Prior Exposure to Intimate Partner Violence Associated With Less HIV Testing Among Young Women

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Abstract

Low-income minority women are disproportionately represented among those living with HIV in the United States. They are also at risk for the SAVA (substance abuse, violence, and HIV/AIDS) syndemic issues. Women who have recently given birth are at high risk for substance use and intimate partner violence (IPV), and HIV testing is not routinely administered during the postpartum visit. We explored the relationship between substance use, IPV, and HIV testing among low-income young adult women attending Special Supplemental Nutrition Program for Women, Infants, and Children (WIC), a federally supported nutrition program. A survey assessed substance use, relationships in particular with violence exposure, and HIV testing behavior in the past 6 months among a convenience sample of 100 women aged 18 to 30. The survey was conducted at several WIC offices in an urban setting in the Mid-Atlantic region between June and December 2015. Physical violence was the only IPV variable significantly associated ($p = .022$) with not being tested for HIV in the past 6 months, remaining significant even after adjusting for demographic and other significant variables (adjusted odds ratio [AOR] = 0.02; 95% confidence interval [CI] = [0.00, 0.41]). Women exposed to physical IPV or psychological IPV in the past year were significantly more likely to have ever used an illicit drug (physical IPV: 34% vs. 59%, $p = .052$; psychological IPV: 22% vs. 53%. $p = .002$). These findings between physical IPV and HIV testing history highlight the need to further understand how the context of violence affects HIV testing behaviors. Providing convenient, safe, and accessible HIV testing sites in spaces like WIC may increase HIV testing rates overall and specifically among women experiencing IPV.

Keywords

intimate partner violence; women; HIV testing; substance use

Introduction

In 2014, 8,328 women were newly infected with HIV in United States, and more than 80% were racial/ethnic minority women (Centers for Disease Control and Prevention [CDC], 2017). Heterosexual contact accounts for 86% of HIV infections among women in the United States (CDC, 2017). Furthermore, the 2.1% HIV prevalence rate found in urban poverty areas in the United States are similar to several countries with generalized HIV epidemics, such as Haiti, Burundi, Ethiopia, and Angola (Denning & DiNenno, 2015). In the United States, minority women are disproportionately represented among those living in impoverished urban areas.

HIV-related issues including risk-taking behaviors, HIV infection, and medication adherence are significantly affected by factors including intimate partner violence (IPV) and substance use, the confluence of which has been labeled as the SAVA (substance abuse, violence, and HIV/AIDS) syndemic (Green et al., 1993; Meyer, Springer, & Altice, 2011; Romero-Daza, Weeks, & Singer, 2003). The SAVA syndemic originally developed from research looking at the effect of gang violence, substance use, and HIV risk behaviors on acquiring HIV (Singer, 1996). The terminology of syndemic was used because of the synergistic effects of exposure to substance use and violence on HIV infection and risk behavior (Meyer et al., 2011; Singer, 1996; Sullivan, Messer, & Quinlivan, 2015). More recent research has begun to examine IPV as the violence component in the SAVA syndemic (Meyer et al., 2011; Singer, 1996). Women living in predominantly racial/ethnic minority low-income neighborhoods are disproportionately affected by SAVA syndemic issues, which may help explain the disproportionate burden of HIV in these communities (Burke, Thieman, Gielen, O'Campo, & McDonnell, 2005; Gielen et al., 2007).

The importance of HIV testing among women has been recently underscored as a valuable public health strategy to identify new infections and link women to HIV medical care so they can receive appropriate therapy and become virally suppressed (Stein et al., 2017). Many cases of HIV infection in women are diagnosed very late in the course of their illness potentially as a result of lack of knowledge, sociocultural beliefs and barriers, and lack of convenient access to HIV counseling and testing (HCT; Hernandez, Zule, Karg, Browne, & Wechsberg, 2012; Paxton, Williams, Bolden, Guzman, & Harawa, 2013; Yee & Simon, 2014). Specifically, women with young children may prioritize family responsibilities and child care over their own health problems, further contributing to the delayed diagnosis and entry to treatment (Aziz & Smith, 2011). If a mother breastfeeds, delayed diagnosis increases the likelihood of mother-to-child HIV transmission (Blumental, Ferster, Van den Wijngaert, & Lepage, 2014; Ciccozzi et al., 2014).

