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Psychosocial, clinical, and behavioral factors related to dual method contraceptive use in HIV positive women

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Abstract

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By Augustina Mara Delaney

Background

HIV-infected women need protection from unintended pregnancy and STI/HIV transmission. The most effective way to achieve this is through dual method contraceptive use (dual methods). Dual methods is the use of a barrier method with concurrent use of contraception effective at preventing pregnancy. Rates of dual methods are low among HIV-infected women, but the dearth of research makes it difficult to determine why uptake is low. Therefore the purpose of this investigation was to identify factors impacting uptake, consistent use, and sustained use of dual methods using an ecological health model.

Methods

Data was from the Women's Interagency HIV Study, a national, longitudinal, epidemiological cohort study. Participants were HIV positive females, age 18 to 45, not currently trying to conceive, and no history of hysterectomy. Bivariate analysis and logistic regression modeling were used to examine factors related to the three behaviors of interest: dual method use, consistent dual method use, and sustained dual method use.

Results

Rates of dual method use were low (36.7%), but among those who used them, rates of consistent use (77.1%) and sustained use (71.4%) were high. Higher parity, being at a southern study site, and older age increased the odds of dual method use. Higher CD4 percent and having more than two male sexual partners significantly decreased the odds of consistent dual methods. Lastly, having a partner significantly increased the odds of sustained dual methods.

Conclusion

Overall, an ecological model is a useful framework for understanding dual method use. Findings suggest that multilevel factors influence uptake of dual method use while interpersonal factors such as partner status and number of sexual partners and intrapersonal factors including CD4 percent are more relevant to consistent and sustained use of dual methods. Regional differences in dual methods suggest policy, community, and organizational level factors impact uptake. Efforts to increase uptake should focus on higher-level factors and not just individuals. Future interventions could also target communication with sexual partners and HIV knowledge to promote consistent and sustained dual methods.

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Chapter 1: Introductory Chapter

Statement of Problem

The Centers for Disease Control estimate that women constitute approximately 25% percent of people living with HIV in the United States, with Black and Hispanic women disproportionately affected by this life-altering disease (CDC, 2015). The majority of HIV positive women are of low socioeconomic status and acquisition of HIV often results in increased financial burdens, stress, and stigmatization (Sandelowski, Lambe, & Barroso, 2004). HIV infection may also increase a woman's susceptibility to or complications from sexually transmitted infections (STI) such as chlamydia, trichomoniasis, and human papillomavirus (Hanisch et al., 2014; Muzny, Rivers, Austin, & Schwebke, 2013; Venkatesh et al., 2011). Co-infection with these STIs may increase risk of HIV transmission to uninfected partners (Fastring et al., 2014). Infants of HIV positive mothers have higher rates of premature birth, low birth weight, and stillbirth (Haeri et al., 2009; Townsend, Cortina-Borja, Peckham, & Tookey, 2007). Additionally, unplanned pregnancy may significantly increase the risk of mother to child to transmission of HIV (Mnyani, Simango, Murphy, Chersich, & McIntyre, 2014). STIs and/or negative pregnancy outcomes represent yet additional sources of stress and financial burden for these already vulnerable women. Providing an HIV positive woman protection against transmission of other sexually transmitted infections (STI) and unintended pregnancies is important to optimize her health as well as the health of her potential children and her sexual partners. Appropriate methods of contraception are key (Tsui, McDonald-Mosley, & Burke, 2010).

The World Health Organization recommends that HIV positive women of reproductive age utilize dual methods of contraception (dual methods) to protect from STI transmission and unintended pregnancy (WHO, 2006, 2015). "Dual methods" refers to the use of a condom with a second form of contraception effective at preventing pregnancy, including hormonal contraceptives and intrauterine devices (Berer, 2006). While condoms may be effective for preventing STI/HIV transmission and pregnancy when used correctly and consistently, in real world situations they are estimated to be 82% effective at preventing unintended pregnancy (Hatcher, Trussell, Cates, Kowal, & Policar, 2011). HIV positive women who incorrectly and inconsistently use condoms are vulnerable to unintended pregnancy and STIs. Alarmingly, rates of consistent condom use in HIV positive women may be as low as 28% and most HIV positive women with unplanned pregnancies report condom use prior to conception (Finocchario-Kessler et al., 2010; Smits et al., 1999). Estimated rates of *dual method* use are even lower, ranging from 11% to 25% of HIV positive women indicating that the majority of HIV positive women are not adequately protected (Massad et al., 2007; Stanwood, Cohn, Heiser, & Pugliese, 2007). Studies in HIV negative women have identified a number of factors that impact contraceptive decisions and use of dual methods. These factors include socio-demographic variables, sexual behaviors, pregnancy history, intimate partner violence, gynecological history such as previous STIs, social support, fatalistic beliefs about pregnancy, and beliefs about contraceptive side effects (Dehlendorf, Rodriguez, Levy, Borrero, & Steinauer, 2010; Harvey, Henderson, & Branch, 2004; Hodgson, Collier, Hayes, Curry, & Fraenkel, 2012; Lang et al., 2011; Rosenthal et al., 2011; Sales, Latham, DiClemente, & Rose, 2010). HIV positive women are faced with a unique set of

circumstances due to their backgrounds and HIV diagnosis, but our current state of knowledge does not enable us to know what factors play a role in use of dual methods. More information is needed to fill this gap.

With the advent of antiretroviral therapy, HIV positive women are living longer, increasing the need for HIV-specific preventative health care, including sexual and reproductive health (ART-CC, 2008). However, the dearth of research and effective interventions makes it difficult to successfully include dual method use in HIV positive women's sexual and reproductive care. Thus far the few interventions developed to increase dual method use have had mixed results (Lopez, Stockon, Chen, Steiner, & Gallo, 2014; O'Leary, 2011). A better understanding of the psychosocial, clinical, and behavioral factors that are predictive of dual method use in HIV positive women is needed if targeted interventions are to be developed.

Purpose

The purpose of this study is to identify psychosocial factors associated with dual method contraceptive use in HIV positive women of childbearing age order to better understand choices and influences surrounding its use. The sample is from the Women's Interagency HIV Study (WIHS), a large national multisite project that follows a cohort of HIV positive and negative women over time. Women participating in the WIHS attend study visits every 6 months to complete survey instruments and receive physical and gynecological exams. For this study, only women with HIV will be included.

Specific Aims

Aim1: Identify behavioral, clinical, and psychosocial factors that are associated with dual method use in a sample of HIV positive women of reproductive age who are sexually active.

Aim 2: Identify behavioral, clinical, and psychosocial factors that are associated with sustained use of dual methods over time.

Aim 3: Identify behavioral, clinical, and psychosocial factors that are associated with consistent dual method use.

Conceptual Framework

The proposed study will utilize the ecological model of health behavior outlined by McLeroy and colleagues (1988) as the theoretical framework. This ecological model of health behavior demonstrates how behaviors, such as contraceptive use, are determined by multilevel factors (Sallis, Owen, & Fisher, 2008). This ecological model of health behavior is useful in understanding factors influencing dual method use because of its recognition of both individual and community/structural factors on health behaviors (see Figure 1). HIV is a significant diagnosis for women and its effects can resonant through many levels of a woman's life from individual relationships to interactions with organizations and community. The ecological model of health behavior outlines five

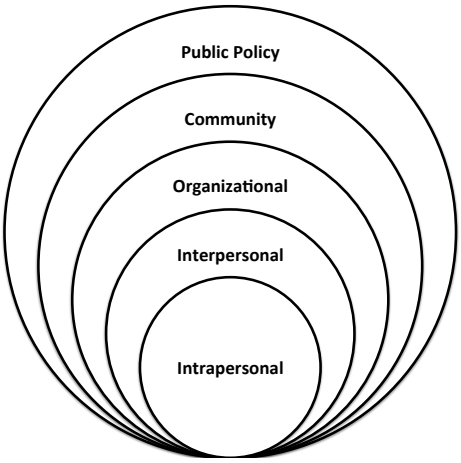

Figure 1: Ecological model of health behavior

levels of influence on the individual: intrapersonal factors, interpersonal processes, organizational factors, community factors, and public policy (McLeroy et al., 1988). Intrapersonal factors are those characteristics of the individual that influence dual method use. Interpersonal factors relate to the individual and her personal relationships. Organizational factors refer to structures and processes of organizations the individual is a part of, including the healthcare system. Community factors embody interactions with people and groups, the relationships between organizations and groups that impact the individual, and geographical and political factors that influence an individual's health behavior of interest. For example, race and ethnicity are community factors because they impact the face-to-face interactions and social groups that individuals tend to engage in. Lastly, public policy impacts individual health behaviors by promoting or restricting behaviors through incentives and legal ramifications. For the purposes of this research, only interpersonal, intrapersonal, organizational, and community factors will be examined.

Background

HIV Positive Women

Women currently represent approximately 50% of HIV positive individuals worldwide and almost 25% of HIV positive persons in the United States (CDC, 2015; WHO, UNAIDS, & UNICEF, 2011). The vast majority of HIV positive women contracted the virus through heterosexual intercourse (CDC, 2011). HIV disproportionately affects black and Hispanic women in the United States. In 2013, black women made up 13% of the female population in the United States, but 63% of women

with HIV (CDC, 2015). Similarly, Hispanic/Latina women were 19.2% of women living with HIV, but only 16.4% of the female population in the US (CDC, 2015). Many of these women lived in conditions of socioeconomic, gender, and racial disparities before acquisition of the virus (Prejean et al., 2011; Teti, Chilton, Lloyd, & Rubinstein, 2006). Once diagnosed, HIV positive women must also cope with increased financial burdens, stress, stigmatization, and health and disease management associated with HIV/AIDS, which further increases their vulnerability (Aziz & Smith, 2011; Sandelowski et al., 2004). HIV positive women experience higher perceived levels of stigmatization because of their ability to bear and potentially infect children and because HIV positive women are often viewed as promiscuous or "dirty" (Sandelowski et al., 2004; Sayles, Ryan, Silver, Sarkisian, & Cunningham, 2007). These beliefs create a unique set of circumstances surrounding the sexual and reproductive health of HIV positive women.

In addition to coping with social disparities and stigmatization, HIV positive women also experience disparities in health care compared to HIV positive men. HIV positive women are diagnosed later, receive less antiretroviral therapy, and consistently have higher HIV morbidity and mortality (Aziz & Smith, 2011; Hirschhorn et al., 2006; Meditz et al., 2011). HIV positive women have higher odds of experiencing both non-AIDS related illnesses such as candida vaginitis, generalized lymphadenopathy, and diarrhea and AIDS related illnesses such as recurrent pneumonia and candida esophagitis (Meditz et al., 2011). Low health literacy, inadequate insurance coverage, and mistrust of healthcare systems partially contribute to HIV positive women's poor health outcomes, however, gender disparities still exist when these factors are controlled for, suggesting additional factors contribute to poor health outcomes (Sohler, Li, & Cunningham, 2009).

Possible reasons for health disparities include women with HIV are more likely to delay entry into care due to insurance, transportation issues, childcare issues, feeling sick, or not feeling sick at all (Aziz & Smith, 2011). A lack of gender specific care may also contribute to health disparities. Past HIV research largely ignored possible gender differences in treatment, social issues, and psychological issues (Loufty et al., 2013). Additionally, less than half of HIV positive women report discussing gender-specific care and treatment and many HIV positive women have cited lack of gender-specific and reproductive care as a significant issue in the quality of their HIV care; as few as one third of HIV positive women receive STI testing and safe sex counseling (Simonsen et al., 2014; Squires et al., 2011). This highlights the need to increase information and understanding about the gender specific needs of HIV positive women, including contraception. Addressing the sexual and reproductive health needs, including provision of contraceptives, is important in maintaining the health of and providing quality care to these vulnerable women (Tsui et al., 2010).

Dual Methods

Ideally HIV positive women should have dual protection during each act of intercourse. Dual protection refers to protection from both sexually transmitted infections (STIs) and unintended pregnancy and is highly recommended for all women of childbearing age (WHO, 2006, 2015). Although condoms can be used for the prevention of both STIs and unintended pregnancy, in typical use they are only 82% effective at preventing pregnancy (WHO, 2006; Hatcher, Trussell, Cates, Kowal, & Policar, 2011). Because of the inadequate protection against unintended pregnancy provided by condoms

in everyday situations, dual methods of contraception (*dual methods)* that utilize condoms and a second highly effective, non-barrier method is recommended by the World Health Organization, the American Congress of Obstetricians and Gynecologists (ACOG), and other authoritative organizations (ACOG, 2010; HRSA, 2013; WHO, 2015). Hormonal contraceptives, IUDs, emergency contraceptives, and sterilization are all methods shown to be highly effective when used correctly and can provide over 99% protection from pregnancy (Hatcher, Trussell, Cates, Kowal, & Policar, 2011). Although dual methods are recommended as standard care, its use in the United States remains low; only about 8% of all reproductive age women utilize two methods of contraception and these percentages may be lower in women at higher risk for unintended pregnancy and STIs (Cavazos-Rehg et al., 2010; Mosher & Jones, 2010).

A better understanding of the factors that correlate with dual method use in HIV positive women is needed if targeted interventions are to be developed. For this study sociodemographic, pregnancy and parity, substance use, relationship, sexual history, healthcare utilization, psychosocial, and STI variables will be analyzed to obtain a more complete picture of dual method use in HIV positive women. Past research on use of dual methods has primarily focused on women who are HIV negative or comparisons between HIV negative and HIV positive women. Research on contraceptive choices in women from a variety of backgrounds provides guidance as to factors that may influence dual method use in HIV positive women. The following variables have been correlated with use of dual methods and/or contraceptive choices in HIV negative women: demographic factors such as age, race/ethnicity, level of education, and income, insurance coverage; conversations with providers; relationship factors such as

relationship status, intimate partner violence, and sexual behaviors; psychological and social factors such as depressive symptoms, familial norms, and community cohesion; and concerns about contracting STIs (Eisenberg, Allsworth, Zhao, & Peipert, 2012; Garbers, Correa, Tobier, Blust, & Chiasson, 2010; Harvey et al., 2004; Lang et al., 2011; Ong, Temple-Smith, Wong, McNamee, & Fairley, 2013; Peipert et al., 2011; Tyler et al., 2013; Williams, Larsen, & McCloskey, 2008). While these studies may provide an awareness of the factors that influence dual method use in HIV negative women, research has indicated that factors may differ significantly in HIV positive women (Kimani et al., 2015; Wilson, Koenig, Walter, Fernandez, & Ethier, 2003). Studies of HIV positive women have shown that lifestyle choices such as use of alcohol or illicit drugs and concerns about unintended pregnancy impact contraceptive choices and dual method use (Massad et al., 2007; Wilson et al., 2003). Additionally, these studies have shown that barrier methods are the most common contraceptive utilized by HIV positive women and that although the use of highly effective contraceptive methods such as birth control pills, injectable progestin, and intrauterine devices have increased in most women this trend has not carried over to HIV positive women (Massad et al., 2007; Sun et al., 2012).

HIV Positive Women and Dual Methods

STI Prevention. Avoiding transmission of STIs is an important part of maintaining an individual's health, but it is even more critical in HIV positive women because of the increased risk and costs associated with transmission. HIV positive women with human papillomavirus co-infections are more likely to develop abnormal pap smears and cervical cancer than HIV negative women (Hanisch et al., 2014;

Mbulawa et al., 2014). Rates of *Trichomonas vaginalis,* a sexually transmitted infection, also remain high among HIV positive women (Fastring et al., 2014; Muzny et al., 2013). Not only can *Trichomonas vaginalis* increase preterm birth and low birth weight in pregnant women, it also causes increased HIV-viral shedding which increases the likelihood of the HIV virus being transmitted to a woman's sexual partner (Fastring et al., 2014; Silver, Guy, Kaldor, Jamil, & Rumbold, 2014). One cost-analysis estimated that prevention and treatment of *Trichomonas vaginalis* translates into $159,264,000 cost savings per year in HIV infections avoided (Lazenby, Unal, Andrews, & Simpson, 2014). HIV positive women may also be more susceptible to *Neisseria gonorrhoeae* and *Chlamydia trachomatis,* which left untreated, can lead to pelvic inflammatory disease, chronic pelvic pain, and infertility (Soper, 2010; Venkatesh et al., 2011). Although condoms are not 100% effective at preventing transmission of HPV to sexually active women, they are the best method for protection against all STIs (Winer et al., 2006).

Pregnancy Prevention. Many HIV positive women are not properly protecting themselves from unintended pregnancy. One study found that only 19% of HIV positive women reported planning their current pregnancy and 68% were using no or inconsistent contraception when they became pregnant (Rahangdale et al., 2014). At least half of pregnancies may be unintended in HIV positive women (Loutfy et al., 2012; Rahangdale et al., 2014). One study showed that as many as 77% of HIV positive women were utilizing condoms as their primary form of contraception before conceiving (Massad et al., 2004). Similarly, an older study found that approximately 70% of HIV positive women with unplanned pregnancies reported using condoms prior to conception (Smits et al., 1999).

Preventing unintended pregnancies is critical for women living with HIV. In all women, unintended pregnancy is associated with low-birth weight infants and pre-term birth as well as later initiation of prenatal care (Orr, James, & Reiter, 2008; Shah et al., 2011). Pregnant HIV positive women currently on highly active antiretroviral therapy are at increased risk of pre-term birth, low birth weight, and stillbirth, and in all HIV positive women unintended pregnancy increases the risk mother to child transmission of HIV (Haeri et al., 2009; Hladik, Stover, Esiru, Harper, & Tappero, 2009; Mnyani et al., 2014; Townsend et al., 2007). The increased risks associated with unintended pregnancy, especially for HIV positive women on highly active antiretroviral therapy, make it imperative that they are able to protect themselves from unintended pregnancy through dual methods.

Summary

Dual method use ensures that HIV positive women can have safe, healthy, and planned pregnancies as well as protection from unwanted sexually transmitted infections. Not only does dual method use protect HIV positive women it also protects their sexual partners and potential children, which translates into millions of dollars saved per year and avoidance of the physical and social costs of STIs and unintended pregnancy.

References

ACOG. (2010). ACOG Practice Bulletin No. 117: Gynecological Care for Women With Human Immunodeficiency Virus. *Obstet Gynecol, 116*(6), 1492-1509. doi:10.1097/AOG.0b013e3182054cae

ART-CC (2008). Life expectancy of individuals on combination antiretroviral therapy in high-income countries: a collaborative analysis of 14 cohort studies. *Lancet, 372*(9635), 293-299. doi:10.1016/S0140-6736(08)61113-7

Aziz, M., & Smith, K. (2011). Challenges and successes in linking HIV-infected women to care in the United States. *Clin Infect Dis., 52*(Suppl 2), S231-237.

Berer, M. (2006). Dual protection: more needed than practised or understood. *Reprod Health Matters, 14*(28), 162-170.

Cavazos-Rehg, P., Krauss, M., Spitznagel, E., Schootman, M., Peipert, J., Cottler, L., & Bierut, L. (2010). Type of contraception method used at last intercourse and associates with health risk behviors among US adolescents. *Contraception, 82*(6), 549-555. doi:10.1016/j.contraception.2010.05.007

CDC. (2015). *HIV Surveillance Report, 2014*. Retrieved from http://www.cdc.gov/hiv/pdf/library/reports/surveillance/cdc-hiv-surveillance-report-us.pdf

Dehlendorf, C., Rodriguez, M., Levy, K., Borrero, S., & Steinauer, J. (2010). Disparities in family planning. *Am j Obstet Gynecol, 202*(3).

Eisenberg, D. L., Allsworth, J. E., Zhao, Q., & Peipert, J. F. (2012). Correlates of Dual-Method Contraceptive Use: An Analysis of the National Survey of Family Growth (2006-2008). *Infect Dis Obstet Gynecol, 2012*. doi:10.1155/2012/717163

Fastring, D., Amedee, A., Gatski, M., Clark, R., Mena, L., Levison, J., . . . Kissinger, P. (2014). Co-occurrence of Trichomonas vaginalis and bacterial vaginosis and vaginal shedding of HIV-1 RNA. *Sex Transm Dis, 41*(3), 173-179. doi:10.1097/OLQ.0000000000000089

Finocchario-Kessler, S., Dariotis, J., Sweat, M., Trent, M., Keller, J., Hafeez, Q., & Anderson, J. (2010). Do HIV-infected women want to discuss reproductive plans with providers, and are those conversations occuring. *AIDS Patient Care STDS, 24*(5), 317-323.

Garbers, S., Correa, N., Tobier, N., Blust, S., & Chiasson, M. A. (2010). Association Between Symptoms of Depression and Contraceptive Method Choices Among Low-Income Women at Urban Reproductive Health Centers. *Matern Child Health J, 14*, 102-109. doi:10.1007/s10995-008-0437-y

Haeri, S., Shauer, M., Dale, M., Leslie, J., Baker, A., Saddlemire, S., & Boggess, K. (2009). Obstetric and newborn infant outcomes in immunodeficiency virus-infected women who are receiving highly active antiretroviral therapy. *Am j Obstet Gynecol, 201*(3), 315.e311-315.e315. doi:10.1016/j.ajog.2009.06.017

Hanisch, R., Cherne, S., Sow, P., Winer, R., Hughes, J., Feng, Q., . . . Hawes, S. (2014). Human papillomavirus type 16 viral load in relation to HIV infection, cervical neoplasia and cancer in Senegal. *Cancer Epidemiol, 38*(4), 369-375. doi:10.1016/j.canep.2014.04.005

Harvey, S., Henderson, J., & Branch, M. (2004). Protecting Against Both Pregnancy and Disease: Predictors of Dual Method Use among a Sample of Women. *Women Health, 39*(1), 25-43.

Hatcher, R. A., Trussell, J., Cates, W., Kowal, D., & Policar, M. S. (2011). *Contraceptive Technology* (20th ed.): Ardent Media.

Hirschhorn, L. R., McInnes, K., Landon, B. E., Wilson, I. B., Ding, L., Marsden, P. V., . . . Cleary, P. D. (2006). Gender differences in quality of care in Ryan White CARE Act-funded clinics. *Womens Health Issues, 16*(3), 104-112.

Hladik, W., Stover, J., Esiru, G., Harper, M., & Tappero, J. (2009). The Contribution of Family Planning towards the Prevention of Vertical HIV Transmission in Uganda. *PLoS One, 4*(11), e7691. doi:10.1371/journal.pone.0007691

Hodgson, E. J., Collier, C., Hayes, L., Curry, L. A., & Fraenkel, L. (2012). Family planning and contraceptive decision-making by economically disadvantaged, African-American women. *Contraception*. doi:10.1016/j.contraception.2012.10.011

HRSA. (2013). *A Guide to the Clinical Care of Women wth HIV - 2013 edition*. Rockville, Maryland: U.S. Department of Health and Human Services.

Kimani, J., Warren, C., Abuya, T., Mutemwa, R., Initiative, I., Mayhew, S., & Askew, I. (2015). Family planning use and fertility desires among women living with HIV in Kenya. *BMC Public Health, 15*(909). doi:10.1186/s12889-015-2218-z

Lang, D., Sales, J., Salazar, L., DiClemente, R., Crosby, R., Brown, L., & Donenberg, G. (2011). Determinants of Multimethod Contraceptive Use in a Sample of Adolescent Women Diagnosed with Psychological Disorders. *Infect Dis Obstet Gynecol, 2011*. doi:10.1155/2011/510239

Lazenby, G., Unal, E., Andrews, A., & Simpson, K. (2014). Cost-Effective Analysis of Annual *Trichomonas vaginalis* Screening and Treatment in HIV-Positive Women

to Prevent HIV Transmission. *Sex Transm Dis, 41*(6), 353-358. doi:10.1097/OLQ.0000000000000008

Lopez, L. M., Stockon, L. L., Chen, M., Steiner, M. J., & Gallo, M. F. (2014). Behavioral interventions for improving dual-method contraceptive use. *Cochrane Database Syst Rev, 30*(3). doi:10.1002/14651858.CD010915.pub2

Loufty, M. R., Sherr, L., Sonnenberg-Schwan, U., Walmsley, S. L., Johnson, M., & Monforte, A. (2013). Caring for women living with HIV: gaps in the evidence. *J Int AIDS Soc, 16*. doi:10.7448/IAS.16.1.18509

Loutfy, M. R., Raboud, J., Wong, J., Yudin, M., Diong, C., Blitz, S., . . . Walmsley, S. (2012). High prevalence of unintended pregnancies in HIV-positive women of reproductive age in Ontario, Canada: a retrospective study. *HIV Med, 13*(2). doi:10.1111/j.1468-1293.2011.00946.x

Massad, L. S., Evans, C. T., Wilson, T. E., T., G. E., Sanchez-Keeland, L., Minkoff, H., . . . Watts, D. H. (2007). Contraceptive Use among U.S. Women with HIV. *Journal of Women's Health, 16*(5), 657-666.

Massad, L. S., Springer, G., Jacobson, L., Watts, H., Anastos, K., Korn, A., . . . Minkoff, H. (2004). Pregnancy rates and predictors of conception, miscarriage and abortion in US women with HIV. *AIDS, 18*(2), 281-286.

Mbulawa, Z., Johnson, L., Marais, D., Gustavsson, I., Moodley, J., Coetzee, D., . . . Williamson, A. (2014). Increased alpha-9 human papillomavirus species viral load in human immunodeficiencey virus positive women. *BMC Infectious Disease, 14*(51). doi:10.1186/1471-2334-14-51

McLeroy, K. R., Bibeau, D., Steckler, A., & Glanz, K. (1988). An Ecological Perspective on Health Promotion Programs. *Health Education Quarterly, 15*(4), 351-377.

Meditz, A. L., MaWhinney, S., Allshouse, A., Feser, W., Markowitz, M., Little, S., . . . Connick, E. (2011). Sex, race, geographic region influence clinical outcomes following primary HIV-1 infection. *J Infect Dis., 203*(4), 442-451. doi:10.1093/infdis/jiq085

Mnyani, C. N., Simango, A., Murphy, J., Chersich, M., & McIntyre, J. A. (2014). Patient factors to target for elimination of mother-to-child transmission of HIV. *Global Health, 10*(36). doi:10.1186/1744-8603-10-36

Mosher, W. D., & Jones, J. (2010). Use of contraception in the United States: 1982-2008. *Vital Health Stat 23*(29), 1-44.

