that MSM reported more inconsistencies in their condom use than their heterosexual peers. Pappas and Halkitis (2011), studying club drugs use in a sample of HIV-positive MSM in New York City, found that men who had been living with HIV for a longer period of time were more likely to report seroconcordant unprotected anal intercourse. Further literature supports that HIV-positive MSM continue to engage in sexual risk-taking into older adulthood, with an HIV-positive serostatus being related to a greater likelihood of engaging in unprotected receptive and unprotected insertive anal intercourse (Jacobs et al. 2010).

Similar to sexual activity and unprotected sexual behaviors, in particular, the presence of substance abuse and/or dependence has been documented in the literature on aging HIV-positive MSM. Specifically, it is important to note that substance use may be related to HIV-status, with HIV-positive individuals reporting increased rates of substance use as compared to HIV-negative individuals (Justice et al. 2004). In addition, in a recent investigation of HIV-positive gay and bisexual men in New York City, Pappas and Halkitis (2011) found that older participants reported different patterns of substance use and sexual-risk behaviors than younger participants. Overall drug use was prevalent across all age groups in this study. Furthermore, younger men were more likely to report unprotected sex with serodiscordant partners than older men in the sample.

Gay, bisexual, and other MSM, in general and across the lifespan, also demonstrate elevated rates of depression and other mental health problems (Cochran and Mays 2008; Mills, et al. 2004). For aging HIV-positive gay, bisexual, and other MSM, these psychiatric conditions may be explained and exacerbated by the synergistic effects of stigma related to age and aging, sexual orientation, race/ethnicity, and HIV (David and Knight, 2008; Diaz et al. 2001; Emlet 2006; Jerome and Halkitis 2009; Parker and Aggleton 2002).

Furthermore, the extant literature points to the presence of drug use and sexual risk-taking behaviors in conjunction with elevated mental health burdens among aging HIV-positive MSM (Halkitis 2010). These findings support the importance of exploring the impact and interplay of HIV, sexual risk-taking, substance use, and mental health in MSM over 50 in the U.S. as informed by a model of syndemics. Such a holistic understanding of health disparities aligns with the recommendations of the Institute of Medicine (2011) to reduce the health disparities faced by the LGBT population.

Syndemics theory, as initially proposed by Merrill Singer (1994, 1996), and later extended to gay men by Singer (2006) and Stall and colleagues (2008), holds that within certain communities there exists a dynamic and complicated synergy between multiple epidemics and endemics that decrease the overall health and well-being of both entire communities as well as of individual people. Thus far, syndemics theory, as it has been applied and extended within the fields of public health and psychology, has only focused on younger (Mustanski et al. 2007; Storholm et al. 2011) or middle aged MSM (Moeller et al. 2011; Stall et al. 2003). However, given the above noted literature and epidemiological evidence in support of overlapping and reinforcing health problems among older HIV-positive individuals, especially among older gay, bisexual, and other MSM, we believe that syndemics theory has the potential to frame the complicated interplay of multiple epidemics and endemics over the entire course of an individual's life.

In line with this, the overarching goal of our analyses for this paper was to examine the extent to which a theory of syndemics is applicable to explaining unprotected sexual behaviors in HIV-positive gay, bisexual, and other MSM ages 50 and over. Specifically, we aimed (1) to describe the current drug use and mental health burdens among 199 HIV-positive gay, bisexual, and other MSM ages 50 and over; 2) to determine the association between these current psychosocial burdens; (3) to examine the combined effects of the current psychosocial burdens in explaining unprotected sexual behavior; (4) to delineate the individual burdens that most contribute to our explanation of unprotected sexual behaviors; and (5) to discuss the prevention/intervention implications of our findings.

METHODS

Study Design

Data for this study, locally named Project GOLD, were collected in two phases: 1) from May 2010 through August 2010, and 2) March 2011 through August 2011. Trained researchers recruited 200 HIV-positive gay, bisexual, and other MSM (100 men in each phase), who were age 50 and older, through a variety of in-person and on-line outreach methods. Using a targeted sampling strategy, we oversampled MSM of color, given the prevalence of HIV in this segment of the population (CDC 2011).

Eligible participants were required to: 1) be 50 years or older, 2) be HIV-positive, 3) be born biologically male, 4) still identify as male, and 5) have had sex with a man in the past six months. Sex was defined as any physical contact that could lead to an orgasm, not including cyber or phone sex. Of the 200 men assessed, 199 were included in the final analytic sample. One participant's data were expunged because he did not have sex with men, making him ineligible for the study, despite information provided in his screener materials. Additionally, standard data cleaning procedures were implemented to ensure data integrity in the study.

Our recruitment efforts included partnering with local community-based organizations. These collaborative outreach efforts and activities included presenting the goals of the study to agency staff and distributing study flyers/ palm cards to potential participants. Palm cards were also utilized to recruit participants in gay neighborhoods, clubs, bars, gay pride, organizational fundraisers, and other events/venues that attracted older gay male community members. Lastly, online recruitment efforts included placing ads on online dating and sex websites, as well as on popular online posting databases.

After completing an initial phone screening, eligible participants were scheduled for a 3-hour survey and interview at our research center in downtown Manhattan. All interviewers were trained in human subjects' protocols, with firm confidentiality requirements to ensure participants' privacy. Researchers read the consent form aloud to all participants to ensure

understanding, regardless of reading ability. Once written consent was obtained, the interviewer commenced survey administration. Taking part in the survey involved minimal risks and every step was taken to minimize the discomfort participants may have felt in answering questions. A total of 262 men were screened in phase 1 and an additional 247 men were screened in phase 2. In terms of the final analytic sample of 199 men, the majority of the sample was recruited through active methods: 30% (n = 59) from efforts at community-based agencies, 22% (n = 44) from Internet-based recruitment, and 12% (n = 24) from the distribution of palm cards and other advertisements. An additional 32% (n = 64) entered the study via referral from a friend.

Participants in phase 1 completed a computer administered survey and a Timeline Followback (TLFB) (Sobell and Sobell 1996). In addition, phase 1 participants were engaged in an in-depth discovery interview. Phase 2 participants completed the survey, a TLFB, and underwent testing for oral, penile, and rectal gonorrhea, as well as penile and rectal Chlamydia.

The computer survey utilized *Audio Computer Assisted Self Interview* (ACASI) software, which allows participants to listen to questions read aloud through headphones. Using ACASI has been found to eliminate the effects that low literacy rates have on internal validity and can be used with people from diverse ethnic backgrounds (Gribble et al. 1999). The TLFB was researcher-administered. The protocol was approved by the IRB of New York University and included written consent from all participants. Participants received a \$50 incentive for their participation in the study.

Measures

Quantitative Survey—This cross-sectional assessment gathered information pertaining to a range of personal factors, mental health burdens, substance use behaviors, and unprotected sexual behaviors.

Personal Factors: Sociodemographic data included information on age, race/ethnicity (Black, White, Latino, and other), sexual orientation (gay/homosexual, bisexual, straight/heterosexual, and other), and year of HIV diagnosis. Employment status was based on participants' reports of whether they were currently working full-time, part-time, or not working. Furthermore, participants were asked to indicate their level of educational attainment (less than high school, high school graduate/GED, associates degree, bachelors degree, or graduate degree).