Increasing HIV testing, particularly among young adults and women, is a key prevention strategy in the Healthy People 2020 goals (Office of Disease Prevention and Health Promotion, 2016). In 2006, the CDC released new guidelines for HIV testing, recommending the integration of routine HIV testing as default into all health care settings as part of regular care (Branson et al., 2006). In particular, HIV testing is recommended for all women during pregnancy. For individuals at elevated HIV risk, yearly or more frequent testing is recommended (HIV.gov, 2017).

The CDC has issued guidance on providing HIV testing in nonclinical settings. Nonclinical settings are defined as community-based sites where medical, diagnostic, and/or treatment services are not routinely provided. Such use of nonclinical settings are seen as novel strategies for targeted testing and linkage to appropriate care, especially in areas of high HIV prevalence (CDC, 2016).

IPV is defined as any attempt to harm or control a former or current intimate partner through physical, sexual, or psychological violence (CDC, 2015b). IPV can interfere with HCT. For example, the fear of violent retribution toward a partner who discloses HIV positive status to their abusive partner can impede HCT (Adams et al., 2011; World Health Organization, 2004). Exposure to IPV has been associated with greater likelihood of getting HIV testing when a national sample in the United States was analyzed within the Behavioral Risk Factor Surveillance System (Nasrullah, Oraka, Breiding, & Chavez, 2013; Rountree, Chen, & Bagwell, 2016). On the contrary, in another recent study, however, IPV exposure was significantly associated with less likelihood of HIV testing among women deemed at high risk for HIV infection (i.e., engaging in transactional sex, injecting drugs, and so on; Etudo, Metheny, Stephenson, & Kalokhe, 2017).

The period of time after a women delivers has been found to be a time of high risk for relapse of substance use (Jones et al., 2014). Substance and alcohol use have been consistently correlated with more likelihood of reporting HIV testing history in women (Kyle et al., 2015; Luseno & Wechsberg, 2009; Norman, Dévieux, Rosenberg, & Malow, 2011). Women in substance use treatment programs have been significantly more likely to have had HIV testing in the past year, compared with males (Kyle et al., 2015). Women with a history of alcohol and cannabis use did perceive themselves to be more at risk for contracting HIV infection (Norman et al., 2011).

Little has been studied and reported on synergistic effects of substance use and IPV history on HIV testing behavior and testing intention in women. One study conducted by Luseno and Wechsberg (2009) examined correlates of HIV testing among high-risk South African women using baseline interviews and HIV testing results of a larger HIV prevention trial. Alcohol abuse in the past year and daily cannabis use was positively correlated with HIV testing. Experiencing physical abuse was positively associated with HIV testing; however, there was no relationship between sexual abuse and HIV testing. Inconsistent condom use and injection drug use was significantly associated with recent HIV testing history (Deering et al., 2015). In summary, while substance and alcohol use were consistently associated with an increased likelihood of HIV testing, mixed findings exist in the relationship between IPV exposure and HIV testing.

The following study reports the results of a survey examining the potential impact of substance use history and IPV on HIV testing history in the past 6 months prior to the survey period among mothers living in predominantly racial/ethnic minority low-income urban neighborhoods with high HIV prevalence. The purpose of this study was to clarify prior mixed findings in the relationship between IPV exposure and HIV testing behavior among socioeconomically disadvantaged maternal populations based on the SAVA literature as it relates to recent HIV testing.

Method

Sample and Recruitment

The survey was conducted in two urban neighborhood sites of the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) in a Mid-Atlantic region between June and December 2015. These specific neighborhoods are known for a relatively higher HIV prevalence rate of 2% to 3% (AIDSVu, 2015). WIC serves to safeguard the health of socioeconomically disadvantaged pregnant, postpartum, and breastfeeding women, infants, and children up to age 5 who are at risk for malnutrition by providing nutritious foods to supplement diets, information on healthy eating including breastfeeding promotion and support, and referrals to health care. WIC is administered by the Food and Nutrition Service (FNS), a federal agency of the U.S. Department of Agriculture, and extends contracts to state and local agencies. The agency's income standard must fall within the defined poverty levels by the federal government to be eligible for WIC services (WIC, 2017). WIC started in 1972 and serves 53% of mothers and children in the United States (U.S. Department of Agriculture, 2015).