Muzny, C. A., Rivers, C. A., Austin, E. L., & Schwebke, J. R. (2013). Trichomonas vaginalis infection among women receiving gynaecological care at an Alabama HIV Clinic. *Sex Transm Infect, 89*(6), 514-518. doi:10.1136/sextrans-2012-050889

O'Leary, A. (2011). Are dual-method messages undermining STI/HIV prevention? *Infect Dis Obstet Gynecol, 2011*, 691210. doi:10.1155/2011/691210

Ong, J., Temple-Smith, M., Wong, W., McNamee, K., & Fairley, C. (2013). When Two Is Better Than One: Differences in Characteristics of Women Using Condoms Only Compared to Those Using Condoms Combined with an Effective Contraceptive. *Journal of Women's Health, 23*(2), 168-174. doi:10.1089/jwh.2013.4319

Orr, S., James, S., & Reiter, J. (2008). Unintended pregnancy and prenatal behaviors among urban, black women in Baltimore, Maryland: the Baltimore preterm birth study. *Ann Epidemiol, 18*(7), 545-551. doi:10.1016/j.annepidem.2008.03.005

Peipert, J. F., Zhao, Q., Meints, L., Peipert, B. J., Redding, C. A., & Allsworth, J. E. (2011). Adherence to dual-method contraceptive use. *Contraception, 84*, 252-258. doi:10.1016/j.contraception.2011.01.023

Prejean, J., Song, R., Hernandez, A., Ziebell, R., Green, T., Walker, F., . . . Hall, H. I. (2011). Estimated HIV Incidence in the United States, 2006-2009. *PLoS One, 6*(8), 1-13.

Prevention, C. f. D. C. a. (2015). *HIV Surveillance Report, 2013*. Retrieved from http://www.cdc.gov/hiv/library/reports/surveillance/

Rahangdale, L., Stewart, A., Stewart, R., Badell, m., Levison, J., Ellis, P., . . . Cohan, D. (2014). Pregnancy Intentions Among Women Living With HIV in the United States. *J Acquir Immune Defic Syndr, 65*, 306-311. doi:10.1097/QAI.0000000000000014

Rosenthal, S. L., Weiss, T. W., Zimet, G. D., Ma, L., Good, M. B., & Vichnin, M. D. (2011). Predictors of HPV vaccine uptake among women aged 19-26: importance of a physician's recommendation. *Vaccine, 29*(5), 890-895. doi:10.1016/j.vaccine.2009.12.063

Sales, J., Latham, T., DiClemente, R., & Rose, E. (2010). Differences Between Dual-Method and Non-Dual-Method Protection Use in a Sample of Young African American Women Residing in the Southeastern United States. *Arch Pediatr Adolesc Med, 164*(12), 1125-1131.

Sallis, J., Owen, N., & Fisher, E. (2008). Ecological models of behavior. In K. Glanz, B. K. Rimer, & F. M. Lewis (Eds.), *Health Behavior and Health Education: Theory, Research and Practice* (3rd ed.). San Francisco: Jossey-Bass.

Sandelowski, M., Lambe, C., & Barroso, J. (2004). Stigma in HIV-positive women. *J Nurs Scholarsh, 36*(2), 122-128.

Sayles, J. N., Ryan, G. W., Silver, J. S., Sarkisian, C. A., & Cunningham, W. E. (2007). Experiences of social stigma and implications for healthcare among a diverse population of HIV positive adults. *J Urban Health, 84*(6), 814-828. doi:10.1007/s11524-007-9220-4

Shah, P., Balkhair, T., Ohlsson, A., Beyene, J., Scott, F., & Frick, C. (2011). Intention to become pregnant and low birth weight and preterm birth: a systemic review. *Matern Child Health J, 15*(2), 205-216. doi:10.1007/s10995-009-0546-2

Silver, B., Guy, R., Kaldor, J., Jamil, M., & Rumbold, A. (2014). Trichomonas vaginalis as a cause of perinatal morbidity: a systemic review and meta-analysis. *Sex Transm Dis, 41*(6), 369-376. doi:10.1097/OLQ.0000000000000134

Simonsen, S. E., Kepka, D., Thompson, J., Warner, E. L., Snyder, M., & Ries, K. M. (2014). Preventative health care among HIV positive women in a Utah HIV/AIDS clinic: a retrospective cohort study. *BMC Womens Health, 14*(37). doi:10.1186/1472-6874-14-37

Smits, A. K., Goergen, C. A., Delaney, J. A., Williamson, C., Mundy, L. M., & Fraser, V. J. (1999). Contraceptive use and pregnancy decision making among women with HIV. *AIDS Patient Care STDS, 13*(12), 739-746.

Sohler, N. L., Li, X., & Cunningham, C. O. (2009). Gender disparities in HIV health care utilization among the serverly disadvantaged: can we determine the reasons? *AIDS Patient Care STDS, 23*(9), 775-783.

Soper, D. (2010). Pelvic inflammatory disease. *Obstet Gynecol, 116*(2 pt 1), 419-428. doi:10.1097/AOG.0b013e3181e92c54

Squires, K. E., Hodder, S. L., Feinberg, J., Bridge, D. A., Abrams, S., Storfer, S. P., & Aberg, J. A. (2011). Health needs of HIV-infected women in the United States: insights from the women living positive survey. *AIDS Patient Care STDS, 25*(5), 279-285. doi:10.1089/apc.2010.0228

Stanwood, N. L., Cohn, S. E., Heiser, J. R., & Pugliese, M. (2007). Contraception and fertility plans in a cohort of HIV-positive women in care. *Contraception, 75*(4), 294-298. doi:10.1016/j.contraception.2006.12.012

Sun, M., Peipert, J. F., Zhao, Q., Wilson, T. E., Weber, K. M., Sanchez-Keeland, L., . . . Massad, L. S. (2012). Trends in contraceptive use among women with human immunodeficiency virus. *Obstet Gynecol, 120*(4), 783-790. doi:10.1097/AOG.0b013e318269c8bb

Teti, C., Chilton, M., Lloyd, L., & Rubinstein, S. (2006). Identifying the links between violence against women and HIV/AIDS: ecosocial and human rights frameworks offer insight into U.S. prevention policies. *Health Hum Rights, 9*(2), 40-61.

Townsend, C. L., Cortina-Borja, M., Peckham, C., & Tookey, P. (2007). Antiretroviral therapy and premature delivery in diagnosed HIV-infected women in the United Kingdom and Ireland. *AIDS, 21*(8), 1019-1026.

Tsui, A. O., McDonald-Mosley, R., & Burke, A. E. (2010). Family planning and the burden of unintended pregnancies. *Epidemiol Rev, 32*(1), 152-174. doi:10.1093/epirev/mxq012

Tyler, C. P., Whiteman, M. K., Kraft, J. M., Zapata, L. B., Hillis, S. D., Curtis, K. M., . . . Marchbanks, P. A. (2013). Dual Use of Condoms With Other Contraceptive Methods Among Adolescents and Young Women in the United States. *Journal of Adolescent Health*. doi:10.1016/j.jadohealth.2013.07.042

Venkatesh, K., van der Straten, A., Mayer, K. H., Blanchard, K., Ramjee, G., Lurie, M., . . . de Bruyn, G. (2011). African Women Recently Infected with HIV-1 and HSV-2 Have Increased Risk of Acquiring *Neisseria gonorrhoeae* and *Chlamydia trachomatis* in the Methods from Improving Reproductive Health in Africa Trial. *Sex Transm Dis, 38*(6), 562-570. doi:10.1097/OLQ.0b013e31820a8c2c

WHO. (2006). *Sexual and Reproductive Health of Women Living With HIV*. Retrieved from http://www.who.int/hiv/pub/guidelines/sexualreproductivehealth.pdf

WHO. (2015). *Medical Eligibility Criteria for Contraceptive Use* (5 ed.). Retrieved from http://who.int/reproductivehealth/publications/family_planning/MEC-5/en/

WHO, UNAIDS, & UNICEF. (2011). *Global HIV/AIDS Response: Epidemic update & health sector progress towards universal access.* Retrieved from http://www.who.int/hiv/pub/progress_report2011/en/

Williams, C. M., Larsen, U., & McCloskey, L. A. (2008). Intimate Partner Violence and Women's Contraceptive Use. *Violence Against Women, 14*, 1382-1396. doi:10.1177/1077801208325187

Wilson, T. E., Koenig, L. J., Walter, E., Fernandez, I., & Ethier, K. (2003). Dual contraceptive method use for pregnancy and disease prevention among HIV-infected and HIV-uninfected women: the importance of an event-level focus for promoting safer sexual behaviors. *Sex Transm Dis, 30*(11), 809-812. doi:10.1097/01.olq.0000086617.41012.14

Winer, R., Hughes, J., Feng, Q., O'Reilly, S., Kiviat, N., Holmes, K., & Koutsky, L. (2006). Condom use and the risk of human papillomavirus infection in young women. *N Engl J Med, 354*(25), 2645-2654.

Chapter 2: An Integrative Review of Dual Method Contraceptive Use in HIV Positive Women

Background

Women comprise 50% of the over 35 million people living with HIV (PLHIV) in the world today and the number continues to rise (UNAIDS, 2014). With the advent of combination antiretroviral medication (cART), women living with HIV (WLHIV) live longer, healthier lives and experience increased fertility (ART-CC, 2008; Marston et al., 2016). As a result, attending to the sexual and reproductive health (SRH) needs has become even more important (ACOG, 2010; Squires et al., 2011). However, research suggests that SRH needs of this population are not being fully met as evidenced by high rates of unintended pregnancy (Narasimhan et al., 2016; Rahangdale, Stewart, et al., 2014). Unintended pregnancy is associated with low birth weight and pre-term birth in all women. For WLHIV, unintended pregnancy is associated with increased risk of pre-term birth, low birth weight, and stillbirth for women on highly active antiretroviral therapy (HAART) as well as increased risk of mother to child transmission of HIV (Mnyani, Simango, Murphy, Chersich, & McIntyre, 2014; Shah et al., 2011; Townsend, Cortina-Borja, Peckham, & Tookey, 2007). Proper protection from unintended pregnancy is significantly more effective at preventing mother to child transmission of HIV than treatment with ARVs (Hladik, Stover, Esiru, Harper, & Tappero, 2009). Condoms have been widely promoted because of the dual protection from HIV and sexually transmitted infection (STI) transmission and pregnancy they provide. Unfortunately, with typical use, condoms are approximately 82% effective at preventing

pregnancy compared to other available contraceptive options that range from 91% to 99.95% effective at preventing pregnancy (Hatcher, Trussell, Cates, Kowal, & Policar, 2011). Many WLHIV report exclusive condom use prior to conception, these women need better protection from pregnancy than condoms alone can provide (Massad et al., 2004; Smits et al., 1999).

The most effective form of protection from HIV/STI transmission and unintended pregnancy for WLHIV is the use of two contraceptive methods, one effective at preventing pregnancy and the second for preventing HIV/STI transmission, mainly male or female condoms. This is known as *dual methods* (Cates & Steiner, 2002). Dual methods is critical because provision of effective forms of contraceptives can reduce the incidence of pregnancy in HIV positive women significantly regardless of antiretroviral medication (ARV) use (Pyra et al., 2015). Additionally, use of dual methods provides comparable protection from STIs as condoms alone (Hood, Hogben, Chartier, Bolan, & Bauer, 2014). Use of dual methods ensures that WLHIV can have safe and healthy planned pregnancies, protection from unwanted sexually transmitted infections, and minimize risk for their sexual partners. Despite World Health Organization recommendations and growing evidence that highly effective forms of contraception are safe in most WLHIV, dual method use in women living with HIV remains low (Stanwood, Cohn, Heiser, & Pugliese, 2007; Sun et al., 2012; WHO, 2015).

Reviews of dual methods exist, but none of these have focused solely on WLHIV (Berer, 2006; Cates & Steiner, 2002; O'Leary, 2011). These can provide some insight into the complex behavior of dual method use, but some factors surrounding dual method use by WLHIV may be unique. Prior studies have shown that WLWHIV use condoms

more consistently with dual methods and are more likely to use condoms and other contraceptives simultaneously than their HIV negative peers (Kimani et al., 2015; Marlow, Maman, Moodley, Curtis, & Reyes, 2015; Wilson, Koenig, Walter, Fernandez, & Ethier, 2003). The purpose of this integrative review is to better understand the factors that impact dual method use in WLHIV and identify interventions to promote dual method use for these women.

Methods

This review utilized the methodological guidelines described by Whittmore and Knafl (2005). The purpose of this review was to answer the following questions:

1) What are barriers and facilitators to dual method use in women living with HIV?

2) What interventions increase dual method use in women living with HIV?

3) What do practice guidelines recommend?

Dual method use was defined as use of a male or female condom with a second form of contraception effective at preventing pregnancy including hormonal contraception, intrauterine devices, tubal ligation, Essure, or vasectomy. Studies conducted both inside and outside the United States were included.

Literature Search

A literature search was conducted in PubMed, CINAHL, and EMBASE using the key search terms: dual methods, dual protection, dual contraceptive use, dual contraception, multi-method contraception, multiple method contraception, contraceptive

use AND HIV AND women, women AND HIV AND contraception, and family planning AND HIV AND women. Journal articles included in this review were limited to English language articles published in peer-reviewed journals between January 1, 1999 and January 25, 2016. Included articles were original research focused on women living with HIV and pertaining to dual method use of contraceptives. Clinical trials, randomized controlled trials, cohort, cross-sectional, qualitative, and longitudinal studies were included. Case studies were excluded from the analysis. Articles were also excluded if they only described prevalence of dual methods or did not have a distinct analysis of HIV positive women and dual method use.

Due to a lack of interventional studies published in the databases above, a search of government and authoritative organizations was performed to examine recommendations for dual methods. Those organizations included the World Health Organization (WHO), the Centers for Disease Control (CDC), UNAIDS, the American College of Obstetrics and Gynecology (ACOG), Health Resources and Services Administration (HRSA), the National Institutes of Health, the Infectious Disease Society of America, and the National Guideline Clearinghouse. The most recent guidelines discussing dual method use and interventions to improve uptake in WLHIV were included in the final review analysis.

Figure 2 illustrates the steps in the literature search. The electronic database search yielded 3,512 results of which 1,310 were duplicates. The 2,202 unique titles and abstracts were reviewed for relevance. If the article referenced contraception or family planning in women living with HIV the article was read in its entirety. A total of 147 articles were read for content related to dual method use in women living with HIV. The

reference lists of these 147 articles were also read for additional relevant articles to include in the review. No additional articles were identified this way.

Data Extraction and Analysis

Data was extracted from articles meeting our inclusion criteria and selected guidelines were entered into a literature grid that described study type (or guideline), sample population, measure of dual method use, and key findings/recommendations about dual method use. Articles were reread and organized by original research questions of this review to reduce the data. Key findings and recommendations were then analyzed for patterns and themes in the data. Two of the authors independently reviewed the data and identified themes to reduce bias. Lastly, synthesis of the key findings and themes was conducted.

Results

Overview

Of the 2202 articles identified, 14 articles met our inclusion criteria and an additional six guidelines selected were included in this review (figure 1). Table 1 provides information on the 14 articles and Table 2 provides information on the six guidelines included. Most of the articles (n=13) were published in the past 10 years and 11 were published in the past five years. Half of the guidelines (n=3) were published within the last five years and all of the guidelines (n=6) were published in the last 10 years. Only two articles reported on randomized control trials to increase dual method use in HIV positive women and only one clinical guideline provides specific

interventions to promote dual methods. Most articles (n=9) reported on research done in African countries, three were from the United States, and two in Asian countries. A variety of methods were reported: seven prospective analyses, one retrospective analysis, two mixed methods, one quasi-experimental, one qualitative analysis, and two randomized controlled trials. Rates of dual method use were very low ranging from 11% to 27.2% (Chakrapani et al., 2011; Lawani, Onyebuchi, & Iyoke, 2014).

Overall, the quality of evidence concerning dual method use was poor due to lack of standard definition and a secondary focus on dual methods. *Dual method* use was the primary outcome of interest in only five of the articles; contraceptive use or choice was the primary outcome in most articles (n=8). Only four articles and one guideline explicitly defined *dual method* contraceptive use as the use of condoms with a second effective form of contraception. One article and three guidelines used the term *dual protection*. However, definitions of *dual protection* varied. One article and one of the guidelines that used the term dual protection defined it as the use of both a barrier method and a second contraceptive method, i.e. the definition of *dual methods*. The other two guidelines defined *dual protection* as the simultaneous protection from STI and unintended pregnancy, which can be achieved through abstinence, condoms alone, or condoms with a second form of contraception.

Barriers/Facilitators

Parity and fertility desires. Parity and fertility desires were found to significantly impact dual methods in three separate studies. Two studies reported significant impact of number of children on dual method use. Chibwesha and colleagues

(2011) reported that in a cross-sectional analysis of 18,407 HIV positive women receiving care at public HIV clinics in Lusaka, Zambia, having one or more children increased the odds of dual method use (AOR 2.07, 95% CI=1.59-2.70). Whiteman et al. (2009) performed an analysis of contraceptive naïve, HIV positive women in Russia and found that WLHIV were significantly more likely to choose dual methods if they had a history of two or more live births (prevalence ratio=1.4) or had enrolled in the study during the postpartum period (prevalence ratio=1.3). Additionally, women were more likely to choose dual methods if they desired future fertility or were uncertain if they desired future pregnancy (prevalence ratio=1.3) (Whiteman et al., 2009). A study by Antelman and colleagues (2015) of 3375 HIV positive men and women attending HIV clinics in Kenya, Namibia, and Tanzania found that having fewer children was associated with decreased odds of dual method use ($AOR_{\text{none vs. 4+}}$ 0.32, 95% CI=0.18-0.55; $AOR_{\text{1 vs. 4+}}$ 0.0.65, 95% CI=0.47-0.91) as was reporting that their partner desired pregnancy a child (AOR 1.51, 95% CI=1.08-2.11). Overall, having more children increases the likelihood of dual method use and possible desire for future fertility may also influence uptake, however with an opposite trend towards decreased use when fertility is desired by a woman's partner.

Relationship factors. A number of relationship factors were reported to influence dual method use. Relationship status significantly influenced dual method use in two analyses. Antelman, et al. (2015) reported that women who were single, widowed, or divorced were less likely to use dual methods compared to married women (AOR 0.75, 95% CI=1.59-2.70). Similarly, Chibwesha et al., (2011) found that participants who

reported being divorced or separated were less likely than those who had never been married to use dual methods (AOR 0.62, 95% CI=0.39-0.97).

Non-disclosure of HIV status to sexual partners was a barrier to dual method use in some but not all studies. Lawani et al. (2014) showed in a cross-sectional study of 658 WLHIV receiving care at PMTCT/postnatal/family planning clinics in southeast Nigeria that 27.8% (133/479) of WLHIV indicated that non-disclosure of HIV status was the primary reason for not using dual methods. Similarly, Saeieh et al. (2016) found in a qualitative study of 18 HIV positive women in Iran that women who had not disclosed their HIV status felt that insisting on using condoms would raise suspicions. Antelman et al. (2015), however, did not find a significant relationship between disclosure of HIV status and dual method use.

The partner's involvement, desire for contraception and relationship power dynamics seem to influence dual method use. In Saeieh and colleagues (2016), participants suggested that men's social power makes it difficult for women to insist on contraceptives for fear of violence. In a mixed methods study of married PLHIV in India, Chakrapani and colleagues (2011) found that reporting dual methods due to partner preference significantly increased the odds of dual method use (OR 2.76, 95% CI=1.08-7.06). Further, female participants had significantly higher odds of dual method use if they reported using dual methods to prevent risk of transmission to their partner (OR 4.48, 95% CI=1.48-13.54) (Chakrapani et al., 2011). These findings were echoed in the 25 in-depth interviews and seven focus groups that comprised the qualitative portion of the study, which found that lack of husband involvement in discussions of family planning were seen as a barrier to dual method use (Chakrapani et al., 2011). Another

mixed methods study by Church et al. (2014) that interviewed 16 HIV care providers and 18 HIV positive patients enrolled in care in Swaziland revealed that women were concerned dual methods would amplify men's resistance to using condoms. Lastly, in Antelman et al. (2015), participants who reported being comfortable asking their partner to use a condom had significantly higher odds of dual method use (AOR 3.58, 95% CI=2.04-6.25).

HIV and health related factors. Factors related to personal health and HIV also impacted dual method use. Three studies found that HIV diagnosis influenced uptake of dual method use. Melaku & Zeleke (2014) found in a cross-sectional analysis of 847 HIV positive women in Northern Ethiopia that no participants were utilizing dual methods before being diagnosed with HIV and 14% reported dual method use afterward. Chakrapani et al. (2011) found that 5% of PLHIV reported dual methods before diagnosis and 23% reported dual methods after receiving their diagnosis. Antelman et al. (2015) found that receiving a diagnosis of HIV in the past year significantly increased the odds of dual method use compared to three or more years (AOR 1.45, 95% CI=1.02-2.06).

Three studies reported on the impact of CD4 cell count on dual method use, with mixed findings. Chibwesha et al. (2011) found that women who had CD4 cell count ≥ 351cells/μL had significantly higher odds (AOR 1.25, 95% CI=1.09-1.45) of dual method use while Chakrapani et al. (2011) found that higher CD4 cell counts decreased the odds of dual method use (OR_{men} 0.73 per increase of 50 cells/μL; OR_{women} 0.75 per increase 50 cells/μL). However, Antelman et al. (2015) reported that CD4 had no significant impact on odds of dual method use.

Church and colleagues (2014) found that participants viewed dual methods as cumbersome due to the extra effort and money it requires. This extra effort compounded with changes in sexual behavior and energy level due to illness deterred participants from using dual methods (Church et al., 2014). In addition, history of tuberculosis and recent injection drug use were also related to dual methods. Chibwesha et al. (2011) reported that participants with no prior history of tuberculosis were more likely to report dual method use (AOR 1.17, 95% CI=1.01-1.35). Whiteman and colleagues (2009) reported that participants who reported recent injection drug use were significantly more likely to choose dual methods over condoms alone (prevalence ration=1.3). Additionally, the study found women who had previously used oral contraceptives (prevalence ratio=1.3) and never or sometimes used condoms in the past year (prevalence ratio=1.9) were more likely to choose dual methods (Whiteman et al., 2009).

Healthcare related factors. Factors such as knowledge and attitudes of HIV providers and types of HIV care also impacted dual method use. Raifman et al. (2014) investigated the impact of progression through the HIV care cascade on contraceptive and dual method use in 3,169 HIV positive women in various stages of HIV care progression: HIV diagnosis, ART initiation, ART for one year, ART for 1-2 years, ART for 2-4 years, and receiving ART for 4-7 years. The study found that at most stages of the HIV care progression the probability of dual method use increased significantly starting at HIV diagnosis (3.5 percentage points) to ART initiation (5.2pp) to ART use for 4-7 years (11.2pp) (Raifman et al., 2014). While progression through the HIV care cascade,

influenced uptake of dual methods, Antelman et al. (2015) found that current receipt of anti-retroviral therapy did not have a significant relationship with dual method use.

HIV care providers may also play a role in uptake of dual method use. According to Church and colleagues (2014), HIV care providers reported that condoms were the primary method of family planning they recommended even when other contraceptive methods were available. The qualitative findings of the study were supported by the quantitative analysis, which showed that of patients using any form of modern contraception, 79.8% used condoms alone while only 11.1% reported dual methods (Church et al., 2014). Additionally, 19% of female participants using condoms reported previous use of non-condom contraceptives, a quarter of whom switched as a result of provider advice (24%) (Church et al., 2014). Blanchard and colleagues (2014) reported on a survey of 1,444 clinicians practicing in healthcare facilities that provided HIV care, family planning, or both in South Africa and Zimbabwe that showed 94.3% recommended dual methods to HIV positive women, but less than half thought contraceptive methods such as injectable contraceptives (42.0%), oral contraceptives (25.2%), and IUDs (4%) were appropriate for HIV positive women. The same study also showed that clinicians trained in family planning were significantly more likely to consider oral contraceptives (OR 1.50, 95% CI=1.09-2.06) or injectables (OR 1.38, 95% CI=1.38-1.77) appropriate for WLHIV (Blanchard et al., 2014). Another survey described by Rahangdale et al. (2014) of 77 physicians, nurse practitioners, and physician assistants who provide care to WLHIV in the United States, found that 43% of providers felt that condoms alone were sufficient for both prevention of STIs and pregnancy, but only 57% of providers reported always or often talking about contraception and only 30%

of providers felt comfortable prescribing hormonal contraceptives to HIV positive women.

HIV positive women's knowledge. A number of qualitative and quantitative analyses indicated that issues surrounding HIV positive women's knowledge of dual methods influence utilization. In Saeieh and colleagues' (2016) qualitative study, HIV positive Iranian women indicated that they had received little or no information about the use of a second contraceptive method with condoms. Similarly Chakrapani et al. (2011) found that family planning counseling primarily focused on condom use and a number of participants who had previously been using non-condom contraceptives discontinued them while other participants were concerned about severe side effects from oral contraceptives and IUDs. Further, Church et al. (2014) found that some PLHIV viewed non-condom contraceptives as a back up to condoms despite concerns over unintended pregnancy. Lawani et al. (2014) reported on a quantitative analysis of HIV positive women in Nigeria that supported these findings; the majority of women in the study (67.9%) were unfamiliar with the practice of dual method use and 46.3% of non-dual method users cited this as their main reason for not practicing dual methods.

Correspondingly, increased HIV and family planning counseling may have a positive effect on dual method use. Antelman et al. (2015) found that recent conversations with a health care provider about family planning increased the odds of dual method use (AOR 1.37, 95% CI=1.10-1.69) and Chakrapani et al. (2011) found that married PLHIV were significantly more likely to report dual method use if they had received posttest HIV counseling (OR 2.96, 95% CI=1.22-7.19).

Sociodemographic. Only one sociodemographic factor was reported to influence dual methods, age. Antelman et al. (2015) found that older age significantly decreased the odds of dual methods when adjusting for other factors including parity and marital status. Chibwesha et al. (2011) also found that older age independently decreased odds of dual method use when controlling for parity and marital status. Neither education nor income significantly impacted odds of dual methods in either analysis.

Interventions

Only two randomized control interventions were identified that specifically focused on increasing uptake of dual method use in HIV positive women and both showed mixed results. Fogarty and colleagues (2001) investigated the effectiveness of a peer-based intervention that used the Stage of Change model as a framework. Primary behaviors assessed were condom use behaviors with main male partner, condom use behavior with other male partners, and non-condom contraceptive use (Fogarty et al., 2001). Participants were divided into two groups, intervention and control (Fogarty et al., 2001). Participants in the intervention group were given access to a trained peer advocate whom they met with to discuss both target behaviors as well as any life circumstances such as housing instability and child custody issues and the peer advocate could provide referrals to needed services (Cabral, Galavotti, Gargiullo, & Armstrong, 1996). In addition, the intervention group had access to weekly drop in support groups led by peer advocates where participants could discuss barriers to primary outcome behaviors and develop strategies to overcome these barriers (Fogarty et al., 2001). Both

the control and intervention groups had access to comprehensive reproductive healthcare (Fogarty et al., 2001). The study found that participants in the intervention group were significantly more likely to improve or maintain condom use behaviors at six months, but not at 6-12 months or 12-18 months (Fogarty et al., 2001). At 6-12 months, women in the intervention group had a significantly larger increase in condom self-efficacy. Additionally, comparison of baseline and 12-18 month data for participants reporting inconsistent condom use at baseline, showed greater improvement in consistency of condom use in the intervention group. Contraceptive behaviors only showed significant improvement at 12-18 months in the intervention group compared to the control group. However, participants in the intervention group were more likely to perceive the disadvantages of contraceptives at 12-18 months. Unfortunately, the study did not provide analysis of the occurrence of these behaviors in an individual i.e. condom use and contraceptive use in one individual.