Mental Health Burdens: Post-traumatic stress disorder (PTSD) was assessed using the Trauma Awareness & Treatment Center (TATC) scale, which is informed by the PCL-C (Weathers et al. 1993; 1996). This measure uses ten Likert-type items to assess participants' levels of PTSD symptomatology. Typical items examine how often in the last week an individual has experienced upsetting memories or flashbacks, avoided specific places or things, or had upsetting thoughts associated with a trauma. Answer options for frequency ranged from 0 "Not at all" through 5 "Extremely." Summed scores of the ten items were calculated and the measure demonstrated high internal consistency ($\alpha = .94$). Scores were dichotomized as having symptoms of PTSD (≥ 6) or not having symptoms of PTSD (< 6 or no trauma history). Levels of depression in the past two weeks were assessed using the Beck Depression Inventory-Version II (BDI) (Beck, Steer, and Garbin 1988), which consists of 21 Likert-type items. Items assess for indicators of depression including experiences of loss of pleasure, feelings of worthlessness, and experiences of loss of energy. Answer options ranged from 0 "None" through 3 "Very much." This measure has been shown to have high internal consistency and test-retest reliability, as well as convergent and construct validity

(Beck et al., 1988). In our study, sum scores of the 21 items were calculated and the measure demonstrated high internal consistency ($\alpha = .93$). Scores were dichotomized as depressed (≥ 16) and not depressed (<16). Cut scores for this measure reflect the mean cut scores from multiple studies (Sherr et al. 2011).

Substance Use Behaviors: With the assistance of the interviewer, participants completed a 30-day calendar of their alcohol and illicit drug use using the Timeline Follow Back method (Sobell and Sobell 1996), which has been noted as a highly effective method for capturing reliable drug-use behavior data (Halkitis et al. 2009). We assessed the number of days of use for alcohol to intoxication, marijuana, inhalant nitrates (poppers), powder cocaine, crack cocaine, ecstasy, gamma-Hydroxybutyric acid (GHB), ketamine, heroin, methamphetamine, and rohypnol. For analytic purposes, the days of use were recoded to create the following dichotomous variables of drug use in the period of assessment: alcohol until intoxication, marijuana, inhalant nitrates (poppers), and all other illicit drugs.

Unprotected Sexual Behaviors: Utilizing the same Timeline Follow Back method noted above (Sobell and Sobell 1996), participants completed a 30-day calendar of their sexual behaviors prior to the day of assessment. This is a recommended method for capturing data on sexual-risk behaviors (Parsons et al. 2005). Data were collected on the number of episodes of unprotected insertive and receptive anal intercourse with HIV-positive, as well as HIV-negative or status-unknown men. For analytic purposes, the following dichotomous variables of sexual risk were created: unprotected insertive anal intercourse with HIV-positive men, unprotected insertive anal intercourse with HIV-negative/status unknown men, unprotected receptive anal intercourse with HIV-positive men, and unprotected receptive anal intercourse with HIV-negative/status unknown men. In addition, two more variables, any unprotected anal intercourse with HIV-positive men and any unprotected anal intercourse with HIV-negative/status unknown men, were calculated.

Discovery-based Interview—The discovery-based interview was guided by The Listening Guide Method of Psychological Inquiry, which enabled researchers to explore the psychological logic of participants (Gilligan et al. 2003). This method stresses the importance of understanding a person's conception of the world and requires careful attention to be paid to the cultural and relational aspects of a person's experience. To adhere to the tenets of the Listening Guide methodology, the interview protocol was comprised of broad-based domains rather than individual questions so as to mimic the flexibility of a natural conversation or inquiry, rather than a regimented structural interview. The domains explored in the interviews included the relational, physical, and psychosocial aspects of living with HIV as a man age 50 and older. Interview lengths ranged from 30 minutes to 1 hour and were captured using a digital recorder. The interviews were then transcribed and reviewed for quality assurance purposes. Quotes from these interviews have been included in this manuscript to both contextualize the study findings and give voice to a population that is seldom heard in the discourse on HIV in the U.S.

Analytic Plan—We undertook a descriptive analysis of our sample characteristics. Then we created dichotomous variables for each of the six current psychosocial burdens, which we defined as usage in the previous 30 days of four drug-related categories (alcohol to intoxication, marijuana, inhalant nitrates, and other illicit drugs), as well as two mental health burdens, depression and PTSD. The depression and PTSD dichotomies were based on the cut-scores determined in the literature. Levels of association, in the form of unadjusted odd ratios, were subsequently calculated for these six psychosocial burden variables. At this point a total current psychosocial burden score was computed via summation of these variables. We then assessed burden score associations with participants' demographic

characteristics using ANOVA, as well as in relation to each of the six unprotected anal intercourse variables (any unprotected anal, insertive anal, or receptive anal intercourse with an HIV-positive partner, and any unprotected anal, insertive anal, or receptive anal intercourse with an HIV-negative/ status unknown partner in the 30 days prior to assessment) using both odds ratios and Spearman-rank correlations. Binary logistic regression models were then constructed to assess the extent to which total current psychosocial burden scores explained the likelihood of engaging in any unprotected anal intercourse with an HIV-positive partner or any unprotected anal intercourse with an HIV-negative/ status unknown partner, while controlling for the potentially confounding effects of age, years living with HIV, and race/ethnicity. Finally, each individual psychosocial burden was then assessed in relation to these two unprotected sexual risk behaviors to determine the unadjusted impact of each burden on unprotected anal intercourse. Throughout the reporting of our results, data were drawn from the qualitative interviews described above in order to clarify and contextualize our quantitative findings.

RESULTS

Sample

The mean age of the 199 participants was 55.49 (SD = 4.54, Md = 55, Range 50-69), and participants had been living with HIV an average of 18.14 years (SD = 6.31, Md = 20, Range 1-27), first becoming aware of their HIV status on average in 1992, when they were in their 30s. The introduction of highly active antiretroviral therapy in 1996 was a turning point in the HIV epidemic, which led to decreases in AIDS mortality (Palella 1998; 2006). Therefore, we dichotomized the sample based upon this historical cut off. Those diagnosed before 1996 comprised 70% (n = 140) of the sample. Moreover, 44% (n = 67) of our sample was diagnosed as seropositive in the first decade of the epidemic in the 1980's. Participants were racially and ethnically diverse with 76% (n = 150) of the men being men of color. Regarding sexual orientation, approximately 75% (n = 149) of the sample was gay-identified. Educational attainment in our sample varied, with 47% having a high school education or less and 53% having an Associate's degree or higher. A majority of the men, 77% (n = 153), were not currently working. Of those not working, reasons for non-work varied: 35% (n = 53) were either looking for work or unable to find work, 13% (n = 20) were retired, 46% (n = 70) were on disability, and 2% (n = 3) were enrolled in school full-time. Participant characteristics are shown in Table 1. Significant differences in educational attainment based on race/ethnicity were detected ($\chi^2(12) = 26.18, p = .01$), as were differences in employment status by race/ethnicity ($\chi^2(6) = 15.86, p < .05$). In particular, White men (65%, n = 30) in our sample were less likely to report not currently working than Black (74%, n = 69) or Latino (93%, n = 26) men. Black (31%, n = 29) and Latino (21%, n = 6) men were less likely to have a Bachelor's degree or higher than their White counterparts (54%, n = 25).

Current Psychosocial Burdens

Approximately one-fifth of the men reported symptoms consistent with both PTSD and depression. Furthermore, although 13% (n = 25) of the men reported drinking to intoxication in the month prior to assessment, marijuana was the substance that participants most frequently reported using (38%, n = 75). In addition, 14% (n = 27) reported using inhalant nitrates (poppers) and 26% (n = 52) reported using any other illicit drugs. The rates of occurrence of the psychosocial burdens in our sample are further described in Table 2.