The Institutional Review Board (University of Pennsylvania) approved this study. Written informed consent was obtained prior to each survey. Interviewers were trained by one of the principle investigators experienced in conducting IPV research. We also had a Standard Operating Procedure (SOP) for IPV should it become evident that there was a safety issue. Participants were recruited from the WIC waiting room by trained members of the research team. All women in the waiting area attending the WIC clinics were given flyers during recruiting sessions. Recruiters came on various days of the week and at various times for 3 to 4 hr on each recruiting session. Women who expressed an interest in the survey were screened for eligibility in a private location at the WIC site. To meet eligibility requirements, women needed to be between the ages of 18 and 30. It was also necessary for the participants to speak and understand English well enough to complete the survey. Women were told that the purpose of the research is to better understand how young women view HIV testing and what they think the barriers are that may prevent young women from getting tested for HIV. Once deemed eligible, the self-administered paper and pencil survey as well as an in-person interview were completed.

Survey

A survey was conducted with this convenience sample of 100 women enrolled in the WIC program. The survey was partially self-administered and partially interviewer-administered. It took approximately 30 min to complete. The participants were thanked for their participation and compensated US$20 for their time at the end of survey. We partnered with the local WIC program in conducting this study with input from the director of WIC in this region who is also a co-author of this article (L.K.).

Demographics and HIV testing history.—The self-administered part of survey consisted of questions on sociodemographic characteristics including age, education, race/ethnicity, work history, date of last delivery, history of sexually transmitted infections (STIs), their HIV status and knowledge of partner's HIV status, perceived HIV risk and history of

HIV testing with self and their partners. Race/ethnicity was defined using the National Institutes of Health (NIH) categories: American Indian or Alaska Native, Asian, Black or African American, Native Hawaiian or Other Pacific Islander, and White and Hispanic or Latino and not Hispanic or Latino (Office of Management and Budget, 1997). Education was measured by asking participants if they had a high school diploma or a general equivalency diploma (GED) as well if they ever attended college, community college, or trade/technical training. Work-ing status was measured with three categories: working full-time outside the home, working part-time outside of the home, or not working outside the home. HIV testing history within the past 6-month period was used as the dependent variable as HIV testing at 6- to 12-month intervals is recommended for those with elevated HIV risk (HIV.gov, 2017). The question was framed as "Have you had a test for HIV in the past 6 months?" We also asked about the number of times they had been tested for HIV in the past 2 years not counting testing during pregnancy. Perceived HIV risk was asked as "What do you consider your risk of HIV infection to be based on your experiences in the past 6 months?" Perceived risk was assessed with one question which had four response choices: no risk, low risk, medium risk, and high risk. We created a binary variable from this by combining no and low risk vs. medium and high risk. Length of the postpartum period was calculated using dates of the survey administration and their last delivery. We asked where they would go to get their next HIV test with response options of regular provider; family planning provider, free HIV testing site; and city health clinic or other. This was followed by a hypothetical question asking if HIV testing were offered at WIC, would they prefer to get an HIV test at WIC relative to the previously selected choice.

Substance and alcohol use history.—Questions on history of substance and alcohol use and sexual relationships were also asked as part of the self-administered survey. For alcohol use, T-ACE was used to assess risky drinking among women who reported alcohol use in their lifetime (Sokol, Martier, & Ager, 1989). T-ACE has demonstrated reliable differentiation of risky drinkers from nonrisky drinkers especially in maternal populations (Sokol et al., 1989). No specific time frame of T-ACE screening was provided on this survey, but the questions were worded referencing their current practices. The screening questions consisted of four questions with dichotomous answer options, asking about needs for continued drinking and others' perception and self-perception of their drinking behavior (Sokol et al., 1989). Risky drinking for this study was defined as a positive response to two or more questions. For other substance use, ever used history and the last time used were asked for each substance, including marijuana, cocaine, amphetamine, sedatives, heroin, prescription drug misuse, hallucinogens, inhalants, and club drugs. Last time used was asked in five categories of last 30 days, last 3 months, last year, last 3 years, and more than last 3 years. In addition, among those who reported having a main or/and casual sexual partner, questions on whether participants were high on substance or alcohol during the last sex were included and perceived regular substance use and binge drinking of their partners were included. A main partner was defined as "someone who you are in a relationship with or who you feel committed to above anyone else." A casual partner was "someone who you do not feel committed to or don't know very well." The questions about main or casual partners were asked as follows: "Do you currently have a main (or casual) male partner you have had vaginal or anal sex with? By 'current,' we mean any time in the past 3 months (90 days)."