A second intervention described by Grossman et al. (2013) investigated the efficacy of integrating family planning services with HIV services in Kenya in increasing uptake of dual method use. The study randomized 18 health facilities of various sizes to either the integrated arm or standard arm. Staff at all participating clinics underwent training to initiate discussions regarding contraceptive use, condom use, and family planning with all clients. HIV clinics in the intervention group received additional training on provision of family planning services, and they provided all reversible family planning methods on site. Staff in the HIV clinics in the standard arm had to refer clients to the family planning services and the services were not necessarily available at the same time as HIV services. Overall, dual method use increased from baseline at both the

integrated clinics (10.1% to 20.9%) and the standard care clinics (11.5% to 19.1%). The odds of dual method use at the integrated site compared to the standard site were 1.3, but this was not significant (95% CI=0.77-2.17).

Guidelines

National Guidelines. A total of five national organizations (ACOG, NIH, HRSA, IDSA, IAS-USA) recommended dual method use for WLHIV. As part of ongoing preconception care and counseling, the HRSA (2013), IAS-USA (2007), and HHS (2015) guidelines recommended discussing pregnancy intentions and dual method use. Guidelines recommended that WLHIV wishing to avoid pregnancy should be provided with contraceptives that are highly effective at preventing pregnancy in addition to condoms because of the high failure rate of condoms. Discussing fertility desires was also recommended by these guidelines (Aaron & Criniti, 2007; HRSA, 2013; Transmission, 2015). All five national guidelines recommended additional counseling on condom use and emphasized the need to provide education on consistent use (Aaron & Criniti, 2007; Aberg et al., 2014; ACOG, 2010; HRSA, 2013; HHS, 2015).

A number of concerns about the provision of highly effective contraceptives were raised. The major issue for consideration was drug interactions. The IDSA, ACOG, HRSA, and HHS guidelines all discussed possible interactions between hormonal contraceptives and certain ARV drugs (Aberg et al., 2014; ACOG, 2010; HRSA, 2013; Transmission, 2015). The ACOG, HRSA, and HHS guidelines provided visuals or tables describing the actual or theoretical interactions between specific ARVs and specific hormonal contraceptives (ACOG, 2010; HRSA, 2013; Transmission, 2015). A second

concern raised by the ACOG and HRSA guidelines was decreased consistency of condom use as a result of receiving a highly effective contraceptive (ACOG, 2010; HRSA, 2013). Overall, interactions with ARVs and concerns about consistency of condom use were the main barriers to dual methods described in the guidelines.

Guidelines provided very little guidance on the best approaches to providing dual methods to HIV positive women. All but the ACOG (2010) guidelines recommended discussing fertility intentions and counseling patients about the use of contraceptives and condoms on a regular basis (Aaron & Criniti, 2007; Aberg et al., 2014; HHS, 2015). The HRSA (2013) guideline provides extensive materials to guide clinicians including decision aids for patients and providers and comprehensive preconception evaluation as well as information on different types of contraceptives, the contraindications, and benefits and disadvantages. Additionally, the HRSA (2013) guideline recommends using motivational interviewing along with the stage of change model for counseling on use of condoms and contraceptive use to avoid pregnancy and STI/HIV transmission.

International guidelines. The World Health Organization (2006) recommends that women desiring to avoid or postpone pregnancy be counseled on all of the contraceptive options available. It recommends that in order to make an informed choice about dual method use women need information on effectiveness, mode of action, proper use of methods, risks and benefits, side effects, costs, issues of convenience, potential drug interactions, and issues with cost and convenience (WHO, 2006).

Discussion

Findings from this review suggest that the factors influencing dual method use in women living with HIV (WLHIV) are varied. Fertility desires, parity, relationship dynamics, healthcare and HIV-related factors, and patient and provider knowledge emerged as barriers and facilitators to dual method use. Only two interventions were identified that looked at dual method use in WLHIV. These interventions had mixed results but suggest that increasing availability of dual methods, educating providers about dual methods, and engaging in provider-patient discussions about dual methods can significantly increase uptake, while peer groups and one-on-one counseling, could increase consistency of dual method use and condom self-efficacy. A number of guidelines from women's health and HIV/AIDS organizations recommended use of dual methods for WLHIV wishing to avoid pregnancy. However, these recommendations were tempered by concerns about medication interactions and consistency of condom use with dual methods.

Quality of the evidence was low because dual methods was not the primary outcome of interest for the majority of articles. Most of the articles reporting on dual methods primarily investigated the utilization, provision, and choice of contraceptive. While effective contraceptive use is a key component of dual methods, the goal for WLHIV is to simultaneously increase condoms and effective forms of contraceptives. Focusing on only contraceptive use or investigating contraceptive use and condom use separately fails to recognize the relationship between condom and contraceptive and makes it difficult to draw conclusions about dual method use from study findings (Pazol, Kramer, & Hogue, 2010; Sangi-Haghpeykar, Posner, & Poindexter, 2005). Future

research needs to have a focus on *dual methods* as a whole to effectively address knowledge gaps, concerns about consistency, and to improve uptake in WLHIV.

Differences in terminology were noted in both articles and guidelines in this review. Both the term *dual methods* and *dual protection* appeared in the literature, and in some cases the terms were used interchangeably. *Dual protection* is protection from both pregnancy and STIs while *dual methods* is the use of condoms with a second form of contraception effective at preventing pregnancy and is a way to achieve *dual protection* (Cates & Steiner, 2002). Interchanging these terms can make it difficult to understand the behavior being studied or desired and might possibly contribute to the large knowledge gap identified in this review. In addition, guidelines discussed the use of condoms and provision of contraceptives to WLHIV, but did not explicitly call it *dual methods*. To avoid confusion researchers and policy makers are encouraged to clarify, define and use consistent terms when studying or making recommendations regarding protection from both pregnancy and STI.

Only two interventions were identified that specifically aimed to increase dual method use in HIV positive women, both with mixed results. This finding is similar to that of a recent Cochrane review of dual methods in HIV positive and HIV negative women that found very few interventions most of which had minimal efficacy (Lopez, Stockon, Chen, Steiner, & Gallo, 2014). While results of interventions in this review were mixed they can contribute to the development of more effective interventions. While Grossman and colleagues (2013) found that adding family planning services concomitant with HIV care did not result in a significant difference between intervention and control clinics, the overall increase in dual method use for both groups was

significant. Providers at all participating clinics received education on dual methods and were instructed to engage in discussions with PLHIV about dual methods (Grossman et al., 2013). This suggests that the provider education and provider-patient conversations about dual methods occurring in both groups were at least partially responsible for increased awareness of options and increased uptake dual methods. Tools such as the preconception evaluation, pregnancy decision-making guide, and motivational interviewing described by the HRSA guidelines (2013) could potentially assist providers in initiating conversations and increasing awareness about dual methods among HIV positive women. Motivational interviewing has been linked to increased health promotion behaviors including condom use, ART adherence, and smoking cessation in HIV positive women (M. Holstad, DiIorio, Kelley, Resnicow, & Sharma, 2011; M. M. Holstad et al., 2012; Manuel, Lum, Hengl, & Sorensen, 2013). Fogarty et al. (2001) similarly found one-on-one counseling and support impacted condom use and contraceptive uptake and was especially impactful for WLHIV who were inconsistent condom users. Motivational interviewing and one-on-one counseling could be incorporated into ongoing preconception counseling (Aaron & Criniti, 2007; HRSA, 2013; Transmission, 2015). Findings from this review also indicate that including partners and discussions of fertility desires in family planning counseling may enhance discussions and increase uptake of dual methods. Further research is needed to determine the most effective method for increasing uptake and consistent use of dual methods.

WLHIV and their HIV providers' knowledge surrounding dual method use also appear to be a barrier. Findings from the review indicate that knowledge about dual methods is low among women living with HIV. HIV provider knowledge of and level of

comfort with providing dual methods to women with HIV varied. Providers recognize that condom use alone may not be sufficient to meet the reproductive health needs of HIV positive women, but a lack of family planning training and discomfort prescribing hormonal contraceptives to HIV positive women may discourage health care providers from having conversations with women. HIV positive women desire conversations with their providers about their contraceptive and reproductive health needs and for many WLHIV, health centers and clinicians are their primary source for information regarding dual methods (Finocchario-Kessler et al., 2010; Lawani et al., 2014; Squires et al., 2011). However, these conversations are not occurring as often as HIV positive women want and need further contributing to the lack of knowledge about dual methods (Finocchario-Kessler et al., 2010). Addressing both WLHIV and HIV care providers' knowledge deficits could be an integral part of promoting dual method use. Increasing WLHIV knowledge should include discussions about contraceptive options, their relative ease of use, symptoms profile, and efficacy (Badell et al., 2012). Use of a tool for dual methods may be helpful in ensuring comprehensive, quality counseling. A checklist may be a useful guide by highlighting topics for discussion, including STI prevention, pregnancy prevention, and possible problems hindering consistent use as well specifying certain communication techniques such as open-ended questions and non-judgmental attitudes (Adams-Skinner et al., 2009).

One of the largest gaps in the research was related to consistency of dual method use. Consistency of condom use with provision of dual methods of contraception was a major concern in guidelines, a concern that has been echoed in literature (O'Leary, 2011). Past research conducted with HIV negative women has primarily been cited as the basis

for this concern (ACOG, 2010; Cates & Steiner, 2002). However, studies of both HIV positive and HIV negative women have shown consistency of condoms with dual methods differs significantly between these two groups of women (Marlow et al., 2015; Wilson et al., 2003). A more thorough investigation the impact of dual methods on consistency of condom use in women living with HIV is needed to better understand dual method use patterns and identify factors that impact consistency of condom use with dual method, so that tailored interventions can be developed and provider comfort with dual methods can be increased.

Overall, the research focused on dual method use in WLHIV is sparse and most of it has been published in the past five years, which may be reflective of this emerging field of study. Despite the dearth of research, dual methods is still recommended by a number of professional organizations. Because there are so few interventions targeted at women living with HIV, there is also little evidence upon which to base implementation of the recommendations. Thus little guidance can be provided to clinicians. Without research to guide their care, it is difficult for them to provide effective care to promote dual methods. This review highlights the large research gaps related to dual method use including lack of evidence-based interventions.

Conclusion

Dual method contraceptive use is not a new concept, but has only recently begun to gain attention in women living with HIV. This is likely due to increased information on both high rates of unintended pregnancy and safe usage of hormonal contraceptives in women living with HIV. As a result, the body of research on dual method use in WLHIV

is limited. The newness of the concept, misuse of terminology, and a tendency to dissect dual method use into its key behaviors i.e. effective contraceptive use and condom use for research may all contribute to the dearth of data pertaining to dual method use in WLHIV. Future research should be explicit about the behavior being investigated. Studies or guidelines discussing condoms and a second method effective at preventing pregnancy should use the term *dual methods* while research focused on *dual protection* should clearly state this.

This review highlights a number of areas for research on dual methods in women living with HIV. Interventions to increase dual method use in WLHIV should focus on increasing patient and provider knowledge, target relationship dynamics and partner communication, and increase availability of dual methods. Future research should focus on identifying the informational needs of providers and WLHIV as well as the why HIV diagnosis impacts dual method use. Further, research on factors contributing to consistent condom use with dual methods and promotion of consistent condom use with dual method use is needed to address major concerns about STI/HIV transmission that may discourage HIV care providers.

Figure 2: Literature search flow diagram

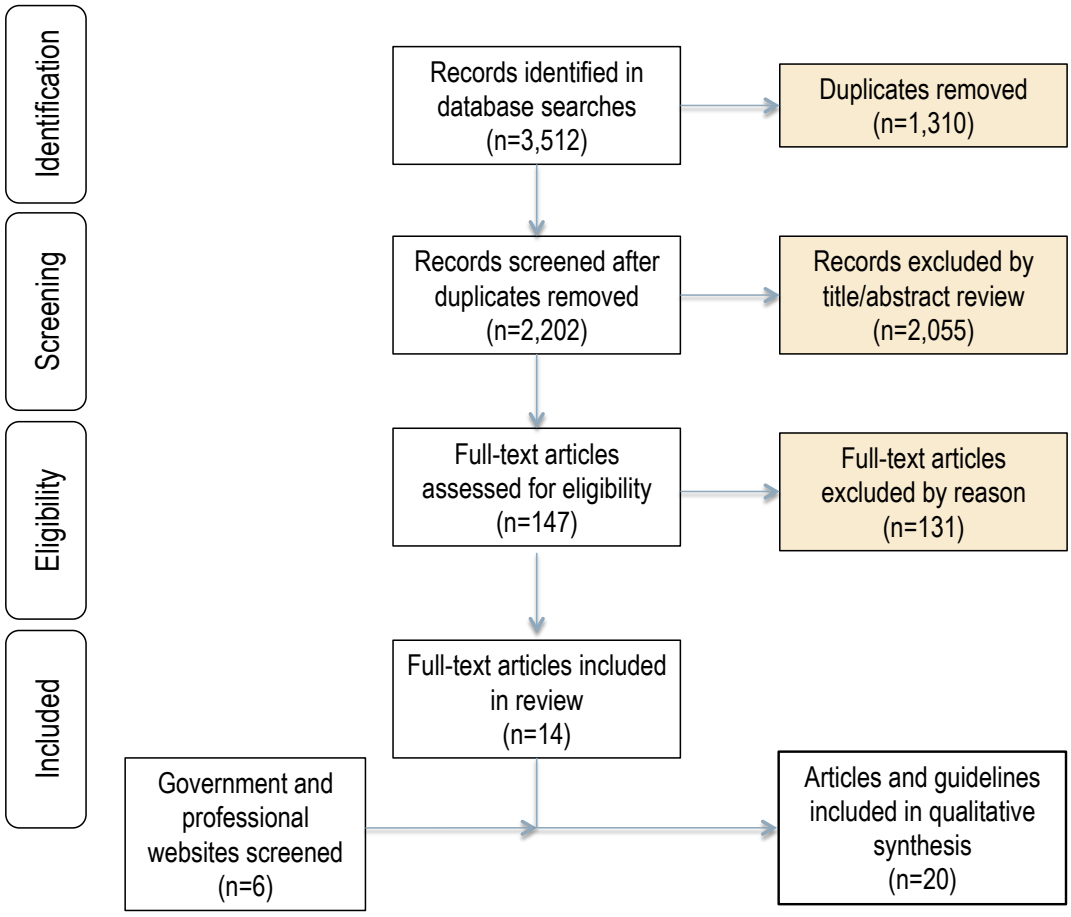

Table 1: Articles included in Analysis and Findings

Article	Definition of dual methods	Sample description	Methods	Findings
Antelman et al., 2015	Defined as use of hormonal, IUD or permanent method together with consistent condom use in past three months	1407 sexually active men and women with HIV in sub-Saharan Africa receiving HIV care	• Cross-sectional • Baseline data for a clustered randomized trial. • Data collected via interview and medical abstraction • *Primary outcome(s):* 1) dual methods; 2) desire for pregnancy in the next 6 months	• 27% of participants not desiring pregnancy in the next 6 months reported dual method use. • Injectable contraceptives were the most common non-barrier effective method used. • Older age, being separated/divorced compared to never married, having fewer living children, or reporting a partner who wants more children decreased odds of dual method use. • Feeling comfortable asking partner to use a condom or recently having a discussed family planning with a provider increased odds of dual method use.
Blanchard et al., 2014	Not defined	n=1444 Clinicians from South Africa and Zimbabwe providing family planning or HIV/STI services	• Cross-sectional • Self-administered survey • *Primary outcome(s):* provision of contraceptives	• Clinicians reported recommending dual methods 94% of the time for HIV-positive women. • 86% of clinicians reported discussion about contraception with HIV positive women. • In general, more than half of clinicians did not think hormonal methods of birth control or IUDs were appropriate for women with HIV. • Clinicians trained in family planning were significantly more likely to think oral and injectable contraceptives are appropriate for women with HIV
Chakrapani	Defined as	n=190	• Mixed methods	• Participants reported

et al., 2011	condom use and an effective method (pill, IUD, injectables, tubal ligation, or vasectomy)	Married HIV positive women (n=97) HIV positive men (n=93) who were 18 or older and reported sexual activity in the past 3 months	• Quantitative: One time survey data • Qualitative: In-depth interviews with 25 PLHIV and 7 focus group discussions • *Primary outcome(s):* dual methods	increased dual methods after their HIV diagnosis • Being female, receiving posttest HIV counseling, using contraception to prevent risk of HIV transmission to partner, and using contraception due to partner preference increased odds of dual method use. • Higher CD4 count decreased the odds of dual method use • Barriers to effective contraceptive use with or without condoms included lack of discussion with healthcare providers, lack of acceptability because of overestimation of side effects, and lack of involvement of husbands in family planning counseling.
Chibwesha et al., 2011	Defined as use of condoms coupled with short- or long term reversible contraceptive or sterilization.	18,407 HIV positive women 16-50 years old on ART who had received at least one reproductive health counseling session	• Quasi-experimental • 109 trained peer counselors delivered a standardized counseling message about dual method use • Reproductive health and contraceptive data collected by peer counselors using standard form • Analysis of information from reproductive health counseling visit and biological data collected within 90 days of visit • *Primary*	• Only 17.7% were using dual methods. • 40% of women who wanted modern contraceptives could not access them. • Being 35 or older and single/divorced/widowed decreased odds of dual method use. • Having one or more child, higher monthly income, CD4 count greater than 350, and no hx of TB increased odds of dual method use

			outcome(s): dual methods	
Church et al., 2014	Not defined	Quantitative: n=611 HIV positive men (n=128) and women (n=482) aged 18-49 Qualitative: Providers (n=16) and clients (n=22)	• Mixed methods • Quantitative: Data collected from clients exiting HIV clinic • Qualitative: One-on-one interviews performed using semi-structured topic guidelines • *Primary outcome(s):* contraceptive use	• 11% of participants used dual methods • Dual methods were seen as additional effort since one method was already being used. • Dual method use was seen as extra money and extra effort. • Cessation of other methods occurred with initiation of ART because of feeling too ill. This made participants unreceptive to family planning counseling. • Failure to use effective methods contrasted with strong desires to avoid pregnancy.
Fogarty et al., 2001	Not defined	n=242 HIV positive women in Baltimore between 18 and 44 years old, not pregnant, and determined to be physically and mentally healthy enough for participation by a health care provider	• Randomized control trial • Two arm randomized control trial • Intervention arm: Worked with a trained peer advocate via one-on-one counseling sessions and group sessions • Control arm: Given access to comprehensive family planning services • Stage of change, condom use, and contraceptives were measure at three transitions, baseline to 6 months, 6 to 12 months, and 12 to 18 months • *Primary outcome(s):* 1) condom use with main partner; 2) condom use with	• Stage of change for condom use with main partners was significantly better for women in the intervention group different throughout the study, but no statistical difference between behaviors • Overall, women in the intervention group had greater condom self-efficacy • Women in the intervention group showed significant progress and significantly less relapse in contraceptive use • Women in the intervention group who used condoms inconsistently showed the most improvement

			other partners; 3) contraceptive use	
Grossman et al., 2013	Defined as use of condoms with another method	A total of 18 health facilities providing HIV care - 12 health centers in the intervention arm and 6 health centers in the control arm	• Cluster-randomized trial • Data extracted from EMR. • Intervention arm: Providers received training regarding family planning counseling and provision of reversible contraceptive methods • Control arm: Providers received training on family planning counseling, but had to refer participants to family planning clinic to receive contraceptives • Analysis compared baseline prevalence (12/2009 – 2/2010) to end point of the study (7/2011 – 9/2011) • *Primary outcome(s):* use of contraceptive method effective at preventing pregnancy	• Prevalence of dual methods in the intervention arm increased from 10.1% at baseline to 20.9% by completion • Prevalence of dual methods in control arm increased from 11.5% at baseline to 19.1% by completion of the study • No significant difference in increase of dual methods between two arms of the study
Heffron et al., 2010	Defined as current use of condom with IUD, tubal ligation, hysterectomy, OC, implants, or injectables	n=3407 HIV-1 seronegative (n=1109) and seropostive (n=2298) women in serodiscordant couples living in Kenya, Rwanda, Tanzania, Uganda,	• Secondary analysis • Data were collected as part of the Partners in Prevention HSV/HIV Transmission Study • The parent study was a randomized controlled trial of	• At 23.5% of visits seropositive women were using dual methods • Prevalence significantly increased from baseline to the 24 month follow-up

		Botswana, South Africa, and Zambia	acyclovir for HSV suppression and prevention of HIV-1 transmission • All participants in the parent study were offered contraception either on-site or by referral • *Primary outcome:* Contraceptive other than condoms	
Lawani et al., 2014	Defined as use of two methods, made up of a barrier method in combination with another effective family planning method as recommended by the WHO	658 HIV positive women returning for their six week postpartum visit in South East Nigeria	• Cross-sectional • One time questionnaire • *Primary outcome(s):* dual methods	• 67.9% lacked knowledge of dual methods. • Of those who had knowledge, 94.1% reported receiving it during visits to health care facilities. • 27.2% used dual methods with the most common form being condoms and oral contraceptives. • Primary reasons for non-use were lack of awareness (46.3%) and non-disclosure of their HIV status (27.8%). • Rates of STIs and unintended pregnancy were higher in non-dual method users
Melaku & Zeleke, 2014	Defined as dual protection - use of both a barrier contraceptive method and use of a hormonal or permanent contraceptive method	847 sexually active, non-pregnant HIV positive women between the ages of 15 and 49	• Cross-sectional • Questionnaire and medical chart review • *Primary outcome(s):* contraceptive utilization (either traditional or modern)	• No participants reported dual methods before HIV diagnosis • 14% of women reported dual method use after HIV diagnosis • Rates of condom use doubled after HIV diagnosis and oral contraceptive use decreased by almost half after diagnosis. • 20.4% reported intention to use dual methods in the future

Rahangdale, Richardson, et al., 2014	Not defined	n=47 Physicians, nurse practitioners, and physician assistants who provide HIV care. Specialties included internal medicine, infectious disease, family medicine, and pediatrics.	• Cross-sectional convenience sample • Self-administered survey • *Primary outcome:* Knowledge and behaviors regarding family planning	• 43% of providers felt that condoms alone were sufficient for STI and pregnancy prevention, 9% neither agreed nor disagreed and 45% disagreed or strongly disagreed. • 30% felt comfortable prescribing hormonal contraceptives and 39% did not. • 57% reported always or often discussing pregnancy/fertility and 57% reported discussing contraception whereas 87% reported discussing condoms always or often. • Reasons given for not discussing contraception included time, comfort, adequate training, other care team members discuss, and female patients are not of reproductive age. • No significant difference in age, gender, or years of experience caring for HIV patients between providers who always or often discussed fertility and contraception and those who didn't.
Raifman et al., 2014	Defined as dual method dual protection - concurrent use of condoms and at least one other contraceptive method.	n=3169 HIV positive women aged 15-49 that self-reported sexual activity in the past year	• Cross-sectional • Survey data collected as part of a larger population study • *Primary outcome(s):* 1) dual method dual protection; 2) single method dual protection	• Likelihood of dual method increased through the care cascade • Likelihood of dual methods increased by 3.5 percentage points (pp) at diagnosis, by 5.2pp when initiating ART, and by 11.2pp after receiving ART for 4-7 years
Saeieh et al., 2016	Not defined	18 HIV positive women receiving care in Tehran	• Qualitative • Semi-structured interviews • *Primary*	Main themes: • Lack of contraceptive counseling • Unavailability of

			outcome(s): contraceptive use	certain contraceptive methods. • Inconsistent condom use due to gender dynamics, ineffectiveness of condoms due to failure (tearing), and disclosure of HIV status
Whiteman et al., 2009	Not defined	451 HIV positive women non- pregnant, not planning to become pregnant aged 16-45 in St. Petersburg, Russia	• Cross-sectional • Analysis of baseline data for larger study. • At baseline eligible women were asked to choose one of the four study methods to use for one year: combined oral contraceptives (COC) with condoms, Depo-Provera and condoms, copper IUD and condoms, or condoms only • *Primary outcome(s):* contraceptive choice	• Almost all participants selected male condoms, 59% would consider COCs, 44% would consider a hormonal patch, 43% would consider DMPA, and 22% would consider the copper IUD • 35% of women selected dual methods. Predictors of choosing highly effective contraception with condoms versus condoms only included having two or more live births, postpartum enrollment, uncertainty about desires for future pregnancy, prior OC use, recent IDU, or sometimes using condoms in the past year.

Table 2: National and international guidelines included in analysis and findings

Citation	Organization	Definition of dual methods	Recommendations
ACOG Guideline: Gynecologic Care for Women with HIV (2010)	American Congress of Obstetricians and Gynecologists (ACOG)	Defined as dual contraception or the concomitant use of condoms and additional contraception	• Women on certain HAART regimes should not use oral contraceptives because of possible drug interactions, especially ritonavir-boosted protease inhibitors. • IUDs are a good contraceptive choice for women. • Women with HIV should be counseled on dual contraception because condoms are not very effective at preventing pregnancy. • There are concerns that use of a method for preventing pregnancy decreases condom use
Primary Care Guidelines for the management of persons infected with HIV: 2013 update by the HIV Medicine Association of the Infectious Disease Society of America (2013)	Infectious Disease Society of America (IDSA)	Not explicitly defined. Discuss use of two methods	• Providers should have regular conversations with women on conception desires. • For women not wishing to get pregnant, providers should provide counseling on the use of condoms and the possibility of using a second form of contraception. • Concerns still exist regarding safety of IUDs in high-risk women. • Combined oral contraceptives should be used cautiously for women on certain ARVs and avoided in women with hyperlipidemia, DM, and chronic liver disease which is common among HIV positive persons
Preconception Health care for HIV-infected women (2007)	International AIDS Society-USA (IAS-USA)	Defined as dual protection - use of hormonal methods or	• All women of reproductive age need pre-conception

		IUD to prevent pregnancy and barrier method to prevent STI and HIV	counseling at every visit. • Contraceptive counseling should be included in preconception care. • The ideal contraceptive method is dual methods. • Clinicians need to tailor messages to patients needs, provide an array of contraceptive choices, and provide positive messages that reinforce the need for consist contraceptive use.
HRSA Guide to caring for women living with HIV (2013)	U.S. Department of Health and Human Serves, Health Resources and Services Administration, HIV/AIDS Bureau	Defined as dual protection - simultaneous protection from pregnancy and HIV/STI transmission which can be accomplished through avoidance of penetrative sex, condom use alone, or condoms in combination with more effective method of contraception	• HIV positive need preconception counseling and it should be incorporated into primary HIV-care. • One of the goals of preconception care is prevention of unintended pregnancy. • Use of patient and provider pregnancy decision aids to identify patient needs. • Dual methods is the best way of preventing pregnancy. • Consider patient preferences as well as ART and care behaviors when providing contraception. • Use of motivational interviewing that looks at patient's state of change for use of condoms and use of contraceptive separately. • If possible, involve male partners in discussion
Sexual and reproductive health of women living with HIV (2006)	World Health Organization	Defined as dual protection - simultaneous protection against	• Preventing unintended pregnancy is an important step in PMTCT.

		unintended pregnancy and STI/HIV achieved by condoms alone or condoms with another effective method of contraception, including emergency contraception.	• Family planning counseling should include discussion of dual protection and risks of STI transmission and unintended pregnancy. • Information should include: effectiveness, mode of action, correct use, risks and benefits, cost and convenience, common side effects, effects on transmission and acquisition of STI/HIV, potential drug interactions.
Recommendations for Use of Antiretroviral drugs in pregnant HIV-1-Infected Women for Maternal Health and Interventions to Reduce Perinatal HIV Transmission in the United States (2015)	Health and Human Services (HHS) Panel on Treatment of HIV-Infected Women and Prevention of Perinatal Transmission-A Working Group of the Office of AIDS Research Advisory Council	Not defined	• Women should continually receive preconception care. • Women wishing to avoid pregnancy should be counseled on all the available options. • Condom use should be promoted to avoid HIV transmission, STI acquisition, and HIV superinfection. • Concerns exist about possible interactions between some forms of contraception and ARVs.