Table 3 provides a summary of the unadjusted odds ratios for the associations across six psychosocial burdens. The data indicate a high level of association between the drug use variables, in particular between alcohol to intoxication, marijuana (OR = 2.85, 95% CI =

1.21, 6.73), and other illicit drugs (OR = 4.56, 95% CI = 1.91, 10.85) in the previous 30 days. Similarly, recent use of marijuana and other illicit drugs in the previous 30 days were found to be associated (OR = 3.46, 95% CI = 1.79, 6.67). A very high level of association was further found between recent depression and PTSD symptoms (OR = 9.01, 95% CI = 4.10, 19.76).

A total current psychosocial burden score was created by adding the drug use and mental health variables, suggesting a theoretical range from 0 to 6. Among the 199 participants, the mean psychosocial burden score was computed at 1.31 (SD = 1.15, Md = 1, Range 0-5). Although the number of years a participant had been living with HIV and his age were significantly related ($r = 0.16, p < .05$), the total psychosocial burden score was only related to age ($r = -0.20, p < .01$). This relation was negative, indicating that older participants would be assumed to have lower total psychosocial burden scores than younger participants. In addition, differences in the total current psychosocial burden score emerged in relation to race/ethnicity ($F(3, 192) = 3.65, p = .01$). Post-hoc analyses indicated that Black men in our sample had higher total burden scores than Latino men (1.45 vs. 0.96, $p < .05$) and White men (1.45 vs. 1.00, $p < .05$). Similarly, participants who indicated that their race/ethnicity was mixed/other reported higher burden scores than both Latino (1.69 vs. 0.96, $p < .05$) and White men in our study (1.72 vs. 1.00, $p = .01$).

From a qualitative perspective, the men described their experiences of these burdens in ways that lend support to our quantitative findings. For example, one participant articulates his experience with substance use in this statement:

“I’ve had a lot of bad experiences. Yeah, I’m still frightened. People still scare me. I done put down a lot of my old ways, but I haven’t put down the lifestyle... Cause certain things still excite me. X-rated tapes excite me... Drugs still excite me and I wish it wasn’t that way... Everything don’t change overnight. It took me 22 years to get this addiction, it took me 8 years to get well. I done had the virus 8 years. But, I didn’t just get it over night. It built up. It built up. See what I’m saying? So, I have to get my force up. You know, my tools... To fight my addiction as well as my HIV and it’s not easy.” (Black, age 57, living with HIV 8 years)

The burden created by illicit drug use can further be seen in these men’s lives when one participant stated:

“I was smoking \$600 a day. That’s my minimum, 600... Yes, crack cocaine. Right now, to tell you the truth, crystal meth costs more than crack. Cause for \$120 you only get this, this amount. \$120 in crack will get you something bigger... I’m not real proud of my drug use. It cost me a lot. Cost me my family. I am distanced from my family.” (Black, age 57, living with HIV 8 years)

Another participant spoke about how his social environment at work influenced/reinforced his drug use, impacting his entire life:

“I was working for [a fashion magazine]...my clients were just all high end, whether it was editorial or commercial, they were high-end people. I woke up one day and realized that I had done cocaine every day for two years. Because of being involved with all these different people. And that wasn’t a good thing, and I needed to stop. Because it wasn’t really being fun anymore, although I never felt like I was addicted. It was more like I was expected.” (White, age 57, living with HIV 25 years)

Furthermore, a participant described his experiences with multiple psychosocial burdens in his life, including his HIV status, when he said:

“It was just five years of denial, and denying everything. It was not a good time to be HIV-positive. Even the gay community was not very kind. I didn’t want to tell them [parents] because, um.... When I was, well, there’s another traumatic event I—I totally left out—when I was 19, my brother died, he was hit by a car. Ugh, that was terrible. I didn’t want them [parents] to have to go through that again, so, I didn’t want to tell them. I didn’t want to do anything about it but drink and drugs.” (White, age 53, living with HIV 23 years)

While other participant described how after being diagnosed with HIV his cocaine use led to a dramatic shift in his life.

“I had three cars and it’s just it, was just crazy, I had a nice place out in Queens and there was a very lovely life for a minute. But then as the stress came in and I was losing money. That’s when more cocaine came in, snorting cocaine. I needed to work long hours so I used the excuse that I needed cocaine just to keep me up. And then finally it just all crumbled and lost it and that kind of shifted my mind, it just shifted me. I was such a go-getter and then I was kind of happy being homeless and I always say I was happy being homeless cause I had no responsibilities.” (Latino, age 52, living with HIV 12 years)

Unprotected Sexual Behavior

In our exploration of unprotected insertive and receptive anal intercourse we distinguished between unprotected sexual behaviors with seroconcordant (HIV-positive) and serodiscordant (HIV-negative or status unknown) men. The percentage of men in our study who engaged in unprotected anal intercourse ranged from 6% ($n = 12$) for unprotected insertive anal intercourse with an HIV-negative/ status unknown partner to 13% ($n = 26$) for unprotected receptive anal intercourse with an HIV-positive partner. Table 2 summarizes these results. We found a significant association between the likelihood of engaging in unprotected insertive and unprotected receptive anal intercourse with an HIV-positive partner ($OR = 10.55$, 95% $CI = 4.06, 27.44$). Specifically, 48% ($n = 12$) of the men who engaged in unprotected insertive anal intercourse also reported engaging in receptive intercourse with a seroconcordant partner. The same pattern emerged when we examined unprotected anal intercourse with an HIV-negative/ status unknown partner ($OR = 44.75$, 95% $CI = 11.11, 180.32$). In particular, 67% ($n = 8$) of those who engaged in unprotected insertive anal intercourse engaged in unprotected receptive behaviors with a serodiscordant partners. Given these associations, we created a new variable for both HIV-positive and HIV-negative/status unknown partners, titled “any unprotected anal intercourse.” We then test the association of this variable with the total current psychosocial burden. Accordingly, 20% ($n = 39$) of our sample reported unprotected anal intercourse with an HIV-positive partner and 10% ($n = 20$) reported unprotected anal intercourse with an HIV-negative/ status unknown partner. We further found that there was no association between any unprotected anal intercourse with an HIV-positive partner and any unprotected anal intercourse with an HIV-negative partner ($OR = 1.42$, 95 % $CI = 0.48, 4.18$).

The men in our study asserted that despite getting older, they still are sexually active:

“I know the brain is the largest sex organ and I-mine’s really active regardless of whether I’m physically being active or not.” (White, age 57, living with HIV 25 years)

Another participant spoke about the way in which sexual interactions allowed him to manage/escape the burdens in his life.

“I’ve been a sex addict for like my whole life. I’m like a casual sex friend. I definitely have an issue with that. I definitely can go online and just have sex with

someone. So, I think it made me. I never was very inclined to relationships. I was always very inclined to like fool around and have casual sex and then after he passed [boyfriend/partner] it was kind of an easy way to not, you know, kind of deal with anything. It's kind of like a way that I sometimes medicate myself to kind of forget about things." (White, age 52, living with HIV 17 years)

Meanwhile, another participant reveled in his continued sexual prowess as he grew older, tallying his sexual encounters.

"Yeah you're a sex addict you're a real slut. How? I want, I want quantification. I want to know how many times did I suck a dick? How many times did I get it up the ass? How many hands did I have up my hole? And so on. So I made up my own damn spreadsheet, I have kept it up since that day." (White, age 59, living with HIV 21 years)

Psychosocial Burden in Relation to Unprotected Sexual Behavior

We next considered the relations between our total current psychosocial burden score and unprotected anal intercourse among the men in our sample. We found that there was a high level of association (unadjusted odds ratios) between the total burden score and unprotected sexual behaviors. In particular, any unprotected anal sex with an HIV-positive partner (OR = 1.38, 95% CI = 1.00, 1.91) and any unprotected anal sex with an HIV-negative/ status unknown partner (OR = 1.61, 95% CI = 1.05, 2.46) were both significantly related to the total burden score.