The questions about partner's substance and alcohol use were asked as follows: "Did your main or casual partner regularly use (3 or more times a week) any of the following substances in the past 30 days," "Did your main or casual partner engage in binge drinking, that is, having 5 or more drinks of alcohol at the same period of time (on the same occasion) on at least 1 day in the past 30 days," and "Do you think your main or casual partner has a problem with drugs or alcohol?"

Relationship and IPV history—Questions on sexual relationship dynamics were based on the Sexual Relationship Power Scale, a theoretically based and validated instrument, consisting of 23 items (Pulerwitz, Gortmaker, & DeJong, 2000). It contains two subscales, which can be used separately or combined, depending upon research requirements. The subscales concern two conceptual dimensions of relationship power: Relationship Control and Decision-Making Dominance. The answer option was coded using 5-point Likert-type scale that ranges from *strongly disagree* to *strongly agree* for the Relationship Control section, and three options of *you*, *both*, and *your partner* for the Decision-Making Dominance section. An example question for the Relationship Control section was "If I asked my partner to use a condom, he would get angry." An example question for the Decision-Making Dominance section was "Who usually has more say about whose friends to go out with?"

For this study, we added four additional questions to the scale that examined relationship power in the context of HIV testing, modified based on existing questions (e.g., "If my partner found out that I went for an HIV test, he would get violent" based on the existing question of "If I asked my partner to use a condom, he would get violent"). These four additional questions were not pilot tested. The alpha coefficient for the full scale was .905, for the Relationship Control scale was .928, and for the Decision-Making Dominance scale was .741.

Questions on psychological, physical, and sexual victimization in the past year were asked in the in-person interview format in a confidential manner to minimize embarrassment of the respondent. The questions were derived from the Revised Conflict Tactics Scales (CTS-2; Straus & Douglas, 2004). The scale assessed victimization and included 10 questions regarding history of physical assault, psychological aggression, sexual coercion, negotiation, and injury by their partners ($\alpha = .608$). Three questions were focused on physical assault, and an example question was "I had a sprain, bruise, or small cut, or felt pain the next day because of a fight with my partner." Two were focused on psychological aggression, and an example question was "My partner insulted or swore or shouted or yelled at me." Two were focused on sexual coercion, and an example question was "My partner used force (like hitting, holding down, or using a weapon) to make me have sex." Three other questions were negotiation and injury related. Standard response options (frequency in past year, occurred prior to past year, never occurred) were converted into color names (i.e., once = green, twice = white, 3–5 times = gray, 6–10 times = yellow, 11–20 times = orange, more than 20 times = red, happened before last year = purple, and never = pink), and participants were asked to respond with a color name to each question to avoid discomfort when responding to these questions. For our current analyses, participant responses were coded as a dichotomous

variable of whether an assault occurred in the past year or not. Negotiation and injury-related questions were not included in the analysis of this report.

Data Analysis

SPSS software (Version 17.0, IBM Company, Chicago, IL) and RStudio (R Foundation for Statistical Computing, Vienna, Austria) were used to analyze the quantitative survey results. Descriptive analysis was conducted to calculate the mean ± SD and counts (%) for each variable of demographics, IPV, substance use, and HIV testing by the history of HIV testing in the past 6 months prior to the survey period. Chi-square analyses were conducted for categorical variables to examine the relationship between HIV testing behavior in the past 6 months and IPV/substance use. Fisher's exact test was conducted for a cell count of below five. A nonparametric ANOVA (i.e., Wilcoxon signed-rank test) was used for continuous variables to ensure accuracy in some of the variables with skewed distributions. A logistic regression was conducted on the outcome of HIV testing history in the past 6 months, based on statistically significant variables ($p < .05$), basic demographic variables (i.e., age, race/ethnicity), and theoretically important SAVA variables. The duration of time since their last delivery was dichotomized by whether the length was 6 months or longer, as HIV testing is recommended for every 6 to 12 months.

As the purpose of this study was to conduct formative research to lay the foundation for the development and evaluation of an intervention, the current study was designed to yield effect size estimates to help inform power calculations for larger studies. Due to the sample size in the current study, some clinically relevant variables may not reach statistical significance. However, the variables that we do find to be statistically significant were considered robust.

