

**STRUCTURAL VULNERABILITY AND HIV/STI RISK BEHAVIOR
AMONG NEW EXOTIC DANCERS IN BALTIMORE, MARYLAND**

by
Meredith Brantley

A dissertation submitted to Johns Hopkins University in conformity with the
requirements for the degree of Doctor of Philosophy

Baltimore, Maryland
March 2016

ABSTRACT

Background: Structurally vulnerable women often face an accumulation of social and economic disadvantage that can shape a context of HIV/STI risk. Women who are structurally vulnerable and working in HIV/STI risk environments such as exotic dance clubs may have an added risk for infection when engaging in sexual and drug-related activity. However, not all structurally vulnerable women engage in risk behaviors, which may be reflective of the intensity at which certain social and economic factors cluster together. This study aims to explore the nature and progression of structural vulnerability experienced by female exotic dancers, and to examine how different experiences of structural vulnerability shape sexual risk behavior and drug use.

Methods: Qualitative and quantitative data from a cohort of female exotic dancers (n=117) working in Baltimore, Maryland followed for three months were used for a series of three separate analyses. First, thematic analysis was applied to qualitative data from a sub-sample of 24 dancers interviewed about experiences of structural vulnerability and sex- and drug-related behaviors. Using data collected through a survey of the entire cohort, latent class analysis was used to classify women into subgroups of structural vulnerability, and latent class regression was used to determine whether sexual risk behavior and drug use varied by subgroup. Lastly, trajectories of structural vulnerability were examined over time and logistic regression models were used to estimate the odds of sexual risk behaviors at follow-up, compared across vulnerability trajectories.

Results: Thematic analysis uncovered both early and recent experiences of structural vulnerability, emphasizing experiences of social and economic hardship that related to housing, education, finances, and arrest history. Narratives revealed how the effects of

structural vulnerability, substance abuse, interpersonal relationships, and opportunities for economic gain through sexual services in the workplace converged to produce varying levels of HIV/STI risk. Latent class analysis revealed two subgroups of structural vulnerability, classified into “low” and “high” vulnerability. One-third of participants were expected to belong to the high vulnerability subgroup, and were more likely to report sex exchange, multiple sex partners, and illicit drug use. The final analyses indicated that dancers who transitioned from low to high vulnerability were more likely to report inconsistent condom use at follow-up compared to women with low vulnerability, and chronically vulnerable women were more likely to report having a high-risk sex partner at follow-up.

Conclusions: Findings consistently indicated that social and economic effects of structural vulnerability play a key role in shaping sexual risk behavior. Integrating efforts to improve access to housing, legal aid, and educational opportunities into HIV/STI intervention programs may help to further mitigate HIV/STI risk. Reshaping public policy that holistically addresses structural drivers across sectors is also critical to achieving widespread impact and successfully eliminating disparities in HIV/STI among vulnerable populations living in the United States.

COMMITTEE OF FINAL THESIS READERS

Committee members:

Deanna Kerrigan, PhD
Associate Professor and Advisor
Department of Health, Behavior and Society
Johns Hopkins Bloomberg School of Public Health

Susan Sherman, PhD
Professor and Co-Advisor
Department of Epidemiology
Johns Hopkins Bloomberg School of Public Health

Jacky Jennings, PhD
Associate Professor
Department of Pediatrics
Johns Hopkins School of Medicine

Danielle German, PhD
Assistant Professor
Department of Health, Behavior and Society
Johns Hopkins Bloomberg School of Public Health

Alternate committee members:

Jill Owczarzak, PhD
Assistant Professor
Department of Health, Behavior and Society
Johns Hopkins Bloomberg School of Public Health

Caitlin Kennedy, PhD
Assistant Professor
Department of International Health
Johns Hopkins Bloomberg School of Public Health

ACKNOWLEDGEMENTS

Many individuals have played a significant role in supporting me through my time as a doctoral student at Johns Hopkins University. First, I would like to thank my advisor, Dr. Deanna Kerrigan. Dr. Kerrigan was one of my first teachers in the Department of Health, Behavior and Society and played a critical role in expanding my thinking around social issues in population health. She delivered valuable mentorship and advice through the most challenging stages of my program, while providing a seamless balance of gentle nudging and reassurance that was critical to the successful writing of my NRSA proposal and subsequently, the completion of this dissertation.

I am also thankful for my co-advisor, Dr. Susan Sherman, for her constant support throughout the program. In addition to professional and financial support through the STI Training Grant, Dr. Sherman provided many opportunities for me to develop into a confident and skilled public health researcher. She went above and beyond to engage me in every aspect of the study under which this dissertation was made possible. Dr. Sherman also guided me closely through the world of grant writing, making it less intimidating and more achievable every step of the way. Even from afar, I always felt connected and encouraged through regular phone calls, team meetings, and incredibly responsive emails, despite her extremely busy schedule. Dr. Sherman was my biggest champion and I am forever grateful.

The mentorship of Dr. Jacky Jennings was an integral part of my experience at Johns Hopkins. From day one, Dr. Jennings offered me an opportunity to join her team at the Center for Child and Community Health Research, where I had the space to think critically about place-based approaches to investigating health disparities and to

collaborate on a variety of projects designed to inform local public health programming. As a research assistant in the Center, and through her mentorship on the STI Training Grant, I learned how to strategically develop and address research questions using robust and innovative methods. I am especially appreciative for the many one-on-one conversations that left me with new knowledge and more questions to be answered.

Many other faculty, staff, and students have contributed to the dissertation process. I thank Dr. Danielle German for serving on my preliminary oral and final exam committees, and for sharing her expertise in mixed methods approaches to investigating the social and economic contexts of health behavior. I am also very appreciative of Dr. Melissa Davey-Rothwell and Dr. Karin Tobin, as they provided advice and encouragement that was critical to the success of my NRSA and subsequent completion of my proposal. Dr. Larry Moulton and Dr. Kate Smith were also essential supporters during proposal writing, and were valuable members of my oral exam committees. I am also thankful for the opportunity to work with the entire STILETTO Study team, especially Katherine Footer, Sahnah Lim, Wendy Davis, Steve Huettner, and Dr. Carla Zelaya. I would also like to thank my cohortmates, especially Melissa King and Victoria Chau, who were critical during the final push.

I am so grateful for my friends and family who were unnecessarily generous during my time as a student. My friend, Dr. Kathryn Brownell, was an unwavering source of motivation and encouragement, always cheering me on with food, drinks, and warm fuzzies. My brother, USAF Major Brant Reilly, and sister-in-law Sara Reilly, graciously lent me their car for my final year after an unexpected move to suburbia, for which I am extremely grateful. I am also appreciative for my sister-in-law Laura

Brantley, for always being up for a coffee run and providing an endless amount of laughter. I am especially thankful for my parents, Terry and Kathy Reilly, who are the most encouraging, optimistic, proud, inquisitive, and loving forces in my life. My husband, Brittain Hall Brantley, deserves the greatest nod for patiently putting up with my antics, encouraging me to question the norm and aim high, and most importantly, for sharing his brilliance and humor at all the right moments.

I am thankful for the financial support provided by the National Institute of Allergy and Infectious Diseases (T32 A1050056) and the National Institute on Drug Abuse (F31 DA038540). Additionally, the STILETTO Study was supported by the National Institute of Drug Abuse (NIDA R21 DA033855) and the Johns Hopkins Center for AIDS Research (JHU CFAR; NIAID 1P30AI094189).

Lastly, I am grateful for the support of the Baltimore City Health Department, recruitment and data collection by the STILETTO study team, and for the women who participated in the study, who so kindly opened up and shared their lives.

TABLE OF CONTENTS

ABSTRACT	ii
COMMITTEE OF FINAL THESIS READERS	iv
ACKNOWLEDGEMENTS	v
TABLE OF CONTENTS	viii
LIST OF TABLES	x
LIST OF FIGURES	xi
CHAPTER ONE: INTRODUCTION	1
Background	2
Study Aims	10
CHAPTER TWO: METHODS	13
Study design and population	14
Qualitative methods: Manuscript one	15
Quantitative methods: Manuscripts two and three	17
Protection of human subjects	25
CHAPTER THREE: MANUSCRIPT ONE	27
Abstract	28
Background	29
Methods	33
Results	36
Discussion	46
CHAPTER FOUR: MANUSCRIPT TWO	51
Abstract	52
Background	52
Methods	56
Results	60
Discussion	63
CHAPTER FIVE: MANUSCRIPT THREE	73
Abstract	74
Background	75
Methods	78
Results	84
Discussion	87

CHAPTER SIX: DISCUSSION	100
Overview	101
Summary of findings	101
Study strengths and limitations	107
Study implications and future research	111
Conclusion	115
BIBLIOGRAPHY	117
APPENDICES	131
Appendix A: Consent form – quantitative study	132
Appendix B: Consent form – qualitative study	137
Appendix C: In-depth interview guides	141
CURRICULUM VITAE	167

LIST OF TABLES

Table 4.1	Descriptive statistics of study sample, n=117	70
Table 4.2	Model fit statistics for 1, 2, and 3 class models, n=117	70
Table 4.3	Bivariate analyses of factors associated with latent class membership (n=117)	72
Table 5.1	Description of sample demographic, dancing-related and psychosocial factors (n=89)	96
Table 5.2	Sexual risk behaviors among dancers at follow-up, by baseline status (n=89)	98
Table 5.3	Correlates of vulnerability trajectory, odds ratios and 95% confidence intervals (n=89)	98
Table 5.4	Odds ratios for sexual risk behavior at follow-up, by vulnerability trajectory (n=89)	99

LIST OF FIGURES

Figure 1.1	Conceptual framework linking macro-level and intermediate-level structural factors to individual social and economic disadvantage	11
Figure 1.2	Conceptual framework linking indicators of structural vulnerability to sexual risk behavior	12
Figure 4.1	Two-class model: probability of vulnerability indicator, conditional on class membership (n=117)	71
Figure 4.2	Estimated probability of reporting sexual risk behavior or illicit drug use in the past six months, by class membership (n=117)	72
Figure 5.1	Vulnerability class and indicators among dancers at follow-up, by baseline status (n=89)	97

CHAPTER ONE: INTRODUCTION

Background

HIV/STI in the United States: opportunities for enhanced prevention and care

In the United States (U.S.), approximately 47,500 individuals are newly infected with HIV each year [1]. An additional 20 million sexually transmitted infections (STIs) occur annually, leading to a substantial burden of disease and associated costs to the U.S. healthcare system [2]. Despite extensive efforts to reduce ongoing transmission of HIV and other sexually transmitted infections, concentrated epidemics remain among certain places and populations. The most significant burden of HIV/STI can be found in urban areas and across the southern and northeast regions of the United States. Disparities in the southern U.S., for example, can be attributed to high rates of overlapping social factors such as poverty, incarceration, stigma, and inadequate access to healthcare [2, 3]. Also rooted in social issues, key populations that are disproportionately affected by HIV and other STIs include men who have sex with men (MSM), people who inject drugs (PWID), adolescents and young adults, and women.

One-fifth of new HIV infections occur among women each year in the United States [1, 3], underscoring the need for new HIV prevention and control strategies specifically targeted for women. Other sexually transmitted infections also pose a particular challenge for women's health, as they are disproportionately affected by the long-term sequelae of untreated infection such as pelvic inflammatory disease, infertility, and reproductive cancers [2, 4]. Among those who are at greatest risk for HIV/STI include women of minority race (i.e., African-American) or young age (i.e., <25 years), as well as women working in certain occupations (i.e., sex workers) or living in neighborhoods of concentrated poverty with high prevalence.

While much of the current focus is on MSM, improving the effectiveness of policies and prevention programs that benefit women is critical to curbing the U.S. HIV/STI epidemic. The most effective approaches may require interventions that are tailored specifically to address the needs of women who are at greatest risk. New strategies remain particularly important for young, minority women who live in communities with high HIV/STI prevalence or are otherwise connected to sexual networks with high rates of infection through work or social venues. Recent evidence-based HIV prevention interventions of promise include Healthy Love, a single-session, low cost educational workshop designed to promote risk reduction by improving self-efficacy for condom use and increasing HIV testing among heterosexual black women in the South [5]. In addition to individual or small group behavioral interventions, systemic initiatives and community-level programs also have important advantages. While systemic initiatives (e.g., local or national-level level efforts to enhance HIV/STI testing capacity or remove barriers to accessing healthcare) offer the largest reach, community-level programs also have potential for widespread impact [6]. Examples include efforts such as educational campaigns on college-campuses targeting young female students, or free access to condoms for female sex workers [6]. However, much progress is yet to be made, and there is an ongoing need for effective, multi-level interventions to reduce HIV/STI burden among women in the United States [7, 8].

Structural vulnerability: a framework for investigating HIV/STI risk

Across the United States and worldwide, HIV and other STIs have most greatly impacted economically disadvantaged populations, pointing to poverty as a driving force of the epidemic. More than half of persons living in poverty in the United States are women, a disparity attributed to discrimination (e.g., lower wages, segregation into lower paying occupations), the costs of caregiving and raising children, and domestic violence [9]. Impoverished women are often limited in their ability to transition into a higher socioeconomic status [10, 11]. Overcoming the “costs” of poverty, requires a safety net of time and money, in addition to the human, social, and health capital or resources needed to deal with the stressful circumstances that stem from unexpected adverse events such as job loss [12, 13]. Without a safety net or substantial resources, the accumulation of mutually reinforcing social and economic disadvantages such as challenges securing stable housing and high-paying, steady employment, can further limit opportunities for women to achieve upward mobility, perpetuating a cycle of poverty [14-17].

Experiences of poverty and scarcity of resources can be understood within a framework of structural vulnerability, which helps to articulate how some women are predisposed to disadvantage for health and well being because of economic, social, and gender discriminations [7, 18]. In addition to macro-level structural factors such as class or gender inequality, structurally vulnerable women are also subject to intermediate-level factors such as neighborhood characteristics and concentrated poverty, local economic conditions, and government laws or policies across multiple sectors [19]. The confluence of these macro-level and micro-level structural factors can construct a context in which individual agency for healthy or protective behavior is compromised [20]. The

symptoms of structural vulnerability often surface at the individual-level, in the form of co-occurring social and economic hardship [7, 18, 21-23]. Specifically, structurally vulnerable women have trouble accessing safe and reliable housing, steady and well-paid employment, and affordable, quality education, in addition to enduring the consequences of encountering the criminal justice system (e.g., arrests and/or incarceration). Figure 1.1 depicts a framework that illustrates how macro and intermediate structural factors co-occur to produce and social and economic disadvantage experienced at the individual level.

A growing body of evidence points to the role of structural vulnerability as predisposing women to an increased risk for HIV and other STIs [7, 21, 23]. Young women who are structurally vulnerable have a particularly high risk for HIV/STIs. Younger women are not only likely to have more sex partners, but structurally vulnerable women are likely to be connected to sexual networks with higher rates of HIV/STI. In addition to increased exposure to infection, risk can be introduced when women have compromised bargaining power to protect themselves against harm when engaging in sexual activity [7, 18, 21, 23]. For example, socially and economically disadvantaged women often find themselves in relationships with limited sexual power. Women in these relationships are more prone to sexual violence and less likely to consistently use condoms [23-25]. In any context of unprotected sex, having multiple, high-risk (e.g., HIV/STI-infected) sex partners can increase the chances for exposure to HIV and other STIs [26-31].

Several individual social and economic disadvantages rooted in intermediate structural factors have been established as important drivers of HIV/STI among women,

demonstrating how HIV/STI risk can be a function of broader social and economic conditions [7, 32-34]. Across different populations and settings, indicators of social stability, such as residential transience, income level, and history of incarceration, may be relevant to understanding the individual social and economic symptoms of structural vulnerability [14, 16, 17, 35-37]. These indicators are recognized as important determinants of HIV and other STIs in some key populations such as injection drug users (IDUs) and low-income women [14, 17, 35, 36, 38]. For example, Aidala et al. suggested that provision of housing may be an important structural intervention for HIV prevention after finding high rates of drug use, needle use, and sex exchange among individuals who were homeless or unstably housed compared to their more housed counterparts. Moreover, individuals whose housing stabilized over time were subsequently less likely to engage in drug and sex related risk behavior. Because multiple social and economic hardships are likely to co-occur, additional research has begun to examine how structural factors intersect to engender HIV/STI risk behavior. German and Latkin found an association between social stability and HIV/STI risk behavior among low-income women, using a combination of indicators related to housing, income, and incarceration [17]. Building off of this framework, Reilly and co-authors also demonstrated a synergistic effect of stability indicators on engagement in high-risk sexual activity and drug use among a sample of female exotic dancers surveyed in Baltimore, Maryland [39].

Places where vulnerable women are concentrated – through their residences, social venues, or workplaces – may provide efficient access points for future research into understanding how structural factors function synergistically to drive HIV/STI transmission. Female exotic dancers are an understudied, key group of at-risk young

women who are drawn to work in exotic dance clubs (EDCs) for the flexible schedule and potential for quick cash (e.g., daily tips). Some EDCs operate as venues in which dancers exchange sex for money or drugs, setting up a context of HIV/STI risk [40-42]. Previous research among dancers in Baltimore, Maryland found high rates of sex exchange and inconsistent condom use [41, 42]. The most structurally vulnerable women entering dancing may be at increased risk for HIV/STI through initiation or escalation of these behaviors. In contrast, women experiencing little to no vulnerability may be more likely to avoid sex exchange or have a greater capacity to protect themselves against infection through consistent condom use when engaging in sex exchange with clients. However, how different experiences of vulnerability converge with the EDC environment to promote or protect against HIV/STI risk has not been explored.

The role of drug use and violence: the intersection of psychosocial factors, structural vulnerability, and HIV/STI risk

Structural drivers of HIV/STIs have also been linked to psychosocial conditions such as drug use and intimate partner violence (IPV) [43-49]. Drug use and experiences of violence are not only accountable for increases in social and economic instability, but are also recognized as products of living in a context of structural disadvantage. Regardless of the causal pathway, drug use and violence are also closely tied to sexual behavior that can increase the risk for HIV or other sexually transmitted infections [29, 30, 47, 48]. To effectively address HIV/STI disparities among women requires a holistic approach that acknowledges the intersection of psychosocial factors, structural vulnerability, and HIV/STI risk behavior.

Drug use can increase HIV/STI risk through several ways. Women who are under the influence of drugs such as prescription opiates, heroin, or cocaine may have weakened sexual inhibitions that may result in sexual encounters that would otherwise be avoided [29, 30]. For some women, this may lead to sex with multiple casual partners or sex in exchange for money or drugs. Women are at elevated risk for HIV/STI when these encounters involve unprotected sex with high-risk (i.e., infected with HIV or an STI) male partners. Exposure to high-risk sex partners is enhanced for women using drugs because they are often connected to drug networks characterized by high rates of HIV/STI [50]. Additionally, women using drugs are less likely to consistently use condoms as a result of sexual inhibition or due to a reduced capacity to negotiate condom use with sex partners [29, 30].

While the relationship between drug use and HIV/STI is well established, research continues to strive for a more clear understanding of the series of risk factors that lead to drug use [51]. This includes a renewed focus on the role of intermediate structural factors, including investigations into the ways in which place shapes the initiation or escalation of drug use [51-53]. For example, the availability of and drug use norms are important contextual factors that determine individual propensity toward drug use [45, 54, 55]. Moreover, recent studies have demonstrated associations between economic deprivation and drug use attributed to stress related to neighborhood poverty, low employment, and income instability that places individuals at risk [43-45]. Drug use can further perpetuate financial stress as a result of from drug-related job loss or injury [56]. In order to best inform solutions around HIV/STI prevention, accurately characterizing the multiple roles of drug use is critical to understanding mechanisms of

HIV/STI risk that are rooted in structural vulnerability.

Intimate partner violence is another key psychosocial risk factor of HIV/STI risk that is rooted in structural vulnerability. HIV/STI risk can be introduced when women are compromised by the cluster of multiple socioeconomic stressors and have compromised bargaining power to protect themselves against harm when engaging in sexual activity or drug use. Socially and economically disadvantaged women often find themselves in relationships with limited sexual power. Women in these relationships are more prone to sexual violence and less likely to consistently use condoms [23-25]. In a study of young female patients attending family planning clinics, researchers found that recent IPV was associated with involuntary condom non-use and fears around requesting condoms; women who had recently experienced IPV were more likely to engage in unprotected sex with their partners [48].

Figure 1.2 illustrates how multiple, overlapping indicators of structural vulnerability may function to drive sexual risk behavior, and includes possible pathways by which the EDC risk environment, drug use, IPV may influence this relationship.

Study Aims

This study aims to investigate the dynamic nature of structural vulnerability as a contextual driver of HIV/STI risk by exploring the embodied experience of structural vulnerability, and its intersection with sexual risk behavior and drug use, over time. Through a sample of new exotic dancers (≤ 12 months dancing, $n=117$) in Baltimore, Maryland, the specific aims of the research are to:

1. Qualitatively explore the nature and progression of structural vulnerability and how different experiences of structural vulnerability shape sexual risk behavior and drug use;
2. Use themes identified in Aim One to quantitatively profile subgroups of structural vulnerability and examine associations with sexual risk behavior and drug use; and
3. Determine trajectories of structural vulnerability and investigate the relationship between structural vulnerability, sexual risk behavior, and drug use over time.

Figure 1.1. Conceptual framework linking macro-level and intermediate-level structural factors to individual social and economic disadvantage.