References

Aaron, E., & Criniti, M. (2007). Preconception health care for HIV-infected women. *Top HIV Med, 15*(4), 137-141.

Aberg, J. A., Gallant, J. E., Ghanem, K. G., Emmanuel, P., Zingman, B. S., & Horberg, M. A. (2014). Primary Care Guidelines for the Management of Persons Infected With HIV: 2013 Update by the HIV Medicine Association of the Infectious Diseases Society of America. *Clin Infect Dis., 58*(1), 1-10. doi:1093/cid/cit757

ACOG. (2010). ACOG Practice Bulletin No. 117: Gynecological Care for Women With Human Immunodeficiency Virus. *Obstet Gynecol, 116*(6), 1492-1509. doi:10.1097/AOG.0b013e3182054cae

Adams-Skinner, J., Exner, T., Pili, C., Wallace, B., Hoffman, S., & Leu, C. S. (2009). The development and validation of a tool to assess nurse performance in dual protection counseling. *Patient Educ Couns, 76*(2), 265-271. doi:10.1016/j.pec.2008.12.024

Antelman, G., Medley, A., Mbatia, R., Pals, S., Arthur, G., Haberlen, S., . . . Bachanas, P. (2015). Pregnancy desire and dual method contraceptive use among people living with HIV attending clinical care in Kenya, Namibia and Tanzania. *J Fam Plann Reprod Health Care, 41*(1), e1. doi:10.1136/jfprhc-2013-100784

ART-CC. (2008). Life expectancy of individuals on combination antiretroviral therapy in high-income countries: a collaborative analysis of 14 cohort studies. *Lancet, 372*(9635), 293-299. doi:10.1016/S0140-6736(08)61113-7

Badell, M. L., Lathrop, E., Haddad, L. B., Goedken, P., Nguyen, M. L., & Cwiak, C. A. (2012). Reproductive healthcare needs and desires in a cohort of HIV-positive women. *Infect Dis Obstet Gynecol, 2012*, 107878. doi:10.1155/2012/107878

Berer, M. (2006). Dual protection: more needed than practised or understood. *Reprod Health Matters, 14*(28), 162-170.

Blanchard, K., Chipato, T., Ramjee, G., Nhemachena, T., Harper, C. C., & Comittee, P. S. W. (2014). Clinicians perceptions and provision of hormonal contraceptives for HIV-positive and at-risk women in Southern Africa: an original research paper. *Contraception, 90*(4), 391-398. doi:10.1016/j.contraception.2014.04.010

Cabral, R., Galavotti, C., Gargiullo, P., & Armstrong, K. (1996). Paraprofessional delivery of a theory based HIV prevention counseling intervention for women. *Public Health Rep, 111*(Suppl 1), 75-82.

Cates, W., & Steiner, M. (2002). Dual Protection Against Unintended Pregnancy and Sexually Transmitted Infections. *Sex Transm Dis, 29*(3), 168-174.

Chakrapani, V., Kershaw, T., Shunmugam, M., Newman, P. A., Cornman, D. H., & Dubrow, R. (2011). Prevalence of and Barriers to Dual-Contraceptive Method Use among Married Men and Women Living with HIV in India. *Infect Dis Obstet Gynecol, 2011*. doi:10.1155/2011/376432.

Chibwesha, C. J., Li, M. S., Matoba, C. K., Mbewe, R. K., Chi, B. H., Stringer, J. S., & Stringer, E. M. (2011). Modern contraceptive and dual method use among HIV-infected women in Lusaka, Zambia. *Infect Dis Obstet Gynecol, 2011*. doi:10.1155/2011/261453

Church, K., Wringe, A., Fakudze, P., Kikuvi, J., Nhlabatsi, Z., Masuku, R., . . . Mayhew, S. H. (2014). Reliance on condoms for contraceptive protection among HIV care and treatment clients: a mixed methods study on contraceptive choice and motivation within a generalised epidemic. *Sex Transm Dis, 90*(5), 394-400. doi:10.1136/sextrans-2013-051339

Finocchario-Kessler, S., Dariotis, J., Sweat, M., Trent, M., Keller, J., Hafeez, Q., & Anderson, J. (2010). Do HIV-infected women want to discuss reproductive plans with providers, and are those conversations occuring. *AIDS Patient Care STDS, 24*(5), 317-323.

Fogarty, L. A., Heilig, C. M., Armstrong, K., Cabral, R., Galavotti, C., Gielen, A. C., & Green, B. M. (2001). Long-term effectiveness of a peer-based intervention to promote condom and contraceptive use among HIV-positive and at-risk women. *Public Health Rep, 116*(Suppl 1), 103-119.

Grossman, D., Onono, M., Newmann, S. J., Blat, C., Bukusi, E. A., Shade, S. B., . . . Cohen, C. R. (2013). Integration of family planning services into HIV care and treatment in Kenya: A cluster-randomized trial. *AIDS, 27*(Suppl 1), S77-S85. doi:10.1097/QAD.0000000000000035

Hatcher, R. A., Trussell, J., Cates, W., Kowal, D., & Policar, M. S. (2011). *Contraceptive Technology* (20th ed.): Ardent Media.

HHS Panel on Treatment of HIV-infected Women and Prevention of Perinatal Transmission (2015). *Recommendations for Use of Antiretroviral Drugs in Pregnant HIV-1-infected Women for Maternal Health and Interventions to*

Reduce Perinatal HIV Transmission in the United States. Retrieved from http://aidsinfo.nih.gov/contentfiles/lvguidelines/PerinatalGL.pdf.

Hladik, W., Stover, J., Esiru, G., Harper, M., & Tappero, J. (2009). The Contribution of Family Planning towards the Prevention of Vertical HIV Transmission in Uganda. *PLoS One, 4*(11), e7691. doi:10.1371/journal.pone.0007691

Holstad, M., DiIorio, C., Kelley, M., Resnicow, K., & Sharma, S. (2011). Group Motivational Interviewing to Promote Adherence to Antiretroviral Medications and Risk Reduction Behaviors in HIV Infected Women. *AIDS Behav, 15*, 885-896. doi:10.1007/s10461-010-9865-y

Holstad, M. M., Essien, J. E., Ekong, E., Higgins, M., Teplinskiy, I., & Adewuyi, M. F. (2012). Motivational groups support adherence to antiretroviral therapy and use of risk reduction behaviors in HIV positive Nigerian women: a pilot study. *Afr J Reprod Health, 16*(3), 14-27.

Hood, J. E., Hogben, M., Chartier, M., Bolan, G., & Bauer, H. (2014). Dual contraceptive use among adolescents and young adults: correlates and implications for condom use and sexually transmitted infection outcomes. *J Fam Plann Reprod Health Care, 40*(3), 200-207. doi:10.1136/jfprhc-2012-100295

HRSA. (2013). *A Guide to the Clinical Care of Women wth HIV - 2013 edition*. Rockville, Maryland: U.S. Department of Health and Human Services.

Kimani, J., Warren, C., Abuya, T., Mutemwa, R., Initiative, I., Mayhew, S., & Askew, I. (2015). Family planning use and fertility desires among women living with HIV in Kenya. *BMC Public Health, 15*(909). doi:10.1186/s12889-015-2218-z

Lawani, L. O., Onyebuchi, A. K., & Iyoke, C. A. (2014). Dual method use for protection of pregnancy and disease prevention among HIV-infected women in South East Nigeria. *BMC Womens Health, 14*(39). doi:10.1186/1472-6874-14-39

Lopez, L. M., Stockon, L. L., Chen, M., Steiner, M. J., & Gallo, M. F. (2014). Behavioral interventions for improving dual-method contraceptive use. *Cochrane Database Syst Rev, 30*(3). doi:10.1002/14651858.CD010915.pub2

Manuel, J. K., Lum, P. J., Hengl, N. S., & Sorensen, J. L. (2013). Smoking cessation interventions with female smokers living with HIV/AIDS: a randomized pilot study of motivational interviewing. *AIDS Care, 25*(7), 820-827. doi:10.1080/09540121.2012.733331

Marlow, H. M., Maman, S., Moodley, D., Curtis, S., & Reyes, L. M. (2015). HIV status and postpartum contraceptive use in antenatal population in Durban, South Africa. *Contraception, 91*(1), 39-43. doi:10.1016/j.contraception.2014.09.007

Marston, M., Nakiyingi-Miiro, J., Hosegood, V., Lutalo, T., Mtenga, B., Zaba, B., & network, A. (2016). Measuring the Impact of Antiretroviral Therapy Roll-Out on Population Level Fertility in Three African Countries. *PLoS One, 11*(3), e0151877. doi:10.1371/journal.pone.0151877

Massad, L. S., Springer, G., Jacobson, L., Watts, H., Anastos, K., Korn, A., . . . Minkoff, H. (2004). Pregnancy rates and predictors of conception, miscarriage and abortion in US women with HIV. *AIDS, 18*(2), 281-286.

Melaku, Y. A., & Zeleke, E. G. (2014). Contraceptive utilization and associated factors among HIV positive women on chronic follow-up care in Tigray Region,

Northern Ethiopia: A cross sectional study. *PLoS One, 9*(4), e94682. doi:10.1371/journal.pone.0094682

Mnyani, C. N., Simango, A., Murphy, J., Chersich, M., & McIntyre, J. A. (2014). Patient factors to target for elimination of mother-to-child transmission of HIV. *Global Health, 10*(36). doi:10.1186/1744-8603-10-36

Narasimhan, M., Orza, L., Welbourn, A., Bewley, S., Crone, T., & Vazquez, M. (2016). Sexual and reproductive health and human rights of women living with HIV: a global community survey. *Bull World Health Organ, 94*(4), 243-249. doi:10.2471/BLT.14.150912

O'Leary, A. (2011). Are dual-method messages undermining STI/HIV prevention? *Infect Dis Obstet Gynecol, 2011*, 691210. doi:10.1155/2011/691210

Pazol, K., Kramer, M. R., & Hogue, C. J. (2010). Condoms for dual protection: patterns of use with highly effective contraceptive methods. *Public Health Rep, 125*(2), 208-217.

Pyra, M., Heffron, R., Mugo, N. R., Nanda, K., Thomas, K. K., Celum, C., . . . Teams, P. i. P. S. (2015). Effectiveness of hormonal contraception in HIV-infected women using antiretroviral therapy. *AIDS, 29*(17), 2353-2359. doi:10.1097/QAD.0000000000000827

Rahangdale, L., Richardson, A., Carda-Auten, J., Adams, R., & Grodensky. (2014). Provider Attitudes toward Discussing Fertility Intentions with HIV-Infected Women and Serodiscordant Couples in the USA. *J AIDS Clin Res, 5*(6). doi:10.4172/2155-6113.1000307

Rahangdale, L., Stewart, A., Stewart, R., Badell, m., Levison, J., Ellis, P., . . . Cohan, D. (2014). Pregnancy Intentions Among Women Living With HIV in the United States. *J Acquir Immune Defic Syndr, 65*, 306-311. doi:10.1097/QAI.0000000000000014

Raifman, J., Chetty, T., Tanser, F., Mutevedzi, T., Matthews, P., Herbst, K., . . . Bärnighausen, T. (2014). Preventing unintended pregnancy and HIV transmission: Effects of the HIV treatment cascade on contraceptive use and choice in rural KwaZulu-Natal. *J Acquir Immune Defic Syndr, 67*(Suppl 4), S218-227. doi:10.1097/QAI.0000000000000373

Saeieh, S. E., Nasrabadi, A. N., Ebadi, A., Moghadam, Z. B., Mohraz, M., Jozani, Z. B., & Rezaei, E. (2016). Contraception use among Iranian women with HIV: A qualitative study. *Global J Health Sci, 8*(1), 199-207. doi:10.5539/gjhs.v8n1p199

Sangi-Haghpeykar, H., Posner, S. F., & Poindexter, A. N. r. (2005). Consistency of condom use among low-income hormonal contraceptive users *Perspect Sex Reprod Health, 37*(4), 184-191.

Shah, P., Balkhair, T., Ohlsson, A., Beyene, J., Scott, F., & Frick, C. (2011). Intention to become pregnant and low birth weight and preterm birth: a systemic review. *Matern Child Health J, 15*(2), 205-216. doi:10.1007/s10995-009-0546-2

Smits, A. K., Goergen, C. A., Delaney, J. A., Williamson, C., Mundy, L. M., & Fraser, V. J. (1999). Contraceptive use and pregnancy decision making among women with HIV. *AIDS Patient Care STDS, 13*(12), 739-746.

Squires, K. E., Hodder, S. L., Feinberg, J., Bridge, D. A., Abrams, S., Storfer, S. P., & Aberg, J. A. (2011). Health needs of HIV-infected women in the United States:

insights from the women living positive survey. *AIDS Patient Care STDS, 25*(5), 279-285. doi:10.1089/apc.2010.0228

Stanwood, N. L., Cohn, S. E., Heiser, J. R., & Pugliese, M. (2007). Contraception and fertility plans in a cohort of HIV-positive women in care. *Contraception, 75*(4), 294-298. doi:10.1016/j.contraception.2006.12.012

Sun, M., Peipert, J. F., Zhao, Q., Wilson, T. E., Weber, K. M., Sanchez-Keeland, L., . . . Massad, L. S. (2012). Trends in contraceptive use among women with human immunodeficiency virus. *Obstet Gynecol, 120*(4), 783-790. doi:10.1097/AOG.0b013e318269c8bb

Townsend, C. L., Cortina-Borja, M., Peckham, C., & Tookey, P. (2007). Antiretroviral therapy and premature delivery in diagnosed HIV-infected women in the United Kingdom and Ireland. *AIDS, 21*(8), 1019-1026.

UNAIDS. (2014). *The Gap Report*. Retrieved from http://files.unaids.org/en/media/unaids/contentassets/documents/unaidspublication/2014/UNAIDS_Gap_report_en.pdf

Whiteman, M. K., Kissin, D. M., Samarina, A., Curtis, K. M., Akatova, N., Marchbanks, P. A., . . . Hillis, S. D. (2009). Determinants of contraceptive choice among women with HIV. *AIDS, 23*(Suppl 1), S47-S54. doi:10.1097/01.aids.0000363777.76129.b4

Whittemore, R., & Knafl, K. (2005). The integrative review: updated methodology. *J Adv Nurs, 52*(5), 546-553.

WHO. (2006). *Sexual and Reproductive Health of Women Living With HIV*. Retrieved from http://www.who.int/hiv/pub/guidelines/sexualreproductivehealth.pdf

WHO. (2015). *Medical Eligibility Criteria for Contraceptive Use* (5 ed.). Retrieved from http://who.int/reproductivehealth/publications/family_planning/MEC-5/en/

Wilson, T. E., Koenig, L. J., Walter, E., Fernandez, I., & Ethier, K. (2003). Dual contraceptive method use for pregnancy and disease prevention among HIV-infected and HIV-uninfected women: the importance of an event-level focus for promoting safer sexual behaviors. *Sex Transm Dis, 30*(11), 809-812. doi:10.1097/01.olq.0000086617.41012.14

Chapter 3: Psychosocial, Clinical, and Behavioral Factors Impacting Dual Method Contraceptive Use

Introduction

Approximately one-fourth of individuals living with HIV in the United States are women, many of whom are not properly protected from unintended pregnancy and sexually transmitted infections (STIs) (CDC, 2015). Rates of planned pregnancy are very low (19%) in HIV positive women increasing the risk of adverse pregnancy outcomes including pre-term birth, low birth weight, and mother to child transmission of HIV (Mnyani, Simango, Murphy, Chersich, & McIntyre, 2014; Orr, James, & Reiter, 2008; Rahangdale, Stewart, et al., 2014; Shah et al., 2011). In addition to pregnancy prevention, HIV positive women must protect themselves and their sexual partners from HIV transmission, acquisition of other drug-resistant strains, and STI transmission (Hanisch et al., 2014; Mbulawa et al., 2014; Venkatesh et al., 2011). Thus, HIV positive women need to practice dual protection (i.e. protection from both HIV/STI transmission and unintended pregnancy). While condoms are widely promoted by HIV care providers for dual protection, condoms do not provide adequate protection from pregnancy. In typical use, condoms are only 82% effective at preventing pregnancy and studies have shown that many HIV positive women who experience unintended pregnancies were utilizing condoms before conception, highlighting the need for additional protection from pregnancy (Hatcher, Trussell, Cates, Kowal, & Policar, 2011; Massad et al., 2004; Smits et al., 1999; Warner & Steiner, 2011).

Currently, the most effective method of achieving dual protection is dual method contraceptive use. Dual method contraceptive use (dual methods) is the use of condoms with a second form of contraception effective at preventing pregnancy, including hormonal contraception, intrauterine devices (IUDs), and sterilization. Dual methods is recommended by the World Health Organization (2006, 2015) and in HIV care guidelines from several agencies (Aberg et al., 2014; HRSA, 2013). Despite these endorsements, rates of dual method use are low among HIV positive women living in the United States (WHO, 2015). Reported rates of dual method use in the United States range from 11% to 25% in HIV positive women (Massad et al., 2007; Stanwood, Cohn, Heiser, & Pugliese, 2007). It is difficult to determine the reasons for low uptake of dual methods because the body of research specifically focused on HIV positive women is small. Research has shown higher parity and desire to avoid pregnancy increase the likelihood of dual methods (Whiteman et al., 2009). Further, lack of knowledge about dual methods, partner contraceptive preference, and disclosure of HIV status may also play a role (Antelman et al., 2015; Chakrapani et al., 2011). Studies of HIV negative women have shown that sociodemographic factors including race/ethnicity, age, income, insurance coverage, and education as well as psychological and partner-related factors such as alcohol use, intimate partner violence, and depression may impact contraceptive choices and dual method use (Eisenberg, Allsworth, Zhao, & Peipert, 2012; Garbers, Correa, Tobier, Blust, & Chiasson, 2010; Tyler et al., 2013; Williams, Larsen, & McCloskey, 2008). However, drawing conclusions from HIV negative women should be done cautiously because comparisons of HIV positive and negative women have shown

differences in rates and patterns of dual method use (Wilson, Koenig, Walter, Fernandez, & Ethier, 2003).

Increasing uptake of dual methods in HIV positive women is difficult without a better understanding of the factors that influence this complex behavior. HIV positive women have a unique set of circumstances impacting their reproductive choices making it difficult to translate research from other groups of women. Therefore, the purpose of this study was to investigate psychosocial, behavioral, and clinical factors that could potentially impact dual method use in a nationally representative cohort of HIV positive women of reproductive age. The primary aim was to better understand dual method use in HIV positive women. An ecological model of health behavior was used to frame the study and guided selection of possible factors associated with dual method use. This ecological model for health behavior conceptualizes five levels of factors that influence health behaviors: intrapersonal, interpersonal, organizational, community, and public policy (McLeroy, Bibeau, Steckler, & Glanz, 1988). The Centers for Disease Control (CDC) and National Cancer Institute have used ecological models to develop interventions and promote health (Glanz, Rimer, & Viswanath, 2008; NCI, 2005). The ecological model is useful because it incorporates the many and varied factors that impact health behaviors. Factors from all levels except public policy were included in this analysis.

Methods

Data source

This was a secondary analysis of data from the Women's Interagency HIV Study (WIHS). The WIHS is a longitudinal cohort study of HIV positive women and women at-risk of HIV. Participants for the WIHS are currently recruited from 10 sites: Brooklyn, NY, Bronx, NY, Chapel Hill, NC, Chicago, IL, San Francisco, CA, Washington, DC, Atlanta, GA, Jackson, MS, Birmingham, AL, and Miami, FL. As of 2015, the WIHS cohort totaled 4,856 participants of whom 3,567 are HIV positive and 1,289 are HIV negative. Women participating in the WIHS study complete a baseline survey, medical history, physical examination, and gynecological exam and return every 6 months for a follow up visit (Barkan et al., 1998). Trained WIHS study staff administer baseline and follow-up surveys using face-to-face interviews in either English or Spanish (Bacon et al., 2005). Blood and other biological specimens, such as vaginal swabs, are collected and trained WIHS practitioners perform physical exams (Bacon et al., 2005). Survey data collected at study visits include: socio-demographic data, pregnancy desires, condom use, contraceptive use, history of STIs, parity, sexual practices, alcohol use, drug use, current antiretroviral medication, depression, social support, and intimate partner violence (WIHS, 2013). Information pertaining to WIHS recruitment and procedures has been detailed elsewhere (Bacon et al., 2005; Barkan et al., 1998).

Data for this study was collected between October 1, 2013 and March 31, 2015, i.e. WIHS study visits 39, 40, and 41. For this analysis, we used data from the most recent WIHS visit and baseline data where indicated for each participant fitting eligibility criteria. Our eligibility criteria was: 1) HIV-positive; 2) female; 3) age 18- 45 years old;

4) not pregnant or intending to conceive in the next 6 months; 5) reported vaginal sex with a male since last study visit; 6) no history of hysterectomy; 7) English or Spanish speaking. Study visits where women reported hysterectomies were excluded from analysis because health conditions or changes resulting in sterility are conceptually different from women choosing sterilization for contraception.

Variables and Measures

Dual methods. Participants in this study were grouped into one of four contraceptive groups: "dual methods," "condoms only," "non-barrier," and "ineffective method." The primary outcome of interest in this study was dual method use. Dual methods was defined as self-report of condom use during heterosexual vaginal intercourse AND self-report a second form of contraception effective at preventing pregnancy including hormonal contraception (oral contraceptives, injectable contraceptives, the patch, NuvaRing, and implantable contraceptives), IUD, tubal ligation, or Essure since the last study visit.

"Condoms only" was defined as reporting "sometimes" or "always" using condoms in response to the question: *"(since your last study visit) during this time, how often did you or your partner(s) wear a rubber or condom when you had vaginal sex?"* If participants reported condom use with an ineffective form of contraceptive i.e. withdrawal or rhythm method, spermicides, or the diaphragm in addition to condom use, they were still considered condom only users.

Participants were considered "non-barrier" users if they reported use of oral contraceptives, injectable contraceptive, implantable contraceptives, IUDs, Essure, or

tubal ligation and answered "never" when asked how often they used condoms during vaginal intercourse since the last study visit.

"Ineffective method" use was defined as report of no contraceptive method or report of using a less effective method for avoiding pregnancy including a diaphragm or cervical cap, spermicides, withdrawal, or the rhythm method with no effective methods.

Community. Two community level covariates were included in this analysis: race/ethnicity and geographical region. Geographical region was collapsed into southern site yes or no due to small cell counts. Participants whose current study visit occurred in GA, MS, NC, AL, and FL were considered Southern study site visit. All other study sites were grouped in the category "no. " This distinction was made because of the higher incidence of HIV in the Southern United States (CDC, 2015). Race/ethnicity variable was collapsed into "African American" and "not African American" based on race/ethnicity distribution of sample participants.

Organizational. Insurance coverage was assessed by self-report of having any form of insurance coverage including Medicaid or private insurance (no/yes). Number of regular HIV care visits assessed using a three level categorical variable, no visits, one visit, or two or more visits since last study visit based on skewed distribution of the data. Lastly, study site was used as a proxy measure of organizational differences in HIV care.

Interpersonal. Interpersonal variables assessed in this analysis included currently experiencing intimate partner violence, partner status, and number of male

sexual partners in the past six months. Currently experiencing intimate partner violence was dichotomized as "no" or "yes." Participants who reported partners with controlling, violent, or emotionally abusive behaviors such as not allowing them to work or go to school, feeling scared of their current partner, or report of physical abuse were considered to be experiencing intimate partner violence ("yes"). Partner status was defined as self-report of being in a relationship with someone the participant considered a partner (no/yes). Number of male sexual partners in the past six months was measured via self-report and was dichotomized into one sexual partner or two or more.

Social support. Social support was measured by the Medical Outcomes Study Social Support Survey (MOS-SSS) emotional/information support subscale and tangible support subscale (Sherbourne & Stewart, 1991). Scores were calculated according to the steps outlined by the instrument developers (Sherbourne & Stewart, 1991). Possible scores range from 0-100 for each subscale; higher subscales scores indicate higher levels of social support (Sherbourne & Stewart, 1991). Reliability measures for this sample were high for the tangible subscale (α=0.93) and the emotional/information support subscale (α=0.97).

Intrapersonal

Depression. The Center for Epidemiological Studies Depression Scale (CES-D) was used to measure depression. The CES-D is a 20-item questionnaire developed to screen for depression in the general population and has been validated in English and Spanish speaking populations (Radloff, 1977; Ruiz-Grosso et al., 2012; Thomas, Jones, Scarinci, Mehan, & Brantley, 2001). The CES-D consists of 20 statements which

participants indicate how often they have occurred in the past week either rarely, some of the time to a little, occasionally to moderately, or most of the time (Radloff, 1977). Each response is assigned a score between 0 and 3, with 0 representing rarely and 3 for most of the time (Radloff, 1977). CES-D scores are calculated by adding the scores for 16 items and reverse coding for 4 items. The standard cut-off value of ≥ 16 for presence of depressive symptoms was used for this study (McKinlay, McKinlay, & Brambilla, 1987). For this analysis, the Chronbach's reliability was α=0.92.

Anxiety. Anxiety was measured using the Generalized Anxiety Disorder Scale (GAD-7). The GAD-7 is a 7-item survey that assess for symptoms of anxiety (Sptizer, Kroenke, Williams, & Löwe, 2006). It has been validated in both English (α=0.89) and Spanish (α=0.93) (Löwe et al., 2008; Mills et al., 2014). Participants scores were calculated per instructions and then dichotomized into a categorical variable using the recommended ≥10 or <10 (Sptizer et al., 2006). A score of 10 or greater was used to indicate presence of anxiety because it maximized sensitivity and specificity of the instruments ability to identify generalized anxiety (Löwe et al., 2008). In this sample, reliability was similar to that previously reported (α=0.93).