Results

Sample Characteristics

The final sample consisted of 100 participants. All participants were between the ages of 18 and 30. The mean age was 24 ± 3, 86% were African American, 49% had more than high school education, and 51% (50/99) were currently working. The mean length since delivery was 337 days with a range of 1 day to 4.7 years. Approximately half (51.6%) of the sample had their last delivery within that last 6 months. Almost all the participants (96%) reported being HIV negative while four participants did not answer the survey question. The participants had been exposed to HIV testing on average twice in the past 2 years excluding the recommended HIV testing during pregnancy. Sixty-four percent reported having an HIV test in the past 6 months, and 91% reported getting tested for HIV during their last pregnancy. Approximately one third (36%) of the participants either had a current main or casual partner that had not been tested for HIV or did not know if their partner had been tested for HIV. A majority of the sample (77%) reported they would go to their regular health care provider to get their next HIV test, instead of going to free HIV testing clinic, city health clinic, or family planning clinic.

Table 1 shows participant characteristics by HIV testing history in the past 6 months prior to the survey period. Those who were tested in the past 6 months prior to the survey period had

a significantly shorter duration since their last delivery than those who were not tested in the past 6 months prior to the survey period (274.7 days vs. 456.21 days; $p = .023$). HIV testing in the past 6 months was significantly associated with having their last delivery within that last 6 months. Of those who were tested for HIV in the past 6 months, 36.1% had their last delivery more than 6 months ago while 63.9% had their last delivery within the last 6 months. Past 6 months HIV testing also affected more number of testing experiences in the past 2 years (1.5 ± 1.0 vs. 2.6 ± 1.5; $p < .001$). No other significant differences were detected in sociodemographic and HIV testing history. More than half the participants regardless of the HIV testing history were in favor of the idea to take an HIV test in a WIC office setting. Both groups had similar percentages for perceived HIV risk (26%).

Substance Use and IPV Characteristics

Table 2 shows substance use and IPV and sexual relationship history by HIV testing history in the past 6 months prior to the survey period. Marijuana was the most prevalent substance being used in a lifetime, followed by alcohol use and use of sedatives. Among those who reported ever use of marijuana ($n = 36$), 11 reported using in the last 30 days, seven reported using in the last 3 months, and 12 reported using in the past year. None of the substance and alcohol use variables were significantly associated with HIV testing in the past 6 months.

Approximately 80% had a main sexual partner, and a third used condoms at last sex. Although not statistically significant, among women who had a casual sexual partner in the last 6 months, condom use was relatively low among those without a history of HIV testing in the past 6 months, compared with their counterparts.

Over 16% were exposed to physical victimization, 51% to psychological victimization, and 10% to sexual victimization in the past year. A history of HIV testing in the past 6 months was significantly correlated with physical victimization in the past year (27% vs. 11%; $p = .048$) but not with psychological or sexual victimization (Table 2). Any illicit substance use was significantly correlated with physical and psychological victimization in the past year (physical: 34% vs. 59%, p = .052; psychological: 22% vs. 53%, p = .002), however, not among those exposed to sexual victimization (38% vs. 40%, p = .891; data not shown). Table 3 shows the result of a logistic regression for physical victimization in the past year on HIV testing history in the past 6 months, controlling for demographic characteristics, length of time since their last delivery, and past 2-year HIV testing history. Physical victimization in the past year showed 98% lower likelihood of having HIV testing in the past 6 months (adjusted odds ratio [AOR] = 0.02; 95% confidence interval [CI] = [0.00, 0.41]).

Discussion

Women exposed to physical victimization in the past year were significantly less likely to get tested for HIV in the past 6 months prior to the survey period and more likely to have ever used an illicit substance. Marijuana use was the most prevalent drug used in a lifetime. Substance use was also significantly associated with psychological victimization in the past year. Our study is the first to quantitively identify a negative association between IPV and HIV testing in a community sample of predominantly minority women living in low-income urban neighborhoods in the United States. This finding reinforces prior studies underscoring

the role of IPV exposure as a barrier against HIV testing among women (Etudo et al., 2017; Williams, Gonzalez-Guarda, Ilias, 2017). IPV experience in the past year (i.e., physical victimization) showed a negative association with HIV testing history in the past 6 months and a positive association with lifetime substance use, indicating that the SAVA syndemic may also apply to HIV testing history among WIC-enrolled mothers living in neighborhoods with high HIV prevalence. Together with the literature showing the inverse relationship between IPV exposure and HIV testing history, evidence underscores the importance of reaching out to women with IPV exposure who are likely to have a risk factor for HIV infection to encourage HIV testing (Etudo et al., 2017). A qualitative study also described several combinations of factors that might function as barriers against HIV testing behavior among those with IPV experiences (e.g., potential for re-traumatization, readiness for testing, other competing priorities, and care for children; Williams et al., 2017).