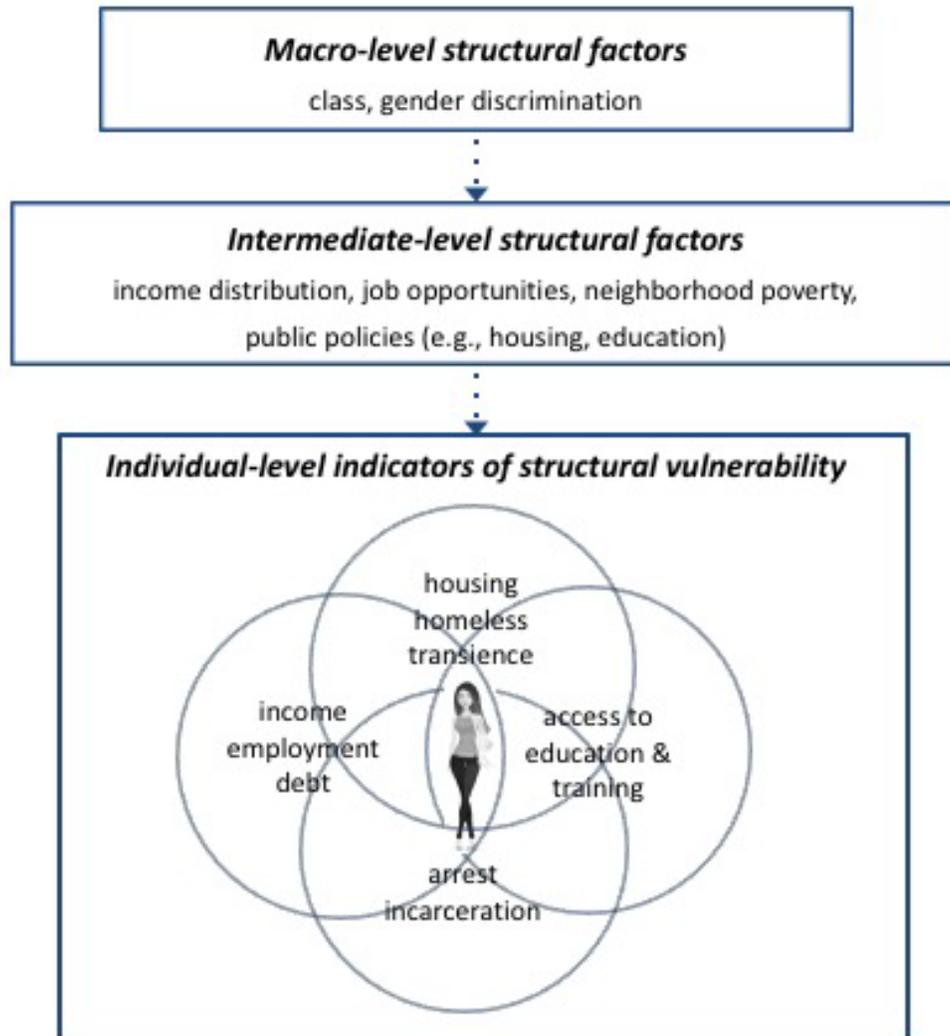
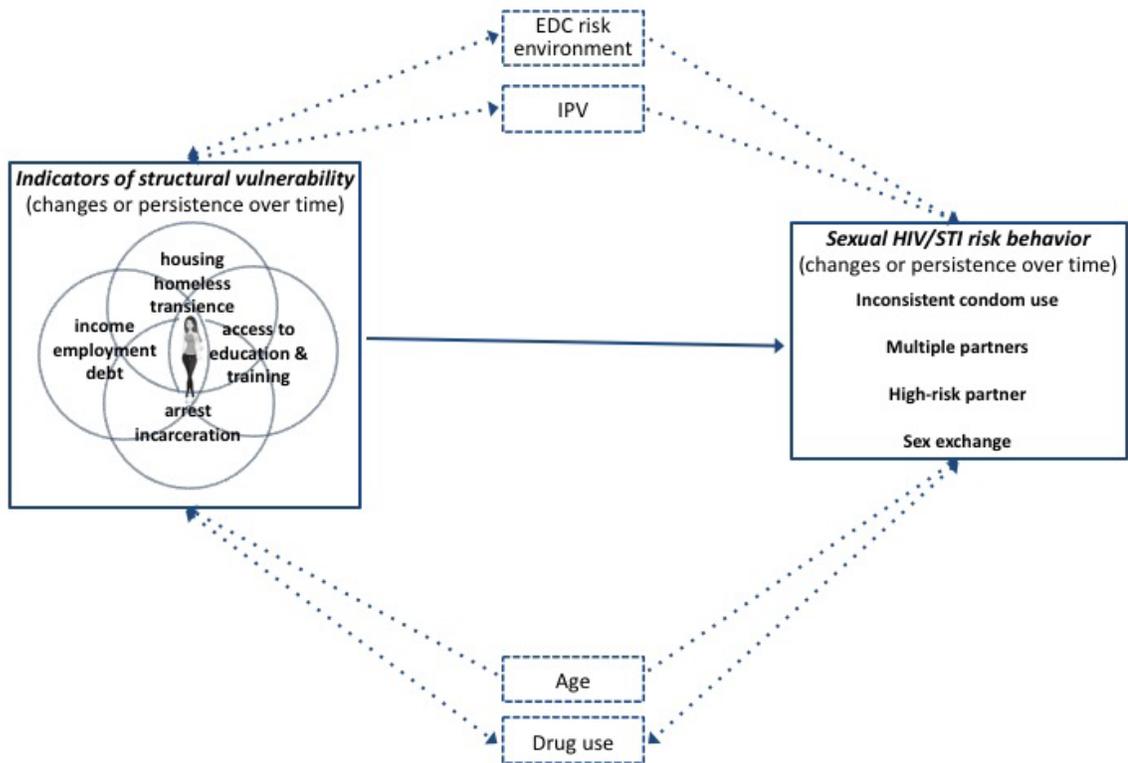


Figure 1.2. Conceptual framework linking indicators of structural vulnerability to sexual risk behavior.



CHAPTER TWO: METHODS

Study design and population

This mixed methods study is an extension to the parent study, STILETTO (STudying the Influence of Location and Environment - Talking Through Opportunities for Safety) Study. Both qualitative and quantitative data collected for the STILETTO Study were used to address each of the three aims outlined in Chapter 1 of this dissertation. Using a concurrent triangulation design, we used both data sources to cross-validate findings between aim 1 and aim 3, and also relied on qualitative data to inform the design of analyses for aim 2. Through this approach, the strengths of both qualitative and quantitative methods can be used to gain a deeper understanding of the research question.

The overarching goal of the STILETTO Study was to characterize the HIV risk environment of exotic dance clubs (EDCs) and investigate the role of the EDC environment on HIV/STI risk. As a longitudinal study, a cohort of women was followed upon entry into dancing through their initial months of work. The study was comprised of two parts: a quantitative component, which began in May 2014, and a qualitative component, which began in July 2014. During each component, women were followed up at three to four months following their baseline quantitative survey and/or qualitative interview.

Cohort participants were purposively recruited from 22 EDCs operating in Baltimore City and County during the baseline quantitative study period (May 2014 to October 2014). Participating EDCs were included based on drug and sex risk profiles previously categorized by a risk environment inventory [57]. Female exotic dancers were eligible to enroll in the cohort if they met the following criteria: ≥ 18 years old, danced for

≤12 months, and danced ≥3 times in the past month. Following eligibility determination and providing informed consent, participants (n=117) filled out a 45-minute baseline survey using audio computer-assisted self-interviewing (ACASI) on a portable tablet. All cohort participants were invited to take a second survey at three months post baseline. The STILETTO Study and this dissertation were approved by the Johns Hopkins Bloomberg School of Public Health Institutional Review Board.

Qualitative methods: Manuscript one

Data collection – in depth interviews

The qualitative study component was comprised of a subsample of twenty-four women from the larger quantitative cohort. Cohort participants were purposively sampled to primarily include dancers who had been working for six months or less at high-risk EDCs, and were open and willing to discuss their lives. The target sample size for interviews was originally 20 participants; however, saturation was not evident as we approached our target and recruitment was expanded to 24 dancers, at which no new themes emerged.

Two interviews were completed with each participant, with the second occurring approximately three to four months apart from the first. The initial interview guide focused on recent social and economic circumstances and early experiences of vulnerability, as well as information related to reasons for dancing, reactions to the EDC environment, experiences of violence, sex- and drug-related behaviors, and health concerns of new dancers. The second interview followed up on their social and economic circumstances, including any changes in housing, education, or job status since

the first interview. Dancers were also asked follow up questions about dancing status, including reasons for leaving dancing altogether or switching clubs, if relevant. Recent sex- and drug-related behaviors, health status, and future goals were also discussed. Interviews were conducted by the student investigator of this dissertation, in addition to two research assistants, in settings convenient to the women's workplace.

Participants provided written consent prior to the first interview and after each interview were compensated \$40 for their time. All but three women took part in both interviews, for a total of 45 interviews. Interviews were audio-recorded and transcribed verbatim. Transcripts were checked for accuracy and cleaned accordingly by the interview team.

Analysis

The study team, consisting of the three interviewers and the principal investigator of the STILETTO Study, applied a multi-step process of thematic content analysis to explore the data. In parallel with another research assistant, the student investigator read through a sample of two transcripts to develop the initial coding framework via open coding. To develop major themes from the data, coding categories were first established through a layered approach that included identifying salient topics as well as sub-categories, relying on both a priori concepts and new topics that emerged from participant perspectives. The predominant approach involved deductive development of codes related to theoretically informed social and economic aspects of structural vulnerability included in the interview guides. The study team created additional codes to represent ideas that appeared to be meaningful and relevant to dancers but were not already

captured by deductive coding. Multiple iterations of the codebook were created through joint coding of additional transcripts by the entire team, a process that also involved individual memoing and subsequent reflection during team discussions. Definitions and examples that corresponded to each code were specified to reinforce consistent and accurate coding and interpretation of all transcripts. Clean transcripts were imported into Atlas.ti [58], a qualitative data management and analysis program, and coded using the codebook developed by the study team.

To more closely examine the nature of structural vulnerability among dancers, the student investigator returned to all transcripts to isolate relevant coded segments of text. Focusing on each dancer's social and economic circumstances (e.g., housing situation, finances), overlapping themes were identified to characterize the most prominent structural factors in which their vulnerability was rooted. To examine the interplay between vulnerability and responses to drug- and sex-related activity occurring in EDCs, dancers' perspectives on drug use and selling sex upon entry into dancing were also extracted. The thematic analysis focused on extracting both early and recent experiences of structural vulnerability shared during the first and second set of interviews, to explore how dancers' vulnerability evolved over time, how they managed these experiences, and how different trajectories of vulnerability shaped HIV/STI risk.

Quantitative methods: Manuscripts two and three

Data collection – baseline and follow-up survey

In addition to demographics, drug use, and sexual behavior, surveys collected information about dancers' recent (past six months) circumstances that were

hypothesized to reflect important social and economic aspects of structural vulnerability (e.g., housing, finances). At three months follow-up, dancers (n=89) were asked similar questions regarding recent (past three months) drug use, sexual behavior, and experiences with vulnerability. Biological specimens were collected at the time of the survey via self-administered vaginal swab, and tested for gonorrhea (GC) and chlamydia (CT) infection. If any test was positive, participants were referred to Baltimore City Health Department clinic specialists for follow-up. Survey data and biological specimens were collected between May 2014 and March 2015, in a variety of locations convenient to participants, including private spaces within EDCs, restaurants, and cars. Participants received an \$80 pre-paid debit card for each survey completed.

Measures

The following measures were collected during both baseline and follow-up surveys, unless otherwise indicated. Self-report of each *recent* behavior or other sample characteristic was defined according to experiences during the past six months from the baseline survey, and during the past three months from the follow-up survey.

Sexual risk behaviors. Sex-related behavioral outcomes were inconsistent condom use with a male sex partner, multiple male sex partners, high-risk male sex partner, and engaging in sex exchange. Although each of these sexual risk behaviors do not directly equate to HIV/STI infection, inconsistent condom use, having multiple overlapping sexual partnerships, sex with high-risk sex partners, and exchanging sex for money or

drugs are important factors that may indicate a heightened context of HIV/STI risk [27-31].

Condom use is an important measure of HIV/STI risk because it directly impacts the probability of transmission from an infected to non-infected individual. **Inconsistent condom use** was defined by report of infrequent condom use (never, rarely, sometimes) with any male sex partner (i.e., exchange, casual, main). Having multiple sex partners is a commonly studied indicator of HIV/STI risk, as having more sex partners provides more opportunity for exposure to potential infection. **Multiple sex partners** was defined by having four or more male sex partners in the past six months at baseline, and having two or more male sex partners in the past three months at follow-up. A related concept, but one that is central to the sex partner, is sex partner concurrency, a sexual behavior that establishes risk for transmission of HIV/STIs through sexual networks [31]. **High-risk sex partners** were defined by having a sex partner who was known to have concurrent sex partners and/or who were known to be an injection drug user. Exchanging sex for money or drugs is an important marker of HIV/STI risk by association with multiple concurrent high-risk sex partnerships and inconsistent condom use [27, 29]. Recent and lifetime **sex exchange** were defined by self-report of exchanging sex for money, drugs, food, or a place to stay.

Vulnerability. Indicators of vulnerability were informed by the literature on structural vulnerability [7, 14, 17, 18, 22, 59-61] and qualitative research from Aim One, Manuscript One that explored` the nature of vulnerability among female exotic dancers. The most salient, co-occurring indicators of structural vulnerability were hypothesized to

include social and economic circumstances related to housing instability, financial insecurity, limited academic achievement, and arrest history. A total of four binary observed variables, one specific to each of these domains, were selected to represent a composite latent variable of vulnerability. **Housing instability** was defined by at least one report of the following recent experiences: homelessness, temporary housing type (e.g., shelter, boarding house), or moving more than twice. **Financial insecurity** was defined as being in debt and behind on rent and/or having recently borrowed money for rent. **Limited education** measured the extent to which an individual had completed or was currently pursuing education, defined as not having graduated high school, received a high school diploma or GED but were not enrolled school, or had some exposure to college but dropped out. **Arrest history** was defined by a history of at least one arrest during adulthood.

EDC risk environment. Twenty-two EDCs from which the sample was recruited were classified as high (n= 12) and low (n=10) **EDC risk** based on a risk environment inventory of EDC social, policy, drug, and economic environments that influence HIV/STI risk [57]. Over fifty environmental factors were measured through a survey prior to the STILETTO Study cohort enrollment, according to items that asked about management pressure to sell sex, economic incentives to engage in unprotected sex with clients, high rates of drug use, and lack of pay structure [57].

Drug use. Drug use was defined by self-report of recently using any of the following illicit drugs: prescription opioids (e.g., Percocet, OxyContin), heroin, cocaine, or crack.

History of violence. Using items adapted from the Adverse Childhood Experiences (ACE) Study [62] and the Conflict Tactics Scale [63], women were considered to have experienced **childhood sexual and physical abuse** if they reported having been pushed, grabbed, slapped or hit so hard it left a mark or injury, or reported having been pressured or forced to have sexual contact, before the age of 18. **Intimate partner violence (IPV)** was defined by any report of recently being physically hurt (e.g., hit, pushed, choked, beaten up) or forced or pressured to have vaginal or anal sex by a main or casual sex partner, using items adapted from the Conflict Tactics Scale [63].

Demographic characteristics. **Age** was dichotomized by the median age, which is also an established cut-off for the age of greater HIV/STI risk: < 25 vs. ≥ 25 years. **Race** was dichotomized into white vs. black and other. These categories were inclusive of both ethnicities when reported (e.g., white = white Hispanic and white non-Hispanic).

Health outcomes. **Self-reported health** was dichotomized by report of excellent or very good and good, fair or poor and depression, in response to a question asking, “In general, would you say your health is...” **Depression** (CESD ≥ 16) was measured using the CES-D scale and dichotomized using a cutoff score of 16 [64, 65]. **Bacterial STI** was defined by a positive test for either gonorrhea (GC) and chlamydia (CT) infection following either the baseline or follow-up survey.

Analysis – manuscript two

Latent class analysis (LCA) was used to identify and classify women into subgroups, based on their response patterns of the four vulnerability indicators. Latent class analysis (LCA) and latent class regression are valuable statistical approaches for researchers seeking to identify a set of underlying subgroups, or latent classes, of structural vulnerability. LCA uses dichotomous or categorical observed indicators to examine different patterns of indicator responses, resulting in unobserved, or latent, classes of individuals. Each class is denoted by conditional probabilities for each indicator to take on a certain response value (e.g., 1 vs. 0). The main objective is to categorize people into the smallest possible set of distinct and interpretable latent classes. Where heterogeneity is present within a population, LCA is useful for grouping individuals by similar characteristics and separating them from individuals who are different, based on indicators of interest [66-69]. This approach is directly applicable to HIV/STI programs that seek to improve efficiency of prevention and outreach services by identifying and targeting groups of people who are at highest risk for infection. For example, models can be used to highlight important patterns of social and economic indicators of vulnerability linked to heightened HIV/STI risk in a population, pointing to which subgroups are at greatest risk and potentially most in need of services. Moreover, identifying the highest risk groups according their vulnerability profile can help to enhance intervention programs by tailoring to the specific social, economic, and health services needs of each group.

Starting with a one-class model, three models were fit (one, two, and three-classes), and evaluated based on a collection of model fit criteria and interpretability of latent classes. Fit criteria included: the Lo-Mendell-Rubin likelihood ratio test, Akaike

Information Criteria (AIC) [70], the sample size-adjusted Bayesian Information Criteria (BIC) [71, 72], bootstrap likelihood ratio test (BLRT) [67, 69]. The smallest relative AIC and BIC values were considered to indicate better fit, along with significant BLRT p-values comparing the less parsimonious model to the larger model [67, 69-72]. Entropy for each fitted model was used to assess the extent to which the identified classes were distinct and subjects accurately classified, on range of 0 to 1, with values above 0.8 indicating good model classification [73]. The final selected model was then examined to estimate the probabilities of membership in each class, and the probability of each indicator conditional on class membership.

Through bivariate latent class regression, we tested whether the vulnerability subgroups differed significantly by demographics, EDC risk, history of violence, and health outcomes. We then ran bivariate latent class regression models to determine whether each HIV/STI risk behavior differed depending on the degree to which women experienced vulnerability. Analyses were performed using R version 3.2.0 [74], using the poLCA package [75] and MPLUS version 7 [76].

Analysis – manuscript three

Informed by manuscript two, manifest variables representing the most likely vulnerability class membership for each subject at baseline and at follow-up were established according to individual posterior predicted probabilities of class membership [77]. Using most likely class membership at each time point, we created a variable representing each transition group, or vulnerability trajectory. Each of the four possible combinations were initially set as a distinct transition groups: high to high, low to high,

high to low, and low to low. A reference category was created by grouping subjects who transitioned from high to low with those who were expected to remain in the low vulnerability subgroup from baseline to follow-up. The final vulnerability trajectory variable was defined by three categories: high-high, low-high, and high/low-low.

Using data from dancers who completed both surveys (N=89), sample characteristics were compared across the two time periods. Patterns of vulnerability and sexual and drug related risk behavior were examined over time, with a special interest in the extent to which most likely vulnerability class membership (and observed indicator variables) and sexual risk behavior changed during the follow-up period.

Through bivariate logistic regression, we tested whether certain demographics, dancing-related factors, history of violence, and drug use, were more likely to be affiliated with a certain vulnerability trajectory. Models estimated differences in characteristics collected at either baseline or follow-up, comparing dancers who were expected to belong to high-high and low-high vulnerability trajectories versus dancers expected to belong to the high/low-low vulnerability trajectory. Each of the sexual risk behaviors was also tested for correlation with reporting that same behavior at follow-up.

Generalized linear models using logistic regression were used to investigate which vulnerability trajectories were associated with each of the four sexual risk behaviors at follow-up. First, four separate bivariate models estimated the odds of engaging in each of the four sexual risk behaviors at follow-up, compared across vulnerability trajectories, and controlling for the particular risk behavior at baseline. Because we hypothesized that baseline risk behavior was correlated with engaging in the same behavior at follow-up, setting baseline sexual risk behavior constant allowed

models to estimate the extent to which risk behavior at follow-up was associated with changes in vulnerability, and not due to prior behavior.

The second set of models served as an initial exploration into the extent to which drug use played a role in the relationship between vulnerability trajectory and sexual risk behavior. Each of the four sexual risk behavior models controlled for drug use at baseline, to test baseline drug use as a correlate of both vulnerability trajectory and future sexual risk behavior. The final set of multivariable regression models built upon previous models to also adjust for potential confounding due to age and intimate partner violence at baseline, in addition to baseline drug use and baseline sexual risk behavior. Controlling for these covariates, the resulting adjusted odds ratios estimated the likelihood of dancers engaging in each of the four sexual risk behaviors at follow-up for a given vulnerability trajectory, compared to the high/low-low trajectory (reference group). All analyses were performed using R version 3.2.0 [74]

Protection of human subjects

The STILETTO Study was approved by the Johns Hopkins Bloomberg School of Public Health Institutional Review Board (IRB) on September 20, 2013. An amendment to include the research for this dissertation was approved by the IRB on May 7, 2014. Study participants (n=117) were recruited and screened to participate in two quantitative surveys, at baseline and three-month follow up, with a subsample (n=24) participating in the qualitative component. Women were excluded if they were too high, too intoxicated, or cognitively impaired at the time of screening. Dancers were protected against risks of participating in the study via several mechanisms, including written informed consent obtained from both quantitative and qualitative study participants, occurring in a private

location where the interviews were held. Consent forms described the purpose of the study, the procedures to be followed, and the risks and benefits of participation, in accordance with all applicable regulations. Protections against loss of confidentiality were particularly important. Given the sensitive nature of the data being collected (e.g., illegal sexual and drug use behaviors), a Certificate of Confidentiality was obtained to protect the privacy of study participants by withholding their identities (e.g., name and other identifying information) from all persons not connected with this research. It allows for, in some circumstances, refusal to give out study information about participants without their consent when it is sought in a legal action.