To examine the association between psychosocial burdens and unprotected anal intercourse, while controlling for the potential confounding effects of age, years living with HIV, and race/ethnicity, we tested two binary logistic regression models using any unprotected anal intercourse with an HIV-positive partner and any unprotected anal intercourse with an HIV-negative/ status unknown partner as the criterion variables. In each case we constructed hierarchical models using two blocks, with our demographic variables in the first block and the total current psychosocial burden score in the second block. The results of these models are shown in Table 4.

The model for unprotected anal intercourse with an HIV-negative/status unknown partner fit in two steps ($\chi^2(6) = 12.65, p < .05$), with the addition of the burden score in step 2 improving the fit over the first model, which only included the demographic variables ($\chi^2(1) = 4.88, p < .05$). Years living with HIV and total burden score were both positively associated with the odds of engaging in unprotected anal intercourse with an HIV-negative/ status unknown partner. The model for unprotected anal intercourse with an HIV-positive partner also fit in two steps ($\chi^2(6) = 12.11, p < .05$), with psychosocial burden again improving the fit of the model over the demographic variables alone ($\chi^2(1) = 3.80, p < .05$). In this model the total current psychosocial burden alone was positively associated with the odds of engaging in unprotected anal intercourse with an HIV-positive partner.

Finally, we further examined the association between unprotected anal intercourse with an HIV-positive or an HIV-negative/ status unknown partner and each of the six psychosocial burden variables, to determine the most salient burdens (see Table 3). Unprotected anal intercourse with an HIV-negative/unknown status partner in the past 30 days was significantly associated with alcohol to intoxication (OR= 3.61, 95% CI = 1.24, 10.50) and using inhalant nitrates (OR = 7.32, 95% CI = 2.67, 20.03) in the same period. Additionally, unprotected anal intercourse with an HIV-positive partner was associated with drinking to intoxication (OR = 3.37, 95% CI = 1.36, 8.15) and the use of other illicit drugs in the previous 30 days (2.40, 95% CI = 1.15, 5.01). Lastly, unprotected anal intercourse with either partner type was not associated with the use of marijuana, depression, or PTSD.

Transactional sex emerged in our qualitative assessment as a factor connecting substance use and unprotected sexual behaviors:

“Cause a lot of times it’s just been sex for drugs. It’s really not sex for money. It’s really sex for drugs. I want drugs from them. I been receiving oral sex for the drugs. The guy would give me a blow job and sex. I would do the drugs while he’s giving me the oral sex.” (Black, age 57, living with HIV 8 years)

Meanwhile, another participant described how his life unraveled after the death of his partner, focusing on how his substance use and sexual behaviors fueled each other, eventually leading to his seroconversion:

“From that point on, I was still drinking every night, got drunk, got drunk, got drunk. I was trying to drown the sorrows and the pain cause I was angry-plus I was pissed at [my partner] for dying. But anyway that’s how I got into cocaine that’s how I really got into drugs. After he was dead and we had him cremated I said maybe I should test myself. I did get tested and I was negative. So I was like oh great you know... Phew. But my addictions were getting deeper and deeper and deeper and at least my addiction circle, we got into a circle of people, we would get a motel room for a weekend and everybody would pool their money and we would just do drugs the whole weekend. Drugs and sex, and that’s how I got it. And I know how I got it.” (Black, age 58, living with HIV 16 years)

DISCUSSION

The findings of our investigation of HIV-positive gay, bisexual, and other MSM ages 50 and over indicate a high prevalence of psychosocial burdens, including psychiatric disorders and substance use among the men sampled. These burdens also are evidenced in the stories relayed by the study participants. Approximately 20% of the men in our sample were classified as currently being depressed, with a similar proportion demonstrating symptoms of PTSD. Because national epidemiological studies to date do not include assessments of sexual orientation (Institute of Medicine 2011), we are not able to make comparisons of this sample to larger gay population estimates. However, previous literature has highlighted that gay and bisexual men experience elevated health disparities in the form of depression and other mental illnesses as compared to their heterosexual peers (Cochran and Mays 2008). Moreover, in the National Comorbidity Study, individuals who suffered from chronic physical illnesses, defined as hypertension, arthritis, asthma, and ulcers, demonstrated a lower prevalence of current depression (10%) than our cohort of older men living with HIV (Kessler et al. 2003).

Similarly, rates of PTSD in our sample of seropositive gay, bisexual, and other MSM are on par with prevalence estimates of PTSD among those who have experienced traumatic events, 15-24% of whom develop symptoms of PTSD after exposure to the event (Breslau 2001). This comparability in prevalence may be explained by the fact that gay men as a whole have experienced an ongoing traumatic event in the form of the HIV epidemic. This trauma may be even more pronounced among those who were diagnosed with HIV prior to the implementation of highly effective antiviral therapies in 1996 (Palella 1998; 2006), when the mortality rate for those diagnosed with HIV was astronomical (Callen 1990). In our sample, the majority of men (70%) was diagnosed prior to 1996 and would be classified as long-term survivors. It may be suggested that this set of men constitute “The AIDS Generation,” a group who, by all accounts, should have died but somehow have managed to survive into older adulthood, living with the post-traumatic stress of the HIV epidemic. At the same time, it is important to note that this generation offers researchers and clinicians valuable life experiences that could inform future models of resiliency and survival (Emlet

et al. 2011). This reality is important to explore in that HIV-positive gay, bisexual, and other MSM continue to survive, while their individual and community-level resiliencies remain relatively unexplored and untapped in designing behavioral interventions for the larger community (Herrick et al. 2011). Overall, our findings regarding mental health in aging seropositive MSM align with the elevated rates of psychiatric disorders among HIV-positive individuals reported elsewhere, including depression, anxiety, and severe mental illness (Chander et al. 2006). Moreover, these results complement previous studies in which psychosocial burdens, including depression, have been shown to be related to an HIV-positive serostatus in MSM (Stall et al. 2003).

Compared to other samples of MSM and older adults, this sample had a lower prevalence of problem drinking. Approximately 12.6% reported drinking alcohol to intoxication at least once in the last month. We compared this to estimates from the 2008 National HIV Behavioral Surveillance System (NHBSS), where 35% of MSM aged 50 and older reported binge drinking (Finlayson et al. 2011). This is also lower than estimates from younger MSM populations (Finlayson et al. 2011) and gay men in the Behavioral Risk Factor Surveillance System (BRFSS) (Conron et al. 2010). The difference between these estimates may be due to differences in the variable definitions. We also found that using alcohol to intoxication was associated with increased odds of unprotected anal sex. Mustanski (2008) has demonstrated that age moderates the relationship between daily alcohol use and risky sexual behavior and reports that there is a growing body of evidence suggesting that alcohol has a stronger influence on risk behavior among older MSM as compared to younger MSM.

This sample of older HIV-positive MSM had relatively high rates of drug use. For example, we found that 37.7% of the men in our study used marijuana in the past month. In the 2008 NHBSS (Finlayson et al. 2011), 25% of MSM aged 50 and older reported marijuana use. Furthermore, in our sample just over a quarter of the men (26.1%) reported other illicit substance use in the past month, which included such substances as cocaine, crack, ecstasy, GHB, ketamine, and methamphetamine. Additionally, 13.6% of our sample reported using poppers (i.e., amyl nitrite). Our estimate of popper use is similar to that of the NHBSS, in which 13% of MSM aged 50 and older reported using poppers (Finlayson et al. 2011). However, NHBSS found less illicit drug use among older men. Specifically, they found that 9% used cocaine, 3% used methamphetamine, and 3% used ecstasy (Finlayson et al. 2011). These differences could be due to regional differences, as NHBSS collects data from 22 metropolitan statistical areas, while our sample comes from only one. In the New York City NHBSS sub-sample, 26% of all MSM used cocaine (Finlayson et al. 2011).