Trust in HIV care provider. Trust in HIV care providers was measured using an adapted version of the Safran Physician Trust Subscale of the Primary Care Assessment Survey (Safran et al., 1998). The adapted version changed the wording from "your doctor" to "your HIV care providers" (Safran et al., 1998). Additionally, the last item of the survey was changed from "how much do you trust your doctor" on a scale of 0 to 10 to "*all things considered, I trust my HIV care providers"* (Safran et al., 1998). For all eight items, participants choose whether they "strongly agree," "agree," "neither agree

nor disagree," "disagree," or "strongly disagree." Responses are given a numerical value between 1 and 5 with 5 equal to strongly agree and 1 equivalent to strongly disagree. Five items are reverse coded. Scores were calculated according to the original instrument, with scores ranging from 0 to 100 and higher scores indicating higher levels of trust of HIV care providers (Safran et al., 1998). The Trust in HIV care providers instrument is only administered at even number study visits, so values for visits 39 and 41 were imputed from visit 40. In order to do this, we had to assume that trust in HIV Care Providers does not change drastically over a six month time period. Reliability calculations showed good reliability of the instrument in this sample (α=0.83).

Health care empowerment. The Health Care Empowerment Inventory was used to measure participants' engagement in their own health care. The Health Care Empowerment Inventory measures two dimensions: 1) desire to be informed, committed, engaged and collaborative (ICCE) in health care; and 2) tolerance for uncertainty (TU) (Johnson, Rose, Dilworth, & Neilands, 2012). This instrument was only administered at even number visits, so values for visits 39 and 41 were imputed from visit 40 responses. The assumption had to be made that health care empowerment does not change drastically in a six month period. The Health Empowerment Inventory consists of eight questions with 5-point Likert scale responses ranging from strongly disagree to strongly agree (Johnson et al., 2012). Scores were a summation of responses; higher cumulative scores indicate higher empowerment. It has been shown to have good validity and reliability in HIV positive in patients (Raykov's ρ = 0.78 and 0.86) (Johnson et al., 2012). Reliability was similar in this sample with a Chronbach's α=0.80 for the ICCE subscale and α=0.75 for the TU subscale.

Barriers to care. Barriers to care were measured using a series of eight statements adapted from Kalichman and colleagues (1999) specifying reasons for not receiving HIV care. Statements include *"Not having transportation to get to or from regular HIV care visit," "not want to go for regular HIV care because you felt too sick,"* and *"not being able to pay for regular HIV care visit."* Participants respond "yes," "no," or "not applicable." Other barriers include work, childcare, unsure where to go for care, and feeling well. Based on distribution of the data points, barriers to care were dichotomized into report of any barriers to HIV care (yes/no). Barriers to care items were only asked at even numbered visits, so values for odd numbered visits (visits 39 and 41) were imputed from visit 40.

HIV stigma. The instrument measuring HIV stigma was adapted from Bunn and colleagues (2007). It is composed of eight statements with a 4-point scale ranging from "strongly agree" (1) to "strongly disagree" (4) with one reverse coded item. Statements include *"having HIV/AIDS makes me feel that I'm a bad person"* and *"I feel discriminated against in health care settings because of my HIV status."* Scores for stigma are summative with a high score of 32 indicating no perceived feelings of stigma. Analysis of our sample indicated good reliability (α=0.86).

Covariates. Sociodemographic data included: participant age, annual household income, highest level of education completed at baseline visit, current employment status (yes/no), and housing. Housing was assessed by self-report of having either their own place of residence (yes) or reporting another place of residence including someone else's house, a shelter, or on the street. Parity i.e. number of live and stillborn births a woman had experienced did not show normal distribution, so data was grouped into a three-level

categorical variable maintaining one group that represented the absence of the variable of interest: “none,” “1-2 children,” and “three or more.” Current substance use was defined as self-report of any recreational drugs such as cocaine, marijuana, and methamphetamine use or taking prescription drugs in a way not prescribed since last study visit. History of sexually transmitted infection was measured as self-report of ever having gonorrhea, chlamydia, or syphilis. Alcohol consumption was categorized as self-report of no alcohol consumption, 0-7 drinks per week, or more than seven drinks per week on average. Tobacco use was measured by self-report of currently smoking (no/yes). Variables related to HIV were also measured. CD4 percent and viral load were measured via blood samples collected by WIHS staff at the study visit. Viral load was dichotomized into detectable or undetectable. Lastly, antiretroviral therapy adherence was measured by self-report of percent of medications taken over the past six months, 100%, 99-95%, or less than 95% of the time.

Analysis Strategy

Data from participants’ most recent WIHS visit were used for this analysis. Bivariate tests for the association between type of contraception and covariates included chi-square tests and Fisher’s exact test for categorical variables and ANOVA tests for normally distributed continuous variables. Bivariate analyses were performed on predictor variables to assess for significant associations with dual methods at a p-value $\leq$ 0.20 for inclusion in the multivariate model analyses (Mickey & Greenland, 1989).

Backward logistic regression was used to create three models: “dual methods” vs. “condom only,” “dual method” vs. “non-barrier methods,” and “dual methods” vs.

"ineffective method." All variables with a bivariate p-value ≤ 0.20 were entered into the model, but only those variables found to be significant at p-value ≤ 0.10 were kept in the model. Interaction terms for variables in the preliminary model were then added into the regression model to determine if there were any significant interactions between variables (Hosmer, Lemeshow, & Sturdivant, 2013). Interactions were considered significant at p-value ≤ 0.05 (Hosmer et al., 2013). The final logistic regression models were created by entering variables related to dual method use at p-value ≤ 0.10 and, if indicated by regression analysis, interaction terms significant at p-value ≤ 0.05. Lastly, Hosmer-Lemeshow goodness of fit test was used to assess the fit of the model. All analyses were performed using SAS 9.4 software (SAS Institute Inc, 2013)

Results

A total of 431 participants were included in this analysis. Sample characteristics are displayed in Table 3. Most participants (74.7%) were non-Hispanic, African-American and the average age of participants was 38.4 years old (SD=4.8). Less than half (42.7%) of participants were from the Southern sites. The majority of participants (87.5%) reported at least one regular HIV care visit since the last study visit. Of eligible participants, 36.7% reported dual method use at their most recent visit, 44.3% reported condoms only, 10.2% reported non-barrier methods only, and 8.8% reported ineffective methods. More than half of the participants (61.8%) had undetectable viral loads and mean CD4 percent for this sample was 32.9% (SD=12.2). The majority of dual method users used permanent methods (i.e. tubal ligation and Essure) (86.1%), 7.0% used Depo-

provera, 3.2% had an IUD, and the remaining dual method users used oral contraceptives or the Ortho-Evra patch.

Rates of dual method use varied widely between different study sites (Table 4). Prevalence of dual methods ranged from 13.3% at the Bronx, NY study site to 65.7% at the Jackson, MS site. Rates of dual method use were significantly higher in southern sites (p-value=0.04) (Table 4), but there was still variation in rates of dual methods between southern sites ranging from a low of 31.8% at the Chapel Hill, NC site to 65.7% in Jackson, MS.

Results of bivariate analysis are shown in Table 4. Age, parity, and being at a southern study site were all significantly related to choice of contraceptive method. No significant relationships were found between contraceptive method and any of the psychosocial or clinical variables. Based on bivariate analysis age, race, southern site, currently having a partner, parity, current drug use, ever having an STI, and the ICCE subscale of the Health Care Empowerment Inventory all met criteria for inclusion in multivariate analysis i.e. p-value ≤ 0.20 and were analyzed in all three regression models. Multivariate analysis for all three models was rerun without the ICCE subscale because it was not significant in any model and many participants (40%, n=174) did not complete the ICCE subscale.

Dual methods vs condom only

In the final logistic regression model for dual methods versus condoms only, age, having a partner, southern study site, parity, and current drug use remained in the regression model (see table 5). However, only southern study site and parity were

significantly related to dual method use at the p-value ≤ 0.05 level. There was a trend towards older age increasing odds of dual method use, but it was not quite significant (p=0.0502). No interaction terms were significant. As the number of children increased the odds of dual method use increased ($OR_{1\text{-}2 \text{ vs none}}$ 2.98, 95%CI=1.43-6.21; $OR_{\geq 3 \text{ vs none}}$ 6.66, 95% CI= 3.15-14.07). Being at one of the five southern WIHS study sites also increased the odds of dual method use (OR 2.20, 95% CI=1.31-3.67), as did currently having a partner (OR 1.68, 95%CI=0.91-3.12), ever having an STI (OR 1.58, 95% CI=0.98-2.56), and increasing age in years (OR 1.06, 95% CI = 1.00-1.11). Report of current use of drugs decreased the odds of dual method use (OR 0.59, 95% CI=0.34-1.02). Overall, the final model fit the data well and had acceptable discriminatory ability (ROC=0.72) (Hosmer et al., 2013). Hosmer-Lemeshow analysis indicated that the model was a good fit for the data (p-value=0.352).

Dual methods vs non-barrier methods

Only one variable remained in the dual methods vs non-barrier methods model (Table 5). Reporting current drug use decreased the odds of dual method use (OR 0.54, 95% CI = 0.26-1.10), but it was not significant. Overall, the discriminatory ability of the model was poor (ROC=0.56) (Hosmer et al., 2013).

Dual methods vs ineffective method

Three variables remained in the final model (race, southern study site, and parity) for dual methods vs ineffective methods and no interaction terms were found to be significant (Table 5). Being at a southern study site (OR 3.30, 95%CI=1.40-7.76), higher

parity ($OR_{1\text{-}2 \text{ vs none}}$ 3.55, 95%CI=1.12-11.24; $OR_{\geq 3 \text{ vs none}}$ 5.91, 95% CI=1.82-19.20), and being African American (OR 2.01, 95% CI=0.91-4.46) increased the odds of dual method use. The discriminatory ability of the model was acceptable (ROC=0.71) (Hosmer et al., 2013). Hosmer-Lemeshow goodness of fit test indicated that the model fit the data well (p-value=0.928).

Discussion

In this study 36.7% of the sample reported using dual methods. This is comparable or higher to previous reports rates from 11% to 25% (Massad et al., 2007; Stanwood, Cohn, Heiser, & Pugliese, 2007). Our results demonstrate that intrapersonal factors such as parity and a trend for age as well as community and organizational level factors may all impact individual women's choices and access to dual methods of contraceptives. Regional differences in dual method use indicate that interventions to increase dual method use should not just focus on intrapersonal and interpersonal factors, but should also take into account organizational and community level factors. The multilevel factors that were significantly related to dual method use in this study suggest that further research or interventions on dual method contraceptive use could use an ecological framework for guidance.

Similar to past research, we found that parity significantly increased the odds of dual method use. Comparison of dual method users to users of other methods showed that with increasing parity the odds of dual method use increased significantly. This was true when comparing dual method users to condom only users and ineffective method users, but not for non-barrier users indicating that parity may be a strong motivator for

obtaining contraception effective at preventing pregnancy regardless of condom use. Past studies have shown that 70% or more of HIV-infected pregnancies report contraceptive use prior to conception, with condoms being the primary contraceptive used (Massad et al., 2004; O'Shea et al., 2016). Possibly past unintended pregnancy while using condoms and concerns about future unintended pregnancy are greater for women with higher parity leading them to seek out more effective forms of contraceptive such as tubal ligation or long acting reversible contraceptives (Kavanaugh, Jerman, & Finer, 2015; Tuuli et al., 2011). Additionally, higher parity may also prompt providers to have more in-depth conversations with women about contraceptive use, which has been shown to increase the odds of dual method use (Antelman et al., 2015; Lawani, Onyebuchi, & Iyoke, 2014).

Of interest, is that the policy, community, and organizational level factor, being at a southern study site, remained significant in two of the three models. Overall women from southern study sites (Jackson, MS, Atlanta, GA, Chapel Hill, NC, Miami, FL, and Birmingham, AL) were more likely to use dual methods. Both countrywide and citywide differences in dual method use suggest that factors unrelated to individual women may impact dual method use. Research has shown that state, health system, and provider level factors impact the health of HIV positive women. Women receiving care at clinics with higher populations of HIV positive women are more likely to have access to case managers and preventative services such as pap smears (Hirschhorn et al., 2006). Additionally, clinic-to-clinic differences in care have been documented including case management, social services, risk reduction counseling, and ARV prescription (McNaghten, Hanson, Dworkin, Jones, & Group, 2003; Weiser et al., 2015). Provider factors may also impact dual method use in HIV positive women. Research focused on

HIV care providers has indicated that HIV care providers are diligent about conversations regarding condom use, but not contraception despite recognizing that condoms alone are not sufficient to meet the contraceptive needs of HIV positive women (Rahangdale, Richardson, Carda-Auten, Adams, & Grodensky, 2014). Further, providers are aware that most pregnancies in HIV positive women are unplanned, but provider initiated conversations about fertility plans do not occur frequently (Coll et al., 2015; Finocchario-Kessler et al., 2010). On a state level, variation in HIV-related laws may also impact dual method use. States laws regarding HIV transmission either from mother to child or from partner to partner vary in their harshness, which could potentially act as a barrier to women accessing reproductive health care (Fried & Kelly, 2011). Conversely, punitive laws may make discussions about contraception a priority for patients and providers. In Mississippi and Georgia, knowingly exposing another individual, which could include a sexual partner or unborn fetus, to HIV is a felony offense ("Crimes Against the Person," 2015; “Crimes Affecting Public Health,” 2013). The Atlanta, GA and Jackson, MS study sites had high rates of dual method use and the Jackson, MS study site had one of the lowest rates of non-barrier and ineffective methods (see Table 2). Legal, health system, and provider level factors may all influence dual method contraceptive use in HIV positive women. Lack of access to services, punitive laws, and minimal or no conversations regarding contraceptive needs suggest that the onus for increased uptake of dual methods does not rest solely on HIV positive women and using an ecological framework can enhance the ability of providers to meet women’s sexual and reproductive health needs.

Our analysis did not find any significant relationship between dual method use and HIV-related factors including CD4 percent, viral load, medication adherence, or HIV stigma. The relationship between CD4 levels and dual method use remains unclear. Findings from this study support past findings showing no relationship between dual method use and CD4 levels, but further research is needed to confirm these findings due to conflicting findings in other studies (Antelman et al., 2015; Chakrapani et al., 2011; Chibwesha et al., 2011). Other research has suggested that HIV positive women may maintain high levels of ARV adherence to suppress viral load in order to compensate for high-risk sexual practices (Holstad, Spangler, Higgins, Dalmida, & Sharma, 2016). However, neither adherence nor viral load impacted dual method use positively or negatively in this study. The absence of significant relationships between HIV-related factors and dual methods in this study is interesting because research on dual method use and contraceptives in HIV positive women has shown that a diagnosis of HIV increases dual method use (Antelman et al., 2015; Melaku & Zeleke, 2014). Based on findings from this study the motivation to increase dual methods may not be related to stigma or HIV clinical factors such as CD4 percent and viral load. Exploration of the mechanism linking HIV diagnosis and dual method use could provide further areas of intervention to increase uptake of dual methods.

Psychosocial factors such as depression, anxiety, and social support were also not significant predictors of dual method use in this analysis. While depression has been linked to ineffective contraceptive choices in women without HIV, other studies have suggested that depression is not a significant factor in contraceptive choice by HIV positive women (Carrieri et al., 2006; Garbers et al., 2010). This study supports previous

findings of depression and dual method use in HIV positive women and also highlights the difference in influential factors between HIV positive women and their HIV negative peers. The lack of individual variables both clinical and psychosocial impacting dual method use in this study further highlights the need to investigate regional and structural factors that could boost uptake of dual methods.

There were a number of limitations to this study. In general, participants in this analysis were older, making findings more relevant to older HIV positive women. This may be especially useful, as the average age of women living with HIV is increasing in the United States (CDC, 2015). Further, because this data was a secondary data analysis, there was no question in the WIHS survey explicitly asking about dual method use, therefore the assumption was made that reported use of condoms and a second contraceptive method are overlapping. It is possible that use of two methods occurred sequentially and not concurrently. The majority of data was collected via self-report which can introduce social desirability bias especially for topics related to sexual and reproductive behaviors. All study sites are located in urban centers, which may influence ease of access and availability of gynecological services for women. Lastly, the number of participants using non-barrier methods or ineffective methods was small, limiting the comparison of these two groups with dual method users.

Conclusion

Overall, the findings from this analysis support the need to view dual method use as a complex health behavior influenced by multilevel factors. Parity was a significant intrapersonal factors impacting dual method use in two regression models. However,

other intrapersonal factors including psychological and HIV-related factors did not significantly influence dual method use in either bivariate or multivariate analysis. None of the factors examined differed significantly between dual method users and non-barrier method users. Further research is needed to determine what prompts or prevents HIV positive women with effective forms of contraception to utilize condoms. Of particular interest is the wide variation in dual method use across sites and regions highlighting the need to investigate community and organizational level factors that may also impact dual method use. Findings from this study suggest that shifting focus from individual level interventions to interventions focused on policy community, and organizational factors may be equally, if not more, efficacious in increasing uptake of dual method use in HIV positive women.

Table 3: Descriptive statistics of sample (n = 431)

Variable	Percent (n)
Age (years)*	38.43 (4.80)
Race/Ethnicity	
African-American (non-Hispanic)	74.71 (322)
Not African-American	25.29 (109)
Education	
Some HS or less	31.55 (136)
HS grad or higher	68.45 (295)
Average household income/year	
$18000 or less	60.33 (254)
More than $18000	39.67 (167)
Marriage status	
Legal/common law marriage	23.19 (99)
Live with partner (not married)	12.88 (55)
Widowed	2.34 (10)
Divorced/Annulled	8.20 (35)
Separated	7.73 (33)
Never married	39.81 (170)
Currently have partner	
No	17.56 (75)
Yes	82.44 (352)
Southern study site	
No	57.31 (247)
Yes	42.69 (184)
Currently have insurance	
No	5.80 (25)
Yes	94.20 (406)
Parity	
None	16.71 (72)
1-2 children	42.23 (182)
Three or more	41.07 (177)
Birth control method	
Dual methods	36.66 (158)
Condoms only	44.32 (191)
Non-barrier method	10.21 (44)
Ineffective method	8.82 (38)
CD4 percent*	32.93 (12.22)
Detectable viral load	
Undetectable	61.78 (257)
Detectable	38.22 (159)
Regular HIV care visits in past 6 months	
No visit	12.50 (42)
One visit	42.56 (143)
Two or more visits	44.94 (151)

*Reporting the mean and standard deviation

Table 4: Bivariate analysis of contraceptive method type

	Dual methods % (n)	Condoms only % (n)	Non-barrier method % (n)	Ineffective method % (n)	*p* value
Age (years)*	38.82 (4.43)	37.68 (5.11)	38.62 (4.41)	40.30 (4.53)	0.009
Race/Ethnicity					0.086
African-American	77.22 (122)	76.44 (146)	72.73 (32)	57.89 (22)	
Not African-American	22.78 (36)	23.56 (45)	27.27 (12)	42.11 (16)	
Southern site					0.041
No	50.00 (79)	60.21 (115)	56.82 (25)	73.68 (28)	
Yes	50.00 (79)	39.79 (76)	43.18 (19)	26.32 (10)	
Education					0.368
Some HS or less	28.48 (45)	30.89 (59)	36.36 (16)	42.11 (16)	
HS grad or higher	71.52 (113)	69.11 (132)	63.64 (28)	57.89 (22)	
Average household income/year					0.904
$18,000 or less	61.29 (95)	58.60 (109)	64.29 (27)	60.53 (23)	
More than $18,000	38.71 (60)	41.40 (77)	35.71 (15)	39.47 (15)	
Currently employed					0.414
No	56.96 (90)	54.45 (104)	61.36 (27)	68.42 (26)	
Yes	43.04 (68)	45.55 (87)	38.64 (17)	31.58 (12)	
Currently has partner					0.052
No	13.29 (21)	21.81 (41)	23.26 (10)	7.89 (3)	
Yes	86.71 (137)	78.19 (147)	76.74 (33)	92.11 (35)	
Currently experiencing IPV					
No	144 (91.14)	174 (92.06)	37 (86.05)	35 (92.11)	0.640
Yes	14 (8.86)	15 (7.94)	6 (13.95)	3 (7.89)	
Own place of residence					0.590
No	24.68 (39)	23.04 (44)	18.18 (8)	15.79 (6)	
Yes	75.32 (119)	76.96 (147)	81.82 (36)	84.21 (32)	
Parity (alive or stillborn)					<0.0001
No children	7.59 (12)	26.18 (50)	4.55 (2)	21.05 (8)	
1-2 children	38.61 (61)	46.60 (89)	34.09 (15)	44.74 (17)	
Three or more children	53.80 (85)	27.23 (52)	61.39 (27)	34.21 (13)	
Currently using drugs					0.190
No	76.58 (121)	68.06 (130)	63.64 (28)	65.79 (25)	
Yes	23.42 (37)	31.94 (61)	36.36 (16)	34.21 (13)	
Currently a smoker					0.740
No	64.56 (102)	63.87 (122)	61.36 (27)	55.26 (21)	
Yes	35.44 (56)	36.13 (69)	38.64 (17)	44.74 (17)	
Average alcohol consumption					0.373
Abstainer	45.57 (72)	43.46 (83)	47.73 (21)	47.37 (18)	
>0-7 drinks/week	41.14 (65)	43.46 (83)	27.27 (12)	36.84 (14)	
>7 drinks/week	13.29 (21)	13.09 (25)	25.00 (11)	15.79 (6)	
Viral load					0.877
Undetectable	64.29 (99)	60.22 (109)	61.36 (27)	59.46 (22)	
Detectable	35.71 (55)	39.78 (72)	38.64 (17)	40.54 (15)	
CD4 percent*	32.72 (13.39)	32.60 (11.69)	33.95 (10.43)	34.21 (12.06)	0.824
Antiretroviral adherence					0.302
100%	46.53 (67)	49.08 (80)	51.28 (20)	33.33 (11)	
95-99%	31.94 (46)	24.54 (40)	20.51 (8)	42.42 (14)	
<95%	21.53 (31)	26.38 (43)	28.21(11)	24.24 (8)	

GAD-7 score					0.946
<10	83.33 (105)	81.12 (116)	79.41 (27)	81.82 (27)	
≥10	16.67 (21)	18.88 (27)	20.59 (7)	18.18 (6)	
CES-D Score					0.543
<16	65.82 (104)	70.00 (133)	64.29 (27)	76.32 (29)	
≥16	34.18 (54)	30.00 (57)	35.71 (15)	23.68 (9)	
MOS-SSS Subscales					
Tangible support*	71.03 (29.19)	71.50 (29.34)	76.10 (32.51)	69.13 (30.38)	0.788
Emotional support *	72.52 (26.95)	73.01 (27.23)	71.05 (35.46)	68.94 (32.34)	0.893
Regular HIV care visit(s) since last study visit					0.253
None	8.73 (11)	14.69 (21)	8.82 (3)	21.21 (7)	
One	48.41 (61)	40.56 (58)	44.12 (15)	27.27 (9)	
Two or more	42.86 (54)	44.76 (64)	47.06 (16)	51.52 (17)	
Barriers to regular HIV care					0.896
No	71.72 (71)	74.77 (80)	78.57 (22)	73.91 (17)	
Yes	28.28 (28)	25.23 (27)	21.43 (6)	26.09 (6)	
Internalized stigma*	17.45 (4.99)	17.14 (5.16)	13.80 (5.65)	16.82 (4.73)	0.227
Healthcare empowerment*	33.23 (4.41)	33.62 (4.32)	33.57 (4.74)	32.65 (4.71)	0.781
Engagement subscale*	17.65 (1.99)	17.99 (2.02)	18.36 (1.87)	17.26 (1.98)	0.148
Uncertainty subscale*	15.59 (3.07)	15.63 (3.13)	15.21 (3.72)	15.39 (3.58)	0.933
Trust in HIV care providers*	66.26 (10.05)	65.21 (11.69)	67.05 (11.92)	65.98 (8.07)	0.834
Number of male partners					0.687
One	83.54 (132)	82.20 (157)	86.36 (38)	89.47 (34)	
Two or more	16.46 (26)	17.80 (34)	13.64 (6)	10.53 (4)	
Ever had chlamydia, gonorrhea, or syphilis					0.087
No	42.41 (67)	50.79 (97)	31.82 (14)	39.47 (15)	
Yes	57.59 (91)	49.21 (94)	68.18 (30)	60.53 (23)	
Study site**					
Bronx	13.33 (4)	50.00 (15)	10.00 (3)	26.67 (8)	
Brooklyn	36.84 (28)	48.68 (37)	9.21 (7)	5.26 (4)	
Washington, DC	32.00 (16)	40.00 (20)	8.00 (4)	20.00 (10)	
San Francisco	25.71 (9)	51.43 (18)	11.43 (4)	11.43 (4)	
Chicago	39.29 (22)	44.64 (25)	12.50 (7)	3.57 (2)	
Chapel Hill	31.82 (14)	47.73 (21)	11.36 (5)	9.09 (4)	
Atlanta	34.69 (17)	46.94 (23)	10.20 (5)	8.16 (4)	
Miami	34.38 (11)	62.50 (20)	0.00 (0)	3.13 (1)	
Birmingham	58.33 (14)	12.50 (3)	29.17 (7)	0.00 (0)	
Jackson	65.71 (23)	25.71 (9)	5.71 (2)	2.86 (1)	
Total	36.66 (158)	44.32 (191)	10.21 (44)	8.82 (38)	

*For continuous variables, data is reported as the mean and standard deviation

**Reported as percent of participants at each study site

Table 5: Final multivariate regression models of dual methods

	exp[B]	95% Confidence Interval	S.E.	*p-value*
Model: Dual methods vs condoms (n=346)				
Age at visit	1.06	1.00-1.11	0.03	0.0502
Currently have partner (ref=no)	1.68	0.91-3.12	0.16	0.099
Ever had STI (ref=no)	1.58	0.98-2.56	0.12	0.062
Southern study site (ref=no)	2.20	1.31-3.67	0.13	0.003
Parity (ref=none)				<0.0001
1-2 children	2.98	1.43-6.21	0.17	0.570
3 or more	6.66	3.15-14.07	0.18	<0.0001
Currently use drugs (ref=no)	0.59	0.34-1.02	0.14	0.058
Model: Dual methods vs non-barrier method (n=202)				
Current drug use (ref=no)	0.54	0.26-1.10	0.37	0.087
Model: Dual methods vs ineffective method (n=196)				
African American (ref=not African American)	2.01	0.91-4.46	0.41	0.086
Southern study site (ref=no)	3.30	1.40-7.76	0.44	0.006
Parity (ref=none)				0.013
1-2 children	3.55	1.12-11.24	0.59	0.031
3 or more	5.91	1.82-19.20	0.60	0.003

References

Aberg, J. A., Gallant, J. E., Ghanem, K. G., Emmanuel, P., Zingman, B. S., & Horberg, M. A. (2014). Primary Care Guidelines for the Management of Persons Infected With HIV: 2013 Update by the HIV Medicine Association of the Infectious Diseases Society of America. *Clin Infect Dis., 58*(1), 1-10. doi:1093/cid/cit757

Antelman, G., Medley, A., Mbatia, R., Pals, S., Arthur, G., Haberlen, S., . . . Bachanas, P. (2015). Pregnancy desire and dual method contraceptive use among people living with HIV attending clinical care in Kenya, Namibia and Tanzania. *J Fam Plann Reprod Health Care, 41*(1), e1. doi:10.1136/jfprhc-2013-100784

Bacon, M. C., von Wyl, V., Alden, C., Sharp, G., Robison, E., Hessol, N., . . . Young, M. A. (2005). The Women's Interagency HIV Study: an observational cohort brings clinical sciences to the bench. *Clin Diagn Lab Immunol, 12*(9), 1013-1019. doi:10.1128/cdli.12.9.1013-1019.2005

Barkan, S. E., Melnick, S. L., Preston-Martin, S., Weber, K., Kalish, L. A., Miotti, P., . . . Feldman, J. (1998). The Women's Interagency HIV Study. WIHS Collaborative Study Group. *Epidemiology, 9*(2), 117-125.