CHAPTER THREE: MANUSCRIPT ONE

*Experiences of structural vulnerability among exotic dancers in Baltimore, Maryland:
co-occurring social and economic antecedents of HIV/STI risk*

Abstract

Women who grow up in an environment of economic scarcity often face limited opportunities for upward mobility, as a result of challenges securing stable housing, quality education, and high-paying, steady employment. Chronically unstable women often also have reduced capacity to protect themselves against HIV/STI related harm when engaging in sexual activity or illicit drug use. Characterizing and targeting the structural contexts that facilitate HIV/STI risk is critical to effective design and implementation of drug and sexual harm reduction interventions. This study explores the nature and progression of structural vulnerability experienced by female exotic dancers during their early lives through the initial months of dancing. We also examine the roles of drug use and social relationships regarding experiences of structural vulnerability and engagement in sexual risk behavior. We conducted semi-structured in-depth interviews with exotic dancers working in Baltimore City and County exotic dance clubs during July 2014 and May 2015. Using thematic analysis, interviews revealed important individual social and economic effects of structural vulnerability. Many dancers depicted early experiences of residential transience, violence, and independence, and were raised in an environment of social and economic scarcity. The accumulation of chronic, overlapping social and economic disadvantage continued upon entry into dancing. Substance use emerged as an important issue for the majority of women, operating cyclically as both precursor to and product of accumulating social and economic hardship. Dancers also revealed social strategies that buffered the effects of structural vulnerability and minimized exposure to workplace-related drug and sexual risks. This study provides insight on an understudied group of at-risk women with a unique demographic profile.

Findings illustrate how the effects of structural vulnerability, substance abuse, social strategies, and opportunities for economic gain through sexual services in the workplace converge to produce varying levels of HIV/STI risk among exotic dancers.

Background

Women who grow up in poverty, and subjected to an environment of chronic social and economic scarcity, are at a particular disadvantage for upward mobility (i.e., moving from lower to higher socioeconomic status) [10, 11]. Socially and economically disadvantaged women are often “stuck” within a cycle of poverty, due to limited opportunities for higher paying occupations, and spending more time and money raising children and caregiving for others, compared to men [9]. Domestic violence can further compromise women’s ability to rise out of poverty [9]. To escape poverty, women must overcome the associated “costs” of poverty, which require a safety net of time and money, in addition to the human, social, and health capital or resources, needed to deal with the stressful circumstances that often stem from unexpected adverse events such as job loss [12, 13]. Without a safety net or substantial resources, the accumulation of mutually reinforcing social and economic disadvantages such as challenges securing stable housing, quality education, and high-paying, steady employment, can further limit opportunities for upward mobility and perpetuate feelings of instability, stress, and desperation [14-17].

While the accumulation of social and economic disadvantage is alone cause for concern, there are also important linkages to poor health outcomes in women, including mental illness (e.g., depression), chronic disease (e.g., diabetes, heart disease), substance

abuse, and HIV and other sexually transmitted infections (STIs) [21, 33, 78-81]. HIV/STI risk can be introduced when women are compromised by a cluster of multiple socioeconomic stressors and have limited bargaining power to protect themselves against harm when engaging in sexual activity or drug use. For example, socially and economically disadvantaged women often find themselves in relationships with limited sexual power. Women in these relationships are more prone to sexual violence and less likely to consistently use condoms [23-25]. Moreover, for individuals with an urgent need to find housing or employment, selling sex provides an additional source of money when opportunities are lacking for reasons such as limited education or a criminal record [82, 83]. While this does not necessarily equate to infection, the settings in which sex exchange takes place can facilitate unsafe sex and constrain women's ability to protect themselves against infection. In any context of unprotected sex, having high-risk (e.g., HIV-infected, sex partner concurrency), overlapping sex partners can increase the chances for exposure to HIV and other STIs [26-31].

Social and economic disadvantages such as housing instability and job loss are established structural drivers of HIV/STI among women, demonstrating how HIV/STI risk can be a function of conditions that are beyond individual control [7, 32-34]. The structural nature of HIV/STI risk underscores the need for social policy change that acknowledges the critical nature of health in all policies [78, 84]. However, effectively addressing HIV/STI disparities through policy is complex and requires a profound understanding of the contexts in which social and economic disadvantage is manifested [78, 85, 86]. Researching health disparities through a lens of *structural vulnerability* directs the focus from individual risk behavior to macro-structural factors such as

economic, social, gender, and racial discriminations, which are recognized as disposing certain groups of people at a disadvantage for health and well being [7, 18, 22]. This perspective is critical to learning about how the contexts in which women live, socialize, and work effect risk-taking behavior. To explore the context of HIV/STI risk among disadvantaged women, structural vulnerability can be defined as the location or position in society where a concentration of multiple discriminations constrain individual agency for sexual-decision making [7, 18, 21, 82]. As a result, structurally vulnerable women are likely to have more exposure to HIV/STI and a lower capacity to protect against infection [7, 18, 21, 23]. The structural vulnerability that emerges from macro-structures is internalized through lived experiences; however, the nature of structural vulnerability experienced by socially and economically disadvantaged women likely to drive HIV/STI risk behavior is underexplored. Identifying the structural factors that shape how socially and economically disadvantaged women are exposed to and manage HIV/STI risk will ultimately point to where and how best to intervene against potential sex- and drug-related harm.

Places where structurally vulnerable women are concentrated – through their residences, social venues, or workplaces – may provide efficient access points for determining key structural factors driving HIV/STI transmission. Reaching women working in HIV/STI risk environments such as sex work venues may help to uncover important insights for targeted outreach (e.g., HIV/STI testing, linkage to care, harm reduction services) for those most in need. Exotic dance clubs (EDCs) are one type of sex work venue in which women may be encouraged to exchange sex for money or drugs [40, 87, 88]. Previous research involving dancers working in Baltimore, Maryland found

high rates of drug use, sex exchange, and inconsistent condom use, setting up a heightened risk for exposure to HIV/STI [41, 42]. Dancers may have a particularly heightened HIV/STI risk, as protections against drug and sexual harms are typically not accessible within a context of underground sex work and other illegal activity. The flexible schedule and potential for quick cash (e.g., daily tips) earned from exotic dancing often attract women dealing with limited job opportunities, housing instability, and the consequences of having a criminal record (i.e., history of arrest)[40-42]. While dancers experience varying degrees of socioeconomic disadvantage, the accumulation of such stressors can lead to feelings of financial desperation, that if present upon entry into dancing, may drive initiation or escalation of drug use or sexual risk behavior [16, 17, 42, 89, 90]. Thus, EDCs are important venues for research exploring the nature of structural vulnerability, and how the effects of structural vulnerability play a role in the escalation of HIV/STI risk behavior

This study explores the nature and progression of accumulated structural vulnerability experienced by female exotic dancers during their early lives and through the initial months of dancing. Through this process, we sought to uncover how structural vulnerability is experienced at the individual level and to examine the interplay of structural drivers before and after initial entry into the EDC HIV/STI risk environment. Specifically, we explore the early foundation from which these women entered dancing and describe the embodied experience of structural vulnerability upon entry. We also examine the influence of drug use and social relationships on experiences of structural vulnerability and engagement in sexual risk behavior. Throughout the paper, we highlight how different experiences of structural vulnerability converge with their work

environment to shape a context of HIV/STI risk. Through the use of iterative, qualitative interviews, this study articulates the path of embodied structural vulnerability that shapes HIV/STI risk behavior. Ultimately, findings will support and inform the ongoing need for multi-level interventions to reduce HIV/STI burden among female exotic dancers, sex workers, and other structurally vulnerable women in the United States [7, 8].

Methods

Data collection

We conducted semi-structured in-depth interviews with female exotic dancers working in Baltimore City and County EDCs during July 2014 and May 2015, as part of The STILETTO (STudying the Influence of Location and Environment –Talking Through Opportunities for Safety) Study, which characterized the HIV risk environment of exotic dance clubs. EDC-level risk (i.e., high vs. low HIV risk) was pre-determined using data on the social, policy, drug, and economic environments of 22 Baltimore EDCs collected during the first phase of the study in summer 2013 [57]. EDCs were classified according to environmental factors that promote risk, such as management pressure to sell sex, economic incentives to engage in unprotected sex with clients, high rates of drug use, and lack of pay structure [57]. Female exotic dancers were eligible for the second phase of the study if they met the following criteria: ≥ 18 years old, danced for ≤ 12 months, and danced ≥ 3 times in the past month. The second phase of the study employed both quantitative and qualitative data collection and followed a cohort of 117 new dancers over six months.

The qualitative study component was comprised of a subsample of twenty-four

women from the larger cohort enrolled several weeks after the quantitative baseline surveys were completed. Cohort participants were purposively sampled to primarily include dancers who had been working for six months or less at high-risk EDCs, and were open and willing to discuss their lives. We targeted newer dancers working at high-risk clubs because we posited that more socially and economically disadvantaged women would be drawn to higher risk clubs. By focusing recruitment on newer dancers we sought to capture early perceptions, attitudes, and behaviors upon entry and then possible changes, after several months dancing, during the second interview. The target sample size for interviews was originally 20 participants; however, saturation was not evident as we approached our target and recruitment was expanded to 24 dancers, at which no new themes emerged. Twenty-one of the 24 dancers initially interviewed were successfully contacted and participated in a second interview. Compared to those who remained in the sample, the three lost to follow-up were from the same club, were slightly older and more educated, and at the time of the first interview had danced for less than four months and reported no sex exchange or drug use. Four of the baseline participants were no longer dancing by the time of the first interview; of these, one started dancing again and four additional women had stopped dancing by the time of the follow up interview.

Two interviews were completed with each participant, with the second occurring three to six months apart from the first. The initial interview guide focused on recent social and economic circumstances and early experiences of structural vulnerability, as well as information related to reasons for dancing, reactions to the EDC environment, experiences of violence, sex- and drug-related behaviors, and health concerns of new dancers. The second interview followed up on their social and economic circumstances,

including any changes in housing, education, or job status since the first interview. Dancers were also asked follow up questions about dancing status, including reasons for leaving dancing altogether or switching clubs, if relevant. Recent sex- and drug-related behaviors, health status, and future goals were also discussed. Interviews were conducted by three authors of this paper (MB, KF, SL) in settings convenient to the women's workplace. Participants provided written consent prior to the first interview and after each interview were compensated \$40 for their time. All but three women took part in both interviews, for a total of 45 interviews. Interviews were audio-recorded and transcribed verbatim. Transcripts were checked for accuracy and cleaned accordingly by the interview team.

Analysis

The study team, consisting of the three interviewers and the principal investigator, applied a multi-step process of thematic content analysis to explore the data. Two authors (MB, KF) read through a sample of two transcripts to develop the initial coding framework via open coding. To develop major themes from the data, coding categories were first established through a layered approach that included identifying salient topics as well as sub-categories, relying on both a priori concepts and new topics that emerged from participant perspectives. The predominant approach involved deductive development of codes related to theoretically informed social and economic aspects of structural vulnerability included in the interview guides. The study team created additional codes to represent ideas that appeared to be meaningful and relevant to dancers but were not already captured by deductive coding. Multiple iterations of the codebook

were created through joint coding of additional transcripts by the entire team, a process that also involved individual memoing and subsequent reflection during team discussions. Definitions and examples that corresponded to each code were specified to reinforce consistent and accurate coding and interpretation of all transcripts. Clean transcripts were imported into Atlas.ti [58], a qualitative data management and analysis program, and coded using the codebook developed by the study team.

To more closely examine the nature of structural vulnerability among dancers, the first author returned to all transcripts to isolate relevant coded segments of text. Focusing on each dancer's social and economic circumstances (e.g., housing situation, finances), overlapping themes were identified to characterize the most prominent structural factors in which their vulnerability was rooted. To examine the interplay between structural vulnerability and engaging in drug- and sex-related activity occurring in EDCs, dancers' perspectives on drug use and selling sex upon entry into dancing were also extracted. The Johns Hopkins Bloomberg School of Public Health Institutional Review Board approved this study.

Results

The thematic analysis uncovered both early and recent experiences of structural vulnerability shared during the first and second set of interviews, providing insight into how dancers' social and economic circumstances evolved over time, how they managed these experiences, and how different trajectories of structural vulnerability shaped HIV/STI risk.

Description of participants

The 24 participants ranged in age from 19 to 33 years (median, 21 years), half of whom identified as Black, approximately one-third were White, and the remaining identified as Native American, Alaskan Native, or Other. The majority reported having graduated from high school, and of these, eight had some college education or higher. One-third of participants were enrolled in school at the time of the first interview. Almost half reported having at least one child. At the time of the first interview, participants reported dancing for an average of five months, ranging from one to eleven months, and earned an average monthly income of \$3000. More than one-third reported current drug use and a similar proportion of participants reported ever selling sex at the time of the first interview.

Interviews revealed several social and economic indications of structural vulnerability. Many dancers depicted early experiences of residential transience, violence, and independence, living in a context of social and economic scarcity from a young age. The accumulation of structural vulnerability, indicated by chronic, overlapping social and economic hardships, continued upon entry into dancing. Substance use emerged as an important issue for the majority of women, operating cyclically as both precursor to and product of economic hardship. Dancers also revealed social strategies that buffered the economic effects of structural vulnerability and reportedly reduced their engagement in EDC-related drug and sexual activity.

Accumulated structural vulnerability: shaping pathways to chronic social and economic hardship

The majority of women recalled early memories of living with limited economic and social resources to meet everyday needs. Some described their childhoods as generally happy and stable until the occurrence of a traumatic experience (e.g., death of a family member, experience with violence), but most described being born into home lives shaped by mental illness, drug and alcohol addiction, and hardship. Many family structures were defined by separation of parents and other guardians, and dancers' shared feelings of abandonment or neglect by the adult figures in their lives. Early lives were often depicted as stressful or unstable, especially when referring to moving homes during childhood. For some this was a perpetual challenge, and often attributed to financial scarcity or a parent's substance abuse.

We moved around a lot because my mom was on drugs and stuff, so I got bounced around a lot of different places. She kept getting kicked out of places...She would get us a place to live, and then we'd get kicked out. It was mainly like friends, well, her friends anyway, and family members and stuff like that. But she couldn't stay off the drugs, so we never really had a stable place.

(19 years old, 8 months dancing)

In addition, the environments in which many of the dancers were raised routinely exposed them to physical and sexual violence. Interviews revealed a range of violent experiences during childhood, including stories of sexual assaults perpetrated by both adults and peers, often a relative, family friend (e.g., mother's boyfriend), neighbor, or acquaintance. Physical abuse was also common both inside and outside the home, not only between adults (e.g., mother and father or step-parents), but also between parents and children and among siblings. While less common, a few dancers reported physical abuse outside of the home, with isolated physical altercations among peers in the neighborhood or school setting, in addition to the more commonly mentioned abuse from

sex partners.

Upon reflection, experiences of transience and violence were recognized by participants as sources of social and economic instability that drove them toward early independence. One dancer who endured relentless episodes of homelessness and abuse shared her journey:

I grew up in a very abusive home. My father was abusive, my mother was abusive. And I was molested by my cousin when I was young...I've been pushed downstairs, I've been kicked in the head, I've had pots and pans all thrown at me. I've been kicked out of the house, I've been homeless a lot...And because of the abuse – he was physically abusive to all of us so it really, it wore down my mom. She became an alcoholic. And she was always spiteful towards me and my sisters but mostly towards me. And I just couldn't deal with it anymore, so I just left.

(22 years old, 4 months dancing)

In response to early structural vulnerability, women sought social and economic stability as they entered a period of emerging adulthood (e.g., late adolescence, early adulthood). By this time, many had adopted a strong will to take control of their lives and considered exotic dancing a logical, flexible, and potentially lucrative alternative to a more traditional low paying, nine-to-five job. Dancers described expectations to improve their situations by earning “quick” money in the form of cash at the end of each shift, as opposed to bi-weekly minimum wage paychecks that available jobs offered. Dancing was also known to be a guaranteed hire compared to other work that was often difficult to obtain due to competition or requirements to meet criteria such as advanced education or no criminal history.

Despite this appeal, entry into dancing did not help to remove pre-existing vulnerabilities, and many women continued to experience a constellation of social and economic hardship that constrained opportunities for upward mobility. While the type and degree to which dancers experienced disadvantage varied, narratives of unstable

housing, financial insecurity, unreliable employment, limited educational opportunities, and legal issues were ubiquitous.

My issue is just my record, money, and my living situation. I applied for Section 8 housing, but I'm like number 100,000, so it's like a seven to ten year waiting list...I would like to stop dancing and working in this environment very soon. So I feel like my first step is to get my own place, and then go back to school, and then I can stop working there. I'm assuming I could be in this type of setting for the next year, just because I need money for school. The hours are good just because my son's asleep while I'm at work, so that's another plus as to why I like dancing and working.

(24 years old, 5 months dancing)

While a number of dancers described permanent living situations, others were searching, but hopeful for a place to call home to achieve the unique stability that housing was expected to provide. Temporary reprieve was often found in the form of house shares with other dancers, friends, or relatives. However, the ability to acquire reliable, long-term housing varied. While many dancers worked several EDC shifts each week, barriers to securing independent, stable housing persisted because of challenges providing proof of employment or limited ability to save enough money for a deposit. Despite the potential to earn hundreds of dollars a shift through tips from stage performances, lap dances, or sex exchange, narratives of living “day to day” were common. Dancers described barely making ends meet, with most or all of their tips being used to pay for expenses such as rent and transportation. Financial drains in the form of dependents, such as sex partners who were unemployed or supporting drug habits with dancers earnings, reinforced their economic hardship. As a result, women were unable to reach a level of financial stability that would allow for leaving dancing altogether if desired, or to achieve goals related to housing or pursuing advanced education to broaden their future employment opportunities. Dancers in school at the time of interviewing expressed concern about their ability to continue due to high tuition

payments or not having the time and energy to juggle work and school.

When multiple stressors, such as those related to housing and finances, co-occurred without a clear resolution in the future, dancers expressed strong feelings of desperation and limited opportunities that served as motivation to continue dancing and to make as much money as possible. Weighing the economics of selling sex against other less profitable services in the club, these dancers described their decisions as logical, and sometimes the only, option to earning the money they needed that day. While a minority, a third of the dancers took advantage of the opportunity to sell sex to customers in the clubs.. For some, this was an immediate decision; the participant quoted below describes the first time doing a “bottle,” a euphemism for selling sex:

The first day I did a bottle because I needed that money for a hotel. And it killed me but I was like I have to do it. And I walked out of there with \$200 the first day...I felt so bad, but at least we went that night straight to a hotel...it still kills me every day because like I got, I do it, you know basically every day because I have to...It got worse since starting because I need money.

(22 years old, 4 months dancing)

The cyclical nature of drug use

Issues around drug use were situated along a continuum related to drug severity (e.g., hard drugs vs. marijuana), level of use (e.g., recreational vs. addiction), and time of initiation (e.g. childhood vs. entry into dancing). One-third of dancers in our study reported current illicit drug use, including heroin, cocaine, and prescription opioids (e.g., Percocet, OxyContin). Dancers who strictly avoided drugs or heavy drinking generally had more stable housing and financial situations and were motivated by either a history of addiction or having witnessed substance abuse among family members or other dancers. Personal goals such as finishing college, securing a permanent home, finding a “real” job,

and raising children provided additional reasons for avoiding drugs and alcohol. At the other extreme, a few dancers were wholly consumed by drug or alcohol use. Prior history of issues with drugs or alcohol was common across the majority of interviews. In particular, those who started abusing drugs at a young age (e.g., childhood, teenage years) described a perpetual struggle for money to buy drugs, getting caught with drugs or engaging in other illegal activity related to their drug use, or getting kicked out of the house. Without a safety net of support, these hardships fueled a continued need for money and drugs that not only led them to dancing, but also introduced sexual risk, including exchanging sex for money or drugs, at an early age.

When I was a teenager I used to go up to Patterson Park and walk around the park, before I started dancing, I was, like, fifteen and jump into cars, and, because I had, like, a three hundred dollar-a-day habit when I was a teenager. So...Yeah. It was a lot...You know, you have to walk down the street and jump in a random car. Like, that's scary...but when you're addicted to drugs you'll do anything. You will. You'll do anything to get that money.

(32 years old, 5 months dancing)

For those who began to experiment with drugs after they started dancing, attributing it to purely recreational or work-related drug use (e.g., cocaine), sharing drugs with clients or dancers was described as the norm in many EDCs.

There's one customer I know that comes by three times a month...he knows certain – like me or some other girls, he will take one up or two. And we'll sit there, just relax, you know, do whatever. A little head or whatever and then do coke. And it just makes it – to me it makes it easier because I don't feel... How can I put it? Guilty and plus it just makes you feel more into it. That's basically what it does. It makes you feel more into it. Like drinking, you get sexual.

(22 years old, 4 months dancing)

Dancers conveyed how heavy drug use undermined potential gains in economic stability that should have been provided by the money they were earning. Moreover, it fueled the continued need to dance in order to sustain the high cost of a drug habit,

situating themselves within an ongoing cycle of drug use, financial scarcity, and the accumulation of additional, interconnected vulnerabilities such as housing instability.