We did not observe a significant relation between unprotected anal intercourse (UAI) and marijuana use, regardless of partner serostatus. These results contradict findings among recently infected MSM, which showed that marijuana use was associated with UAI (Drumright et al. 2006). Similarly, Bedoya and colleagues (2012) have shown marijuana use to be associated with serodiscordant unprotected anal intercourse among Latino MSM. However, these samples included broad age ranges as young as 16 (Bedoya et al. 2012) and 18 (Drumright et al. 2006). No studies to our knowledge have addressed this relation among older MSM exclusively.

With regard to sexual behaviors, our results support the notion that HIV-positive MSM ages 50 and older do engage in unprotected anal sex. These findings concur with previous research (Lovejoy et al. 2008; Pappas and Halkitis 2011). In our sample we found that, within partner serostatus, engaging in unprotected insertive anal intercourse and in unprotected receptive anal intercourse were related. However, no relations were observed for unprotected anal intercourse across partner HIV status (i.e., unprotected anal intercourse with an HIV-positive partner was not found to be related to unprotected anal intercourse

with an HIV-negative/ status unknown partner). Approximately 19% of our sample reported any unprotected anal intercourse with an HIV-positive partner, while roughly 10% reported any unprotected anal intercourse with an HIV-negative/ status unknown partner. Other studies on HIV-positive MSM with more general samples have reported a prevalence of sexual-risk behaviors that ranged from 8 to 46% (Van Kesteren et al. 2007).

This manuscript presents findings from one of the first research studies to test a theory of syndemics in aging HIV-positive gay, bisexual, and other MSM. Although previous studies have highlighted the strong relations between psychosocial burdens and sexual risk-taking in age-diverse samples of MSM (Egan et al. 2011; Moeller et al. 2011; Stall et al. 2003), much of the focus of this research has been on the applicability of syndemics theory to understanding sexual risk-taking in adolescent, emerging, and young adult gay, bisexual, and other MSM (Mustanski et al. 2007; Halkitis et al. 2012; Solomon et al. 2011; Storhlom et al. 2011). Like these previous investigations, we demonstrate a high level of association between psychosocial burdens and unprotected anal intercourse, with the men who possessed higher overall burden scores also indicating a higher likelihood of engaging in unprotected anal intercourse. This relation holds true for unprotected anal intercourse with both HIV-positive and HIV-negative/ status unknown partners.

Like each of the above noted studies of syndemics among gay, bisexual, and other MSM, we applied an additive model of psychosocial burdens to test for association and provide support for the model. However, we also have been able to provide support for a theory of syndemics in young gay and bisexual men using more elaborate models in the form of structural equation modeling (Halkitis et al. 2012), that we hope to apply to future studies of syndemics in aging MSM.

Limitations

There are several limitations to this study. First, this is a self-selected sample of older HIV-positive, gay, bisexual, and other MSM from one geographic context, New York City. Second, because all the measures are self-reported, we cannot rule out the possibility of participants answering in a socially desirable manner. For our most critical data, drug use and unprotected sex, we utilized the Timeline Followback method, which captures the previous month's sexual and substance use behaviors and has been shown to have good test-retest reliability and convergent validity (Fals-Stewart et al. 2000; Halkitis et al. 2009). However, it is important to note that since the researchers and participants completed this measure face-to-face, it is possible that participants responded differently across researchers, possibly depending on perceptions of age, race, gender, and/or sexual orientation. Third, this study employed a cross-sectional design and, as is the case with such designs, associations are subject to spuriousness. Also a larger sample size would have increased statistical power and allowed for more sophisticated statistical analyses in the form of possible measurement model construction, lending more support to the theory. Since this was a study of aging HIV-positive men, cognitive deficits or early dementia due to age, HIV, long-term ART, or any combination thereof, may have impacted one's recollection of time, persons, or events.

The men in this sample survived through the early AIDS epidemic, when transmission and mortality rates were high. As a result, another potential limitation of this study is survivor bias, which occurs when a disease results in high mortality rates, leaving one to conduct studies with only the survivors of the disease (Schlesselman 1982). It is likely that the outcomes (i.e., unprotected anal intercourse) and exposures (i.e., depression, PTSD, and substance use) are associated with mortality in this population, and thus by studying these survivors the observed associations between the syndemic effects and unprotected anal intercourse are biased. However, we believe that the estimates would be biased away from the null (i.e., underestimated).

Conclusions

As the HIV-positive population of gay, bisexual, and other MSM continue to age, these men will undoubtedly confront many of the complications faced by older adults in general, although, perhaps, in an even more pronounced way given their HIV infection. Still, as has been evidenced across the population “50 is the new 40,” and adults continue to remain vibrant and active as they mature. For gay, bisexual, and other MSM this may include active sexual lives and alcohol and illicit drug use. The findings of our analysis highlight the presence of both sexual and drug risk taking behaviors in older men and that syndemics theory has as much relevance in understanding these behaviors in older HIV-positive MSM as it does in younger MSM, where the theory has been predominantly applied. We believe future research will elucidate the relevance of syndemics theory in studies of older MSM regardless of serostatus, given the ongoing interplay of various epidemics and endemics beyond HIV, which affect MSM across the lifespan.

The graying of AIDS, as well as the graying of the U.S. populous in general, will be fueled by the baby-boomer generation. This group of individuals is radically different than previous generations, calling for innovative and dynamic research approaches, which can then aid us in reconsidering the manner in which we will deliver services and fashion prevention strategies for this growing population of older adults. Given evidence for a syndemic in this segment of the population and the evidence of risk behaviors that extend into older adulthood, strategies for prevention and care will need to be holistic and multidimensional in nature. Taken together, these findings indicate that policies and programming must be developed to consider the needs and behaviors of this growing population of gay men, recognizing that strategies that work for 20-year-olds may not be effective for 50-, 60-, or even 70-year-olds.

For health practitioners serving this population, it is imperative that the delivery of care simultaneously consider the impacts of living with HIV, the process of aging, and the ongoing syndemic factors evidenced in these men's lives. Especially important in a holistic approach to care will be attention to the psychosocial stressors that function as catalysts to a syndemic and which may have as much power to influence/ create syndemic conditions in the lives of older HIV-positive men as they do in creating risk states in younger gay men. For mental health practitioners, therapeutic approaches also must recognize that among older HIV-positive men there is likely a lifelong pattern of a syndemic to which they must attend. An important part of this work will be contextualizing various health burdens in older adulthood, which is already fraught with its own medical and psychiatric complications even without a diagnosis of HIV.

For those developing prevention strategies, it will be critical to attend to the active sexual lives of older HIV-positive MSM, to recognize that both illicit substance and alcohol use are occurring among these men, and that similar risk factors which predispose younger men to risk-taking also likely will predispose older HIV-positive men to congruent risk behaviors. While addressing the underlying stressors which lead to a syndemic is likely the most effective approach to ameliorating risk, the manner in which these stressors are addressed must be tailored to the differing developmental contexts that exist for older gay men as compared to younger gay men.