Bunn, J. Y., Solomon, S. E., Miller, C., & Forehand, R. (2007). Measurement of stigma in people with HIV: Reexamination of the HIV Stigma Scale. *AIDS Educ Prev, 19*(3), 198-208.

Carrieri, M. P., Rey, D., Serraino, D., Trémolières, F., Méchali, D., Moatti, J. P., . . . GROUP, M. S. (2006). Oral contraception and unprotected sex with occasional partners of women HIV-infected through injection drug use. *AIDS Care, 18*(7), 795-800. doi:10.1080/09540120500431584

CDC. (2015). *HIV Surveillance Report, 2014*. Retrieved from http://www.cdc.gov/hiv/pdf/library/reports/surveillance/cdc-hiv-surveillance-report-us.pdf

Chakrapani, V., Kershaw, T., Shunmugam, M., Newman, P. A., Cornman, D. H., & Dubrow, R. (2011). Prevalence of and Barriers to Dual-Contraceptive Method Use among Married Men and Women Living with HIV in India. *Infect Dis Obstet Gynecol, 2011*. doi:10.1155/2011/376432.

Chibwesha, C. J., Li, M. S., Matoba, C. K., Mbewe, R. K., Chi, B. H., Stringer, J. S., & Stringer, E. M. (2011). Modern contraceptive and dual method use among HIV-infected women in Lusaka, Zambia. *Infect Dis Obstet Gynecol, 2011*. doi:10.1155/2011/261453

Coll, A. S., Potter, J. E., Chaktoura, N., Alcaide, M. L., Cook, R., & Jones, D. L. (2015). Providers' perspectives on preconception counseling and safer conception for HIV-infected women. *AIDS Care*, 1-6. doi:10.1080/09540121.2015.1112349

Crimes Against the Person, Georgia Code, 16-5-60 (2015).

Eisenberg, D. L., Allsworth, J. E., Zhao, Q., & Peipert, J. F. (2012). Correlates of Dual-Method Contraceptive Use: An Analysis of the National Survey of Family Growth (2006-2008). *Infect Dis Obstet Gynecol, 2012*. doi:10.1155/2012/717163

Finocchario-Kessler, S., Dariotis, J., Sweat, M., Trent, M., Keller, J., Hafeez, Q., & Anderson, J. (2010). Do HIV-infected women want to discuss reproductive plans with providers, and are those conversations occuring. *AIDS Patient Care STDS, 24*(5), 317-323.

Fried, S. T., & Kelly, B. (2011). Gender, race + geography = jeopardy: marginalized women, human rights and HIV in the United States. *Womens Health Issues, 21*(Suppl 6), S243-249. doi:10.1016/j.whi.2011.07.008

Garbers, S., Correa, N., Tobier, N., Blust, S., & Chiasson, M. A. (2010). Association Between Symptoms of Depression and Contraceptive Method Choices Among Low-Income Women at Urban Reproductive Health Centers. *Matern Child Health J, 14*, 102-109. doi:10.1007/s10995-008-0437-y

Glanz, K., Rimer, B. K., & Viswanath, K. (2008). *Health Behavior and Health Education: Theory, Research, and Practice* (4th ed.). San Francisco, CA: John Wiley & Sons, Inc.

Hanisch, R., Cherne, S., Sow, P., Winer, R., Hughes, J., Feng, Q., . . . Hawes, S. (2014). Human papillomavirus type 16 viral load in relation to HIV infection, cervical neoplasia and cancer in Senegal. *Cancer Epidemiol, 38*(4), 369-375. doi:10.1016/j.canep.2014.04.005

Hatcher, R. A., Trussell, J., Cates, W., Kowal, D., & Policar, M. S. (2011). *Contraceptive Technology* (20th ed.): Ardent Media.

Hirschhorn, L. R., McInnes, K., Landon, B. E., Wilson, I. B., Ding, L., Marsden, P. V., . . . Cleary, P. D. (2006). Gender differences in quality of care in Ryan White CARE Act-funded clinics. *Womens Health Issues, 16*(3), 104-112.

Holstad, M. M., Spangler, S., Higgins, M., Dalmida, S. G., & Sharma, S. (2016). Psychosocial Characteristics Associated with Both Antiretroviral Therapy Adherence and Risk Behaviors in Women Living with HIV. *AIDS Behav, 20*(5), 1084-1096. doi:10.1007/s10461-015-1209-5

Hosmer, D. W., Lemeshow, S., & Sturdivant, R. X. (2013). *Applied Logistic Regression* (3rd ed.). Hoboken, NJ: John Wiley & Sons, Inc.

HRSA. (2013). *A Guide to the Clinical Care of Women wth HIV - 2013 edition*. Rockville, Maryland: U.S. Department of Health and Human Services.

SAS Institute Inc. (2013). SAS (Version 9.4). Cary, NC.

Johnson, M. O., Rose, C. D., Dilworth, S. E., & Neilands, T. B. (2012). Advances in the Conceptualization and Measurement of Health Care Empowerment: Development and Validation of the Health Care Empowerment Inventory. *PLoS One, 7*(9), e45692. doi:10.1371/journal.pone.0045692

Kalichman, S. C., Catz, S., & Ramachandran, B. (1999). Barriers to HIV/AIDS treatment and treatment adherence among African-American adults with disadvantaged education. *J Natl Med Assoc, 91*(8), 439-446.

Kavanaugh, M. L., Jerman, J., & Finer, L. B. (2015). Changes in Use of Long-Acting Reversible Contraceptive Methods Among U.S. Women, 2009-2012. *Obstet Gynecol, 126*(5), 917-927. doi:10.1097/AOG.0000000000001094

Lawani, L. O., Onyebuchi, A. K., & Iyoke, C. A. (2014). Dual method use for protection of pregnancy and disease prevention among HIV-infected women in South East Nigeria. *BMC Womens Health, 14*(39). doi:10.1186/1472-6874-14-39

Löwe, B., Decker, O., Müller, S., Brähler, E., Schellberg, D., Herzog, W., & Herzberg, P. Y. (2008). Validation and standardization of the Generalized Anxiety Disorder Screener (GAD-7) in the general population. *Med Care, 46*(3), 266-274. doi:10.1097/MLR.0b013e318160d093

Massad, L. S., Springer, G., Jacobson, L., Watts, H., Anastos, K., Korn, A., . . . Minkoff, H. (2004). Pregnancy rates and predictors of conception, miscarriage and abortion in US women with HIV. *AIDS, 18*(2), 281-286.

Massad, L. S., Evans, C. T., Wilson, T. E., T., G. E., Sanchez-Keeland, L., Minkoff, H., . . . Watts, D. H. (2007). Contraceptive Use among U.S. Women with HIV. *Journal of Women's Health, 16*(5), 657-666.

Mbulawa, Z., Johnson, L., Marais, D., Gustavsson, I., Moodley, J., Coetzee, D., . . . Williamson, A. (2014). Increased alpha-9 human papillomavirus species viral load in human immunodeficiencey virus positive women. *BMC Infectious Disease, 14*(51). doi:10.1186/1471-2334-14-51

McKinlay, J. B., McKinlay, S. M., & Brambilla, D. (1987). The Relative Contributions of Endocrine Changes and Social Circumstances to Depression in Mid-Aged Women. *J Health Soc Behav, 28*(4), 345-363.

McLeroy, K. R., Bibeau, D., Steckler, A., & Glanz, K. (1988). An Ecological Perspective on Health Promotion Programs. *Health Education Quarterly, 15*(4), 351-377.

McNaghten, A. D., Hanson, D. L., Dworkin, M. S., Jones, J. L., & Group, A. A. S. o. H. D. (2003). Differences in prescription of antiretroviral therapy in a large cohort of HIV-infected patients. *J Acquir Immune Defic Syndr, 32*(5), 499-505.

Melaku, Y. A., & Zeleke, E. G. (2014). Contraceptive utilization and associated factors among HIV positive women on chronic follow-up care in Tigray Region, Northern Ethiopia: A cross sectional study. *PLoS One, 9*(4), e94682. doi:10.1371/journal.pone.0094682

Mickey, R. M., & Greenland, S. (1989). The Impact of Confounder Selection Criteria on Effect Estimation. *Am J Epidemiol, 130*(5), 125-137.

Mills, S., Fox, R., Malcarne, V., Roesch, S., Champagne, B., & Sadler, G. (2014). The psychometric properties of the generalized anxiety disorder-7 scale in Hispanic Americans with English or Spanish language preference. *Cultur Divers Ethnic Minor Psychol, 20*(3), 463-468. doi:10.1037/a0036523

Crimes Affecting Public Health, Mississippi Code § 97-27-14 (2013).

Mnyani, C. N., Simango, A., Murphy, J., Chersich, M., & McIntyre, J. A. (2014). Patient factors to target for elimination of mother-to-child transmission of HIV. *Global Health, 10*(36). doi:10.1186/1744-8603-10-36

NCI. (2005). *Theory at a Glance: A guide for Health Promotion Practice*. Retrieved from http://www.sneb.org/2014/Theory%20at%20a%20Glance.pdf

O'Shea, M. S., Rosenberg, N. E., Tang, J. H., Mukuzunga, C., Kaliti, S., Mwale, S., & Hosseinipour, M. C. (2016). Reproductive intentions and family planning practices of pregnancy HIV-infected Malawian women on antiretroviral therapy. *AIDS Care*. doi:10.1080/09540121.2016.1140891

Orr, S., James, S., & Reiter, J. (2008). Unintended pregnancy and prenatal behaviors among urban, black women in Baltimore, Maryland: the Baltimore preterm birth study. *Ann Epidemiol, 18*(7), 545-551. doi:10.1016/j.annepidem.2008.03.005

Radloff, L. (1977). The CES-D: A self-report depression scale for research in the general population. *Applied Psychological Measurement, 1*, 385-401.

Rahangdale, L., Richardson, A., Carda-Auten, J., Adams, R., & Grodensky. (2014). Provider Attitudes toward Discussing Fertility Intentions with HIV-Infected

Women and Serodiscordant Couples in the USA. *J AIDS Clin Res, 5*(6). doi:10.4172/2155-6113.1000307

Rahangdale, L., Stewart, A., Stewart, R., Badell, m., Levison, J., Ellis, P., . . . Cohan, D. (2014). Pregnancy Intentions Among Women Living With HIV in the United States. *J Acquir Immune Defic Syndr, 65*, 306-311. doi:10.1097/QAI.0000000000000014

Ruiz-Grosso, P., de Mola, C., Vega-Dienstmaier, J., Arevalo, J., Chavez, K., Vilela, A., . . . Huapaya, J. (2012). Validation of the Spanish Center for Epidemiological Studies Depression and Zung Self-Rating Depression Scales: A Comparative Validation Study. *PLoS One, 7*(10). doi:10.1371/journal.pone.0045413

Safran, D. G., Kosinski, M., Tarlov, A. R., Rogers, W. H., Taira, D. A., Lieberman, N., & Ware, J. E. (1998). The Primary Care Assessment Survey: Test of Data Quality and Measurement Performance. *Med Care, 36*(5), 728-739.

Shah, P., Balkhair, T., Ohlsson, A., Beyene, J., Scott, F., & Frick, C. (2011). Intention to become pregnant and low birth weight and preterm birth: a systemic review. *Matern Child Health J, 15*(2), 205-216. doi:10.1007/s10995-009-0546-2

Sherbourne, C., & Stewart, A. (1991). The MOS Social Support Survey. *Soc Sci Med, 32*(6), 705-714.

Smits, A. K., Goergen, C. A., Delaney, J. A., Williamson, C., Mundy, L. M., & Fraser, V. J. (1999). Contraceptive use and pregnancy decision making among women with HIV. *AIDS Patient Care STDS, 13*(12), 739-746.

Sptizer, R. L., Kroenke, K., Williams, J. B., & Löwe, B. (2006). A brief measure for assessing generalized anxiety disorder: the GAD-7. *Arch Intern Med, 166*(10), 1092-1097.

Stanwood, N. L., Cohn, S. E., Heiser, J. R., & Pugliese, M. (2007). Contraception and fertility plans in a cohort of HIV-positive women in care. *Contraception, 75*(4), 294-298. doi:10.1016/j.contraception.2006.12.012

Thomas, J., Jones, G., Scarinci, I., Mehan, D., & Brantley, P. (2001). The utility of the CES-D as a depression screening measure among low-income women attending primary care clinics. The Center for Epidemiologic Studies-Depression. *Int J Psychiatry Med, 31*(1), 25-40.

Tuuli, M. G., Duong, T. H., Yost, N. P., Ellis, J., Burke, C. V., Basanta-Henry, P. L., & Lindsay, M. (2011). Postpartum contraceptive preferences of HIV-infected women in the era of highly active antiretroviral therapy (HAART) and scheduled cesarean deliveries. *Contraception, 84*(2), 150-154. doi:10.1016/j.contraception.2010.11.001

Tyler, C. P., Whiteman, M. K., Kraft, J. M., Zapata, L. B., Hillis, S. D., Curtis, K. M., . . . Marchbanks, P. A. (2013). Dual Use of Condoms With Other Contraceptive Methods Among Adolescents and Young Women in the United States. *Journal of Adolescent Health*. doi:10.1016/j.jadohealth.2013.07.042

Venkatesh, K., van der Straten, A., Mayer, K. H., Blanchard, K., Ramjee, G., Lurie, M., . . . de Bruyn, G. (2011). African Women Recently Infected with HIV-1 and HSV-2 Have Increased Risk of Acquiring *Neisseria gonorrhoeae* and *Chlamydia*

trachomatis in the Methods from Improving Reproductive Health in Africa Trial. *Sex Transm Dis, 38*(6), 562-570. doi:10.1097/OLQ.0b013e31820a8c2c

Warner, L., & Steiner, M. J. (2011). Male Condoms. In R. A. Hatcher, J. Trussell, A. L. Nelson, W. Cates, D. Kowal, & M. S. Policar (Eds.), *Contraceptive Technology* (Revised 20th ed.). Atlanta, GA: Ardent Media, Inc.

Weiser, J., Beer, L., Frazier, E. L., Patel, R., Dempsey, A., Hauck, H., & Skarbinski, J. (2015). Service Delivery and Patient Outcomes in Ryan White HIV/AIDS Program-Funded and -Nonfunded Health Care Facilities in the United States. *JAMA Intern Med, 175*(10), 1650-1659. doi:10.1001/jamainternmed.2015.4095

Whiteman, M. K., Kissin, D. M., Samarina, A., Curtis, K. M., Akatova, N., Marchbanks, P. A., . . . Hillis, S. D. (2009). Determinants of contraceptive choice among women with HIV. *AIDS, 23*(Suppl 1), S47-S54. doi:10.1097/01.aids.0000363777.76129.b4

WHO. (2006). *Sexual and Reproductive Health of Women Living With HIV*. Retrieved from http://www.who.int/hiv/pub/guidelines/sexualreproductivehealth.pdf

WHO. (2015). *Medical Eligibility Criteria for Contraceptive Use* (5 ed.). Retrieved from http://who.int/reproductivehealth/publications/family_planning/MEC-5/en/

WIHS. (2013). Women's Interagency HIV Study. Retrieved from https://statepiaps.jhsph.edu/wihs/index.htm

Williams, C. M., Larsen, U., & McCloskey, L. A. (2008). Intimate Partner Violence and Women's Contraceptive Use. *Violence Against Women, 14*, 1382-1396. doi:10.1177/1077801208325187

Wilson, T. E., Koenig, L. J., Walter, E., Fernandez, I., & Ethier, K. (2003). Dual contraceptive method use for pregnancy and disease prevention among HIV-infected and HIV-uninfected women: the importance of an event-level focus for promoting safer sexual behaviors. *Sex Transm Dis, 30*(11), 809-812. doi:10.1097/01.olq.0000086617.41012.14

Chapter 4: Psychosocial, Clinical, and Behavioral Factors Impacting Sustained and Consistent Dual Method Contraceptive Use

Introduction

Women of childbearing age require protection from sexually transmitted infections (STIs) and unintended pregnancy in order to maintain good reproductive health (WHO, 2006, 2015). Although condoms can be used for the prevention of both STIs and unintended pregnancy, in typical use they are only 82% effective at preventing pregnancy (Hatcher, Trussell, Cates, Kowal, & Policar, 2011). Because of the inadequate protection against unintended pregnancy provided by condoms in everyday situations, dual methods of contraception that utilize condoms and a second highly effective, non-barrier method is recommended by the World Health Organization (2015) for women wishing to avoid pregnancy. Hormonal contraceptives, IUDs, emergency contraceptives, and sterilization are considered to be highly effective because they provide up to 99% protection from pregnancy and used in conjunction with consistent condom use provide effective dual protection (Hatcher, Trussell, Cates, Kowal, & Policar, 2011). Although dual methods are recommended as part of preconception care, uptake remains low in the United States; only about 8% of all reproductive age women utilize two methods of contraception and these percentages may be lower in women at higher risk for unintended pregnancy and STIs (Cavazos-Rehg et al., 2010; Mosher & Jones, 2010).

For women living with HIV (WLHIV), the consequences of STIs and unintended pregnancy may be significant. Rates of co-infection with *Trichomonas vaginalis* are high among women living with HIV leading to increased viral shedding and studies have

suggested that women living with HIV are more susceptible to infection by *Neisseria gonorrhoeae* and *Chlamydia trachomatis,* which left untreated, can lead to pelvic inflammatory disease, chronic pelvic pain, and infertility (Soper, 2010; Venkatesh et al., 2011). Women co-infected with HIV and human papillomavirus are at higher risk for abnormal pap smears and cervical cancer (Hanisch et al., 2014; Mbulawa et al., 2014). Additionally, unintended pregnancy is associated with increased risk of pre-term birth, low birth weight, and late entry into prenatal care and in HIV positive mothers there is increased risk of stillbirth and mother to child transmission of HIV (Haeri et al., 2009; Mnyani, Simango, Murphy, Chersich, & McIntyre, 2014; Orr, James, & Reiter, 2008; Shah et al., 2011; Townsend, Cortina-Borja, Peckham, & Tookey, 2007). As few as 19% of HIV positive women planned their pregnancies and most HIV positive women wishing to avoid pregnancy report condom use prior to conception (Massad et al., 2004; Rahangdale et al., 2014; Smits et al., 1999). Dual methods provide HIV positive women better control over their fertility than condoms alone can provide. However, to maximize the benefits of dual methods two contraceptive methods need to be used consistently over time.

Despite recommendations, dual method use by HIV positive women remains low (Massad et al., 2007; Stanwood, Cohn, Heiser, & Pugliese, 2007). One barrier to dual methods may be the concern that provision of contraceptive methods effective at preventing pregnancy may lead to decreased use of condoms, a risk some providers may not be willing to take (ACOG, 2010; Schoenbaum et al., 2001). Research related to consistent and continued use of dual methods in HIV positive women is limited, making it difficult to make recommendations and address these concerns. Patterns of dual

method use may be related to concerns about pregnancy and STI transmission as well as partner serostatus, alcohol use, and ever having an HIV positive child (Schoenbaum et al., 2001; Weinhardt et al., 2004; Wilson et al., 2003). Further, maintenance of dual methods over time may be influenced by psychosocial factors and life circumstances such as child custody and housing that are more pressing than access to reproductive services (Fogarty et al., 2001). More information is needed about factors affecting patterns of dual method use in order to safely promote dual method use in HIV positive women.

Very little is known about patterns of dual method use in HIV positive women living in the United States, which may hinder efforts increase uptake. The purpose of this study was to investigate factors associated with sustained and consistent use of dual methods in HIV positive women living in the United States. An ecological model for health behavior was used to guide this analysis. The model conceptualizes health behaviors as being influenced by five levels of factors: intrapersonal, interpersonal, organizational, community, and public policy (McLeroy, Bibeau, Steckler, & Glanz, 1988). This framework is applicable because it accounts for the complex nature of health behaviors (Glanz, Rimer, & Viswanath, 2008; NCI, 2005). This analysis examined factors from four levels: intrapersonal, interpersonal, organizational, and community.

Methods

Data source

This study analyzed data collected for the Women's Interagency HIV Study (WIHS). The WIHS is a longitudinal cohort study that began recruiting HIV positive and at-risk women in 1993. As of 2015, 4,856 women are a part of the WIHS of whom 3,567

are HIV positive. Participants for the WIHS are currently recruited from 10 sites: Brooklyn, NY, Bronx, NY, Chapel Hill, NC, Chicago, IL, San Francisco, CA, Washington, DC, Atlanta, GA, Birmingham, AL, Miami, FL, and Jackson, MS. WIHS participants complete a physical and gynecological examination as well as a comprehensive survey with questions about socio-demographic data, pregnancy desires, contraceptive use, condom use, sexual behaviors, STI history, parity, alcohol and drug use, antiretroviral medication, depression and anxiety, healthcare utilization, social support, and intimate partner violence. Participants return every 6 months for study visits. Surveys are administered by trained WIHS staff using one-on-one interviews in the participants preferred language, either English or Spanish. Trained WIHS providers collect biological samples including blood (Bacon et al., 2005). More detailed descriptions of the WIHS recruitment and study protocols have been published elsewhere (Bacon et al., 2005; Barkan et al., 1998).

WIHS study visits are numbered starting from the beginning of the study at visit 1. Visit numbers are standard for all participants regardless of which study visit number they enroll during. Data for this study was collected between October 1, 2013 and March 31, 2015, representing visits 39-41, and from baseline visits when indicated. Only WIHS participants fitting eligibility criteria were included in this study. Eligible participants had to be 1) HIV seropositive, 2) female, 3) 18-45 years old, 4) not pregnant and not planning to conceive in the next 6 months, 6) no history of hysterectomy, and 7) English or Spanish speaking.

Variables and measures

Dual methods. Dual methods was defined using two survey items. In the first survey item, participants were asked what method they were using to avoid pregnancy. Possible responses include condoms alone, specific hormonal methods (i.e. oral contraceptives, NuvaRing, Depo-Provera), permanent methods (i.e. sterilization), and no method. The second item asked *"(since your last study visit) during this time, how often did you or your partner(s) wear a rubber or condom when you had vaginal sex?"* Reponses were "always," "sometimes," or "never." Dual method used was defined as self-report of use of condoms, "sometimes" or "always," and second contraceptive method effective at preventing pregnancy.

Consistent dual methods. Consistent dual methods was defined using the same two items as above. Participants who were dual method users at their most recent study visit and reported ***always*** using a condom during vaginal intercourse were categorized as "consistent use." Self-report of dual method use at most recent visit and ***sometimes*** condom use were placed in the "inconsistent use" group.

Sustained dual methods. The same survey items used to define dual methods (see above) were used to define sustained dual method use. Participants who reported dual methods at two consecutive study visits were considered "sustained use." Participants reporting dual methods at the first visit but no dual methods at the second visit were considered "not sustained." For participants with three consecutive study visits, the two most recent visits were used for this analysis.

Community. This analysis included two community level variables: race/ethnicity and geographical region. Race/ethnicity variable was collapsed into "African American" and "not African American" based on race/ethnicity distribution of sample participants. Study sites were categorized as southern or not southern sites because of higher regional incidence of HIV/AIDS in the southern region of the United States (CDC, 2015). The Atlanta, Chapel Hill, Birmingham, Miami, and Jackson sites were considered southern sites and all other sites were considered not southern.

Organizational. There were three organizational variables included in this analysis. Current insurance coverage was defined as having any form of insurance coverage including Medicaid, Medicare, or private insurance (yes) or no forms of insurance (no). WIHS study site was considered an organizational factor as well. Lastly, number of regular HIV care visits was assessed by self-reported number of HIV regular care visits in the past six months. Based on distribution of the data, regular HIV care visits was dichotomized into "0-1 visits" or "two or more visits."

Interpersonal. To assess patient relationship status, participants were asked if they were currently in a relationship with someone they considered a partner, either "yes" or "no." Current intimate partner violence was measured by responding yes to any of a series of questions about a partner's controlling, violent, or emotionally abusive behaviors such as not allowing them to work or go to school, feeling scared of their current partner, or report of physical abuse. Lastly, number of male sexual partners in the

past six months was measured via self-report. Due to skewed distribution, the variable was dichotomized into "one sexual partner" or "two or more."

Social support. Two subscales of the Medical Outcomes Study Social Support Survey (MOS-SSS) were used to measure social support: 1) emotional/information support and 2) tangible support (Sherbourne & Stewart, 1991). Responses are coded as "(1) none of the time," "(2) a little of the time," " (3) some of the time," " (4) most of the time," or " (5) all of the time." Scores were calculated as instructed by the instrument developers with possible scores for each subscale ranging from 0-100 (Sherbourne & Stewart, 1991). Higher scores represent higher levels of social support (Sherbourne & Stewart, 1991). In this analysis, the emotional/informational subscale had an α=0.95 and the tangible support subscale had an α=0.92. All reliability analysis provided in this study were performed on the larger, consistent dual method use, sample.

Intrapersonal.

Depression. Depression was measured using The Center for Epidemiological Studies Depression Scale (CES-D). The CES-D is a 20-item instrument used to screen for depression in the general population and has been validated in both English and Spanish (Ruiz-Grosso et al., 2012). Instrument items are a series of statements encompassing symptoms associated with depression. Participants indicate how often in the past week they have experienced each symptom ranging from "rarely" to "most of the time." Responses are given a value of 0-3, with 3 representing "most of the time." CES-D scores were calculated by summing response scores and reverse coding four items. Scores were then dichotomized as <16 or ≥ 16 (the instrument cut point for high

likelihood of depression) (Radloff, 1977). The Chronbach's reliability α=0.91 in this sample.