I never thought I would make as much money as I can make. But really, I don't have anything to show for it. I wanted to dance to have things to show for it. I mean, I have some nice things, like shoes, and I have a place to live in. But I'm behind on my rent because of Percs...If I could just get off of the Percs, I would be set. I make so much money. It's ridiculous how much money I make. And not even being cocky, but I really make a lot of money. I should have anything I want, and I don't. Like, I don't have anything. I'm going to lose my house in five days if I don't come up with 400 fucking dollars. That's my fault.

(19 years old, 8 months dancing)

Women who reported selling sex firmly defined their rules with clients to always include condoms. However, a heightened context of HIV/STI risk surfaced from the narratives in which socioeconomic hardship and substance use intersected within the EDC environment. A few occasions of inconsistent condom use were mentioned, and occurred during circumstances in which alcohol or drugs were in play. In the following scenario, this dancer describes not using a condom with a client during a shift of heavy heavily and as an opportunity to earn more money:

I'm not going to say that I never have [had unprotected sex with a client], because I have gotten really drunk before and it was a really high tip, and I've gotten it once or twice. But after that, and I got myself tested, I never did it again.

(21 years old, 11 months dancing)

Social relationships and strategies to achieve economic stability

Social isolation emerged as a key theme, as dancers described being disconnected from family and friends, and often referred to being on their own. In addition to the women who described early experiences of structural vulnerability and independence, others described distancing themselves after starting to dance, fearful of family members finding out. Of those that revealed to a family member that they were dancing, many

became isolated after they were verbally shamed, kicked out of the house, or children were taken away. Among dancers, trust was limited and most described keeping to themselves during their shifts. As a result, women had limited social connection or access to the resources necessary to stabilize and achieve their goals.

I just want my life to be how it's supposed to be. And I don't even know what that's like... I felt like that when I turned... Like, at least at twenty. I would be in school right now, or like, have my own place, at least a job, a stable job. I don't have that...I'm just by myself. And, just stuff ain't going the way I want it to.

(20 years old, 2 months dancing)

Others, while not socially isolated, also remained at an economic disadvantage due to the financial and emotional drain of partners who were abusive or took advantage of dancers' earnings for their own benefit. In contrast, dancers also described social relationships that helped them to gain financial stability and space to pursue their personal goals, such as new employment or higher education. Sources of external support included relatives, partners, and friends. Provision of either temporary or permanent housing was a recurring example demonstrating how dancers received support from others, allowing them to live rent-free during tight financial circumstances. The ability to rely on safe, comfortable, and long-term housing was particularly meaningful, providing a boost to their financial stability and alleviating the immediate need for money. One dancer, after enduring years of challenges securing safe and reliable housing, described the impact of eventually finding a comfortable place to live with her uncle, with the only expectation being to stock food in the house:

I really like it. Like, he genuinely, like, cares about me, really...I have a safe home to go to every night. I don't have to worry about someone hitting on me. I don't have to worry about people knowing where I live. I go to sleep good, like, I go to sleep and... You know, I can have a good sleep, don't wake up in the middle of the night. I don't hear no dogs. I don't hear no cats. I

don't hear no people. I don't smell weed. Yeah, I've never felt so safe, like, I really feel so safe.

(20 years old, 2 months dancing)

In combination with the tips earned from performing lap and stage dances, receiving free housing or a small amount of cash assistance often enabled dancers to protect themselves against harm while working in the clubs. Compared to those experiencing extreme social and economic scarcity, dancers who were not financially stressed tended to avoid engaging in sexual and drug related activity in the club. One participant, who had been living with a relative for several years, shared her perspective on selling sex while referring to her other job as a waitress:.

I get good money on stage. I can make anywhere from -- the least I usually make is \$100, \$150; the most I have made when I've been there is probably like \$550, and I haven't made that in a while... and I don't know if the girls do anything extra. I personally don't, because for one, I have a job; I'm not that desperate for money.

(24 years old, 5 months dancing)

Dancers also sought out economic assistance by creating new social connections. Often referred to as “sugar daddies,” dancers described meeting men, through work or on the street, who offered to take care of them financially in exchange for companionship. While some of these arrangements were sexual in nature, others were not; regardless, these relationships were articulated as a business exchange motivated by a variety of economic needs and drive to achieve upward mobility. By paying for dancers’ school, utilities, clothes, and other daily costs that would otherwise be a struggle, these men were viewed as an opportunity to stabilize financially and rise out of a situation of otherwise limited opportunities.

There's a guy. He takes me out every day. It works out...He's like an older man, and you could tell he's really lonely. So we just made an agreement that if I'm nice to him - we don't do anything - that's why, we don't do

anything sexual, because he can't. So he just wants someone to be around him. So for that, he just buys me things...he buys food for the house. He buys like everything I need.

(22 years old, 4 months dancing)

Discussion

In this study of structural vulnerability among exotic dancers, participants revealed a convergence of social and economic factors that fueled a chronic scarcity of resources, early independence, and limited opportunities that funneled them into exotic dance work. The continuation of housing instability, financial scarcity, criminal history, and limited education and job opportunities, compelled women to remain in the EDC setting. The cost of this accumulated vulnerability – perpetual scarcity of resources and an inability to plan beyond daily needs – further constrained their reach toward stability. The most highly vulnerable women were particularly disposed to work-related sexual risk behavior such as engaging in unprotected sex with clients. In contrast, women who were able to improve their circumstances generally faced less work-related harm, either by leaving work as a dancer altogether if they desired, or through the ability to avoid sex and drug related activity occurring within the EDC environment.

Drug and alcohol use surfaced as key issue that impaired dancers' economic stability and enabled sexual risk behavior. Despite high earning potential, achieving financial stability remained a challenge for dancers with expensive drug habits. Dancers that habitually used drugs, beyond experimenting at work with clients or other dancers, often portrayed their drug use as barrier to rising out of the circumstances that initially drove them to start dancing. The intersection between drug use and socioeconomic hardship was further articulated by dancers who considered drinking or using drugs as a

way to “take the edge off” and effectively function in their role as dancers. Drugs and alcohol were also available to dancers seeking ways to cope with the hardships of working as a dancer (e.g., harassment and discrimination from clients) as well as social and economic stressors outside of the EDC environment. Consequently, concurrent social and economic hardship with heavy substance abuse often facilitated a heightened state of HIV/STI risk by way of high-risk sex exchange (i.e., unprotected sex with clients).

Dancers described overlapping challenges to accessing safe housing, affordable education, reliable employment, and legal support. These findings point to potential leverage points for intervention at structural, community, and individual levels, and support recent calls for multi-level approaches to improve sexual health of venue-based sex workers and other groups of structurally vulnerable women [7, 8]. Recent progress at the state and city level includes laws that are intended to promote fair access to employment opportunities. Grounded in policies such as “Ban the Box,” employers can be restricted from asking about a job candidate’s arrest history by removing the conviction check-box from job applications [91]. In conjunction with the enactment of fair employment law, policy makers should consider ways to promote awareness and help women over the hurdles of applying for jobs. While these efforts are encouraging, much progress is yet to be made to address health in all policies [84]. Affordable housing, education, and employment policies that minimize the financial, temporal, and cognitive costs of living in economic scarcity may further alleviate the constant social and economic stressors that perpetuate dancer’s vulnerability and subsequent HIV/STI risk [92].

Accounts of dancers' ability to buffer the effects of structural vulnerability through use of their familial and social networks could be used to guide programs designed to help women stabilize economically, reduce workplace-related harm, and improve their health and well being. By having access to resources that relieved one or more stressors (e.g., housing, bills, tuition, childcare), women were able to reverse or slow down the accumulation of social and economic hardship that had previously persisted in their lives. While social networks can be a source of HIV/STI risk, the importance of dancers' connections to resources through family and friends willing to provide important economic support was evident, particularly for women who otherwise had no financial buffer. This external support provided space to prioritize future goals, while lifting the constraints on opportunities for upward mobility. In turn, women had increased control and agency for decisions to engage in EDC-related drug and sexual activity. Programs that are tailored to women's needs and offer individual case management services or facilitate access to housing, while promoting financial self-efficacy may complement macro-level policy change. Given the history of violence among our sample, comprehensive approaches would likely also benefit from efforts toward violence prevention. Moreover, improving access for women seeking drug treatment services may help to disrupt the cyclical nature of drug use and consequently reduce HIV/STI risk behavior [89]. While challenging, a combination of economic, social, and drug-related policies and programs that are not punitive in design, and packaged to carefully address in tandem the co-occurring hardships experienced by the women in our study, is critical to successful programming and delivery of HIV/STI prevention and other health services [93].

Study findings should be viewed in light of several limitations. Bias may exist due to potential for participant recall and social desirability associated with questions about private or illegal behaviors; however, the iterative nature of the interviews and interviewers' rapport with participants to most accurately capture dancers' lived experiences. Purposive sampling resulted in interviews with dancers who were primarily recruited from higher risk clubs who were willing to meet outside of work and talk openly about their lives. Thus, the experiences of some dancers, possibly women who were more socially and economically stable, may not be adequately reflected by these findings. Eight of the 24 women interviewed stopped dancing at some point during the study; however, this is likely reflective in the broader exotic dancer population as prior research demonstrated high rates of turnover throughout Baltimore EDCs. Lastly, overall interpretation of the data was subject to potential researcher biases shaped by life experiences that differed from those of the participants. Reflexivity regarding these potential biases was encouraged by memoing after each interview and regular discussions during team meetings.

Despite these limitations, this study provides a unique contribution to the literature for several reasons. By accessing an environment in which marginalized women are concentrated, we gained insight on an understudied group of structurally vulnerable women with a unique demographic profile. Through a series of qualitative in-depth interviews with new exotic dancers, we explored how the accumulation of social and economic disadvantage disposes women toward HIV/STI risk environments. Narratives not only revealed dancers' embodied experiences of structural vulnerability, but illustrated how the interplay of substance abuse, interpersonal relationships, and

opportunities for economic gain through sexual services in the workplace converge with the social and economic effects of vulnerability to produce varying levels of HIV/STI risk. Findings call for evaluation of multi-level interventions that in combination demonstrate potential for promoting sexual health in this and other populations of structurally vulnerable women. The complex and dynamic nature of vulnerability should be investigated through measurement and analysis of mechanisms that may explain the relationship between accumulated structural vulnerability, drug use, and sexual risk behavior. Identifying ways to disrupt the effects of structural vulnerability, by creating safer environments or promoting access to social support, will be critical to not only help women rise out of economically dire circumstances, but to ultimately reduce or eliminate HIV/STI risk.

CHAPTER FOUR: MANUSCRIPT TWO

Identifying patterns of social and economic hardship among structurally vulnerable women: a latent class analysis of HIV/STI risk

Abstract

Women who are structurally vulnerable – predisposed to disadvantage for health and well being because of economic, social, gender, and racial discriminations – are at heightened risk for HIV/STIs. However, not all structurally vulnerable women engage in high-risk drug or sexual risk behavior. Identifying the combinations of social and economic factors, or typologies of structural vulnerability, that drive HIV/STI risk behavior is critical to uncovering profiles of women who are at greatest risk, and most in need of targeted prevention. Latent class analysis (LCA) was used to classify a sample of exotic dancers (n=117) into subgroups based on response patterns of four vulnerability indicators. Latent class regression models were used to test whether sex and drug related risk behavior differed by vulnerability subgroup. Prevalence of vulnerability indicators varied across housing instability (39%), financial insecurity (39%), limited education (67%), and history of arrest (36%). LCA yielded a two-class model solution, with 32% of participants expected to belong to a “high vulnerability” subgroup. Dancers in the high vulnerability subgroup were more likely to report sex exchange (OR = 8.1, 95% CI: 1.9, 34.4), multiple sex partnerships (OR = 6.4, 95% CI: 1.9, 21.5), and illicit drug use (OR = 17.4, 95% CI: 2.5, 123.1). Findings underscore the importance of holistically addressing a range of inter-related structural factors contributing to HIV/STI risk.

Background

In the United States, approximately 50,000 individuals are newly infected with HIV each year [94]. An additional 20 million sexually transmitted infections (STIs) occur annually, leading to substantial disease and associated costs to the U.S. healthcare

system [2]. Roughly half of annual STIs are among women, who bear a disproportionate burden of the long-term consequences of untreated HIV and STIs, including pelvic inflammatory disease, infertility, and increased risk for certain cancers [2]. New strategies for the targeted control of HIV/STIs are needed. Without significant changes to current approaches, particularly for individuals at greatest risk of infection, substantial increases in HIV/STI incidence are likely to occur [95]. A growing body of evidence points to the importance of structural vulnerabilities that predispose women to a heightened risk for HIV and other STIs [7, 21, 23]. Broadly, the concept of vulnerability relates societal contexts to an individual's ability to control health outcomes [20]. Structurally vulnerable women are positioned in society such that they experience a variety of economic, social, gender, and racial discriminations that constrain individual agency for sexual-decision making. As a result of social positioning and restricted sense of agency, structurally vulnerable women are likely to have more exposure to HIV/STI and a lower capacity to protect against infection [7, 18, 21, 23].

Manifested through individual lived experiences, the effects of structural vulnerability often surface as an accumulation of multiple social and economic disadvantages [7, 18, 21-23]. Structurally vulnerable women have limited access to resources such as safe and reliable housing, steady and well-paid employment, and affordable, quality education. Often co-occurring, these mutually reinforcing disadvantages can trigger psychological distress, an urgent need for money, and limited opportunities [14-17]. Women who are highly disadvantaged may be presented with or seek out resources immediately available through existing social or sexual networks, which in certain settings, can introduce HIV/STI related harm. For example, selling sex

can provide a source of money when other employment opportunities are limited or unable to meet other needs such as transportation or flexible scheduling [82, 83]. However, the settings in which sex exchange takes place are often characterized by policies, stigma, and discrimination that facilitate unsafe sex and constrain women's ability to protect themselves against infection [96]. Moreover, women in relationships with limited sexual power or those who experience sexual violence often have a reduced capacity to protect themselves through consistent condom use [23-25]. Drug use further complicates such contexts of elevated HIV/STI risk by weakening sexual inhibitions and ability to negotiate condom use with sex partners [29, 30].

However, not all structurally vulnerable women are at heightened risk for HIV/STI, which may be reflective of the intensity at which certain social and economic factors cluster together to synergistically drive drug and sex related risk behavior. Identifying the most powerful combinations of social and economic factors, or typologies of structural vulnerability, that drive HIV/STI risk behavior is critical to uncovering profiles of women who are at greatest risk, and thus most in need of targeted prevention and harm reduction services. Women working in the sex industry originate from a range of social and economic backgrounds, and are likely heterogeneous regarding their experiences of structural vulnerability. These women represent a key population through which subgroups characterizing different types of vulnerability may be identified. In the United States and elsewhere, the nature of the sex industry spans a vast range of services, including pornography, online sex, and exotic dance, resulting in varying levels of occupational HIV/STI risk. Female exotic dancers are one group of women in this industry, with research indicating that they move frequently, have inconsistent income,

flow in and out of school, and suffer the consequences of a criminal record [40, 41, 88]. The accumulation of social and economic disadvantage may render women more susceptible to sex- and drug- related harm when exposed to the exotic dance club (EDC) environment.

Exotic dancers present a unique and diverse group of women, and the most influential social and economic drivers of HIV/STI risk in this population remain unclear. Moreover, the degree to which these factors cluster together, and the synergistic effect of this clustering on HIV/STI risk behavior, has not been explored in depth. Research investigating the interconnected nature of social and economic stressors that may lead to HIV/STI risk behavior is limited, and is particularly scarce among women [17, 39, 59-61]. Recent studies support a growing body of evidence indicating that HIV/STI risk is grounded within a syndemic of multiple, overlapping economic and social conditions, but further research is needed to understand this context of risk for structurally vulnerable women [17, 59-61] [39]

This paper aims to profile dancers' experiences of structural vulnerability by identifying distinct patterns of co-occurring social and economic disadvantage. Using indicators of structural vulnerability related to housing, finances, education, and arrest, latent class analysis was used to investigate how different indicators cluster together and are associated with drug use and sexual risk behavior. Recognizing the most salient and co-occurring aspects of structural vulnerability is a critical step in identifying women at greatest risk for infection. In addition to guiding targeted HIV/STI programming, this study also has important implications for social policy. The discovery of clusters of modifiable structural drivers of HIV/STI can point to important social and economic

issues that if addressed holistically, may reduce HIV/STI transmission across communities most at risk.

Methods

Study population

Participants were purposively recruited from Baltimore City and County EDCs to a cohort for the STILETTO (STUDying the Influence of Location and Environment – Talking Through Opportunities for Safety) Study, investigating the role of the EDC environment on HIV/STI risk. Twenty-two EDCs from which the sample was recruited were classified as high (n= 12) and low (n=10) HIV risk based on drug and sex risk profiles previously categorized by a risk environment inventory that used data on the social, policy, drug, and economic environments of the 22 EDCs [57]. Eligibility criteria included: ≥ 18 years old, danced for ≤ 12 months, and danced ≥ 3 times in the past month. Following eligibility determination and providing informed consent, participants (n=117) filled out a 45-minute survey using audio computer-assisted self-interviewing (ACASI) on a portable tablet. In addition to demographics, drug use, and sexual behavior, surveys collected information about dancers' recent (past six months) circumstances that were hypothesized to reflect important social and economic aspects of structural vulnerability (e.g., housing, finances). Biological specimens were collected at the time of the survey via self-administered vaginal swab, and tested for gonorrhea (GC) and chlamydia (CT) infection. If any test was positive, participants were referred to Baltimore City Health Department clinic specialists for follow-up. Survey data and biological specimens were collected between May and October 2014, in a variety of locations convenient to

participants, including private spaces within EDCs, restaurants, and cars. Participants received a \$80 pre-paid debit card for their time. The study was approved by the Johns Hopkins Bloomberg School of Public Health Institutional Review Board.

Measures

Structural vulnerability. Indicators of structural vulnerability were informed by the literature [7, 14, 17, 18, 22, 59-61] and recent qualitative research exploring the nature of vulnerability among female exotic dancers [97]. The most salient, co-occurring indicators of structural vulnerability were hypothesized to include social and economic circumstances related to housing instability, financial insecurity, limited education, and arrest history. A total of four binary observed variables, one specific to each of these domains, were selected to represent a composite latent variable of vulnerability. Housing instability was defined by at least one report of the following experiences in the past six months: homelessness, temporary housing type (e.g., shelter, boarding house), or moving more than twice. Financial insecurity was defined as reporting being in debt and behind on rent and/or having borrowed money for rent in the past six months. Limited education (i.e., the extent to which an individual has completed education) was defined as not having graduated high school, received a high school diploma or GED but were not enrolled school, or had some exposure to college but dropped out. Arrest history was defined by a history of at least one arrest during adulthood.

HIV/STI risk behaviors. Sexual risk behavior variables included report of the following in the past six months: inconsistent condom use with any male sex partner (i.e., exchange, casual, main); multiple (>3) male sex partners; high-risk main male sex partner

(i.e., partner concurrency and/or IDU); and engaging in sex exchange. Lifetime (ever) exchanging in sex exchange was also assessed. Drug use was defined by any report of illicit use of prescription opioids (e.g., Percocet, OxyContin), heroin, cocaine, or crack use in the past six months.

Demographic characteristics and other covariates of interest. Demographic variables were age (dichotomized by the median age, 24 years) and race (white vs. non-white). Dancing related variables included overall HIV/STI risk category (high vs. low) of the EDC from which the dancer was recruited, based on the pre-determined risk environment measure [57]. Length of time working as a dancer was examined and dichotomized at the median, four months or less. Childhood sexual and physical abuse was assessed via two physical violence items adapted from the Adverse Childhood Experiences (ACE) Study [62] and sexual violence items from the Conflict Tactics Scale [63], according to whether women reported having been pushed, grabbed, slapped or hit so hard it left a mark or injury, or reported having been pressured or forced to have sexual contact, before the age of 18. Recent intimate partner violence (IPV) was captured via items adapted from the Conflict Tactics Scale [63], and defined by any report of being physically hurt (e.g., hit, pushed, choked, beaten up) or forced or pressured to have vaginal or anal sex by a main or casual sex partner in the past six months. Health outcomes of interest were self-reported health (excellent or very good) and depression (CESD ≥ 16) [64, 65].

Analysis

Descriptive statistics for vulnerability indicators, HIV/STI risk behaviors, demographic characteristics, and other covariates of interest were analyzed through examination of distributions, including mean and median for continuous variables (age, number of sex partners), and frequencies for categorical and dichotomous variables. A tetrachoric correlation matrix was estimated to assess the relationships between each pair of indicators, paying careful attention to identifying indicators that could be highly correlated. Because of the multi-level study design that selected dancers from a sample of 22 different EDC environments, we tested for intraclass correlation (ICC) by club for each characteristic. An intercept-only random effects model was used to estimate ICC and determine if there was a need to control for potential clustering observed across characteristics that could be explained by EDC affiliation.

Latent class analysis (LCA) was used to identify and classify women into subgroups, based on their response patterns of the four vulnerability indicators. LCA uses observed indicators to examine different patterns of indicator responses, resulting in unobserved, or latent, classes of individuals. Each class is denoted by conditional probabilities for each indicator to take on a certain response value (e.g., 1 or 0), with the main objective to categorize people into the smallest possible set of distinct and interpretable latent classes [67, 69]. Starting with a one-class model, three models were fit (one, two, and three-classes), and evaluated based on a collection of model fit criteria and interpretability of latent classes. Models beyond three classes did not converge due to the limits of the data, as too many parameters restricted identifiability. The best fitting model was identified according to Lo-Mendell-Rubin likelihood ratio test [ref], Akaike Information Criteria (AIC) [70], the sample size-adjusted Bayesian Information Criteria

(BIC) [71, 72], bootstrap likelihood ratio test (BLRT) [67, 69], and entropy [73]. The smallest relative AIC and BIC values were considered to indicate better fit, along with significant BLRT p-values comparing the less parsimonious model to the larger model (e.g., 2 class model vs. 3 class model) [67, 69-72]. Entropy was used to assess the extent to which the identified classes were distinct and subjects accurately classified, on range of 0 to 1, with values above 0.8 indicating good model classification [73]. The final selected model was examined to estimate the probabilities of membership in each class, and the probability of each indicator conditional on class membership.