A final and critical concern in addressing the possible syndemic in older HIV-positive gay, bisexual, and other MSM noted in this manuscript is the recognition that a substantial portion of these men are long-term survivors of HIV. They have witnessed and survived the devastation inflicted upon the gay community within the first two decades of the epidemic, back when AIDS was “a gay plague.” Thus these men also possess emotional and physical fortitudes, as well as demonstrate high levels of resiliency. It is important that such

resiliency be understood and harnessed to both serve these men individually, as they enter into the later stages of life, and the gay community as a whole, which continues to be disproportionately affected by HIV over time. The stories of survival of “the AIDS generation” should serve as a model of resiliency to assist in informing HIV prevention and care moving forward, as well as possibly prevention and care for other demanding medical conditions.

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REFERENCES

- Beck, Aaron T.; Steer, Robert A.; Carbin, Margery G. Psychometric Properties of the Beck Depression Inventory: Twenty-Five Years of Evaluation. *Clinical Psychology Review*. 1988; 8(1):77–100.
- Bedoya, Andres C.; Mimiaga, Mathew J.; Beauchamp, Geetha; Donnell, Deborah; Mayer, Keneth H.; Safren, Steven A. Predictors of HIV Transmission Risk Behavior and Seroconversion Among Latino Men Who Have Sex with Men in Project EXPLORE. *AIDS and Behavior*. 2012; 16(3):608–617. [PubMed: 21390540]
- Breslau, Naomi. The Epidemiology of Posttraumatic Stress Disorder: What is the Extent of the Problem? *Journal of Clinical Psychiatry*. 2001; 62(Suppl 17):16–22. [PubMed: 11495091]
- Callen, Micahel. *Surviving AIDS*. Harper Collins Publishers; New York: 1990.
- Chander; Geetanjali; Himelhoch, Seth; Moore, Richard D. Substance Abuse and Psychiatric Disorders in HIV-Positive Patients: Epidemiology and Impact on Antiretroviral Therapy. *Drugs*. 2006; 66(6): 769–789. [PubMed: 16706551]
- Center for Disease Control and Prevention. [accessed November 1, 2011] HIV/AIDS Among Persons Aged 50 and Older. 2008. <http://www.cdc.gov/hiv/topics/over50/resources/factsheets/pdf/over50.pdf>
- HIV Surveillance Report, 2009. 2011; vol. 21 <http://www.cdc.gov/hiv/topics/surveillance/resources/reports/2009report/>.
- Cochran, Susan D.; Mays, Vicki M. Prevalence of Primary Mental Health Morbidity and Suicide Symptoms Among Gay and Bisexual Men. In: Wolitski; Richard; Stall; Ron; Valdiserri; Ronald, O., editors. *Unequal Opportunity: Health Disparities Affecting Gay and Bisexual Men in the United States*. Oxford University Press; Oxford: 2008. p. 97-120.
- Conron, Kerith J.; Mimiaga, Matthew; Landers, Stewart J. A population-based study of sexual orientation identity and gender differences in adult health. *American Journal of Public Health*. 2010; 100(10):1953–60. [PubMed: 20516373]
- David; Steven; Knight, Bob G. Stress and Coping Among Gay Men: Age and Ethnic Differences. *Psychology and Aging*. 2008; 23(1):62–69. [PubMed: 18361655]
- Diaz RM, Ayala George, Bein Edward, Jeff Henne J, Marin MBarbara V. The Impact of Homophobia, Poverty, and Racism on Mental Health of Gay and Bisexual Latino Men: Findings From 3 US Cities. *American Journal of Public Health*. 2001; 91(6):927–932. [PubMed: 11392936]
- Drumright, Lydia N.; Little, Susan J.; Steffanie, A.; Strathdee, A.; Slymen, Donald J.; Araneta, Maria Rosario G.; Malmgren, Vanessa L.; Vanessa, L.; Daar, Eric S.; Gorbach, Pamina M. Unprotected Anal Intercourse and Substance Use Among Men Who Have Sex with Men With Recent HIV Infection. *Journal of Acquired Immune Deficiency Syndromes*. 2006; 43(3):344–350. [PubMed: 16980913]
- Egan, James E.; Frye, Victoria; Kurtz, Steven P.; Latkin, Carl; Carl; Chen, Minxing; Tobin, Karin; Yang, Cui; Koblin, Beryl A. Migration, Neighborhoods, and Networks: Approaches to Understanding How Urban Environmental Conditions Affect Syndemic Adverse Health Outcomes Among Gay, Bisexual, and Other Men Who Have Sex with Men. *AIDS and Behavior*. 2011; 15(Suppl. 1):35–50.

- Emlet, Charles A. You're Awfully Old to Have This Disease: Experiences of Stigma and Ageism in Adults 50 Years and Older Living with HIV/AIDS. *The Gerontologist*. 2006; 46(6):781–790. [PubMed: 17169933]
- “I’m not going to die from the AIDS”: Resilience in Aging with HIV Disease. *The Gerontologist*. 2011; 51(1):101–111. [PubMed: 20650948]
- Fals-Stewart; William; O’Farrell, Timothy J.; Freitas, Timothy T.; McFarlin, Susan K.; Rutigliano, Peter. The Timeline Follow Back Reports of Psychoactive Substance Use by Drug-Abusing Patients: Psychometric Properties. *Journal of Consulting and Clinical Psychology*. 2000; 68(1): 134–144. [PubMed: 10710848]
- Finlayson, Teresa J, Le Binh, Smith Amanda, Bowles Kristina, Cribbin Melissa, Miles Isa, Oster Alexandra M. Martin Tricia, Edwards Alicia, DiNenno Elizabeth. HIV Risk, Prevention, and Testing Behaviors Among Men Who Have Sex with Men --- National HIV Behavioral Surveillance System, 21 U.S. Cities, United States, 2008. *MMWR. Morbidity and mortality weekly report: Surveillance Summaries*. 2011; 60(SS14):1–34.
- Gilligan; Carol; Spencer, Renee; Weinberg, Katherine; Bertsch, Tatiana. On the Listening Guide: A Voice-Centered Relational Model. In: Camic, Paul M.; Rhodes, Jean E.; Yardley, Lucy, editors. *Qualitative Research in Psychology: Expanding Perspectives in Methodology and Design*. American Psychological Association; Washington, D.C.: 2003. p. 157-172.
- Gribble, James N, Miller Heather G. Rogers Susan M. Turner Charles F. Interview Mode and Measurement of Sexual Behaviors: Methodological Issues. *Journal of Sex Research*. 1999; 36(1): 16–24. [PubMed: 23226876]
- Halkitis, Perry N. Reframing HIV Prevention for Gay Men in the United States. *American Psychologist*. 2010; 65(8):752–763. [PubMed: 21058777]
- Halkitis, Perry N.; Moeller, Robert W.; Robert, W.; Siconolfi, Daniel E.; Storholm, Erik D.; Solomon, Todd M.; Bub, Kristen L. Measurement Model Exploring a Syndemic in Emerging Adult Gay and Bisexual Men. *AIDS and Behavior*. 2012 [Epub ahead of print] DOI: D10.1007/s10461-012-0273-3.
- Halkitis, Perry N.; Solomon, Todd M.; Moeller, Robert W.; Doig, Stephanie A.R.; Espinosa, Lindsay S.; Siconolfi, Daniel; Homer, Bruce D. Methamphetamine Use among Gay, Bisexual and Non-Identified Men-Who-Have-Sex-With-Men: An Analysis of Daily Patterns. *Journal of Health Psychology*. 2009; 14(2):222–231. [PubMed: 19237489]
- Herrick; Lim, Amy L. Sin How; Wei, Chongyi; Smith, Helen; Guadamuz, Thomas; Friedman, Mark S.; Stall, Ron. Resilience as an Untapped Resource in Behavioral Intervention Design for Gay Men. *AIDS and Behavior*. 2011; 15(Suppl. 1):25–29.
- Institute of Medicine. [accessed November 1, 2011] The Health of Lesbian, Gay, Bisexual, and Transgender People: Building a Foundation for Better Understanding. 2011. <http://www.iom.edu/Reports/2011/The-Health-of-Lesbian-Gay-Bisexual-and-Transgender-People.aspx>
- Jacobs, Robins J.; Fernandez, Isabel M.; Ownby, Raymond L.; Bowen, Stephen G.; Hardigan, Patrick C.; Kane, Michael N. Factors Associated with Risk for Unprotected Receptive and Insertive Anal Intercourse in Men Aged 40 and Older Who Have Sex with Men. *AIDS Care*. 2010; 22(10):1204–1211. [PubMed: 20229374]
- Jerome, Roy C.; Halkitis, Perry N. Stigmatization, Stress and The Search for Belonging in Black Men Who Have Sex with Men and Who Use Methamphetamine. *Journal of Black Psychology*. 2009; 35(3):343–365.
- Justice, Amy C.; McGinnis, Kathleen A.; Atkinson, Hampton; Robert, J.; Heaton, K.; Young, Corrina; Sadek, Josph; Madenwald, Tamra; Becker, James T.; Conigliaro, Joseph; Brown, Sheldon T.; Rimland, Dabid; Crystal, Steve; Steve; Simberkoff, Michael; for the VACS 5 Project Team. Psychiatric and Neurocognitive Disorders Among HIV-Positive and Negative Veterans in Care: Veterans Aging Cohort Five-Site Study. *AIDS*. 2004; 18:49–59.
- Kessler, Ronald C.; Ormel, Johan; Demler, Olga; Stang, Paul E. Comorbid Mental Disorders Account for the Role Impairment of Commonly Occurring Chronic Physical Disorders: Results From the National Comorbidity Survey. *Journal of Occupational and Environmental Medicine*. 2003; 45(12):1257–1266. [PubMed: 14665811]