In our study, substance use was not associated with HIV testing history in the past 6 months prior to the survey period, although the current sample did not show a high prevalence of illicit drug use which may have impacted findings. A few studies in and outside of the United States have shown that women using illicit drugs were more likely to be exposed to HIV testing than their counterparts, and future studies should continue to investigate this relationship (Deering et al., 2015; Frimpong, Guerrero, Kong, & Tsai, 2015; Luseno & Wechsberg, 2009).

Women who were tested for HIV in the past 6 months prior to the survey period had a significantly shorter duration since their last delivery than their counterparts. This likely represents the recommended HIV testing conducted during their last pregnancy. Having a delivery within the past 6 months was associated with past 6 months HIV testing, indicating the need to offer accessible HIV testing to mothers who have children older than 6 months. As most pregnant women have access to HIV testing at the beginning and the end of their pregnancy, these findings support the notion that HIV testing should also target women when they are not pregnant as they may not have the same access to HIV testing as they did while they were pregnant.

Approximately one quarter of participants perceived themselves at elevated HIV risk which is concerning given that the study took place in neighborhoods with high rates of HIV prevalence rate of 2% to 3% (AIDSVu, 2015). However, this finding is consistent with the literature that 92% of heterosexual HIV-negative women at increased risk for HIV had sex without a condom in the past year (CDC, 2014). Many women living in areas of urban poverty may not be aware of their own risk, their partner's risk, or actual HIV status of themselves. Among Black women, two thirds of new HIV infections are attributable to lack of condom use with a partner who is unaware of his HIV status (CDC, 2015a).

A majority of the women in this sample had a main partner instead of a casual partner, and reported substance use was relatively low which may also account for the relatively low prevalence of perceived HIV risk. However, it is still crucial to provide information about HIV testing and accessible locations for testing as these women are sexually active while living in areas with high HIV prevalence. A majority of the sample did not use condoms at last sex in the past 6 months, and one third either had a partner who had not been tested for

HIV or did not know if their partner had been tested for HIV. Similarly, access to HIV testing for this age group is especially important as young adult women in general are at high risk for IPV victimization and HIV infection (CDC, 2017; Smith et al., 2017). Women in domestic violence shelters have voiced that IPV exposure can lead to decreased self-esteem and self-efficacy (Draucker et al., 2015). Decreased self-efficacy and esteem, and fear of partner retribution may be barriers to HIV counseling and testing (HCT) among those experiencing physical partner violence.

Our study showed that over half of our sample preferred having access to HIV testing in a nonclinical setting. While the small sample does not allow the results to generalize to all WIC participants, these findings remain important given the CDC recommendations for implementing HIV testing in non-clinical settings (CDC, 2016). The WIC office setting may be ideal for disadvantaged mothers because the office is usually located nearby their neighborhood and requires mothers to show up every 3 months to receive food vouchers. WIC offices would also be a location that mothers would visit for up to 5 years since their last delivery and could be an important access point for providing HIV tests for women not currently pregnant. Specific steps would also need to be taken to foster linkages to appropriate follow-up care, including the woman's primary care provider, which is consistent with these CDC guidelines.

Several limitations are acknowledged in the current study. First, the current study did not have enough power to detect some associations that may have been clinically relevant, such as distinguishing the potential impact of substance use and IPV on HIV testing history given the relatively low rate of reported substance use in this population. Second, the sample was collected as a convenience sample limited to women enrolled at WIC, which may limit the generalizability of the findings to other WIC-enrolled mothers or other young women with more severe substance use and IPV histories. We also did not have access to the information of reasons why women did not take the survey. Third, substance use responses in our study were self-reported, and the responses particularly to sensitive questions might have been affected (El Marroun et al., 2011; Garg et al., 2016). Although future studies should examine the relationship between substance use and HIV testing with an increased sample size, it should be noted that women may fear disclosing their substance use even in the context of a confidential survey for a potentially significant legal ramification following disclosed substance use. Fourth, the question of asking HIV testing history in the past 6 months did not ask survey participants to exclude testing done during the last pregnancy. This prevented the study from distinguishing routine testing during pregnancy from other incidences of HIV testing. Finally, the survey was a cross-sectional study, which did not allow us to identify any temporal associations among IPV, substance use, and HIV testing history.