Using bivariate latent class regression (LCR), we tested whether vulnerability class membership differed significantly by demographics, EDC risk environment, history of violence, and health status. STI outcomes were not included in the series of bivariate regression models due to small cell sizes. A second set of bivariate latent class regression models were run to determine whether vulnerability class membership was associated with each of the HIV/STI risk behaviors. To treat risk behavior as a dependent distal variable, and predict class specific distributions of each outcome, we transformed the model using an Excel-based LCA outcome probability calculator [98, 99]. This approach allows for estimates of probabilities for each HIV/STI risk behavior by vulnerability class. Small sample size restricted our ability to run multivariable or stratified latent class regression models. Analyses were performed using R version 3.2.0 [74], using the poLCA package [75] and MPLUS version 7 [76].

Results

Descriptive statistics

Among participants (N=117), 40% were age 24 years or older, 35% were white, and 68% were working a high-risk club at baseline (Table 1). Approximately half (48%) reported dancing for four months or less. Experiences of sexual and physical abuse were common, with 44% reporting childhood sexual or physical violence and 31% reporting recent (i.e., in the past six months) IPV. More than one-third (39%) reported recent homelessness, moving more than twice, or sleeping in temporary housing; similarly, 39% had recently borrowed or owed money for rent, and 36% reported a history of arrest. Two-thirds (67%) reported limited education. Intraclass correlation estimates found that the percent variance in each indicator attributed to differences across EDCs was negligible (<0.000), therefore, LCA and LCR models were not grouped by club affiliation.

Frequency of inconsistent condom use in the past six months with any partner was common (68%), but varied depending on partner type: 9% with exchange partners, 19% with casual partners, and 65% among main partners (data not shown). In the past six months, 25% had more than three sex partners and 24% had a high-risk (e.g., partner concurrency or IDU) male sex partner; 29% reported recent sex exchange, and 41% reported ever engaging in sex exchange. Twenty-eight percent of women reported use of prescription opioids, heroin, cocaine, or crack in the past six months.

Approximately half of participants (51%) reported excellent or very good health and 39% reported symptoms of depression. Prevalence of bacterial STI (CG or CT) was 9% (N = 106).

Latent class solutions

LCA modeling yielded a two-class model solution, supported by the fit statistics shown in Table 2. The one-class model did not fit the data statistically significantly better than the two-class model, suggesting that the vulnerability indicators could be more appropriately modeled as related within latent subgroups. Compared to a three-class model, the two-class solution demonstrated the best fit to the observed data, given a lower AIC (612.20) and sample size adjusted BIC (608.61). Non-significant LMR and bootstrap likelihood ratio tests ($p = 0.404$, $p=0.250$, respectively) also provided evidence against the three-class model as a better fit to the data compared to the more parsimonious two-class solution. Entropy was high (0.92), indicating good classification for the two-class model.

Estimated class prevalence and conditional probability of vulnerability indicators given class membership in the two-class model are presented in Figure 1. The response pattern depicted by low probabilities of housing instability, financial insecurity, history of arrest, and moderate probability of limited education, was identified as the first latent class, and considered the “low vulnerability” subgroup. In contrast, a second latent class, characterized by high probabilities for both housing instability and financial insecurity, and moderate probabilities for limited education and history of arrest, was identified as the “high vulnerability” subgroup. Over two-thirds of the women (68%) were expected to be in the low vulnerability subgroup, and the remaining third (32%) were expected to belong to the high vulnerability subgroup.

Covariates associated with vulnerability class membership

Several social and health characteristics were associated with latent class membership (Table 3). Women with recent experiences of IPV and depression were more likely to be classified as highly vulnerable ($OR_{IPV} = 13.5$, 95% CI: 3.5, 52.0, $OR_{depress} = 10.4$, 95% CI: 2.8, 38.9). Age and race were not significantly different across subgroups of vulnerability. However, frequency distributions for dancing at a high-risk club and having a history of child sexual or physical abuse suggested a trend toward differences by class membership although these differences were not statistically significant.

Linking vulnerability class membership to HIV/STI risk behavior

The probability of reporting sexual risk behavior and drug use differed by vulnerability class membership (Figure 1). Specifically, women classified in the high vulnerability class were more likely to report recently having multiple sex partners (52% vs. 15%, $p=0.030$) and engaging in sex exchange (71% vs. 16%, $p=0.017$) compared to women who were expected to be in the low vulnerability class. Women in the high vulnerability class were also more likely to report recently using illicit drugs (e.g., prescription opioids, heroin, cocaine, or crack) (57% vs. 7%, $p=0.035$).

Discussion

This study explored how a set of mutually reinforcing social and economic hardships cluster into distinct underlying subgroups of structural vulnerability. Using housing, finance, education, and arrest related hardship as indicators of structural vulnerability, latent class analysis identified a two-class model. Subgroups were

differentiated primarily by housing instability and financial insecurity, followed by arrest history and low education. Notably, one-third of women were expected to belong to the high vulnerability subgroup, represented by high probabilities for both housing instability and financial insecurity, and moderate probabilities for low education and history of arrest. Although education was less distinctive across the two vulnerability groups, it was carefully considered as an important domain of structural vulnerability for inclusion in the model. Not only is access to quality education rooted in the structural contexts in which some women have been limited by economic, gender, or racial discriminations, but opportunities to pursue and complete higher-level training are tightly connected to housing, employment, financial stability, and exposure to the criminal justice system [100, 101].

In addition to a comprehensive set of fit statistics supporting the final two-class model, interpretation was meaningful. Indicators clustered together to form distinct subgroups representing “high” and “low” vulnerability. While the probabilities of housing instability, financial insecurity, and limited educational attainment were substantial (0.78-0.79) among the high vulnerability subgroup, the probability of having an arrest history was not as high (0.62). Moreover, the probability of reporting limited education was less distinct between the two subgroups compared to the other indicators. Low education was common in the sample; therefore, we would expect to see a higher probability of low vulnerability class membership given low education compared to the other indicators. Additionally, although education was included in the model because of the hypothesis that dancers with low education would also be likely to experience housing, financial, and arrest-related instability, it is plausible that some women could be

experiencing low levels of vulnerability overall, but struggle to access higher educational opportunities. With a larger sample, we may have seen a distinction between this group and another low vulnerability, high education class, for example. The classification of dancers into two distinct groups based on our current model also provided meaning into our investigation of the degree to which different experiences of vulnerability are associated with drug use and sexual risk behavior. Similar findings are reflected in other research. In a study evaluating the role of accumulated vulnerability among low-income urban women, investigators identified two groups, classified according to homelessness, incarceration, monthly income, and residential transience [17]. In a separate but related study, latent class models incorporated having a main partner as an additional indicator, generating a latent construct of accumulated vulnerability that revealed two identifiable subgroups [16].

Latent class analysis not only supported our hypotheses that multiple social and economic indicators of vulnerability are inter-related but also revealed a key subgroup of individuals most at risk for HIV/STI. Specifically, we classified distinct social and economic profiles of structurally vulnerable women that may be contributing to variations in sex-related risk behavior. Women experiencing an accumulation of social and economic disadvantage at the time of our study were more likely to report recently having multiple sex partners, engaging in sex exchange, and using illicit drugs, compared to women expected to be in the low vulnerability group. Our findings support a continued emphasis on recognizing the multiple layers of contextual factors driving disparities in HIV/STI, including various social and economic positions (employment, income opportunities, education, gender) [102]. Moreover, our results are similar to

other studies that have demonstrated how overlapping experiences of social and economic disadvantage can set up a heightened context of risk. German and Latkin found an association between subgroups of social stability and HIV/STI risk behavior among low-income women, using indicators of housing stability, finances, and incarceration [17].

IPV and depression emerged as significant psychosocial factors related to dancers' vulnerability. Specifically, women classified into the high vulnerability subgroup were more likely to have experienced recent IPV and report symptoms of depression. These findings are not surprising in light of previously established links to drug use, sexual behavior, and HIV/STI [46-49]. Future research should explore causal pathways that involve IPV, depression, vulnerability, and HIV/STI risk behavior. To carefully address these co-occurring issues, it will be important to elucidate the mechanisms by which experiences of intimate partner violence influence or are influenced by different experiences of vulnerability, including how fluctuations in social and economic disadvantage or chronic disadvantage might be associated. Investigations into how vulnerability is connected to mental health, e.g., depression, may also be informative to identify additional social, economic, and health service needs among this key HIV/STI risk population.

Study findings should be considered in light of some limitations. Small sample size restricted the number of indicators to include in the latent model of vulnerability, in addition to the number of possible classes to evaluate for model fit. As a result, alternative models reflecting different patterns of structural vulnerability may not have been selected. However, the final model was without identifiability issues and allowed

for two distinguishable groups. Recent LCA simulations using a sample of 100 subjects to test a 3-class model with five indicators demonstrated good power to predict a correct model and variable classification [67]. Regression analysis was also limited to testing for primarily bivariate associations. Odds ratio estimates were imprecise as indicated by large confidence intervals, particularly for differences in class membership comparing women who did and did not report illicit drug use. A large portion of the women was recruited from high-risk EDCs (68%), which may have resulted in less variability of exposure to sex- and drug-related risk across the sample. However, indicators of vulnerability were not correlated within clubs and vulnerability class membership was not significantly different comparing dancers across high and low risk EDCs. Results demonstrated that social and economic factors are not only connected but function synergistically to amplify exposure to sex- and drug-related risk behavior; however, we did not determine the function by which each of these indicators interact synergistically (e.g., additive, multiplicative). A deeper understanding of these interactions would further inform programs looking to prioritize resources when targeting multiple factors.

Despite limitations, LCA proved a valuable tool for grouping study participants by similar experiences of vulnerability to assess HIV/STI risk. Models highlighted important patterns of social and economic indicators of vulnerability linked to heightened HIV/STI risk in a population, pointing to subgroups at greatest risk and most in need of services. This approach is applicable to HIV/STI programs that seek to improve efficiency of prevention (e.g., risk reduction) and outreach services (e.g., testing, linkage to care and treatment) by targeting groups of people who are at highest risk for infection. In addition to targeted HIV/STI prevention and outreach, structurally vulnerable women

would also likely benefit from referrals and case management to support safe housing, affordable education and job training programs, and financial management. Programs should consider approaches that are tailored to address issues that present a challenge for women to benefit from these services if available. For example, women are more likely to be responsible for childcare and other caretaking that can limit the time available to pursue education or job training. Evidence from this paper also suggests a need for gender-appropriate integrated psychosocial support services that provide access to mental health care, reduce intimate partner violence, and promote safety for women working within the EDC environment.

Structurally informed policy change is also imperative, as findings underscore the importance of holistically addressing a complex range of co-occurring structural factors contributing to HIV/STI risk. Distinctions in housing and financial instability, limited opportunities for academic achievement, and arrest history highlight an opportunity to improve health through inter-sectoral approaches that address social, economic, and health needs in tandem. The ‘Health in All Policies’ movement calls for new solutions to address the social determinants of health through revitalized policies and structures that facilitate collaboration across government agencies [84]. This approach requires partnerships across agencies such as those involved in the housing, education, criminal justice, and employment sectors to create public policies that promote equitable access to resources [84]. For example, as demonstrated by the King County Health Department in Seattle, Washington, city leaders can spearhead collaboration across education, criminal justice, and housing sectors to create policies designed to improve educational outcomes for students in low-income communities, or reduce incarceration rates and improve

employment options for low-income adults [103]. Future research should continue to evaluate and refine both program and policy changes intended to not only disrupt the pathways between vulnerability and HIV/STI risk behavior but also to optimally address the root causes of structural vulnerability across disadvantaged communities.

Table 4.1. Descriptive statistics of study sample, n=117

Characteristic	N	%
Age \geq 24 years	47	40.2
Race, White	41	35.0
Dancing related		
Recruited from high-risk exotic dance club	80	68.4
Dancing \leq 4 months	56	47.9
History of abuse		
Childhood sexual or physical violence	51	43.6
IPV, past 6 months	36	30.8
Vulnerability indicator		
Housing: homeless, temp housing, >2 moves, past 6	45	38.5
Financial: borrowed money or behind on rent, past 6	46	39.3
Education: limited academic achievement*	78	66.7
Arrest: history of arrest in adulthood	43	36.8
Illicit drug use, past 6 months**	32	27.5
Sexual risk behavior, past 6 months		
Inconsistent condom use, any partner	80	68.4
Multiple (>3) male sex partners	29	24.8
High-risk main sex partner (IDU or concurrency)	28	23.9
Sex exchange	34	29.1
Health outcomes		
Self-reported health, excellent/very good	60	51.3
Depression, CESD-16	46	39.3
Baseline CG/CT infection (N=106)	10	9.4

*Dancer had not graduated high school, received a high school diploma/GED but was not enrolled school, or had some exposure to college but dropped out

**Prescription opioids, heroin, cocaine, crack

Table 4.2. Model fit statistics for 1, 2, and 3 class models, n=117

Model	Log likelihood	# parameters	LMR p-value	AIC	Adj-BIC	BLRT p-value
1 class	-307.78	4	--	623.55	621.95	--
2 class	-297.10	9	0.024	612.20	608.61	0.000
3 class	-294.73	14	0.404	617.47	611.88	0.250

LMR: Lo-Mendell-Rubin likelihood ratio test; BLRT: bootstrap likelihood ratio test

Figure 4.1. Two-class model: probability of vulnerability indicator, conditional on class membership (n=117)

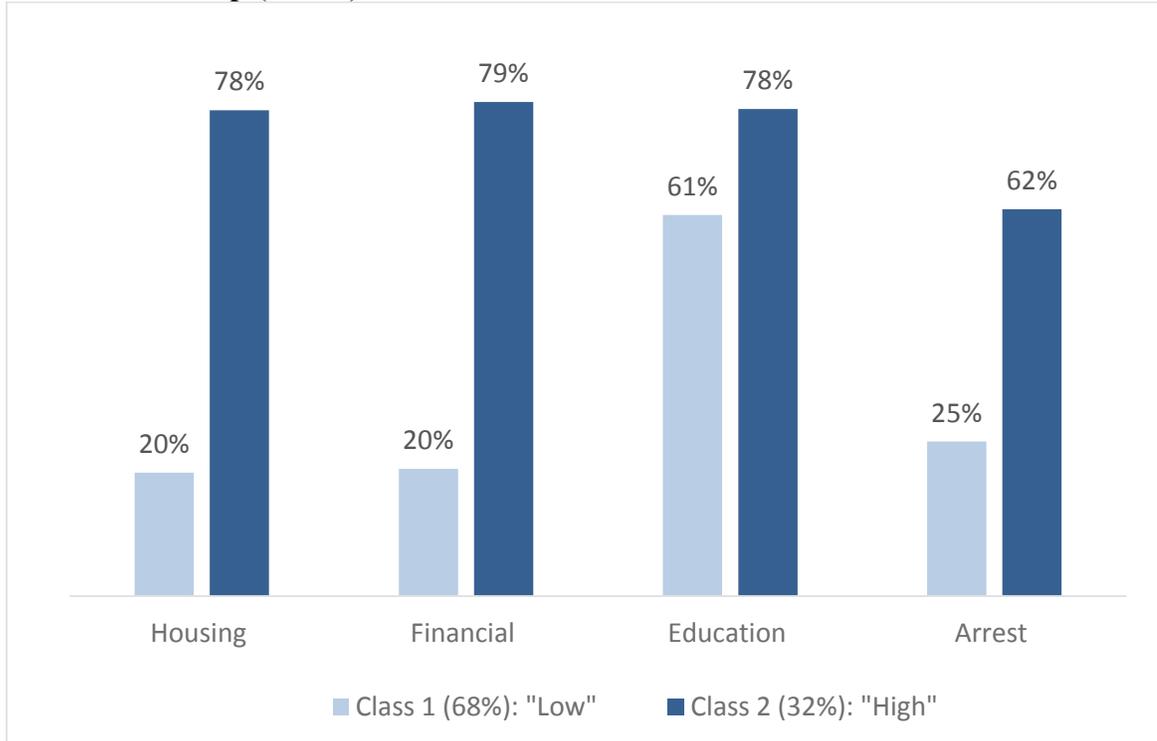
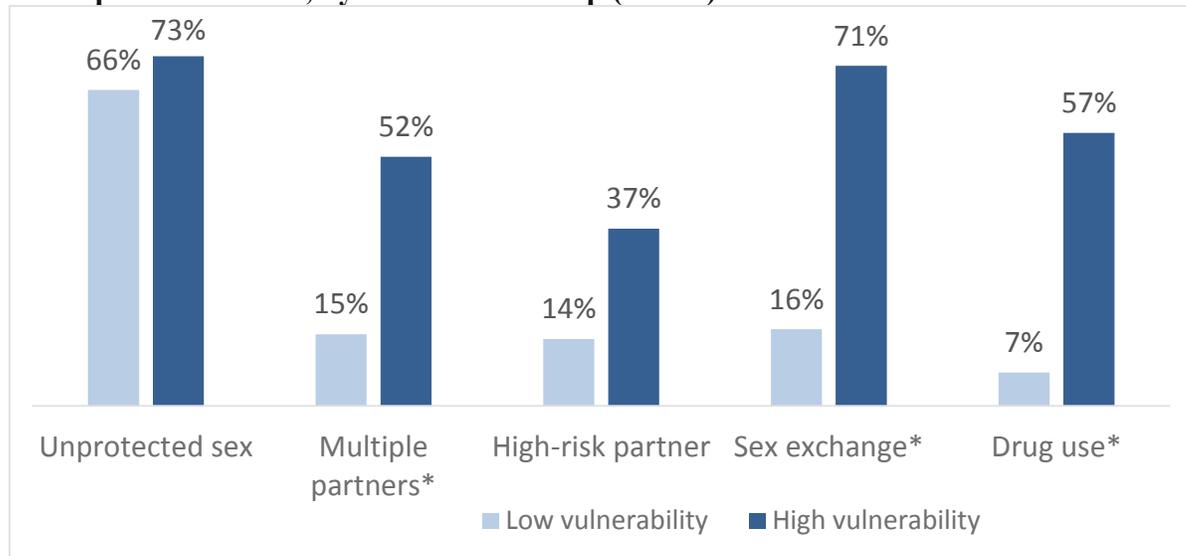


Table 4.3. Bivariate analyses of factors associated with latent class membership (n=117)

Characteristic	Low vulnerability	High vulnerability	OR (95% CI)
Age \geq 24 years	34.4%	59.3%	1.8 (0.6, 5.9)
Race, White	22.0%	42.1%	3.8 (0.8, 17.4)
Dancing related			
High-risk EDC	63.2%	83.3%	2.6 (0.6, 10.8)
Dancing <4 months	52.5%	51.5%	0.8 (0.3, 2.3)
History of abuse			
Childhood sexual or physical violence	34.2%	59.1%	2.5 (0.9, 7.3)
IPV, past 6 months	14.1%	75.0%	13.5 (3.5, 52.0)*
Health status			
General, excellent/very good	59.3%	33.3%	0.4 (0.1, 1.3)
Depression	13.6%	72.5%	10.4 (2.8, 38.9)*

Note: odds ratio compares frequency of given characteristic for dancers expected to be in high vulnerability group vs. low vulnerability subgroup. *p<0.05

Figure 4.2. Estimated probability of reporting sexual risk behavior or illicit drug use in the past six months, by class membership (n=117)



Multiple partners: >3 male sex partners; high-risk partner: male partner IDU or partner concurrency; drug use: prescription opioids, heroin, cocaine, crack. *p<0.05

CHAPTER FIVE: MANUSCRIPT THREE

*Trajectories of structural vulnerability associated with sexual risk behavior
and drug use among new female exotic dancers*

Abstract

Structurally vulnerable women often face an accumulation of social and economic disadvantage, such as housing, financial, and employment instability, as well as limited access to affordable, quality education that can shape a context of HIV/STI risk. Women who are structurally vulnerable and working in HIV/STI risk environments such as exotic dance clubs (EDCs) may have an added risk for infection when engaging in sexual and drug-related activity. Upon entry into dancing, chronic or fluctuating states of social and economic disadvantage may enhance or alleviate this risk over time. However, the trajectories of structural vulnerability (e.g., housing and financial instability, limited education, arrest history) among women entering exotic dancing have not been previously examined, and the extent to which changes in vulnerability influence sexual risk behavior is unknown. To fill this gap, the objective of this study is to explore changes in structural vulnerability during the early months of working in EDCs, and to determine whether certain trajectories of structural vulnerability are associated with sexual risk behavior. From a sample of new exotic dancers followed for three months (n=89), latent class analysis (LCA) established two subgroups of women based on high and low vulnerability. Trajectories of structural vulnerability and sexual risk behavior were examined over time, with a special interest in the extent to which vulnerability class membership and sexual risk behavior remained high or increased during the follow-up period. Controlling for age, intimate partner violence, and baseline sexual risk behavior, multivariable logistic regression was used to test for associations between vulnerability trajectories, baseline drug use and sexual risk behavior at follow-up. Roughly one-third (30%) of dancers remained highly vulnerable during the study period, and 24%

transitioned from low to high vulnerability. Dancers who transitioned from low to high were more likely to report inconsistent condom use at follow-up compared to dancers of low vulnerability (adjusted odds ratio [aOR] = 4.4, 95% CI: 1.2, 22.4). Dancers who reported baseline drug use were more likely to report having multiple sex partners (aOR = 5.0, 95% CI: 1.2, 24.2) and engaging in sex exchange (aOR = 5.7, 95% CI: 1.4, 28.3) at follow-up. This study provides insight into the dynamic nature of structural vulnerability and sexual risk behavior in the context of a high-risk HIV/STI workplace environment.