- Lindau, Schumm, Stacy L. Philip; Laumann, Edward O.; Levinson, Wendy; O'Muircheartaigh, Colm A.; Waite, Linda J. A Study of Sexuality and Health Among Older Adults in the United States. *New England Journal of Medicine*. 2007; 357(8):762–774. [PubMed: 17715410]
- Lovejoy, Travis I.; Heckman, Timothy G.; Sikkema, Kathleen J.; Hansen, Nathan B.; Kochman, Arlene; Suhr, Julie A.; Garske, John P.; Christopher, J. Patterns and Correlates of Sexual Activity and Condom Use Behavior in Persons 50-Plus Years of Age Living with HIV/AIDS. *AIDS and Behavior*. 2008; 12(6):943–956. [PubMed: 18389361]
- Luther, Vera P.; Wilkin, Aimee M. HIV Infection In Older Adults. *Clinics in Geriatric Medicine*. 2007; 23(3):567–583. [PubMed: 17631234]
- Manfredi, Roberto. Impact of HIV Infection and Antiretroviral Therapy in the Older Patient. *Expert Review of Anti-infective Therapy*. 2004; 2(6):821–824. [PubMed: 15566324]
- Marks, Gary; Crepaz, Nicole; Senterfitt, J. Walton; Janssen, Robert S. Meta-Analysis of High-Risk Sexual Behavior in Persons Aware and Unaware They Are Infected with HIV in the United States: Implications for HIV Prevention Programs. *Journal of Acquired Immune Deficiency Syndrome*. 2005; 39(4):446–453.
- Mills, Thomas C.; Paul, Jay; Stall, Ron; Pollack, Lance; Canchola, Jesse; Chang, Y. Jason; Moskowitz, Judith; Catania, Joseph A. Distress and Depression in Men Who Have Sex with Men: The Urban Men's Health Study. *American Journal of Psychiatry*. 2004; 161(2):278–285. [PubMed: 14754777]
- Moeller, Robert W.; Halkitis, Perry N.; Surrence, Katie. The Interplay of Syndemic Production and Serosorting in Drug-Using Gay and Bisexual Men. *Journal of Gay and Lesbian Social Services*. 2011; 23(1):89–106.
- Mustanski, Brian S. Moderating Effects of Age on the Alcohol and Sexual Risk Taking Association: An Online Daily Diary Study of Men Who Have Sex with Men. *AIDS and Behavior*. 2008; 12(1): 118–126. [PubMed: 18034298]
- Mustanski, Brian S.; Garofalo, Robert; Herrick, Amy; Donenberg, Geri. Psychosocial Health Problems Increase Risk for HIV Among Urban Young Men Who Have Sex with Men: Preliminary Evidence of a Syndemic in Need of Attention. *Annals of Behavioral Medicine*. 2007; 34(1):37–45. [PubMed: 17688395]
- Palella, Frank J., Jr.; Baker, Rose K.; Moorman, Anne C.; Chmiel, Joan S.; Wood, Kathleen C.; John, T.; Brooks, Holmberg, Scott D.; HIV Outpatient Study investigators. Mortality in the Highly Active Antiretroviral Therapy Era: Changing Causes of Death and Disease in the HIV Outpatient Study. *Journal of Immune Deficiency Syndromes*. 2006; 43(1):27–34.
- Palella, Frank J., Jr.; Delaney, Kathleen M.; Moorman, Anne C.; Loveless, Mark O.; Fuhrer, Jack; Satten, Glen A.; Aschman, Diane J.; Diane, J.; Holmberg, Scott D.; Scott, D.; HIB Outpatient Study Investigators. Declining Morbidity and Mortality among Patients with Advanced Human Immunodeficiency Virus Infection. *The New England Journal of Medicine*. 1998; 338:853–860. [PubMed: 9516219]
- Pappas, Molly K.; Halkitis, Perry N. Sexual Risk Taking and Club Drug Use Across Three Age Cohorts of HIV-positive Gay and Bisexual Men in New York City. *AIDS Care*. 2011; 23(11): 1410–1416. [PubMed: 22022849]
- Parker, Richard; Aggleton, Peter. HIV/AIDS-Related Stigma and Discrimination: A Conceptual Framework and an Agenda for Action. The Population Council, Inc.; New York: 2002. <http://www.popcouncil.org/pdfs/horizons/sdencptlfrmrwrk.pdf> [accessed August 21, 2012]
- Parsons, Jeffrey T.; Schrimshaw, Eric W.; Wolitski, Richard J.; Halkitis, Perry N.; Purcell, David W.; Hoff, Colleen C.; Gomez, Cynthia. Sexual Harm Reduction Practices of HIV Seropositive Gay and Bisexual Men: Serosorting, Strategic Positioning, and Withdraw Before Ejaculation. *AIDS*. 2005; 19(Suppl. 1):S13–S25. [PubMed: 15838191]
- Purcell, David W.; Parsons, Jeffrey T.; Halkitis, Perry N.; Mizuno, Yuko; Woods, William J. Substance Use and Sexual Transmission Risk Behavior of HIV-Positive Men Who Have Sex with Men. *Journal of Substance Abuse*. 2001; 13(1-2):185–200. [PubMed: 11547619]
- Schlesselman, James J. Case-Control Studies: Design, Conduct, and Analysis. Oxford University Press; New York: 1982.