Conclusion

In summary, the current study examined the potential impact of substance use and IPV history on HIV testing history in the past 6 months prior to the survey period among a sample of a predominantly racial/ethnic minority WIC-enrolled mothers living in neighborhoods with high HIV prevalence. Evidence of the SAVA syndemic was noted with the association between IPV and both lifetime substance use and less HIV testing in the past

6 months. Future studies should continue to examine the factors affecting HIV testing history among socioeconomically disadvantaged mothers with an ultimate aim to develop an intervention to increase HIV testing in the population. The intervention should address associated SAVA factors using an integrated trauma-informed care approach to help navigate multiple HIV testing barriers. Finally, an intervention should also be sensitive to women's fear on potential legal ramification from disclosing IPV and substance use information.

Acknowledgments

Author Biographies

Yukiko Washio, PhD, is a researcher at the Christiana Care Health Services Obstetrics and Gynecology Department and University of Delaware. She does maternal infant public health research focused on major behavioral risk factors in pregnancy and birth adverse outcomes. She conceptualized the study, obtained funding, and was involved in implementing the project, analyzing the results, and developing the publication manuscript.

Elizabeth Novack Wright, PhD, BSN, has a doctoral degree in nursing from University of Pennsylvania and worked on HIV and intimate partner violence research for her dissertation projects including the project in this study.

Annet Davis-Vogel, RN, MSW, is a research nurse at University of Pennsylvania and has been involved in managing projects for HIV and psychosocial issues including the project in this study.

Jesse Chittams, MS, is a lead statistician at University of Pennsylvania and has been involved in a number of projects at School of Nursing. He conducted the statistical analysis for this project.

Claire Anagnostopulos, BA, BSN, has been studying HIV in women with Dr. Teitelman at University of Pennsylvania and was significantly involved in conducting the project in this study and developing the manuscript.

Linda M. Kilby, PhD, is the executive director at WIC program in Philadelphia and was involved in implementing the project in this study and developing the manuscript.

Anne M. Teitelman, PhD, FNP-BC, FAANP, FAAN, is the associate professor at School of Nursing at University of Pennsylvania and has worked with Dr. Washio on all aspects of the project in this study.

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Table 1.

Sociodemographic and HIV-Related Characteristics by HIV Testing History in the Past 6 Months.

	Overall Sample	Not HIV Tested in Past 6 Months	HIV Tested in Past 6 Months	p value
	(N = 100)	(n = 34)	(n = 64)	
Age (M ± SD)	24.19 ± 3.29 (n = 93)	23.7 ± 3.1 (n = 32)	24.6 ± 3.3 (n = 61)	.270
Race (% Black)	86.0 (86/100)	82.4 (28/34)	89.1 (57/64)	.365[a]
Ethnicity (% Hispanic)	93.6 (88/94)	12.9 (4/31)	3.3 (2/61)	.174[a]
High school diploma	84.0 (84/100)	85.3 (29/34)	84.4 (54/64)	.904
College attendance	49.0 (49/100)	50.0 (17/34)	48.4 (31/64)	.883
Working part- or full-time	51.0 (50/99)	47.1 (16/34)	50.8 (32/63)	.726
No. of days after delivery	337.6 ± 371.8 (n = 95)	456.2 ± 397.8 (n = 34)	274.72 ± 348.83 (n = 61)	.023
6 months or less after delivery	48.5 (47/97)	29.4 (10/34)	63.9 (39/61)	.001
Access to regular health care providers	96.0 (96/100)	91.2 (31/34)	98.4 (63/64)	.119[a]
No. of HIV testing in past 2 years	2.16 ± 1.44 (n = 90)	1.5 ± 1.0 (n = 30)	2.6 ± 1.5 (n = 60)	<.001
HIV tested during the last pregnancy	91.0 (87/96)	86.7 (n = 30)	93.8 (n = 64)	.251
Ever had STI	44.4 (44/99)	51.5 (17/33)	39.1 (25/64)	.241
Partner ever tested for HIV	63.6 (63/99)	55.9 (19/34)	68.3 (43/63)	.226
Afraid or not ever told partner about	9.5 (9/95)	3.3 (1/30)	9.5 (6/63)	.422[a]
HIV testing results				
Perceived HIV risk	27.0 (27/100)	26.5 (9/34)	26.6 (17/64)	.992
Prefer HIV testing at WIC	41.0 (41/100)	67.6 (23/34)	54.7 (35/64)	.214

Note. STI = sexually transmitted infection; WIC = Women, Infants, and Children.