Background

Despite extensive efforts to reduce transmission of HIV and other sexually transmitted infections (STIs), concentrated epidemics persist in the United States. Young women are an important group for which new, targeted strategies for the prevention and control of HIV/STIs are needed. Not only do young women constitute a significant proportion of new infections each year, but they are also disproportionately affected by the long-term consequences of HIV and untreated STIs, such as pelvic inflammatory disease, infertility, and reproductive cancers [2]. Structurally vulnerable women have a particularly heightened risk for HIV/STIs, as a result of economic, social, gender-based discriminations that can constrain individual agency for sexual-decision making and compromise individual health [7, 18, 21, 23]. As a result of their social positioning, structurally vulnerable women are likely to have more exposure to HIV/STI and have a lower capacity to protect against infection [7, 18, 21, 23]. The effects of structural vulnerability on an individual often surface in the form of co-occurring social and economic disadvantages [7, 18, 21-23], which can be particularly detrimental for women.

For example, structurally vulnerable women often face an accumulation of co-occurring challenges accessing resources such as safe and reliable housing, flexible and well-paid employment, and affordable, quality education that can perpetuate a cycle of disadvantage. These circumstances have been previously established as important structural drivers of HIV/STI risk among women, demonstrating how HIV/STI risk can be a function of upstream social and economic forces [7, 32-34].

To sustainably alleviate the disproportionate burden of HIV/STI among young structurally vulnerable women, interventions should be designed to target and modify the social and economic factors at the core of their structural vulnerability [53, 104-107]. By definition, the social and economic indicators of structural vulnerability (e.g., housing instability) are time-dependent. As a result, structural vulnerability is a dynamic construct, which has direct implications for accurately characterizing HIV/STI risk. However, how individual experiences of structural vulnerability change over time, and the impacts of fluctuations in social and economic disadvantage on HIV/STI sexual risk behavior, are unknown. An enhanced understanding of the patterns over time of social and economic disadvantage could inform structural interventions by tailoring programs to focus on factors that co-occur over time, or where fluctuations are found to have a significant impact on changes in sexual risk behavior. Moreover, understanding how different vulnerability trajectories influence sexual risk behaviors would help to further understand the socially constructed nature of HIV/STI risk among women, resulting in more efficient and effective HIV/STI prevention programs and services to those most in need.

Female exotic dancers are often a structurally vulnerable, yet understudied, group of at-risk women who may engage in sexual risk behaviors through their work at exotic dance clubs (EDCs). In addition to offering services such as stage and lap dancing, some EDCs operate as venues in which dancers exchange sexual services for money or drugs [40-42]. Our previous research among dancers in Baltimore, Maryland found high rates of sex exchange and inconsistent condom use [41, 42]. Upon entering the EDC setting women may be at increased risk for HIV/STI through initiation or escalation of these behaviors. Classifying trajectories of structural vulnerability is especially relevant in the context of this type of high-risk workplace [53, 57, 108], as chronic or fluctuating states of social and economic disadvantage may enhance or alleviate HIV/STI risk over time. However, the trajectories of structural vulnerability among women entering exotic dancing have not been previously examined, and the degree to which experiences of structural vulnerability changes in this population is unknown. As a result, the field remains uncertain as to whether certain trajectories are linked to increased sexual risk behavior among this key population for HIV/STI prevention.

Also of concern is the illicit drug use, such as prescription opiates, heroin, and cocaine, that is commonplace in the exotic dance club setting where women are frequently exposed to sex-related HIV/STI risk. Drug use can further increase dancers' HIV/STI risk through several ways, including weakening sexual inhibitions and increasing the potential for engaging in unprotected sex with paying and/or non-paying partners [29, 30]. Additionally, drug use links individuals into drug networks, which have higher HIV/STI prevalence [50]. However, how drug use is connected to the pathway between structural vulnerability and HIV/STI risk behavior is unclear. For

some, the early formation of a drug habit or escalation of drug use upon entry into dancing can perpetuate the struggle to achieve a state of social and economic stability [42, 88]. For others, drug use may be a product of structural vulnerability, possibly as a coping response to deal with chronic social and economic hardship. In order to best inform solutions around HIV/STI prevention among structurally vulnerable women, accurately characterizing the role of drug use is critical to understanding mechanisms of HIV/STI risk rooted in structural vulnerability.

The primary objective of this study was to investigate the relationship between structural vulnerability and HIV/STI risk behavior over time. Specifically, we aimed to describe trajectories and correlates (e.g., demographic, social, and EDC-related) of structural vulnerability, and to explore changes in sexual risk behavior over time, among a sample of women followed for three months after entry into exotic dancing. We then identified which trajectories were most likely to result in increased sexual risk behavior during this time. A third study objective was to explore the role of drug use, by examining relationships with structural vulnerability trajectories and sexual risk behavior. We hypothesized that women who experienced a growing accumulation of social and economic disadvantage, as well as those who were increasingly disadvantaged during the early months of exotic dancing, were more likely to engage in subsequent sexual risk behavior, compared to women who experienced less disadvantage. By addressing these questions, this study provides unique insight into the dynamic nature of structural vulnerability and sexual risk behavior in the context of a high HIV/STI risk workplace.

Methods

Study design and study population

Participants were purposively recruited from 22 Baltimore City and County EDCs to a cohort for the STILETTO (STudying the Influence of Location and Environment – Talking Through Opportunities for Safety) Study, investigating the role of the EDC environment on HIV/STI risk. EDCs were scored using a risk environment inventory based on the collective profiles of the EDC social, economic, drug, and policy environments [57]. Participants were sequentially recruited from the highest and lowest risk EDCs until target sample size was reached. Eligibility criteria included: ≥ 18 years old, danced for ≤ 12 months, and danced ≥ 3 times in the past month. Following eligibility determination and providing informed consent, participants (n=117) filled out a 45-minute baseline survey using audio computer-assisted self-interviewing (ACASI) on a portable tablet. In addition to demographics, drug use, and sexual behavior, surveys collected information about dancers' recent circumstances that were hypothesized to reflect important social and economic aspects of structural vulnerability (e.g., housing, finances). Participants were invited to take a second survey at three months post baseline. At follow-up, dancers (n=89) were asked similar questions regarding recent drug use, sexual behavior, and experiences with structural vulnerability. Survey data were collected between May 2014 and March 2015, in a variety of locations convenient to participants, including private spaces within EDCs, restaurants, and cars. Participants received an \$80 pre-paid debit card for each survey completed. This study was approved by the Johns Hopkins Bloomberg School of Public Health Institutional Review Board.

Measures

Structural vulnerability trajectory. The main independent variable of interest was structural vulnerability trajectory, a measure developed through a multi-step process. Results from a previous latent class analysis (LCA) of baseline structural vulnerability informed this measure (unpublished). Specifically, four binary observed variables – housing instability (homelessness, transience, or living in temporary housing), financial insecurity (in debt or unable to pay for housing), limited education (did not graduate high school or graduated but did not pursue or left college), and arrest history – were selected to represent a composite latent variable of structural vulnerability. Final LCA models revealed two distinct subgroups of structural vulnerability, characterized as “low” and “high” vulnerability. Supported by high entropy at baseline (0.91), a manifest variable representing the most likely vulnerability class membership for each subject at baseline was established according to individual posterior predicted probabilities of class membership [77]. This procedure was subsequently applied to follow-up data (entropy = 0.86) to estimate the most likely vulnerability class membership for each subject at follow-up. LCA was performed using the poLCA package [75] in R version 3.2.0 [74], and MPLUS version 7 [76].

Using most likely class membership at each time point, we created a variable representing each transition group, or structural vulnerability trajectory. Each of the four possible combinations were initially set as a distinct transition groups: high to high, low to high, high to low, and low to low. Due to small cell sizes and supported by previous findings suggesting low risk associated with belonging to a low vulnerability subgroup [109], a reference category was created by grouping subjects who transitioned from high to low with those who were expected to remain in the low vulnerability subgroup from

baseline to follow-up (i.e., high/low to low). The final vulnerability trajectory variable was defined by three categories: high-high, low-high, and high/low-low.

HIV/STI sexual risk behavior. The dependent variables of interest were four separate measures of HIV/STI sexual risk behavior at follow-up. Behavioral outcomes at follow-up were defined by self-report of the following in the past three months: (1) inconsistent condom use when having vaginal or anal sex with any (i.e., exchange, casual, main) male partners; (2) having multiple (≥ 2) sex partners; (3) having a high-risk sex partner, defined by a partner who injects drugs or who had concurrent sex partners; and (4) sex in exchange for money, drugs, food, or a place to stay. The four baseline sexual risk behaviors were considered for inclusion as covariates in analyses, and defined by self-report of engaging in a given behavior within the past six months, with one definitional difference for multiple sex partners to account for double the reporting period (≥ 4 in past six months).

Drug use. Drug use was defined by self-report of illicit use of prescription opioids (e.g., Percocet, OxyContin), heroin, cocaine, or crack use. Recent drug use was measured at both baseline (any use within the past six months) and at follow-up (any use within the past three months).

Demographic characteristics and other covariates of interest. Demographic variables included age (dichotomized by the median age, 24 years) and race (white vs. non-white). Dancing related variables included overall HIV/STI risk level of the EDC from which the dancer was recruited, dichotomized by high/low risk based on a previously validated risk environment measure [57]. Length of time working as a dancer was captured at both baseline and follow-up and dichotomized at the median time at

baseline, four months or less. Two related items, added to the survey at follow-up, captured whether or not the participant remained dancing at follow-up, and whether she was working at the same club from which she was recruited. At baseline, women reported whether they had experienced childhood sexual or physical violence before the age of 18, defined by having been pushed, grabbed, slapped or hit so hard it left a mark or injury [62], or having been pressured or forced to have sexual contact [63]. Using items adapted from the Conflict Tactics Scale [63], recent intimate partner violence (IPV) was collected during baseline and follow-up surveys, defined by any report of being physically hurt (e.g., hit, pushed, choked, beaten up) or forced or pressured to have vaginal or anal sex by a main or casual sex partner in the past six months (past three months at follow-up).

Analysis

The distribution of demographics, dancing related variables, history of abuse, structural vulnerability indicators, most likely vulnerability class membership, and each of the HIV/STI risk behaviors were compared across the two time periods. Using data from dancers who completed both surveys (N=89), we explored patterns of structural vulnerability and sexual and drug related risk behavior over time, specifically examining the extent to which most likely vulnerability class membership changed during the follow-up period. A contingency table was established according to the proportion of dancers expected to belong to each vulnerability class at follow-up, given baseline class membership. To more closely examine factors potentially driving vulnerability trajectories for new dancers, we examined the patterns of observed structural

vulnerability indicators between baseline and follow-up. For example, among dancers who were unstably housed at baseline, we calculated the proportion that remained unstably housed versus those who transitioned to stable housing at follow up. Similarly, the table included transition proportions for sexual risk behaviors to determine among dancers reporting risk behavior at baseline, what proportion continued to engage in risk behavior during the follow-up period. Tables also ascertained the proportion of dancers who transitioned to engaging in risk behavior given no risk behavior at baseline.

Through bivariate multinomial logistic regression, we determined whether certain demographics, dancing-related factors, history of violence, and drug use, were more likely to be affiliated with a certain vulnerability trajectory. Models estimated odds ratios by characteristics collected at either baseline or follow-up, comparing dancers who were expected to belong to high-high and low-high vulnerability trajectories versus dancers expected to belong to the high/low-low vulnerability trajectory. Correlations between sexual risk behavior at baseline and follow-up were examined to assess whether behaviors remained the same or changed over time. McNemar's exact tests were used to determine whether or not proportions of reported behaviors were statistically significant between baseline and follow-up ($\alpha = 0.05$).

Generalized linear models using logistic regression were then used to investigate which trajectories of structural vulnerability were associated with each of the four sexual risk behaviors at follow-up. First, four separate models estimated the odds of engaging in each of the four sexual risk behaviors at follow-up, compared across vulnerability trajectories, and controlling for the particular risk behavior at baseline. Because we hypothesized that baseline risk behavior was correlated with engaging in the same

behavior at follow-up, setting baseline sexual risk behavior constant allowed models to estimate the extent to which risk behavior at follow-up was associated with changes in vulnerability, and not due to prior behavior.

The second set of models served as an exploration into the extent to which drug use played a role in the relationship between vulnerability trajectory and sexual risk behavior. Each of the four sexual risk behavior models controlled for drug use at baseline, to examine baseline drug use as a correlate of both vulnerability trajectory and future sexual risk behavior. The final set of multivariable regression models built upon previous models to also adjust for potential confounding due to age and intimate partner violence at baseline, in addition to baseline drug use and baseline sexual risk behavior. Controlling for these covariates, the resulting adjusted odds ratios estimated the likelihood of dancers engaging in each of the four sexual risk behaviors at follow-up for a given vulnerability trajectory, compared to the high/low-low trajectory (reference group). All analyses were performed using R version 3.2.0 [74]

Results

Descriptive statistics

Among participants (N=89), 40% were age 24 years or older, 36% were white, and 67% were recruited from a high-risk club (Table 1). Approximately half (51%) reported dancing for four months or less at baseline. At follow-up, the majority of participants reported that they remained dancing (79%) and about half (54%) were still working at the same club in which they were recruited for the study. Experiences of sexual and physical abuse were common, with 45% reporting childhood sexual or

physical violence; 30% reported recent IPV at baseline, and 21% reported recent IPV at follow-up.

Indicators of structural vulnerability were common at baseline; dancers reported unstable housing (39%), recent financial insecurity (39%), limited education (67%), and a history of arrest (37%) (Figure 1). Almost one-third of dancers (32%) were expected to belong to the high vulnerability class at baseline, which increased to 54% at follow-up. The prevalence of recent (i.e., past six months) sexual risk behavior at baseline varied: inconsistent condom use with any partner was common (68%), 26% of dancers had more than three male sex partners, 24% had a high-risk male sex partner, and 28% reported recent sex exchange (Table 2). Twenty-eight percent of women (n=25) reported using prescription opioids, heroin, cocaine, or crack within the six months prior to baseline (data not shown).

Patterns of transitioning from baseline to follow-up

Structural vulnerability transition patterns between baseline and follow-up demonstrated individual changes over time. While the majority of dancers in the high vulnerability subgroup at baseline were expected to remain highly vulnerable (90%), more than one-third (36%) of women with previously low vulnerability transitioned to high vulnerability (Figure 1). Among dancers who were expected to belong to the low vulnerability class at baseline (n=59), 64% remained in this class. Transitions between most likely class membership were likely influenced by fluctuations in housing stability and financial insecurity. In particular, dancers who reported unstable housing at baseline, 58% remained unstable; 30% of dancers reported transitioning to unstable housing after

reporting stability at baseline. Transitions in sexual risk behavior varied by type. Notably, among dancers who reported recent sex exchange at baseline, only 29% reported continuing to engage in sex exchange at follow-up; 7% of dancers who reported no sex exchange at baseline reported engaging in sex exchange at follow-up (Table 2). The overall decrease in reports of sex exchange between baseline (31%) and follow-up (13%) was statistically significant ($p=0.002$).

Structural vulnerability trajectories, drug use, and sexual risk behavior

Structural vulnerability trajectories were distributed across three categories: high-high (30%); low-high (24%); high/low-low (46%). Bivariate analyses found few sample characteristics associated with vulnerability trajectory (Table 3). Age and race were not significantly different across vulnerability trajectories. Similarly, models suggested no difference between vulnerability trajectories by EDC risk, length of time dancing at baseline, whether participants remained dancing, and whether they worked at the same EDC throughout the follow-up period. However, relative to the high/low-low vulnerability trajectory, regression models suggested that women who remained in the high vulnerability class were more likely to have experienced recent IPV at both baseline (odds ratio [OR] = 7.1, 95% CI: 2.4, 22.9) and follow-up (OR = 7.5, 95% CI: 2.0, 36.5). Women who transitioned from low to high vulnerability were more likely to have reported IPV at follow up (OR = 5.1, 95% CI: 1.2, 26.6), but not at baseline. Participants who reported drug use at baseline (OR = 9.0, 95% CI: 2.9, 32.8) and at follow-up (OR = 3.8, 95% CI: 1.3, 11.7) were more likely to report remaining in the high vulnerability subgroup compared to other trajectories. As expected, report of each of the sexual risk

behaviors at baseline was significantly associated with also reporting that same behavior at follow-up (data not shown).

Controlling for baseline sexual risk behavior, results of regression models found several meaningful estimates for the odds of engaging in sexual risk behavior at follow-up across vulnerability trajectories, although strength of findings varied (Table 4, model 1). The odds of reporting inconsistent condom use was almost four times higher among dancers who transitioned from low to high vulnerability compared to dancers who either transitioned to or remained in the low vulnerability group (OR = 3.9, 95% CI: 1.0, 19.5, $p=0.10$). This model also suggested no difference in condom use at follow-up between high-high and high/low-low vulnerability trajectory groups. In contrast, dancers who remained highly vulnerable during the follow-up period were more likely to report having a high-risk sex partner (i.e., IDU or concurrency) at follow-up (OR = 4.7, 95% CI: 1.2, 21.0), but this was not significant for dancers in the low-high trajectory group.

The second set of models found significant associations between drug use at baseline and each of the four sexual risk behaviors at follow-up. Holding vulnerability trajectory constant, drug use was significantly associated with having multiple sex partners (aOR = 4.4, 95% CI: 1.3, 16.7) and engaging in sex exchange (aOR = 5.6, 95% CI: 1.3, 28.3) at follow-up (Table 4, model 2). In the final multivariable models that controlled for baseline drug use, age, and baseline IPV, significant associations between vulnerability trajectory, drug use, and risk behavior remained (Table 4, model 3).

Discussion

This study provided a unique exploration into the dynamic nature of structural

vulnerability and sex-related HIV/STI risk behavior among female exotic dancers. Analyses revealed four distinct patterns of structural vulnerability during the study period. Most women either remained highly vulnerable or transitioned from a state of low to high vulnerability during the first year of dancing. Few women experienced reduced levels of social and economic disadvantage. Fluctuations in multiple social and economic circumstances likely contributed to transitions toward high vulnerability among dancers who were less vulnerable at baseline. The greatest shifts were observed among dancers who were stably housed at baseline but reported unstable housing at follow-up. Decreasing levels of educational achievement were likely attributed to school drop out following entry into dancing, or for the youngest dancers, completion of high school or GED without continuing on to pursue higher education. Additionally, many dancers who experienced unstable housing, financial insecurity, and limited education at baseline continued to experience these hardships. Among dancers who reported a given indicator at baseline, more than half remained unstably housed, almost two-thirds remained financially insecure, and almost all dancers remained academically limited.

Findings suggest that different experiences of structural vulnerability over time could be driving sexual risk behavior following entry into dancing. We identified different propensities toward sexual risk behavior between dancers who were chronically disadvantaged (high-high trajectory) and those who were increasingly disadvantaged (low-high trajectory). Specifically, dancers who transitioned from low to high vulnerability had relatively higher odds of reporting inconsistent condom use at follow-up. The shift from low to high vulnerability during the early months of dancing may signal a critical period of new instability that could increase HIV/STI risk. Dancers

experiencing new circumstances of social and economic instability may be less adjusted to protect themselves against sex-related harm, specifically through condom use, and thus potentially represent a uniquely at-risk subgroup. In a cohort study of HIV positive individuals living in New York City, multiple structural factors, including housing stability, were identified as predictors of unprotected sex [110]. In addition to housing, an ecological analysis of HIV incidence in 80 U.S. cities found that heterosexual risk increased in populations and locations characterized by income inequality, poverty, and low educational attainment [111]. These data support our findings that the accumulation of multiple social and economic factors may function to synergistically drive HIV/STI risk over time, and should be considered as potential barriers to successful implementation of HIV/STI prevention and control programs across urban settings of the United States.

Chronically disadvantaged women were more likely to report having a high-risk sex partner (i.e., IDU or concurrent) at follow-up, which may be indicative of new connections to high-risk sexual networks. After adjusting for drug use and other covariates, the odds of having recently engaged in sex exchange at follow-up were high, although not significant, for both women who had increasing disadvantage or remained highly disadvantaged. Although these estimates were not statistically significant, the meaningfully high effect sizes may be explained by the accumulation of social and economic disadvantage, which has been previously associated with sex exchange [112]. While only focused on one indicator, similar results were observed among a sample of low-income HIV positive individuals in a supportive housing program; clients whose housing worsened during a six-month period were significantly more likely to report

recent sex exchange at follow-up compared to others who experienced no housing changes [14]. Additionally, in a cohort of female drug users in Atlanta, despite participation in a community-based HIV risk reduction intervention, women who were unstably housed throughout the program were more likely to have sold sex for money or drugs at six months follow-up, compared to women who were stably housed [113]. Taken together, these findings indicate that housing may be an important structural barrier to consider when implementing drug or sex-related harm reduction interventions.