- Shah; Sanjiv; Mildvan, Donna. HIV and Aging. *Current Infectious Disease Reports*. 2006; 8(3):241–247. [PubMed: 16643776]
- Sherr; Lorraine; Clucas, Claudine; Harding, Richard; Sibley, Elissa; Catalan, Jose. HIV and Depression – A Systematic Review of Interventions. *Psychology, Health, and Medicine*. 2011; 16(5):493–527.
- Singer, Merrill. AIDS and the Health Crisis of the U.S. Urban Poor: The Perspective of Critical Medical Anthropology. *Social Science & Medicine*. 1994; 39(7):931–48. [PubMed: 7992126]
- A Dose of Drugs, a Touch of Violence, A Case of AIDS: Conceptualizing the SAVA Syndemic. *Free Inquiry in Creative Sociology*. 1996; 24(2):99–110.
- A Dose of Drugs, A Touch of Violence, A Case of AIDS, Part 2: Further Conceptualizing the SAVA Syndemic. *Free Inquiry in Creative Sociology*. 2006; 34(1):39–51.
- Sobell, Linda C.; Sobell, Mark B. *Timeline Followback User's Guide: A Calendar Method for Assessing Alcohol and Drug Use*. Addiction Research Foundation; Toronto: 1996.
- Solomon, Todd M.; Halkitis, Perry N.; Moeller, Robert W.; Siconolfi, Daniel E.; Kiang, Matthew V.; Barton, Staci B. Sex Parties Among Young Gay, and Bisexual, and Other Men Who Have Sex with Men in New York City: Attendance and Behavior. *Journal of Urban Health*. 2011; 88(6): 1063–1075. [PubMed: 21698548]
- Stall; Ron; Friedman, Mark; Catania, Joseph A. Interacting Epidemics and Gay Men's Health: A Theory of Syndemic Production among Urban Gay Men. In: Wolitski, Richard J.; Stall, Ron; Valdiserri, Ronald O., editors. *Unequal Opportunity: Health Disparities Affecting Gay and Bisexual Men in the United States*. Oxford University Press; Oxford: 2008. p. 251-274.
- Stall; Ron; Mills, Thomas C.; Williamson, John; Hart, Trevor; Greenwood, Greg; Paul, Jay; Pollack, Lanse; Binson, Diane; Osmond, Dennis; Catania, Joseph A.; Joseph. Association of Co-Occurring Psychosocial Health Problems and Increased Vulnerability to HIV/AIDS Among Urban Men Who Have Sex with Men. *American Journal of Public Health*. 2003; 93(6):939–42. [PubMed: 12773359]
- Storholm, Erik D.; Halkitis, Perry N.; Siconolfi, Daniel E.; Moeller, Robert W. Cigarette Smoking as Part of a Syndemic Among Young Men Who Have Sex with Men Ages 13-29 in New York City. *Journal of Urban Health*. 2011; 88(4):663–676. [PubMed: 21479753]
- Van Kesteren, Nicole MC, Hospers Harm J. Kok Gerjo. Sexual Risk Behavior Among HIV-Positive Men Who Have Sex with Men: A literature review. *Patient Education and Counseling*. 2007; 65(1):5–20. [PubMed: 17098392]
- Weathers; Frank, W.; Litz, Brett T.; Herman, Debra S.; Huska, Jennifer A.; Keane, Terence M. The PCL-C Checklist (PCL): Reliability, Validity, and Diagnostic Utility. Paper presented at the Annual Meeting of the International Society for Traumatic Stress Studies; San Antonio, TX. October 24-27, 1993; 1993.
- Weathers, Frank W.; Ford, Julian D. Psychometric Properties of the PTSD Checklist (PCL-C, PCL-S, PCL-M, PCL-PR). In: Stamm, B. Hudnall, editor. *Measurement of Stress, Trauma, and Adaptation*. Sidran Press; Lutherville, MD: 1996. p. 250-252.

Table 1

Demographic characteristics of HIV-positive MSM ages 50 and older, New York City 2010-2011, N = 199

	% (n)
Race	
Black	47.4 (93)
White	23.5 (46)
Latino	14.3 (28)
Mixed Race/Other	14.6 (29)
Missing	1.5 (3)
Sexual Orientation	
Gay/Homosexual	74.9 (149)
Bisexual	18.1 (36)
Straight/Heterosexual	2.0 (4)
Other	5.0 (10)
Date of Diagnosis	
Pre-HAART (prior to 1996)	70.4 (140)
Post-HAART (1996 or later)	29.6 (59)
Education	
Less than HS	11.6 (23)
High School/ GED	35.7 (71)
Associates degree	18.6 (37)
Bachelors degree or higher	23.6 (47)
Graduate degree	10.6 (21)
Employment Status	
Employed full-time	9.0 (18)
Employed part-time	14.1 (28)
Not currently working	76.9 (153)

Table 2

Psychosocial burdens and unprotected anal intercourse among MSM ages 50 and older, New York City 2010-2011, N = 199

	% (n)
Current Mental health burden	
Depression	20.1 (40)
PTSD	20.6 (41)
Drug Use Burden, Past 30 Days	
Alcohol to intoxication	12.6 (25)
Inhalant Nitrates (Poppers)	13.6 (27)
Marijuana	37.7 (75)
Other drugs ^I	26.1 (52)
Unprotected Sex, past 30 days	
HIV-positive partners	
Unprotected anal insertive	12.6 (25)
Unprotected anal receptive	13.1 (26)
Any unprotected anal	19.6 (39)
HIV-negative or status unknown partners	
Unprotected anal insertive	6.0 (12)
Unprotected anal receptive	8.0 (16)
Any unprotected anal	10.1 (20)

^I Other drugs include club drugs, cocaine, crack, heroin, and methamphetamines

Table 3

Association (OR, 95% CI) between psychosocial burdens and unprotected anal intercourse among MSM ages 50 and older, New York City 2010-2011, N = 199

	1.Alcohol to Intoxication	2.Inhalant Nitrates	3.Marijuana	4.Other illicit drugs	5. Depression	6.PTSD	7. Any UA HIV+ Partners	8. Any UA HIV-/UNK Partners
1		1.73 (0.59, 5.07)	2.85** (1.21, 6.73)	4.56*** (1.91, 10.85)	1.30 (0.48, 3.50)	0.71 (0.23, 2.18)	3.33** (1.36, 8.15)	3.61** (1.24, 10.50)
2			1.65 (0.73, 3.73)	0.99 (0.39, 2.49)	0.46 (0.13, 1.60)	0.44 (0.13, 1.54)	1.92 (0.77, 4.77)	7.32*** (2.67, 20.03)
3				3.46*** (1.79, 6.67)	0.99 (0.48, 2.03)	0.46 (0.21, 1.01)	1.76 (0.87, 3.57)	1.40 (0.55, 3.56)
4					1.28 (0.59, 2.74)	1.05 (0.48, 2.28)	2.40* (1.15, 5.01)	2.05 (0.78, 5.33)
5						9.01*** (4.10, 19.76)	0.39 (0.13, 1.18)	0.68 (0.19, 2.44)
6							1.20 (0.52, 2.78)	0.40 (0.90, 1.79)

* p .05;

** p .01

*** p .001

Table 4

Binary logistic regressions explaining unprotected anal intercourse among MSM ages 50 and older, New York City 2010-2011, N = 199

	Unprotected anal intercourse HIV-positive partners		Unprotected anal intercourse HIV-negative/status unknown partners	
	OR (95% CI)	p	OR (95% CI)	p
Age	0.95 (0.86, 1.04)	.26	0.92 (0.81, 1.05)	.20
Years living with HIV	1.00 (0.94, 1.06)	.94	1.12 (1.01, 1.23)	.03
Race/ethnicity	N/A	.08	N/A	.75
Total current psychosocial burden	1.38 (1.00, 1.91)	.05	1.61 (1.05, 2.46)	.03
Final model Fit	$\chi^2(6) = 12.11, p < .05$		$\chi^2(6) = 12.65, p < .05$	
Pseudo (Nagelkerke) R	9.5%		13.1%	