Anxiety. The Generalized Anxiety Disorder Scale (GAD-7) was used to measure anxiety. The GAD-7 is a 7-item survey that screens for symptoms of anxiety such as nervousness, difficulty relaxing, and fear (Löwe et al., 2008). Both the English and Spanish versions of the GAD-7 have been validated (Löwe et al., 2008; Mills et al., 2014). Scores were calculated as recommended and dichotomized into scores greater than or equal to 10 (high likelihood of generalized anxiety disorder) or less than 10 (low likelihood of generalized anxiety disorder) (Löwe et al., 2008; Spitzer, Kroenke, Williams, & Löwe, 2006). Reliability of the instrument in this sample was α=0.94.

Internalized HIV-stigma. HIV-related stigma was measured using 8-items adapted from Bunn and colleagues (2007). Survey items included *"having HIV/AIDS makes me feel that I'm a bad person"* and *"I feel discriminated against in health care settings because of my HIV status."* Participants responded to statements using a 4 point scale ranging from "strongly agree" to "strongly disagree" responses have a value of 1 to 4 respectively. Lower scores indicate higher levels of stigma. Reliability of the instrument in this sample was α=0.82.

Trust in HIV care provider. The Safran Physician Trust Subscale of the Primary Care Assessment Survey was used to measure trust in HIV care providers (Safran et al., 1998). The subscale was adapted by replacing "your doctor" with "your HIV care providers and the eighth question was modified from "how much do you trust your doctor" on a scale of 0 to 10 to "*all things considered, I trust my HIV care providers*." The survey has eight statements including *"you can tell your HIV care providers*

anything," or *"Your HIV care providers would always tell you the truth about your health, even if there was bad news."* Participants choose whether they "strongly agree," "agree," "neither agree nor disagree," "disagree," or "strongly disagree." Each response has a numerical value between 1 and 5 with 1 corresponding to strongly disagree. Scores were calculated according to the original instrument instructions (Safran et al., 1998). Possible scores range from 0 to 100, with higher scores corresponding to higher trust in providers. Reliability in this sample was α=0.82. The Trust in HIV Care Provider instrument is only administered at even numbered WIHS visit. As a result, scores for visit 39 and visit 41 were imputed from visit 40. The assumption was made that trust in HIV providers would not change significantly in a six-month period.

Health Care Empowerment Inventory. The Health Care Empowerment Inventory was used to measure health care empowerment. The instrument is composed of two subscales measuring different dimensions of health care empowerment: 1) desire to be informed, committed, engaged and collaborative in health care (ICCE); and 2) tolerance for uncertainty (TU) (Johnson, Rose, Dilworth, & Neilands, 2012). The instrument consists of eight questions with 5-point Likert scale responses ranging from strongly disagree to strongly agree (Johnson et al., 2012). Scores are calculated by summing responses. Higher scores indicate higher levels of health care empowerment. This instrument is only administered at even numbered visits, so values for visits 39 and 41 were imputed from visit 40. Reliability of the ICCE subscale was α=0.74 and TU subscale was α=0.73 in this sample.

Barriers to HIV care. Barriers to HIV care were assessed using a series of statements adapted from Kalichman and colleagues (1999). The survey contained seven

of the original 10 barriers and added a question regarding childcare. The items ask reasons for not receiving care; participants respond "yes," "no," or "not applicable." Statements include *"Not having transportation to get to or from regular HIV care visit," "not want to go for regular HIV care because you felt too sick,"* and *"not being able to pay for regular HIV care visit."* Because of skewed distribution, the barriers to care variable was dichotomized as self-report of barriers "yes" or "no." Survey items for barriers to care are only administered at even numbered visits, so values for visit 39 and visit 41 were imputed from visit 40.

Other covariates. Additional intrapersonal covariates were collected for use in analysis including age, employment status, annual household income, place of residence, highest level of education completed at baseline visit, and parity. Employment status was measured by self-report of current employment (no/yes). Annual household income was collapsed into a binomial variable based on distribution of participants' income (>$18,000/≤$18,000). Housing was assessed by self-report of having either their own place of residence (yes) or reporting another place of residence including someone else's house, a shelter, or on the street. Parity was assessed as total number of births (live or stillborn). Based on distribution of the data, parity was categorized into 0-1, two, or three or more. HIV specific variables were also assessed including study obtained lab values for CD4 percent and viral load. Viral load was dichotomized as detectable and undetectable. Antiretroviral therapy adherence was obtained by self-report of percent of antiretroviral medications taken in the past six months. Based on distribution of the data, adherence was collapsed into a three level categorical variable: 100%, 99-95%, or <95%. Current substance use was defined as self-report of use of recreational or street drugs, or

prescription drugs in a none-prescribed way since the last study visit. Alcohol consumption was categorized as self-report of no alcohol consumption, 0-7 drinks per week, or more than seven drinks per week on average. Tobacco use was measured by self-report of currently smoking (no/yes). Variables related to HIV were also measured. Lastly, history of sexually transmitted illnesses was measured by self-report of ever having gonorrhea, syphilis, or chlamydia (no/yes).

Analysis strategy

Consistent dual method use. The first analysis compared differences between consistent and inconsistent dual method use at most recent study visit where vaginal sex with a man was reported. Bivariate analysis was performed to identify variables related to consistent dual method use. Tests for associations included chi-square tests and Fischer's exact test for categorical variables and ANOVA for normally distributed continuous variables. Those variables with associations to consistent use at p-value $\leq$ 0.20 were included in regression analysis (Mickey & Greenland, 1989).

Backward logistic regression was utilized to create a regression model comparing "consistent use" to "inconsistent use." Variables with a p-value ≤ 0.10 were kept in the preliminary model. Interaction terms for variables in the preliminary model were then added to the model to assess for significant interactions. Interactions were considered significant if they had a $p \leq 0.05$ and were included in the final model (Hosmer, Lemeshow, & Sturdivant, 2013). The final logistic regression model was created by entering variables related to consistent dual method use at p-value ≤ 0.10 and, if indicated

by regression analysis, interaction terms significant at p-value ≤ 0.05. Hosmer-Lemeshow goodness of fit test was used to assess the fit of the model.

Sustained dual method use. The second analysis only included participants with data from two consecutive WIHS study visits that reported vaginal sex with a man and dual method use at the first of the two consecutive visits. For this analysis, the two most recent consecutive study visits were used. Women who did not report vaginal sex at the second study visit were included in the study because the goal was to identify reasons for not sustaining dual method use. Theoretically, women who are not having sex would not sustain dual methods. Bivariate analysis was performed to identify variables at the *second* study visit associated with sustained dual method use. Categorical variables were assessed using chi-square tests and Fischer's exact test and ANOVA for normally distributed continuous variables. Variables with an association with sustained dual method use in bivariate analysis with p-values ≤ 0.20 were included in the regression analysis (Mickey & Greenland, 1989).

Backward logistic regression of sustained versus not sustained dual method use was conducted to identify variables related to sustained dual method use at a level of p-value ≤ 0.10. A preliminary model containing variables related to sustained dual method use at p-value ≤ 0.10 was created and interaction terms were entered into the model to identify significant interactions between predictor variables (Hosmer et al., 2013). Significant interaction terms (p-value ≤ 0.05) were left in the model. The final regression model was created by entering variables significant at p-value ≤ 0.10 and interaction terms significant at p-value ≤ 0.05. The Hosmer-Lemeshow goodness of fit test was used to assess the fit of the final regression model.

Results

Consistent dual method use

In total, 157 WIHS participants met the eligibility criteria for the analysis of consistent dual methods. Table 6 describes sample characteristics. The average age of participants was 38.8 (SD=4.4) years old. Most women were African-American (77.1%) and had at least completed high school (71.3%). Annual household income for women in the study was low, with 61.0% reporting annual household incomes below $18,000/year. Almost all participants (96.8%) had some form of health insurance, but less than half (43.3%) were currently employed. Over two thirds (64.1%) had undetectable viral loads and the average CD4 percent was 32.7% (SD=13.4). Seventy-seven percent reported consistent use of dual methods.

Bivariate analysis of variables is shown in Table 7. Number of male sexual partners and the Tolerance for Uncertainty (TU) subscale of Health Care Empowerment Inventory scores were the only variables significantly associated with consistent dual method use. The mean TU subscale score was 16.0 (SD=3.1) for consistent users and 14.3 (SD=2.8) for inconsistent users. Women reporting two or more male sexual partners in the past six months were less likely to report consistent dual method use (12.4% vs 30.6%). Based on bivariate analysis, annual household income, number of male sexual partners, parity, IPV, CD4 percent, ever having an STI, and TU subscale scores were analyzed in multivariate modeling. Results showed that the TU subscale was not significant at the p-value ≤ 0.05 level, so multivariate analysis was performed again

without entering the TU subscale because there was a substantial amount of missing data: over one third (36.9%, n=58) of participants did not complete the instrument.

Table 8 shows the final multivariate model for consistent dual methods. Having two or more sexual partners, parity, ever having an STI, and CD4 percent all remained in the final model. Self-report of two or more male sexual partners in the past six months (OR 0.26, 95%CI=0.09-0.72), ever having an STI (OR 0.45, 95%CI=0.19-1.09), higher CD4 percent (OR 0.96, 95%CI=0.93-0.99), and parity ($OR_{2\ vs\ 0\text{-}1}$ 0.19, 95%CI=0.04-0.85; $OR_{\geq 3\ vs\ 0\text{-}1}$ 0.23, 95% CI= 0.06-0.87) were associated with lower odds of consistent dual methods. The discriminatory ability of the final model was good (ROC=0.73) and Hosmer-Lemeshow analysis indicated the model fit the data (p=0.91) (Hosmer et al., 2013).

Sustained dual method use

A total of 111 women with two consecutive visits were having vaginal sex with a man and using dual methods at the first study visit. Of these participants, 72.1% reported dual method use at both visits, i.e., sustained use (see Table 9). The average age of participants was 39.1 years old (SD=3.9) and most (77.8%) were African American. The majority of participants (65.7%) had at least graduated high school and almost all (98.2%) had some form of health insurance. Average CD4 percent was 32.5% (SD=13.3) and 57.8% of participants had undetectable viral loads.

Only 27.9% (n=31) of them were not using dual methods at the second study visit i.e. not sustained. Nine of the 31 women not using dual methods at the second study visit reported no vaginal sex with a man between the first and second study visit. Reasons

cited for no sexual activity included avoiding STD/HIV transmission (n=3) and personal decision (n=2). An additional six women switched from dual methods to condoms only and 16 switched from dual methods to only non-barrier methods effective at preventing pregnancy including tubal ligation, IUD, oral contraceptives, and depo-provera injections.

The results for bivariate analysis of sustained dual method use can be found in Table 10. Bivariate analysis indicated that currently having a partner and the Health Care Empowerment Inventory TU subscale were the only variables significantly associated with sustained dual method use. Participants who sustained dual method use had significantly higher TU subscale scores (16.0, SD=2.6) compared to women who did not (14.4, SD=3.6). No other psychosocial variables were found to be significantly associated with sustained dual method use. Education, employment status, currently having a partner, being a smoker, regular HIV care visits, CD4 percent, and TU subscale scores were all included in the multivariate analysis because they met the p-value ≤ 0.20 for inclusion criteria (Mickey & Greenland, 1989). Alcohol consumption and number of male sexual partners were not included due to small cell counts. Although TU subscale met inclusion criteria, the initial multivariate analysis indicated that TU subscale was not significant at p-value ≤ 0.05, so the regression analysis was re-run a second time without it because of large amount of missing data (15.2% of participants [n=16] did not complete the instrument). Therefore, TU was not included in the final multivariate analysis.

Table 8 shows the results of multivariate modeling. Multivariate analysis included 106 participants; five participants were excluded due to missing data. Currently

having a partner, currently smoking, and regular HIV care remained in the final model for sustained dual method use. Being a smoker (OR 2.72, 95%CI=0.87 – 8.51) and having a partner (OR 7.54, 95%CI=2.21 – 25.77) increased the odds of sustained dual method use while 2 or more regular HIV care visits (OR 0.43, 95%CI=0.16 – 1.15) decreased the odds of sustained dual method use. However, currently smoking (p-value=0.085) and number of regular care visits (p-value=0.093) were not significant. The discriminatory ability of the model was acceptable (ROC=0.73) (Hosmer et al., 2013). Hosmer-Lemeshow test indicated good fit of the model (p=0.905).

Discussion

Guided by an ecological model of health behavior, this is one of the few studies that specifically investigated patterns of dual method use in HIV positive women. Overall, rates of consistent dual method use and sustained dual method use were high in this sample of HIV positive dual method users. Over three quarters of the 157 participants reported consistent use of dual methods while almost 72% of participants sustained dual method use over the two study periods. Of the factors investigated, only intrapersonal and interpersonal factors were related to patterns of dual method use. No community or organizational related factors were significant in this analysis. Findings from this study suggest that focusing on modifiable intrapersonal factors and interpersonal factors such as partner dynamics and HIV knowledge may encourage consistent and continued dual method use in HIV positive women.

Consistent dual methods

Concerns about dual method use in women with HIV have been raised because it is believed that provision of a contraceptive method effective at preventing pregnancy would lead to inconsistent condom use (O'Leary, 2011). However, the proportion of *consistent* dual method users in this study is slightly higher than reported rates of consistent condom (28-70%) and consistent dual method (49-57%) use reported in past studies of HIV positive women (Finocchario-Kessler et al., 2010; Raiford, Wingood, & DiClemente, 2007; Schoenbaum et al., 2001; Wilson et al., 1999). Of the factors investigated, having more sexual partners and CD4 percent represent possible targets for interventions to improve consistent dual method use.

Reporting two or more sexual partners in the past six months significantly decreased the odds of consistent dual method use in this analysis. The impact of number of sexual partners on consistency of dual methods may be contributed to interpersonal factors. It could indicate increased frequency of intercourse, which has been linked to inconsistent condom use (Sangi-Haghpeykar, Posner, & Poindexter, 2005; Williams et al., 2001). Women reporting greater numbers of sexual partners are likely engaging in casual sexual partnerships, a risk factor for higher risk sexual behaviors (Lurie et al., 2008). Additionally, different sexual partners may have different contraceptive preferences leading to inconsistent use of dual methods. Communication with causal sexual partners may be poor, women may not disclose their HIV status, or feel less empowered to insist on condom use, further increasing the likelihood of unprotected intercourse (Bajunirwe, Bangsberg, & Sethi, 2013; Closson et al., 2015). Targeting communication with causal sexual relationships may increase consistency of dual method use. Empowering HIV positive women to discuss their status with all sexual partners as

well as improve condom self-efficacy through HIV/AIDS support groups specifically for women, one-on-one counseling, or motivational interviewing may improve consistency of dual methods (Fogarty et al., 2001; Larios et al., 2009; Paudel & Baral, 2015).

In this analysis, CD4 percent was the only HIV-related factor that significantly altered odds of consistent dual method use. This finding is consistent with other research that has shown biological markers of HIV suppression, i.e. undetectable viral load and CD4 count, increase the odds of high-risk sexual practices (Tun, Gange, Vlahov, Strathdee, & Celentano, 2004). Women who perceive their infectiousness or risk of HIV transmission to be high are more likely to practice safer sexual behaviors (Kalichman et al., 2015). Higher CD4 percent may signal to women that they are less infectious and they may become lax with dual method use. This risk compensation strategy is concerning as perceived reduced infectiousness may not actually equate to decreased risk of HIV transmission (Kalichman et al., 2015). HIV positive women need in-depth discussions about HIV transmission and infection risk relative to biological markers. Increased knowledge about infectivity may reduce higher risk sexual behaviors and promote consistent dual method use.

Sustained dual methods

Most of the women in this analysis sustained dual method use over the one-year, two-study visit period. One third of women who discontinued dual methods reported no sexual intercourse with a male at the second study visit in order to avoid STI transmission and personal reasons. The remainder of women switched to condoms only or non-barrier methods. Unfortunately, the sample size did not permit analysis of factors associated

with switching to a specific method. Only interpersonal factors were related to sustained use in this analysis.

Partner specific factors influenced sustained dual method use in this analysis. Currently being in a relationship with someone considered a partner significantly increased the odds of sustained dual method use. Partner related factors have repeatedly been shown to influence HIV positive women's contraceptive behaviors through partner openness to contraceptive methods, comfort communicating with partner, and partner HIV serostatus (Antelman et al., 2015; Raiford et al., 2007; Weinhardt et al., 2004). Further research is needed to pinpoint which partner factors have the largest influence on sustained dual methods. Interventions targeted at improving communication with partners or involving HIV positive women's sexual partners in discussion about family planning and dual method are promising for promoting continuous dual method use while HIV positive women wish to avoid pregnancy (Antelman et al., 2015; Chakrapani et al., 2011).

Limitations

There were a number of limitations in this study. Average age of participants in this study was older and most participants in this study had undergone tubal ligation for pregnancy prevention. Maintenance of dual methods may be easier because these women do not need to refill prescriptions or obtain regular contraceptive injections in addition to obtaining and using condoms. Additionally, older women may have different motivations and patterns of use than younger women living with HIV making this more applicable to the aging population of HIV positive women in the United States (CDC,

2015). However, these factors should be applied cautiously to younger groups of HIV positive women. The study only followed participants over two WIHS study visits (approximately one year) and the number of participants stopping dual methods was small limiting the ability to analyze possible factors impacting sustained dual method use. The majority of data was collected via participant self-report, which can introduce social desirability bias. Lastly, consistency of dual methods looked specifically at consistency of condom use with dual method. This analysis did not look at consistency of methods effective at preventing pregnancy that could be used inconsistently including oral contraceptives, NuvaRing, Depo-provera, and Ortho Evra.

Conclusion

We examined the relationship of multiple variables from different levels of an ecological model to determine factors associated with consistent and sustained dual methods in a sample of HIV positive women from the WIHS. Interpersonal and intrapersonal level factors were the only factors found to significantly impact consistent dual method use. Higher CD4 percent significantly decreased consistent dual methods as did having more than two sexual partners. This suggests that HIV positive women who are currently practicing higher risk behaviors i.e. multiple sexual partners, are those who are not adequately protecting themselves or their partners. This may in part be due to risk compensation by HIV positive women who believe higher CD4 percent decreases the likelihood of HIV transmission. Further, interventions to improve consistency of dual method use should focus on improving the woman's condom self-efficacy, HIV knowledge, and partner communication skills.

Interpersonal factors were the only factors influencing sustained dual method use. Having a partner significantly increased the likelihood of sustained dual method use over the one-year study period. Partner related factors were significant in both analyses suggesting that interventions aimed at improving communication about contraceptives with sexual partners may positively impact both consistency of use and sustained dual method use over time. Further investigation is needed to better understand sustained use of dual methods. Other factors not captured by this analysis may influence HIV positive women's decisions to continue using dual methods.

Table 6: Sample description for consistency analysis (n = 157)

Variable	% (n)
Age (years)*	38.81 (4.45)
Race/Ethnicity	
African-American (non-Hispanic)	77.07 (121)
Not African-American	22.93 (36)
Education	
Some HS or less	28.66 (45)
HS grad/some college	71.34 (112)
Annual household income	
$18000 or less	61.04 (94)
More than $18000	38.96 (60)
Employed	
No	56.69 (89)
Yes	43.31 (68)
Insurance	
No	3.18 (5)
Yes	96.82 (152)
Parity	
0-1	22.93 (36)
Two	23.57 (37)
Three or more	53.50 (84)
Marriage status	
Legal/common law marriage	21.94 (34)
Live with partner (not married)	11.61 (18)
Widowed	1.29 (2)
Divorced/Annulled	9.03 (14)
Separated	12.26 (19)
Never married	38.71 (60)
Other	5.16 (8)
Currently have partner	
No	13.28 (21)
Yes	86.62 (136)
Consistent use of dual methods	
Always	77.07 (121)
Sometimes	22.93 (36)
CD4 percent*	32.75 (13.43)
Detectable viral load	
Undetectable	64.05 (98)
Detectable	35.95 (55)

*Continuous variables reported as mean and standard deviation

Table 7: Bivariate associations with consistent dual methods (n = 157).

Variable	Consistent % (n)	Inconsistent % (n)	*p*-value
Age (years)*	38.91 (4.69)	38.48 (3.54)	0.606
Race/Ethnicity			0.737
African-American (non-Hispanic)	77.69 (94)	75.00 (27)	
Other	22.31 (27)	25.00 (9)	
Southern study site			0.672
No	48.76 (59)	52.78 (19)	
Yes	51.24 (62)	47.22 (17)	
Education			0.894
Some HS or less	28.93 (35)	27.78 (10)	
HS grad/some college	71.07 (86)	72.22 (26)	
Annual household income			0.116
$18000 or less	57.63 (68)	72.22 (26)	
>$18000	42.37 (50)	27.78 (10)	
Employed			0.321
No	54.55 (66)	63.89 (23)	
Yes	45.45 (55)	36.11 (13)	
Currently have partner			1.000
No	13.22 (16)	13.89 (5)	
Yes	86.78 (105)	86.11 (31)	
Currently experiencing IPV			0.091
No	113 (93.39)	30 (83.33)	
Yes	8 (6.61)	6 (16.67)	
Number of male sexual partners			0.010
One	87.60 (106)	69.44 (25)	
Two or more	12.40 (15)	30.56 (11)	
Own place of residence			0.980
No	24.79 (30)	25.00 (9)	
Yes	75.21 (91)	75.00 (27)	
Parity			0.052
0-1	27.27 (33)	8.33 (3)	
Two	23.14 (28)	25.00 (9)	
Three or more	49.59 (60)	66.67 (24)	
Average weekly alcohol consumption			0.865
Abstainer	45.45 (55)	44.44 (16)	
>0-7 drinks	40.50 (49)	44.44 (16)	
>7 drinks	14.05 (17)	11.11 (4)	
Currently using drugs			0.260
No	78.51 (95)	69.44 (25)	
Yes	21.49 (26)	30.56 (11)	
Currently smokes			0.581
No	66.12 (80)	61.11 (22)	
Yes	33.88 (41)	38.89 (14)	
Number of regular care visits			0.844
0-1	57.14 (56)	59.26 (16)	
Two or more visits	42.86 (42)	40.74 (11)	
CD4 percent*	31.91 (13.15)	35.50 (14.12)	0.161

Viral load			0.441
Undetectable	62.39 (73)	69.44 (25)	
Detectable	37.61 (44)	30.56 (11)	
ARV medication adherence			0.914
100%	46.36 (51)	45.45 (15)	
99-95%	32.73 (36)	30.30 (10)	
<95%	20.91 (23)	24.24 (8)	
Internalized HIV-stigma*	17.21 (5.61)	18.07 (2.84)	0.590
Ever had gonorrhea, chlamydia, or syphilis			0.094
No	46.28 (56)	30.56 (11)	
Yes	53.72 (65)	69.44 (25)	
CES-D score			0.951
<16	66.12 (80)	66.67 (24)	
≥ 16	33.88 (41)	33.33 (12)	
GAD-7 score			0.375
<10	85.71 (84)	77.78 (21)	
≥ 10	14.29 (14)	22.22 (6)	
Social Support (MOS-SS)			
Tangible social support*	72.58 (27.47)	66.44 (34.98)	0.335
Emotional social support*	72.58 (27.78)	71.64 (24.47)	0.874
Health Care Empowerment Inventory			
ICCE subscale*	17.76 (2.00)	17.32 (1.97)	0.346
TU subscale*	16.01 (3.05)	14.32 (2.82)	0.016
Barriers to HIV care			0.633
No	72.97 (54)	68.00 (17)	
Yes	27.03 (20)	32.00 (8)	
Trust in physician*	65.91 (10.15)	67.30 (9.89)	0.553

*Continuous variables reported as mean and (standard deviation)

Table 8: Final multivariate models for consistent dual method use and sustained dual method use

	exp[B]	95% CI Odds Ratio	S.E.	*p*-value
Consistent use				
Variable (n =153)				
Parity (ref=0-1)				0.070
Two children	0.19	0.04 – 0.85	0.36	0.092
Three or more	0.23	0.06 – 0.87	0.30	0.154
Ever had an STI (ref=no)	0.45	0.19 –1.09	0.22	0.078
More than two sexual partners (ref=one)	0.26	0.09 – 0.72	0.26	0.010
CD4 percent	0.96	0.93 – 0.99	0.02	0.013
Sustained use				
Variable (n=106)				
Currently have partner (ref=no)	7.54	2.21-25.77	0.31	0.001
Currently smoke (ref=no)	2.72	0.87-8.51	0.29	0.085
Regular HIV care (ref=0-1 visits)	0.43	0.16 – 1.15	0.25	0.093

Table 9: Sample description for sustained dual methods (n=111)

Variable	% (n)
Age (years)*	39.11 (3.91)
Race/Ethnicity	
African-American (non-Hispanic)	77.78 (84)
Not African-American	22.22 (24)
Education	
Some HS or less	34.26 (37)
HS grad/some college	65.74 (71)
Annual household income	
$18000 or less	55.14 (59)
More than $18000	44.86 (48)
Employed	
No	50.93 (55)
Yes	49.07 (53)
Insurance	
No	1.85 (2)
Yes	98.15 (106)
Parity	
0-1	20.72 (23)
Two	27.93 (31)
Three or more	51.35 (57)
Marriage status	
Legal/common law marriage	22.43 (24)
Live with partner (not married)	6.54 (7)
Widowed	1.87 (2)
Divorced/Annulled	12.15 (13)
Separated	11.21 (12)
Never married	40.19 (43)
Other	5.61 (6)
Currently have partner	
No	15.74 (17)
Yes	84.26 (91)
Sustained dual methods	
Sustained	72.07 (80)
Not sustained	27.93 (31)
CD4 percent*	32.50 (13.27)
Detectable viral load	
Undetectable	57.80 (63)
Detectable	42.20 (46)

*Continuous variables reported as mean and (standard deviation)

Table 10: Bivariate associations with sustained dual methods (n = 111)

Variable	Sustained % (n)	Not Sustained % (n)	*p*-value
Age (years)*	39.06 (3.87)	39.24 (4.08)	0.831
Race/Ethnicity			0.907
African-American (non-Hispanic)	77.50 (62)	78.57 (22)	
Not African-American	22.50 (18)	21.43 (6)	
Southern study site			0.234
No	58.75 (47)	70.97 (22)	
Yes	41.25 (33)	29.03 (9)	
Education			0.265
Some HS or less	31.25 (25)	42.86 (12)	
HS grad or higher	68.75 (55)	57.14 (16)	
Annual household income			0.490
$18000 or less	53.16 (42)	60.71 (17)	
>$18000	46.84 (37)	39.29 (11)	
Employed			0.229
No	47.50 (38)	60.71 (17)	
Yes	52.50 (42)	39.29 (11)	
Currently have partner			0.002
No	8.75 (7)	35.71 (10)	
Yes	91.25 (73)	64.29 (18)	
Currently experiencing IPV			1.000
No	93.75 (75)	92.86 (26)	
Yes	6.25 (5)	7.14 (2)	
Number of male sexual partners			<0.0001
None	0.00 (0)	33.33 (9)	
One	87.50 (70)	59.26 (16)	
Two or more	12.50 (10)	7.41 (2)	
Own place of residence			0.917
No	18.75 (15)	17.86 (5)	
Yes	81.25 (65)	82.14 (23)	
Parity			0.499
0-1	22.50 (18)	16.13 (5)	
Two	25.00 (20)	35.48 (11)	
Three or more	52.50 (42)	48.39 (15)	
Average weekly alcohol consumption			0.199
Abstainer	40.00 (32)	44.44 (12)	
>0-7 drinks	42.50 (34)	51.85 (14)	
>7 drinks	17.50 (14)	3.70 (1)	
Currently using drugs			0.778
No	71.25 (57)	74.07 (20)	
Yes	28.75 (23)	25.93 (7)	
Currently smoke			0.119
No	61.25 (49)	77.78 (21)	
Yes	38.75 (31)	22.22 (6)	
Number of regular HIV care visits			0.101
0-1	60.76 (48)	42.86 (12)	
Two or more	39.24 (31)	57.14 (16)	

CD4 percent*	33.70 (13.42)	29.24 (12.48)	0.123
Viral load			0.440
Undetectable	60.00 (48)	51.72 (15)	
Detectable	40.00 (32)	48.28 (14)	
ARV medication adherence			0.496
100%	40.54 (30)	48.39 (15)	
99-95%	37.84 (28)	25.81 (8)	
<95%	21.62 (16)	25.81 (8)	
Ever had gonorrhea, chlamydia, syphilis			0.499
No	42.50 (34)	35.48 (11)	
Yes	57.50 (46)	64.52 (20)	
CES-D score			0.479
<16	73.75 (59)	66.67 (18)	
≥ 16	26.25 (21)	33.33 (9)	
GAD-7 score			0.572
<10	83.54 (66)	78.57 (22)	
≥ 10	16.46 (13)	21.43 (6)	
Social Support (MOS-SS)			
Tangible support*	71.91 (28.38)	74.78 (29.19)	0.650
Emotional support*	71.52 (27.62)	71.21 (33.64)	0.961
Barriers to HIV care			0.783
No	77.61 (52)	75.00 (21)	
Yes	22.39 (15)	25.00 (7)	
Trust in physician*	66.72 (10.31)	63.84 (10.64)	0.222
Health Care Empowerment Inventory			
ICCE subscale*	17.76 (2.08)	17.64 (2.00)	0.799
TU subscale*	16.03 (2.58)	14.36 (3.60)	0.012

*Continuous variables reported as mean and (standard deviation)

References

ACOG. (2010). ACOG Practice Bulletin No. 117: Gynecological Care for Women With Human Immunodeficiency Virus. *Obstet Gynecol, 116*(6), 1492-1509. doi:10.1097/AOG.0b013e3182054cae

Antelman, G., Medley, A., Mbatia, R., Pals, S., Arthur, G., Haberlen, S., . . . Bachanas, P. (2015). Pregnancy desire and dual method contraceptive use among people living with HIV attending clinical care in Kenya, Namibia and Tanzania. *J Fam Plann Reprod Health Care, 41*(1), e1. doi:10.1136/jfprhc-2013-100784

Bacon, M. C., von Wyl, V., Alden, C., Sharp, G., Robison, E., Hessol, N., . . . Young, M. A. (2005). The Women's Interagency HIV Study: an observational cohort brings clinical sciences to the bench. *Clin Diagn Lab Immunol, 12*(9), 1013-1019. doi:10.1128/cdli.12.9.1013-1019.2005

Bajunirwe, F., Bangsberg, D. R., & Sethi, A. K. (2013). Alcohol use and HIV serostatus of partner predict high-risk sexual behavior among patients receiving antiretroviral therapy in South Western Uganda. *BMC Public Health, 13*(430). doi:10.1186/1471-2458-13-430

Barkan, S. E., Melnick, S. L., Preston-Martin, S., Weber, K., Kalish, L. A., Miotti, P., . . . Feldman, J. (1998). The Women's Interagency HIV Study. WIHS Collaborative Study Group. *Epidemiology, 9*(2), 117-125.