At baseline, more than a quarter of dancers reported recent opiates, heroin, crack, or cocaine use with close to three-fourths of these continuing at follow-up. Among dancers who reported no drug use at baseline, eight percent reported initiating drug use during the follow-up period. In sum, dancers who entered dancing having used hard drugs continued to do so, and similarly, those who did not use these drugs in the past did not change their behavior. While the baseline prevalence of drug use is likely an underestimate due to the illegal nature of the behavior, these patterns suggest that drug use may be a more static behavior, and potentially less related to working in EDCs, compared to sexual risk behavior. When examined alongside structural vulnerability trajectories and sexual risk behavior, drug use emerged as an important indicator of HIV/STI risk. In multivariate models, dancers who reported using drugs at baseline were more likely to report having multiple sex partners and engaging in sex exchange at follow-up. The relationship between drug use and HIV/STI risk behavior is well established in the literature. Women using drugs may have weakened sexual inhibitions that can result in sexual encounters that would otherwise be avoided, leading to sex with multiple casual partners or sex in exchange for money or drugs [29, 30]. While these

relationships were observed in our analyses, women using drugs did not report significantly higher rates of unprotected sex, which was also expected [29, 30]. Drug use among the sample of dancers was also correlated with experiences of chronic vulnerability, as denoted by significant associations with the trajectory characterized by consistently high vulnerability. Investigations into the role of structural factors in the initiation or escalation of drug use are ongoing [51-53]. Recent studies have demonstrated associations between economic deprivation and drug use attributed to stress related to neighborhood poverty, low employment, and income instability that places individuals at risk [43-45]. Drug use can further perpetuate financial stress as a result of from drug-related job loss or injury [56]. In order to best inform solutions around HIV/STI prevention, accurately characterizing the multiple roles of drug use is critical to understanding mechanisms of HIV/STI risk that are rooted in structural vulnerability.

Another important finding of this study suggests a need for closer examination of the impact of intimate partner violence on trajectories of vulnerability. IPV played an important role in changes from low to high vulnerability during the study. Dancers with a chronic accumulation of social and economic disadvantage were more likely to have reported IPV during both time points compared to low vulnerability dancers; however, dancers who experienced increasing disadvantage were more likely to report IPV at follow-up but not baseline. This pattern suggests that recent IPV may have a destabilizing effect on dancers, rendering them socially and economically vulnerable over a short period of time. Violence is not only recognized as a product of living in a context of structural disadvantage, but has also been associated with the escalation of social and economic instability through disruptions in work productivity and income [114]. Women

in experiencing IPV are less likely to consistently use condoms with their partners, driven by involuntary condom non-use and fears around condom negotiation [23-25, 48].

Dancers experiencing both violence and economic disadvantage may have a reduced capacity to protect against harms incurred through working in exotic dance clubs, as well as through sexual partnerships outside of the EDC environment.

Women who experienced chronic structural vulnerability during the study were likely from early life predisposed to limited opportunities for upward mobility [10, 11]. Transitioning from high to low vulnerability was uncommon among study participants, indicating an inability to acquire immediate gains in housing and financial security following entry into dancing. To escape these hardships, dancers need to overcome the “costs” associated with sustained poverty, which require a safety net of time and money, in addition to the human, social, and health capital, or resources, required to handle unexpected adverse events such as job loss or housing eviction [12, 13]. With this understanding, study findings have the potential to meaningfully inform multi-level interventions aiming to improve sexual health of exotic dancers and other groups of vulnerable women. Affordable housing, opportunities to pursue higher education, and job training programs that minimize the financial costs of economic scarcity, while allowing for the time needed for dancers to stabilize, may further alleviate the individual effects of vulnerability and subsequent HIV/STI risk behavior [92]. In conjunction with addressing structural drivers of HIV/STI risk behavior, programs should consider tackling in tandem issues related to substance abuse, such as improving access for women seeking drug treatment or needle exchange programs. Given the high prevalence of intimate partner violence and its connection to increasing vulnerability in our study

population, programs would likely also benefit from efforts around violence prevention.

Study findings should be considered in light of several limitations. We used complete-case data to uncover transition patterns of vulnerability behavior over time, which has not been previously characterized. However, this approach resulted in small sample size and parameter restrictions that hindered our ability to directly relate variables of interest to latent transition classes through single-step latent regression analysis. As an alternative, we created a vulnerability trajectory variable, based on most likely vulnerability class membership at each time point, for inclusion as the primary independent variable in longitudinal regression analyses. This requires treating most likely class membership as an exact, observed variable by forcing individuals into classes, which can be problematic when two individuals have different probabilities for class membership but are assigned and treated as members of the same class [77]. However, establishing manifest variables using most likely class membership estimates can be appropriate when models are characterized by entropy higher than 0.8, a level met by both baseline and follow-up latent vulnerability models. Simulations have demonstrated when these criteria are achieved, models have more power and result in lower bias compared to single-step latent class regression [77]. Sample size also contributed to imprecise estimates from the series of regression models intended to assess the effect of vulnerability trajectory on sexual risk behavior during the study period. Despite wide confidence intervals, significant differences were found between vulnerability trajectories across sexual risk behavior outcomes, suggesting that vulnerability and sexual risk behavior are tightly linked. Relatedly, while findings point to the importance of drug use in the pathways relating vulnerability to sexual risk

behavior, models were not robust enough to truly evaluate the mechanisms by which drug use affects these pathways. Testing drug use as a precursor to vulnerability, and as a potential mediator or moderator of the relationship between vulnerability and sexual risk behavior, would ideally be tested in a larger cohort with multiple time points.

Also worth consideration in the context of these findings is the variability in time-dependency across observed indicators used to measure the latent construct of vulnerability. Among our study population, housing and financial stability changed by for a third and a quarter of dancers, respectively during the three month period. As expected, these were relatively more dynamic social and economic circumstances compared to indicators used to measure education and arrest history. Limited education was used to assess highest level of education attained, in combination with school status, as a proxy to identify women who were either struggling with maintaining a higher education program (i.e., drop out before completing degree) or those who had low baseline levels of education (i.e., high school grad only). While education-related transitions were noted – 16% either improved their education (e.g., enrolling in school or completing college) or transitioned to lower achievement (e.g., drop out), such changes are less likely to occur over a period of three months compared to changes in housing and financial stability. Arrest history was the most static indicator used in the vulnerability class models; however, a small number of dancers with no history at baseline reported arrests during the follow up period. Data were collected on arrest history as a proxy to understanding the extent to which dancers had criminal records, which has been noted as a barrier to accessing desirable job opportunities, education, and housing [115-117]. While a direct measure of criminal record would likely improve accuracy and allow for

more variability over time, this indicator was important to represent of vulnerability as a syndemic of multiple overlapping social and economic hardships.

Despite these limitations, this study uncovered distinct trajectories of vulnerability that were linked to sex-related HIV/STI risk behavior among exotic dancers. These linkages underscore the importance of continuing to ground our understanding of HIV/STI disparities in structural factors that drive inequity in access to resources such as affordable housing, steady employment, and quality education. Findings call for leveraging of resources through collaboration across institutions to confront these inequities through policies that straddle housing, justice, employment, education to improve population health [84]. On a smaller scale, targeted HIV/STI prevention and control strategies should not only consider the chronically vulnerable, but also women who are on the fringe of transitioning to a state of high vulnerability. The destabilizing effects of an unexpected event such as job loss, experiences of intimate partner violence, or prolonged drug use may trigger transitions from low to high vulnerability. Therefore, timing is a critical component to identifying and preventing both acute and continued HIV/STI risk. Future research should investigate the mechanisms by which the pathway between vulnerability and HIV/STI risk behavior may be disrupted, such as environmental or social factors that buffer against the effects of vulnerability. Identifying factors that either promote a constant level of low vulnerability or facilitate transitions out of a state of high vulnerability is likely critical to not only help women rise out of economically dire circumstances, but to ultimately reduce sexual and drug-related harm in the long-term.

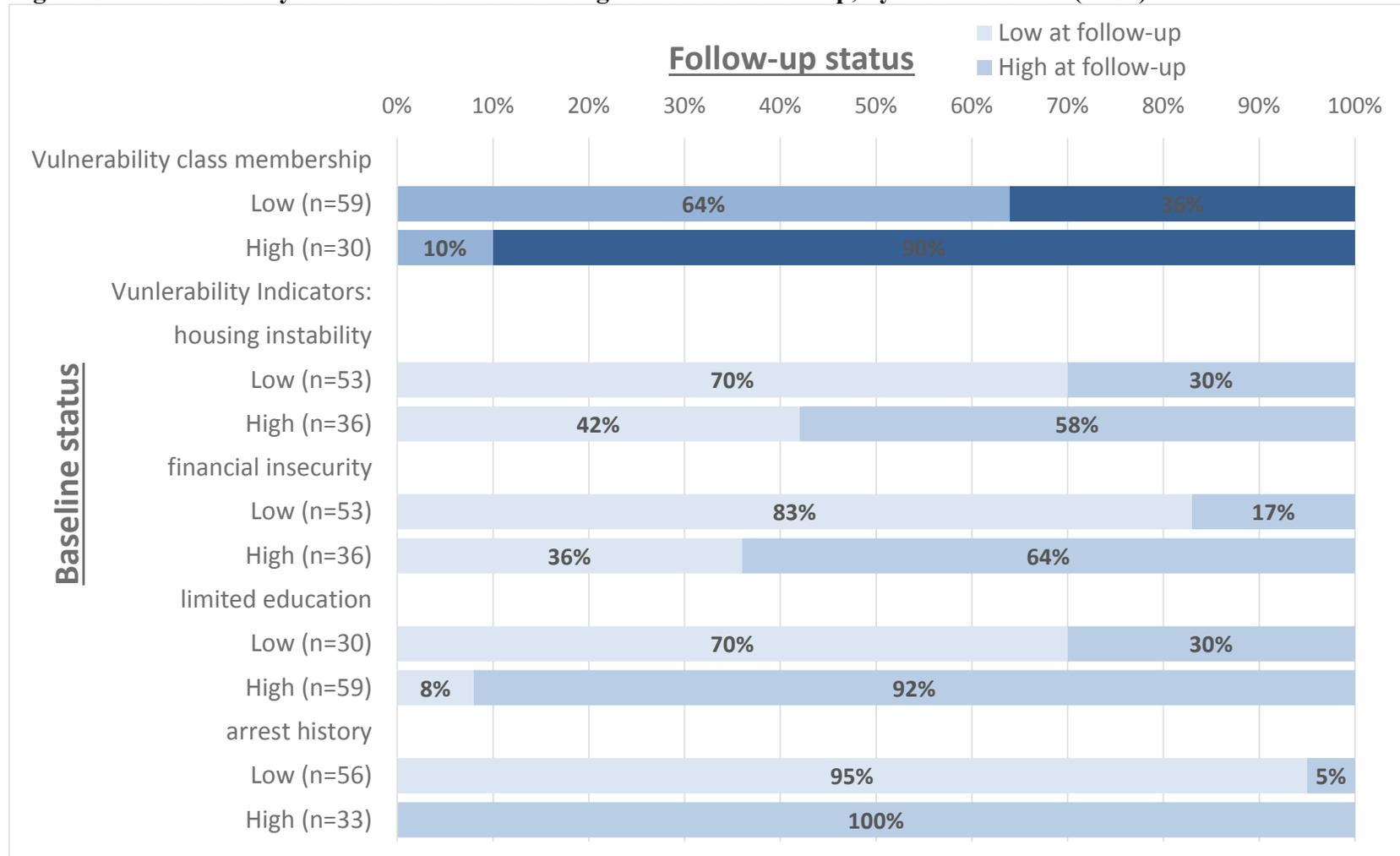
Table 5.1. Description of sample demographic, dancing-related and psychosocial factors (n=89)

Characteristic	Baseline n (%)	Follow-up n (%)
Age		
≥24 years	36 (40.4)	---
<24 years	53 (59.6)	---
Race		
White	32 (36.0)	---
Black & other	57 (64.0)	---
Dancing-related factors		
Recruited from high-risk EDC	60 (67.4)	---
Dancing ≤4 months	45 (50.6)	---
Currently dancing at an EDC	89 (100.0)	70 (78.7)
Currently dancing in same EDC as baseline	---	48 (53.9)
Experiences of violence		
Sexual or physical abuse during childhood	40 (44.9)	---
Intimate partner violence, recent [§]	27 (30.3)	19 (21.3)
Illicit drug use, recent* [§]		
Yes	25 (28.1)	23 (25.8)
No	64 (71.9)	66 (74.2)

[§]Recent: baseline report = past six months; follow-up report = past three months.

*Illicit drug use: use of prescription opiates, heroin, cocaine, crack

Figure 5.1. Vulnerability class and indicators among dancers at follow-up, by baseline status (n=89)



Note: Vulnerability class membership based on a latent class analysis that included the indicators listed. Baseline report = past six months; follow-up report = past three months

Table 5.2. Sexual risk behaviors among dancers at follow-up, by baseline status (n=89)

Baseline	% (n) at follow-up**		X ² , p value
	No	Yes	
Inconsistent condom use			
No (n=27)	52% (14)	48% (13)	0.847
Yes (n=62)	23% (14)	77% (48)	
Multiple sex partners			
No (n=66)	80% (53)	20% (13)	0.838
Yes (n=23)	48% (11)	52% (12)	
IDU and concurrent sex partners			
No (n=67)	90% (60)	10% (7)	0.180
Yes (n=22)	59% (13)	41% (9)	
Sex exchange			
No (n=61)	93% (57)	7% (4)	0.002
Yes (n=28)	71% (20)	29% (8)	

*Vulnerability class membership based on a latent class analysis that included the indicators listed.

**Frequencies are row percents given baseline status; X² McNemar tests compared overall proportion of dancers reporting behavior at baseline vs. at follow-up.

Note: baseline report = past six months; follow-up report = past three months.

Table 5.3. Correlates of vulnerability trajectory, odds ratios and 95% confidence intervals (n=89)

Characteristic	Increasingly Vulnerable (Class: Low-High) N=21	Chronically Vulnerable (Class: High-High) N=27
Demographic Factors		
≥24 years (vs. <24)	1.2 (0.4, 3.5)	2.1 (0.8, 5.7)
White (vs. Black & other)	2.0 (0.7, 6.3)	2.2 (0.8, 6.2)
Dancing-Related Factors		
Recruited from high-risk EDC, baseline	1.6 (0.5, 5.3)	1.8 (0.6, 5.6)
Dancing ≤4 months, baseline	0.7 (0.2, 2.1)	1.2 (0.4, 3.2)
Still dancing, follow-up	1.9 (0.5, 9.5)	1.1 (0.4, 3.8)
Dancing in recruitment EDC, follow-up	1.5 (0.5, 4.7)	1.0 (0.4, 2.7)
History of abuse		
Childhood sexual or physical violence	0.8 (0.3, 2.3)	1.4 (0.5, 3.7)
Recent IPV, baseline	1.1 (0.3, 4.3)	7.1 (2.4, 22.9)
Recent IPV, follow-up	5.1 (1.2, 26.6)	7.5 (2.0, 36.5)
Drug use		
Drug use, baseline	2.3 (0.6, 9.2)	9.0 (2.9, 32.8)
Drug use, follow up	0.4 (0.1, 1.9)	3.8 (1.3, 11.7)

Note: models were bivariate analyses comparing sample characteristics across vulnerability trajectories, with reference category high/low-low (n=41); vulnerability trajectory based on most likely class membership estimated from latent class analysis of vulnerability at baseline and at follow-up. Baseline report = past six months, follow-up report = past three months

Table 5.4. Odds ratios for sexual risk behavior at follow-up, by vulnerability trajectory (n=89)

Model*	Condom Use	Multiple Partners	High-risk Partner	Sex exchange
Model 1				
Low-High	3.9 (1.0, 19.5)	1.1 (0.3, 3.6)	2.1 (0.3, 11.7)	3.6 (0.7, 22.7)
High-High	1.5 (0.5, 4.5)	0.5 (0.1, 1.6)	4.7 (1.2, 21.0)	1.6 (0.3, 9.1)
Model 2				
Low-High	4.2 (1.1, 21.0)	0.9 (0.2, 3.1)	1.7 (0.3, 9.8)	2.9 (0.5, 19.3)
High-High	1.9 (0.6, 6.9)	0.3 (0.1, 1.0)	3.3 (0.7, 16.6)	0.8 (0.1, 5.1)
Baseline drug use	0.6 (0.2, 1.9)	4.4 (1.3, 16.7)	2.3 (0.5, 10.1)	5.6 (1.3, 28.3)
Model 3				
Low-High	4.4 (1.2, 22.4)	0.9 (0.2, 3.2)	2.0 (0.3, 13.6)	2.8 (0.5, 19.1)
High-High	1.9 (0.5, 7.2)	0.3 (0.1, 1.4)	3.0 (0.6, 18.3)	0.9 (0.1, 6.4)
Baseline drug use	0.5 (0.1, 1.8)	5.0 (1.2, 24.2)	1.3 (0.2, 6.8)	6.2 (1.1, 40.0)
Age \geq 24 years	0.5 (0.2, 1.5)	0.5 (0.1, 1.5)	0.8 (0.2, 2.9)	0.6 (0.1, 2.9)
Baseline IPV	1.6 (0.4, 6.6)	0.9 (0.2, 3.5)	3.0 (0.7, 13.2)	0.9 (0.1, 4.9)

Note: reference category was high/low-low trajectory; vulnerability trajectory based on most likely class membership estimated from latent class analysis of vulnerability at baseline and at follow-up.

*All models controlled for each of the sexual risk behaviors at baseline (e.g., condom use model controlled for baseline condom use).

CHAPTER SIX: DISCUSSION

Overview

The objective of this dissertation was to investigate the dynamic nature of structural vulnerability as a contextual driver of HIV/STI risk, by exploring the relationship between the socioeconomic effects of structural vulnerability and sexual risk behavior among a sample of new exotic dancers in Baltimore, Maryland. This dissertation research contributes to building a more nuanced understanding of the nature of structural vulnerability and its role in STI/HIV risk behavior among women in the context of a high-risk work environment. The ultimate goal of the research was to inform future programming and public policies that seek to more efficiently address the structural factors driving HIV/STI transmission among vulnerable populations. Three specific research aims were addressed using a mixed methods approach, and completed as described in the three manuscripts of this dissertation. This discussion chapter provides a summary of results and conclusions for each dissertation aim.

Summary of findings

Aim One

The objective of Aim One was to qualitatively explore the nature and progression of structural vulnerability and how different experiences of and responses to vulnerability shape HIV/STI risk behavior among exotic dancers. The first manuscript (Chapter Three) addresses this aim by describing individual experiences of structural vulnerability from an early age through entry into dancing. This manuscript also examines the role of drug use and social support in shaping experiences of vulnerability and proclivity toward sexual risk behavior. The sample for this study was a group of twenty-four women from

the larger STILETTO Study cohort, who on average, had been dancing for five months and were working in high-risk EDCs at the time of the first interview. The age of women ranged from 19 to 33 years, and the majority had graduated from high school. This study was designed to support and inform the ongoing need for multi-level structural interventions to reduce HIV/STI burden among female exotic dancers and other vulnerable women in the United States.

Thematic analysis uncovered both early and recent experiences of structural vulnerability, providing insight into how dancers' vulnerability evolved over time, how they managed these experiences, and how different trajectories of vulnerability shaped HIV/STI risk. Many dancers reported early experiences of residential transience, violence, and independence at a young age. The accumulation of structural vulnerability, indicated by chronic, overlapping social and economic hardships, continued upon entry into dancing. The continuation of housing instability, financial scarcity, criminal history, and limited education and job opportunities, compelled women to remain in the EDC setting. The most disadvantaged women were particularly disposed to work-related sexual risk behavior such as engaging in unprotected sex with clients. Substance use emerged as an important issue for the majority of women, often further impairing the ability to stabilize economically and setting up a heightened context of HIV/STI risk. Dancers also revealed social strategies that buffered the economic effects of their vulnerability. Women who were able to improve their circumstances, particularly related to housing and finances, generally faced less work-related harm as they gained control and ability to avoid EDC-related drug and sexual activity.

Through the use of iterative, qualitative methods, Manuscript One articulates the path of embodied structural vulnerability that shaped HIV/STI risk behavior among new exotic dancers. By accessing an environment in which marginalized women are concentrated, this study adds insight into an understudied group of vulnerable women with a unique demographic profile. Narratives revealed how structural vulnerability, substance abuse, interpersonal relationships, and opportunities for economic gain through sexual services in the workplace converge to produce varying levels of HIV/STI risk.

Aim Two

Informed by findings from Aim One, the objective of Aim Two was to identify patterns of social and economic disadvantage and associations with sex-related HIV/STI risk behavior. As described in Manuscript Two (Chapter Four), using latent class analysis (LCA), we explored how dancers' experiences clustered into distinct subgroups, or latent classes, of structural vulnerability. We then sought to discover demographic, dancing-related, and psychosocial factors that predicted class membership. We subsequently examined the degree to which membership within certain subgroups was associated with sexual risk behavior, drug use, and a set of theoretically related health outcomes (i.e., depression, self-reported health, bacterial STI). Using quantitative data collected from 117 dancers who participated in the baseline survey of the STILETTO Study, Aim Two was designed to identify subgroups of women who are at greatest risk for infection. Additionally, the discovery of clusters of modifiable, co-occurring structural drivers of HIV/STI risk points to important social and economic issues that if

addressed holistically, could result in significant reductions in HIV/STI transmission across communities most at risk.

LCA modeling yielded a two-class model solution, according to response patterns of four indicators of structural vulnerability: housing instability, financial insecurity, history of arrest, and limited academic achievement. The two classes were labeled as “low vulnerability” and “high vulnerability” subgroups; one-third of participants were expected to belong to the high vulnerability subgroup. Notably, women who had recently experienced intimate partner violence (IPV) were more likely to be classified as highly vulnerable compared to women who had not experienced IPV. Findings also revealed that women who were expected to belong to the high vulnerability subgroup were more likely to report sex exchange, multiple sex partners, and illicit drug use.