[a]
Fisher's exact test.

Table 2.

Substance Use and Violence Exposure by HIV Testing History in the Past 6 Months.

	Overall Sample	Not HIV Tested in Past 6 Months	HIV Tested in Past 6 Months	p value
	(N = 100)	(n = 34)	(n = 64)	
T-ACE positive (risk drinking)	7.8 (6/76)	4.3 (1/23)	9.4 (5/53)	.661[a]
Had a drink within the last 3 months	56.0 (42/75)	65.2 (15/23)	51.9 (27/52)	.285
Ever used marijuana	36.7 (36/98)	35.3 (12/34)	37.5 (24/64)	.829
Used marijuana within the last year	47.2 (17/36)	58.3 (7/12)	41.7 (10/24)	.345
Ever used cocaine	3.1 (3/98)	0.0 (0/34)	4.7 (3/64)	.549[a]
Ever used amphetamine	2.0 (2/98)	2.9 (1/34)	1.6 (1/64)	1[a]
Ever used sedatives	5.1 (5/98)	5.9 (2/34)	4.7 (3/64)	1[a]
Ever used heroin	0 (0/98)	0 (0/34)	0 (0/64)	NA
Ever misused prescription drugs	0 (0/98)	0 (0/34)	3.1 (2/64)	.542[a]
Ever used hallucinogen	2.0 (2/98)	2.9 (1/34)	1.6 (1/64)	1[a]
Ever misused a drug	38 (38/100)	35.3 (12/34)	37.5 (24/64)	.829
Sexual partner binge drink in the past 30 days	10.3 (10/97)	11.8 (4/34)	9.5 (6/63)	.737[a]
Currently have a main sexual partner	78.6 (77/98)	82.4 (28/34)	76.6 (49/64)	.506
Currently have a casual sexual partner	3.1 (3/98)	5.9 (2/34)	1.6 (1/64)	.275[a]
Partner has problem with drugs and alcohol	5.2 (5/97)	2.9 (1/34)	6.3 (4/63)	.654[a]
High on drugs or alcohol during the last sex	2.1 (2/97)	5.9 (2/34)	0.0 (0/63)	.121[a]
Used condom with main partner in the last 6 months	33.7 (28/83)	31.0 (9/29)	35.2 (19/54)	.703
Used condom with casual partner in the past 6 months	66.7 (14/21)	57.1 (4/7)	71.4 (10/14)	.638[a]
Psychological victimization in the past year	51.0 (50/98)	55.9 (19/34)	48.4 (31/64)	.483
Physical victimization in the past year	16.3 (16/98)	26.5 (9/34)	10.9 (7/64)	.048[*]
Sexual victimization in the past year	10.2 (10/98)	14.7 (5/34)	7.8 (5/64)	.309[a]
Sexual relationship power scale score—relationship (M ± SD)	64.12 ± 10.15	63.6 ± 9.8 (n = 34)	65.0 ± 10.1 (n = 63)	.330
Sexual relationship power scale score—decision making (M ± SD)	17.06 ± 2.41	17.0 ± 2.0 (n = 34)	17.3 ± 2.5 (n = 63)	.913

[a]Fisher's exact test.

*
$p < .05.$

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Table 3.

Logistic Regression on HIV Testing History in the Past 6 Months.

	AOR	95% CI
6 months or longer after delivery	0.14	[0.01, 1.02]
Maternal age	1.38	[1.03, 2.06]
Race/ethnicity	2.76	[0.12, 76.18]
Past 2 years HIV testing history	4.29[**]	[1.81, 14.37]
Had a drink within the last 3 months	1.68	[0.22, 15.70]
Ever misused a drug	0.43	[0.05, 2.83]
Past year physical victimization	0.02[*]	[0.00, 0.41]
Past year sexual victimization	5.51	[0.46, 136.90]
Past year psychological victimization	5.61	[0.66, 94.08]

Note. AOR = adjusted odds ratio; CI = confidence interval.

[*]
$p < .05$.

[**]
$p < .01$.