Berer, M. (2006). Dual protection: more needed than practised or understood. *Reprod Health Matters, 14*(28), 162-170.

Bunn, J. Y., Solomon, S. E., Miller, C., & Forehand, R. (2007). Measurement of stigma in people with HIV: Reexamination of the HIV Stigma Scale. *AIDS Educ Prev, 19*(3), 198-208.

Cavazos-Rehg, P., Krauss, M., Spitznagel, E., Schootman, M., Peipert, J., Cottler, L., & Bierut, L. (2010). Type of contraception method used at last intercourse and associates with health risk behviors among US adolescents. *Contraception, 82*(6), 549-555. doi:10.1016/j.contraception.2010.05.007

CDC. (2015). *HIV Surveillance Report, 2014*. Retrieved from http://www.cdc.gov/hiv/pdf/library/reports/surveillance/cdc-hiv-surveillance-report-us.pdf

Chakrapani, V., Kershaw, T., Shunmugam, M., Newman, P. A., Cornman, D. H., & Dubrow, R. (2011). Prevalence of and Barriers to Dual-Contraceptive Method Use among Married Men and Women Living with HIV in India. *Infect Dis Obstet Gynecol, 2011*. doi:10.1155/2011/376432.

Closson, E. F., Mimiaga, M. J., Sherman, S. G., Tangmunkongvorakul, A., Friendman, R. K., Limbada, M., . . . team, H. s. (2015). Intimacy versus isolation: a qualitative study of sexual practices among sexually active HIV-infected patients in HIV care in Brazil, Thailand, and Zambia. *PLoS One, 10*(3), e0120957. doi:10.1371/journal.pone.0120957

Finocchario-Kessler, S., Dariotis, J., Sweat, M., Trent, M., Keller, J., Hafeez, Q., & Anderson, J. (2010). Do HIV-infected women want to discuss reproductive plans with providers, and are those conversations occuring. *AIDS Patient Care STDS, 24*(5), 317-323.

Fogarty, L. A., Heilig, C. M., Armstrong, K., Cabral, R., Galavotti, C., Gielen, A. C., & Green, B. M. (2001). Long-term effectiveness of a peer-based intervention to promote condom and contraceptive use among HIV-positive and at-risk women. *Public Health Rep, 116*(Suppl 1), 103-119.

Glanz, K., Rimer, B. K., & Viswanath, K. (2008). *Health Behavior and Health Education: Theory, Research, and Practice* (4th ed.). San Francisco, CA: John Wiley & Sons, Inc.

Haeri, S., Shauer, M., Dale, M., Leslie, J., Baker, A., Saddlemire, S., & Boggess, K. (2009). Obstetric and newborn infant outcomes in immunodeficiency virus-infected women who are receiving highly active antiretroviral therapy. *Am J Obstet Gynecol, 201*(3), 315.e311-315.e315. doi:10.1016/j.ajog.2009.06.017

Hanisch, R., Cherne, S., Sow, P., Winer, R., Hughes, J., Feng, Q., . . . Hawes, S. (2014). Human papillomavirus type 16 viral load in relation to HIV infection, cervical neoplasia and cancer in Senegal. *Cancer Epidemiol, 38*(4), 369-375. doi:10.1016/j.canep.2014.04.005

Hatcher, R. A., Trussell, J., Cates, W., Kowal, D., & Policar, M. S. (2011). *Contraceptive Technology* (20th ed.): Ardent Media.

Hosmer, D. W., Lemeshow, S., & Sturdivant, R. X. (2013). *Applied Logistic Regression* (3rd ed.). Hoboken, NJ: John Wiley & Sons, Inc.

Huber, L. R., Hogue, C. J., Stein, A. D., Drews, C., Zieman, M., King, J., & Schayes, S. (2006). Contraceptive use and discontinuation: Findings from the contraceptive history, initiation, and choice study. *Am j Obstet Gynecol, 194*(5), 1290-1295.

Johnson, M. O., Rose, C. D., Dilworth, S. E., & Neilands, T. B. (2012). Advances in the Conceptualization and Measurement of Health Care Empowerment: Development and Validation of the Health Care Empowerment Inventory. *PLoS One, 7*(9), e45692. doi:10.1371/journal.pone.0045692

Kalichman, S. C., Catz, S., & Ramachandran, B. (1999). Barriers to HIV/AIDS treatment and treatment adherence among African-American adults with disadvantaged education. *J Natl Med Assoc, 91*(8), 439-446.

Kalichman, S. C., Cherry, C., Kalichman, M. O., Washington, C., Grebler, T., Hoyt, G., . . . Welles, B. (2015). Sexual Behaviors and Transmission Risks Among People Living with HIV: Beliefs, Perceptions, and Challenges to Using Treatments as Prevention. *Arch Sex Behav*. doi:10.1007/s10508-015-0559-4

Larios, S. E., Lozada, R., Strathdee, S. A., Semple, S. J., Roesch, S., Staines, H., . . . Patterson, T. L. (2009). An exploration of contextual factors that influence HIV risk in female sex workers in Mexico: The Social Ecological Model applied to HIV risk behaviors. *AIDS Care, 21*(10), 1335-1342. doi:10.1080/09540120902803190

Löwe, B., Decker, O., Müller, S., Brähler, E., Schellberg, D., Herzog, W., & Herzberg, P. Y. (2008). Validation and standardization of the Generalized Anxiety Disorder Screener (GAD-7) in the general population. *Med Care, 46*(3), 266-274. doi:10.1097/MLR.0b013e318160d093

Lurie, M., Pronyk, P., de Moor, E., Heyer, A., de Bruyn, G., Struthers, H., . . . Martinson, N. (2008). Sexual behavior and reproductive health among HIV-infected patients

in urban and rural South Africa. *J Acquir Immune Defic Syndr, 47*(4), 484-493. doi:10.1097/QAI.0b013e3181648de8

Massad, L. S., Evans, C. T., Wilson, T. E., T., G. E., Sanchez-Keeland, L., Minkoff, H., . . . Watts, D. H. (2007). Contraceptive Use among U.S. Women with HIV. *Journal of Women's Health, 16*(5), 657-666.

Massad, L. S., Springer, G., Jacobson, L., Watts, H., Anastos, K., Korn, A., . . . Minkoff, H. (2004). Pregnancy rates and predictors of conception, miscarriage and abortion in US women with HIV. *AIDS, 18*(2), 281-286.

Mbulawa, Z., Johnson, L., Marais, D., Gustavsson, I., Moodley, J., Coetzee, D., . . . Williamson, A. (2014). Increased alpha-9 human papillomavirus species viral load in human immunodeficiencey virus positive women. *BMC Infectious Disease, 14*(51). doi:10.1186/1471-2334-14-51

McLeroy, K. R., Bibeau, D., Steckler, A., & Glanz, K. (1988). An Ecological Perspective on Health Promotion Programs. *Health Education Quarterly, 15*(4), 351-377.

Mickey, R. M., & Greenland, S. (1989). The Impact of Confounder Selection Criteria on Effect Estimation. *Am J Epidemiol, 130*(5), 125-137.

Mills, S., Fox, R., Malcarne, V., Roesch, S., Champagne, B., & Sadler, G. (2014). The psychometric properties of the generalized anxiety disorder-7 scale in Hispanic Americans with English or Spanish language preference. *Cultur Divers Ethnic Minor Psychol, 20*(3), 463-468. doi:10.1037/a0036523

Mnyani, C. N., Simango, A., Murphy, J., Chersich, M., & McIntyre, J. A. (2014). Patient factors to target for elimination of mother-to-child transmission of HIV. *Global Health, 10*(36). doi:10.1186/1744-8603-10-36

Mosher, W. D., & Jones, J. (2010). Use of contraception in the United States: 1982-2008. *Vital Health Stat 23*(29), 1-44.

NCI. (2005). *Theory at a Glance: A guide for Health Promotion Practice*. Retrieved from

O'Leary, A. (2011). Are dual-method messages undermining STI/HIV prevention? *Infect Dis Obstet Gynecol, 2011*, 691210. doi:10.1155/2011/691210

Orr, S., James, S., & Reiter, J. (2008). Unintended pregnancy and prenatal behaviors among urban, black women in Baltimore, Maryland: the Baltimore preterm birth study. *Ann Epidemiol, 18*(7), 545-551. doi:10.1016/j.annepidem.2008.03.005

Paudel, V., & Baral, K. P. (2015). Women living with HIV/AIDS (WLHA), battling stigma, discrimination and denial and the role of support groups as a coping strategy: a review of literature. *Reprod Health, 12*(53). doi:10.1186/s12978-015-0032-9

Radloff, L. (1977). The CES-D: A self-report depression scale for research in the general population. *Applied Psychological Measurement, 1*, 385-401.

Rahangdale, L., Stewart, A., Stewart, R., Badell, m., Levison, J., Ellis, P., . . . Cohan, D. (2014). Pregnancy Intentions Among Women Living With HIV in the United States. *J Acquir Immune Defic Syndr, 65*, 306-311. doi:10.1097/QAI.0000000000000014

Raiford, J. L., Wingood, G. M., & DiClemente, R. J. (2007). Correlates of consistent condom use among HIV-positive African American women. *Women Health, 46*(2-3), 41-58.

Ruiz-Grosso, P., de Mola, C., Vega-Dienstmaier, J., Arevalo, J., Chavez, K., Vilela, A., . . . Huapaya, J. (2012). Validation of the Spanish Center for Epidemiological

Studies Depression and Zung Self-Rating Depression Scales: A Comparative Validation Study. *PLoS One, 7*(10). doi:10.1371/journal.pone.0045413

Safran, D. G., Kosinski, M., Tarlov, A. R., Rogers, W. H., Taira, D. A., Lieberman, N., & Ware, J. E. (1998). The Primary Care Assessment Survey: Test of Data Quality and Measurement Performance. *Med Care, 36*(5), 728-739.

Sangi-Haghpeykar, H., Posner, S. F., & Poindexter, A. N. r. (2005). Consistency of condom use among low-income hormonal contraceptive users *Perspect Sex Reprod Health, 37*(4), 184-191.

Schoenbaum, E. E., Change, C. J., Moore, J., Stein, M., Warren, D., Schuman, P., . . . Duerr, A. C. (2001). Use of condoms and other contraceptive methods by HIV-infected and at-risk women. *Clin J Womens Health, 1*(3), 115-122. doi:10.1053/cjwh.2001.25543

Shah, P., Balkhair, T., Ohlsson, A., Beyene, J., Scott, F., & Frick, C. (2011). Intention to become pregnant and low birth weight and preterm birth: a systemic review. *Matern Child Health J, 15*(2), 205-216. doi:10.1007/s10995-009-0546-2

Sherbourne, C., & Stewart, A. (1991). The MOS Social Support Survey. *Soc Sci Med, 32*(6), 705-714.

Smits, A. K., Goergen, C. A., Delaney, J. A., Williamson, C., Mundy, L. M., & Fraser, V. J. (1999). Contraceptive use and pregnancy decision making among women with HIV. *AIDS Patient Care STDS, 13*(12), 739-746.

Soper, D. (2010). Pelvic inflammatory disease. *Obstet Gynecol, 116*(2 pt 1), 419-428. doi:10.1097/AOG.0b013e3181e92c54

Spitzer, R. L., Kroenke, K., Williams, J. B., & Löwe, B. (2006). A Brief Measure for Assessing Generalized Anxiety Disorder: The GAD-7. *Arch Intern Med, 166*(10), 1092-1097. doi:10.1001/archinte.166.10.1092

Stanwood, N. L., Cohn, S. E., Heiser, J. R., & Pugliese, M. (2007). Contraception and fertility plans in a cohort of HIV-positive women in care. *Contraception, 75*(4), 294-298. doi:10.1016/j.contraception.2006.12.012

Townsend, C. L., Cortina-Borja, M., Peckham, C., & Tookey, P. (2007). Antiretroviral therapy and premature delivery in diagnosed HIV-infected women in the United Kingdom and Ireland. *AIDS, 21*(8), 1019-1026.

Tun, W., Gange, S. J., Vlahov, D., Strathdee, S. A., & Celentano, D. D. (2004). Increase in Sexual Risk Behavior Associated with Immunologic Response to Highly Active Antiretroviral Therapy among HIV-Infected Injection Drug Users. *Clinc Infect Dis, 38*(8), 1167-1174.

Venkatesh, K., van der Straten, A., Mayer, K. H., Blanchard, K., Ramjee, G., Lurie, M., . . . de Bruyn, G. (2011). African Women Recently Infected with HIV-1 and HSV-2 Have Increased Risk of Acquiring *Neisseria gonorrhoeae* and *Chlamydia trachomatis* in the Methods from Improving Reproductive Health in Africa Trial. *Sex Transm Dis, 38*(6), 562-570. doi:10.1097/OLQ.0b013e31820a8c2c

Weinhardt, L. S., Kelly, J. A., Brondino, M. J., Rotheram-Borus, M. J., Krishenbaum, S. B., Chesney, M. A., . . . Team, N. I. o. M. H. L. P. (2004). HIV transmission risk behavior among men and women living with HIV in 4 cities in the United States. *J Acquir Immune Defic Syndr, 36*(5), 1057-1066.

Williams, M., Ross, M. W., Bowen, A. M., Timpson, S., McCoy, H. V., Perkins, K., . . . Young, P. (2001). An investigation of condom use by frequency of sex. *Sex Transm Infect, 77*(6), 433-435.

Wilson, T. E., Koenig, L., Ickovics, J., Walter, E., Suss, A., Fernandez, M., & Project, P. G. E. (2003). Contraception use, family planning, and unprotected sex: few differences among HIV-infected and uninfected postpartum women in four US states. *J Acquir Immune Defic Syndr, 33*(5), 608-613.

Wilson, T. E., Massad, L. S., Riester, K. A., Barkan, S., Richardson, J., Young, M., . . . Greenblatt, R. (1999). Sexual, contraceptive, and drug use behaviors of women with HIV and those at high risk for infection: results from the Women's Interagency HIV Study. *AIDS, 13*(5), 591-598.

WHO. (2006). *Sexual and Reproductive Health of Women Living With HIV*. Retrieved from http://www.who.int/hiv/pub/guidelines/sexualreproductivehealth.pdf

WHO. (2015). *Medical Eligibility Criteria for Contraceptive Use* (5 ed.). Retrieved from http://who.int/reproductivehealth/publications/family_planning/MEC-5/en/

Chapter 5: Summary & Synthesis

Introduction

This dissertation research includes an integrative review of dual method use in women living with HIV (WLHIV) and a secondary analysis of data from the WIHS study. The integrative review included original research articles and HIV care guidelines by authoritative HIV/AIDS and women's health organizations. The purpose of the review was to identify barriers and facilitators to dual method use in HIV positive women as well as highlight areas for further research. Based on the integrative review and an extensive literature search, three aims were developed that would potentially contribute new information to the literature. The three aims investigated possible factors related to use of dual methods, consistent dual method use, and sustained dual method use.

A secondary analysis of 431 women from the Women's Interagency HIV Study (WIHS) was conducted. An ecological model for health behavior guided selection of factors for analysis because it acknowledges multilevel factors that can impact a health behavior. Dual methods was defined as self-report of condom use with a second form of contraception effective at preventing pregnancy. Consistent dual methods was defined of self-report of always using condoms during sexual intercourse and the use of a second contraceptive effective at preventing pregnancy. Lastly, sustained dual method use was defined as the use of dual methods over two WIHS study visits (approximately one-year study). Logistic regression modeling was utilized for all three analyses. A summary of findings is presented here.

Integrative review

A total of 14 articles and six practice guidelines were identified that fit criteria for inclusion. The review showed that the research reporting on dual method contraceptive use in women living with HIV is scarce. Parity and fertility desires, relationship factors, HIV and health factors, health care factors, knowledge, and sociodemographic factors were all possible factors identified through the review. Partner factors include HIV disclosure, communication about family planning, partner fertility desires, and partner contraceptive preferences. HIV related factors influencing dual method use include HIV diagnosis, CD4 count, and physical health. Lastly, knowledge of both HIV-care providers and HIV positive women impacted provision and uptake of dual methods. Two interventions were identified, but results from these interventions were mixed. Availability of contraception and discussions about dual methods with providers may be enough to significantly increase uptake. Whereas peer groups and one-on-one counseling may increase consistency of dual method use and HIV positive women's condom and contraceptive self-efficacy over time. A number of guidelines by women's health and HIV/AIDS organizations recommended use of dual methods for WLHIV wishing to avoid pregnancy. However, these recommendations were done with caution because of concerns related to medication interactions and inconsistency of contraceptive use.

The review highlighted issues that may impact dual method research, specifically discrepancies in terminology and a primary focus on contraceptive use. A primary focus on contraceptive use downplays any relationship between concurrent contraceptive and condom use that may exist and makes it challenging to draw conclusions about dual method use. Further, many articles and guidelines either incorrectly used the term dual

protection or discussed the use of condoms and a second form of contraceptive without designating it as dual methods. A lack of consistent use of the term and lack of focus on dual method use may be barriers to increasing knowledge and research about dual methods in HIV positive women.

Aim1: **Identify behavioral, clinical, and psychosocial factors that are associated with dual method use in a sample of HIV positive women of reproductive age who are sexually active.**

In the first analysis, 36.7% of women used dual methods while 44.3% used condoms only and 19.0% used either non-barrier or ineffective methods. Comparison of dual methods to condom only, non-barrier methods, and ineffective methods revealed a number of factors that increase the odds of dual method use. Parity and being at a southern site were significant when comparing dual methods to condoms and dual methods to ineffective methods. Participants reporting any children were significantly more likely to use dual methods than women reporting no children. Further, as the number of children increased, so did the odds of dual method use. Participants at southern study sites had significantly higher odds of dual method use. While the sample size was too small to assess differences between individual sites, prevalence of dual method use varied from site to site with the lowest rate reported at the Bronx, NY site (13.3%) and the highest rate at the Jackson, MS site (65.7%). There was a trend toward older age increasing the odds of dual method use when comparing dual methods to condoms only. In the model comparing dual methods to non-barrier methods, no factors remained significant at the p-value less than or equal to 0.05 level. The number of

participants using non-barrier methods was low (n = 44) which may have resulted in insufficient power to detect any differences.

Aim 2: **Identify behavioral, clinical, and psychosocial factors that are associated with sustained use of dual methods over time.**

Of the 111 participants with two consecutive WIHS visits utilizing dual methods at the first visit, 72.1% sustained dual methods over both study visits. Almost one third of women who did not sustain dual methods, reported abstaining from intercourse to prevent STI/HIV transmission or for personal reasons. The only factor significantly related to sustained dual method was currently having a partner. Women who reported currently being in a relationship with someone they considered a partner had significantly higher odds of sustained dual method use suggesting the influence of partner factors in maintenance of dual methods.

Aim 3: **Identify behavioral, clinical, and psychosocial factors that are associated with consistent dual method use.**

In a sample of 157 WIHS participants reporting dual method use, 77.1% of participants reported using dual methods consistently. Number of sexual partners and CD4 percent both influenced consistency of dual method use. In this analysis, women reporting two or more sexual partners in the past six months had decreased odds of consistent dual methods indicating women engaging in higher risk sexual behaviors are not adequately protecting themselves or their partners. Additionally, as CD4 percent

increased, odds of consistent dual method use significantly decreased. This suggests that risk compensation practices may impact the consistency of dual methods.

Synthesis

Results from these analyses indicate that the ecological model of health behavior is a useful framework for understanding uptake and patterns of dual method use. Use of dual methods was influenced by intrapersonal and interpersonal factors and possibly organizational, community, and policy level factors, while patterns of dual method use such as consistency and sustained use were only influenced by interpersonal and intrapersonal factors.

Parity and age, intrapersonal factors, significantly increased the odds of using dual methods. The significantly higher rate of dual methods at southern sites suggests higher-level factors i.e. policy, community, and organizational factors can facilitate or deter dual methods in HIV positive women. Additional research is needed to identify specific policy, community, and organizational factors most relevant to dual methods.

Examination of consistency and sustained use of dual methods revealed that intrapersonal and interpersonal factors influence patterns of dual method use. This suggests that once HIV positive women have been provided dual methods, it may be the personal and relationship factors that determine how consistently and the length of time dual methods are used. Having a partner and number of male sexual partners were partner related, interpersonal factors that impacted patterns of dual method use. Factors identified in the integrative review may partially explain the relationship including HIV disclosure to one's partner, partner preference for contraception or condoms, and comfort

communicating with partner. CD4 percent was also a significant intrapersonal factor that impacted patterns of dual method use. While the relationship between CD4 levels and uptake of dual methods still remains unclear based on the integrative review, CD4 percent significantly decreased the odds of consistent dual methods. The relationship between CD4 percent and consistency could indicate that HIV positive women practice risk compensation. Higher CD4 percent may lead HIV positive women to believe they are less infectious and be less diligent about using dual methods because of perceived reduced risk of HIV transmission to their partner. Partner-related and HIV-related factors significantly impacted patterns of dual methods, and could be areas of further investigation to better understand consistent and sustained use of dual methods.

Findings from the integrative review indicated that interpersonal factors related to the patient-provider relationship that HIV positive women have with their HIV care providers can also have a significant impact on uptake of dual methods. HIV positive women are responsive to HIV care providers' contraceptive advice and for many women their providers are their primary source of information related to dual methods. However, in these analyses no HIV care factors were significant. Trust in HIV care providers, number of regular HIV care visits, barriers to HIV care, and health care empowerment did not significantly impact dual method use in any of the models. This suggests other interpersonal factors identified in the review, but not captured in these analyses, including provider comfort with providing contraception, provider concerns about inconsistent dual method use, and lack of conversations about dual methods, may be more influential.

Implications for research

There are still many knowledge gaps surrounding dual method use by HIV positive women. Future research should focus on what organizational, policy, and community level factors led to the wide range of observed prevalence and significant impact of being from a southern study site. Identifying these factors could highlight specific targets for interventions that have a wider impact on a larger number of HIV positive women. The integrative review suggests provider family planning training and programmatic goals may be areas that yield promising results. Additionally, research could focus on specific regional differences in family planning and preconception services, provider knowledge, community knowledge and beliefs, and HIV/AIDS government policy to provide more robust data on factors influencing uptake. A second area that requires further investigation is additional factors impacting consistency of dual method use. This is especially important because concerns about consistency of use are expressed repeatedly through the literature and most conclusions about WLHIV's consistency are drawn from studies of HIV negative women. Little is known about the factors that influence consistency of use, but findings from this study strongly suggest that a more in-depth investigation of interpersonal factors related to women and their sexual partners is needed.

Implications for practice

Few interventions have been developed to address dual method use in women living with HIV. Based on the findings from these analyses, interventions should use a multipronged approach that incorporates multiple levels of the ecological model.

Increasing availability of preconception and family planning services, family planning training for HIV care providers, and standard dual methods counseling may improve uptake of dual methods. Further intervention on interpersonal and intrapersonal factors through counseling, inclusion of partners in counseling, peer support groups, and motivational interviewing may improve consistency of use and increase sustained use of dual methods.