Findings supported our hypotheses that multiple social and economic indicators of vulnerability are inter-related and revealed a key subgroup of individuals most at risk for HIV/STI. Specifically, we classified distinct profiles of vulnerable women that may be contributing to variations in sex-related risk behavior. This approach is relevant for HIV/STI programs that seek to improve efficiency of prevention (e.g., risk reduction) and outreach services (e.g., testing, linkage to care and treatment) by targeting groups of people who are at highest risk for infection.

Aim Three

The objective of Aim Three was to quantitatively investigate the relationship between structural vulnerability, sexual risk behavior, and drug use over time. Manuscript Three (Chapter Five) summarizes the findings of Aim Three, including a

description of the different trajectories of structural vulnerability experienced by exotic dancers during the first year of dancing. In addition to testing demographic, dancing-related, and psychosocial correlates of these trajectories, a series of analyses identified vulnerability trajectories that were most likely to give rise to sexual risk behavior. The role of drug use, as it relates to vulnerability trajectories and sexual risk behavior, was also explored. Using data from women who participated in both the baseline and follow-up surveys for the STILETTO Study (n=89), Aim Three provides a unique glimpse into the dynamic nature of structural vulnerability, drug use, and sexual risk behavior in the context of a high HIV/STI workplace.

Four distinct transition patterns between baseline and follow-up demonstrated changes in individual experiences of structural vulnerability over time. Roughly one-third of dancers remained highly vulnerable, and about a quarter experienced increasing vulnerability. Changes in sexual risk behavior during the study period varied. While half of dancers reported never exchanging sex, twenty-one percent consistently exchanged sex during the study period, and seven percent initiated sex exchange during follow-up. In contrast, a minority of dancers reported consistent condom use, with more than half reporting unprotected at both time points, and fifteen percent changing from consistently using condoms at baseline to inconsistent condom use at follow-up. Results of regression analyses suggest that dancers who transitioned from low to high vulnerability were more likely to report inconsistent condom use at follow-up compared to women with low vulnerability, and chronically vulnerable women were more likely to report having a high-risk sex partner at follow-up. After adjusting for drug use and other covariates, the

odds of engaging in sex exchange at follow-up were high for both women who remained highly vulnerable or had increasing vulnerability.

At baseline, more than a quarter of dancers reported recent opiates, heroin, crack, or cocaine use with close to three-fourths of these continuing at follow-up. Among dancers who reported no drug use at baseline, only 8% reported initiating drug use during the follow-up period. Dancers who entered dancing having used hard drugs continued to do so, and similarly, those who did not use these drugs in the past did not change their behavior. While the baseline prevalence of drug use is likely an underestimate due to the illegal nature of the behavior in question, patterns suggest that drug use is a more established behavior by the time women enter dancing, compared to sexual risk behavior, which fluctuated during the study period. Drug use was strongly associated with chronic vulnerability from baseline to follow-up. Moreover, drug use emerged as an important indicator of sexual risk, including having multiple sex partners and engaging in sex exchange at follow-up, regardless of vulnerability trajectory.

Triangulation of findings

Across all three manuscripts, findings consistently indicate that the social and economic consequences of structural vulnerability co-occur, and often persist or increase over time. The collection of results also demonstrates that an accumulation of social and economic disadvantage may be driving sexual risk behavior, and is further complicated by the cyclical nature of violence victimization and drug use. Using a concurrent triangulation design, findings from Aim One were cross-validated with Aims Two and Three as both qualitative and quantitative data illustrated the complex and dynamic

nature of structural vulnerability. For example, in the qualitative interviews dancers revealed that unstable housing and financial situations often restricted their ability to remain in school or pursue higher education. Additionally, women described the impact of lingering criminal records as a hinder to achieving goals such as returning to school, pursuing jobs outside of dancing, or securing more reliable housing. The quantitative analyses supported these findings, as demonstrated by distinct subgroups of inter-related social and economic indicators representing housing and financial stability, limited opportunities for educational attainment, and history of arrest. Taken together, findings revealed that women who are chronically or increasingly disadvantaged are more likely to engage in a risky sexual behavior or drug use, and therefore an important group for HIV/STI prevention.

Study strengths and limitations

Limitations

Study findings should be considered in light of several limitations, including sample size, sources of potential bias, and generalizability. Aims Two and Three were limited by small sample size. For Aim Two, LCA models were restricted in the number of indicators to include as well as the number of possible classes to evaluate for model fit. As a result, alternative models reflecting different patterns of structural vulnerability may not have been selected. However, the final model was without identifiability issues and allowed for two distinguishable groups. Small sample size and parameter restrictions also hindered the ability to directly relate variables of interest to latent transition classes through single-step latent regression analysis in Aim Three. As an alternative, a

vulnerability trajectory variable based on most likely vulnerability class membership at each time point was created, and included as a manifest variable in longitudinal regression analyses. Treating most likely class membership as an exact, observed variable by forcing individuals into classes can be problematic when two individuals have different probabilities for class membership but are assigned and treated as members of the same class [77]. However, establishing manifest variables using most likely class membership estimates can be appropriate when models are characterized by entropy higher than 0.8, a level met by both baseline and follow-up latent vulnerability models. Lastly, odds ratio estimates were imprecise, as indicated by large confidence intervals observed during analyses for both Aim Two and Aim Three.

The quantitative component of the study suffered from loss to follow up, although 76% of women remained in the study and participated in both surveys. Upon examination for differences by demographics, history of violence, and dancing related characteristics, no differences were found between women who had dropped out versus those who had remained in the study.

Eligibility criteria allowed women who had been dancing up to one year to participate in the study. As a result, women had been exposed to the EDC risk environment at varying duration, with the median length of time dancing at four months. This is most relevant to findings in Aim 3, which explored changes in risk behavior over time, to in part address the question of whether exposure to the EDC risk environment influences these changes. For some women, exposure to the EDC risk environment may have provoked changes immediately or early on. Therefore, it is possible that we did not

capture changes that occurred among women upon entry into dancing, that by the time of the study had already been dancing for several months.

Another potential study limitation is the self-report of sex and drug-related behaviors. Behaviors such as sex exchange and hard drug (e.g., heroin, cocaine) use were likely subject to social desirability bias because of the illegal nature of these activities. However, during qualitative data collection for Aim 1, the iterative nature of the interviews and interviewers' rapport with participants aided in the ability to accurately capture dancers' behaviors. Additionally, ACASI was used to help mitigate bias during quantitative data collection; however, underreporting may have minimized the strength of associations observed between vulnerability and behaviors estimated in Aims Two and Three. These variables may have also been subject to recall bias, particularly for the baseline survey, during which dancers were asked about experiences and behaviors going back six months.

Purposive sampling resulted in interviews with dancers who were primarily recruited from higher risk clubs who were willing to meet outside of work and talk openly about their lives. Thus, the experiences of some dancers, possibly women with higher levels of vulnerability or working in EDCs with higher rates of drugs and sex exchange, could have been oversampled. On the other hand, we may have excluded some of the higher risk women who were interested in participating but were too drunk or high during screening. The quantitative sample consisted of primarily newer dancers, working in a specific set of high-risk EDC environments in Baltimore City and County. Thus, findings may not be generalizable to all exotic dancers in Baltimore or other cities.

Strengths

This study is also characterized by several strengths. The research used a robust, mixed methods approach to extensively explore the role of structural vulnerability and sexual risk behavior in the context of a high-risk workplace among an understudied key HIV/STI population. The qualitative aim informed the selection of indicators for LCA in Aim 2, and supported interpretation of findings from Aim 3, which further confirmed that the social and economic effects of structural vulnerability play a key role in shaping STI risk behavior. The collection of data at two time points allowed for an initial exploration into the likelihood of engaging in sexual risk behavior given different trajectories of structural vulnerability.

Grounded in a theoretical framework of structural vulnerability, this study investigated how social and economic factors cluster among a sample of new exotic dancers, a unique and diverse group of vulnerable women. Prior to this research, the degree to which these factors cluster together, and the synergistic effect of this clustering on HIV/STI risk behavior, had not been explored at length, especially among women [17, 39, 59-61]. A growing body of evidence indicates that HIV/STI risk is grounded within a syndemic of multiple, overlapping economic and social conditions, but further research was needed to understand this context of risk for vulnerable women [17, 59-61] [39]. Analyses uncovered the synergistic relationships across key structural factors driving sexual risk behavior and drug use that together may engender heightened HIV/STI risk.

Aim Two used the valuable method of latent class analysis to identify the most powerful combinations of social and economic factors, or typologies of structural vulnerability, that drive HIV/STI risk behavior, which was critical step to uncovering the

nuances behind what places women at greatest risk. Moreover, this approach is directly applicable for programs seeking efficient ways to target populations most at risk and in need of prevention and harm reduction services. Aim Three incorporates additional strengths by taking advantage of the longitudinal nature of the data. Classifying trajectories of vulnerability was especially relevant in understanding sexual risk behavior in the context of a high-risk work environment, where chronic or fluctuating states of vulnerability have the potential to enhance or alleviate this risk over time. The trajectories of vulnerability experienced among women entering exotic dancing were previously unknown, as well as whether certain trajectories of vulnerability are linked to sexual risk behavior among this HIV/STI key population. Aim Three provided an enhanced understanding of the longitudinal patterns of vulnerability, and offers a guide for structural interventions to focus on factors that co-occur over time, or where fluctuations are found to have a strong impact on changes in sexual risk behavior.

Study implications and future research

Program implications

Manuscript One features in-depth descriptions of how overlapping structural factors created challenges around accessing safe housing, affordable education, reliable employment, and legal support among a subgroup of dancers. These experiences were also evident in Manuscripts Two and Three, in which housing instability, limited education, financial insecurity, and history of arrest were found to be common among the larger cohort of dancers. Findings point to important opportunities for intervention at

structural, community, and individual levels to protect the sexual health of exotic dancers and other groups of vulnerable women.

In addition to targeted HIV/STI prevention and outreach (i.e., testing and linkage to treatment), results from all three manuscripts indicate that the most vulnerable women would also likely benefit from programs with integrated referrals and case management that provide access to safe housing, affordable education, job training, and financial management. These may be important services through which vulnerable women can be indirectly protected from HIV/STI risk. Women would likely also benefit from provision of services that provide access to mental health care and reduce intimate partner violence. A community-level approach could be taken by delivering services within venues such as EDCs. Improving access for women seeking drug treatment services may help to disrupt the cyclical nature of drug use and consequently reduce HIV/STI risk behavior [89]. Manuscript Three highlighted the importance of time when designing and implementing HIV/STI prevention and control programs. Strategies should not only consider the chronically vulnerable, but also women who are on the fringe of transitioning to a state of high vulnerability. The destabilizing effects of an unexpected event such as job loss, housing eviction, or experiences of intimate partner violence may trigger transitions from low to high vulnerability. Therefore, timing is a critical component to identifying and intervening upon both acute and continued HIV/STI risk.

Policy implications

Taken together, the results of this dissertation point to several implications for policy. The linkages found between vulnerability and sexual risk behavior underscore

the importance of continuing to ground our understanding of HIV/STI disparities in structural factors that drive inequity in access to resources such as affordable housing, steady employment, and quality education. Findings call for leveraging of resources through collaboration across institutions to confront these inequities through policies that straddle housing, justice, employment, education to improve population health [84]. Dancers' experiences of housing and financial instability, limited opportunities for academic advancement, and history of arrest highlight areas where health could be improved through inter-sectoral approaches that address social, economic, and health needs in tandem. The 'Health in All Policies' movement calls for new solutions to address the social determinants of health through revitalized policies and structures that facilitate collaboration across government agencies [84]. This approach requires partnerships across agencies such as those involved in the housing, education, criminal justice, and employment sectors to create public policies that promote equitable access to resources [84]. Leaders from government at the national, state, and local levels should facilitate inter-agency collaboration that calls for redesign of education, criminal justice, and housing policies. However, much progress is yet to be made to address health in all policies [84]. Affordable housing, education, and employment policies that minimize the financial, temporal, and cognitive costs of living in economic scarcity may further alleviate the constant social and economic stressors that perpetuate dancer's vulnerability and subsequent HIV/STI risk [92].

Future research

Findings from each manuscript point to several areas for future research that would contribute to a more thorough understanding of structural vulnerability among women in the United States, as well as the mechanisms by which individual experiences of social and economic hardship relate to sexual risk behavior, especially in the context of high-risk residential, social, or work environments.

In the qualitative aim (Manuscript One), accounts of dancers' ability to buffer the effects of their vulnerability through use of their familial and social networks suggest an opportunity to help vulnerable women stabilize economically, reduce workplace-related harm, and improve their health and well being. By having access to resources that relieved one or more stressors (e.g., housing, bills, tuition, childcare), women were able to reverse or slow down the accumulation of social and economic hardship that had previously persisted in their lives. This external support allowed them to avoid EDC-related sex and drug related risk while providing space to prioritize future goals. However, the quantitative component of the study did not collect data on this type of support that would inform a better understanding of how social connections and external sources of financial support may function to buffer women's structural vulnerability. Future research into the mechanisms by which social resources play a role in the relationship between structural vulnerability and sexual risk behavior may be key to more effective HIV/STI prevention interventions. Future research should also explore other potential mechanisms by which the pathway between vulnerability and HIV/STI risk behavior may be disrupted, such as environmental factors or sources of social support that buffer against the effects of vulnerability. Identifying factors that either promote a constant level of low vulnerability or facilitate transitions out of a state of high

vulnerability is likely critical to not only help women rise out of economically dire circumstances, but to ultimately reduce sexual and drug-related harm.

IPV emerged as an important psychosocial factor related to dancers' vulnerability. Specifically, highly vulnerable women were more likely to have experienced recent IPV. Future research should explore causal pathways that involve IPV, vulnerability, and HIV/STI risk behavior. To carefully address these co-occurring issues, it will be important to elucidate the mechanisms by which experiences of intimate partner violence influence or are influenced by different states of vulnerability. Investigations into how vulnerability is connected to mental health, e.g., depression, may also be informative to identify additional social, economic, and health service needs among this key HIV/STI risk population.

Conclusion

HIV/STI is a persistent, concentrated epidemic that continues to present a challenge to improving public health in the United States. The greatest burden of HIV/STI continues to occur among the most socially and economically disadvantaged populations. The current state of the U.S. HIV/STI epidemic calls for efforts to better understand which modifiable structural drivers of risk offer the greatest potential for reductions in transmission when intervened upon. This dissertation used a mixed methods design to provide a more nuanced understanding of the nature of vulnerability and its role in sexual risk behavior among an understudied at-risk population of women. Findings from the three manuscripts consistently indicate that social and economic effects of structural vulnerability play a key role in shaping sexual risk behavior, and that

integrating efforts to curb violence and drug use into HIV/STI intervention programs may help to further mitigate HIV/STI risk. Results also support a continued push toward the Health in All Policies approach. Reshaping public policy that holistically addresses structural drivers of HIV/STI across sectors is critical to achieving widespread impact and successfully eliminating disparities in health among the most vulnerable populations of the United States.

BIBLIOGRAPHY

1. Centers for Disease Control and Prevention. Estimated HIV incidence in the United States, 2007–2010. HIV Surveillance Supplemental Report. 2012;17(4).
2. Centers for Disease Control and Prevention. Sexually Transmitted Disease Surveillance 2012. Atlanta: U.S. Department of Health and Human Services; 2013.
3. Centers for Disease Control and Prevention. Diagnoses of HIV Infection in the United States and Dependent Areas, 2014. HIV Surveillance Report 2015;26.
4. Deal C, Cates W, Peeling R, Wald A. Long-term clinical sequelae of sexually transmitted infections in women. *Emerging Infectious Diseases* 2004;10(11):e2.
5. Centers for Disease Control and Prevention. Community-based program to prevent HIV/STD infection among heterosexual black women. *Morbidity and Mortality Weekly Report (MMWR)* 2014;63(1):15-20.
6. Piper JM. Prevention of sexually transmitted infections in women. *Infect Dis Clin North Am* 2008; 22(4):619-vi.
7. Rhodes T, Wagner K, Strathdee SA, Shannon K, Davidson P, Bourgois P. Structural violence and structural vulnerability within the risk environment: theoretical and methodological perspectives for a social epidemiology of HIV risk among injection drug users and sex workers. In: O'Campo P, Dunn JR, eds. *Rethinking Social Epidemiology: Towards a Science of Change*. Dordrecht: Springer; 2012:205–30.

8. Shannon K, Strathdee SA, Goldenberg S, Duff P, Mwangi P, Rusakova M, et al. Global epidemiology of HIV among female sex workers: influence of structural determinants. *Lancet* 2014; 385(9962):55-71.
9. Cawthorne BA. *The Straight Facts on Women in Poverty*. Center for American Progress, 2008.
10. DeNavas-Walt C, Proctor BD. U.S. Census Bureau, Current Population Reports, Income and Poverty in the United States: 2013. U.S. Government Printing Office, Washington, DC, 2014.
11. Isaacs JB, Sawhill IV. Reaching for the prize: The limits on economic mobility. *Milken Institute Review*. Fourth Quarter, 2008.
12. Daminger A, Hayes J, Barrows A, Wright J. Poverty Interrupted: Applying Behavioral Science to the Context of Chronic Scarcity. *Ideas42*. May 2015.
13. Mullainathan S, Shafir E. *Scarcity: Why Having Too Little Means So Much*. New York: Times Books, 2013
14. Aidala A, Cross JE, Stall R, Harre D, Sumartojo E. Housing status and HIV risk behaviors: implications for prevention and policy. *AIDS Behav* 2005;9(3):251–65.
15. Baral S, Beyrer C, Muessig K, Poteat T, Wirtz AL, Decker MR, et al. Burden of HIV among female sex workers in low-income and middle-income countries: a systematic review and meta-analysis. *Lancet Infect Dis* 2012;12(7):538–549.
16. German D, Latkin CA. Social stability and HIV risk behavior: evaluating the role of accumulated vulnerability. *AIDS Behav* 2012;16(1):168–78.

17. German D, Latkin CA. Social stability and health: exploring multidimensional social disadvantage. *J Urban Health* 2012;89(1):19–35.
18. Quesada J, Hart LK, Bourgois P. Structural vulnerability and health: Latino migrant laborers in the United States. *Med Anthropol* 2011;30(4):339-62.
19. Sumartojo E. Structural factors in HIV prevention: concepts, examples, and implications for research. *AIDS*, 2000;14 Suppl 1:S3-10.
20. Blum RW, McNeely C, Nonnemaker J, Vulnerability, risk, and protection. 2002;31(1 Suppl):28-39.
21. Gupta GR, Parkhurst JO, Ogden JA, Aggleton P, Mahal A. Structural approaches to HIV prevention. *Lancet* 2008;372(9640):764-75.
22. Holmes SM. Structural vulnerability and hierarchies of ethnicity and citizenship on the farm. *Med Anthropol* 2011;30(4):425-49.
23. Gupta GR, Ogden J, Warner A. Moving forward on women's gender-related HIV vulnerability: the good news, the bad news and what to do about it. *Glob Public Health* 2011;6 Suppl 3:S370-82.
24. Jewkes R, Dunkle K, Nduna M, et al. Factors associated with HIV sero-status in young rural South African women: connections between intimate partner violence and HIV. *Int J Epidemiol* 2006;35(6):1461-8.
25. Pettifor AE, Measham DM, Rees HV, Padian NS. Sexual power and HIV risk, South Africa. *Emerging Infectious Diseases* 2004;10(11):1996-2004.
26. Pitpitan EV, Kalichman SC, Eaton LA, Strathdee SA, Patterson TL. HIV/STI risk among venue-based female sex workers across the globe: a look back and the way forward. *Curr HIV/AIDS Rep* 2013;10(1):65–78.

27. Platt L, Jolley E, Rhodes T, et al. Factors mediating HIV risk among female sex workers in Europe: a systematic review and ecological analysis. *BMJ Open* 2013;3(7).
28. Aral SO, Adimora AA, Fenton KA. Understanding and responding to disparities in HIV and other sexually transmitted infections in African Americans. *Lancet* 2008;372(9635):337–40.
29. Dunkle KL, Jewkes RK, Brown HC, Gray GE, McIntyre JA, Harlow SD. Transactional sex among women in Soweto, South Africa: prevalence, risk factors and association with HIV infection. *Soc Sci Med* 2004;59(8):1581–92.
30. Hallfors DD, Iritani BJ, Miller WC, Bauer DJ. Sexual and drug behavior patterns and HIV and STD racial disparities: the need for new directions. *Am J Public Health* 2007;97(1):125–32.
31. Potterat JJ, Zimmerman-Rogers H, Muth SQ, et al. Chlamydia transmission: concurrency, reproduction number, and the epidemic trajectory. *Am J Epidemiol* 1999;150(12):1331–9.
32. Link BG, Phelan J. Social conditions as fundamental causes of disease. *J Health Soc Behav* 1995;Spec No:80–94.
33. Phelan JC, Link BG. Fundamental cause theory. In: Cockerham WC, ed. *Medical Sociology on the Move*. Dordrecht: Springer; 2013:105–25.
34. Phelan JC, Link BG, Tehranifar P. Social conditions as fundamental causes of health inequalities: theory, evidence, and policy implications. *J Health Soc Behav* 2010;51 Suppl:S28–40.

35. Grieb SMD, Davey-Rothwell M, Latkin CA. Housing stability and HIV testing among low-income urban African-Americans. *AIDS Edu Prev* 2013;25(5):430–44.
36. German D, Davey MA, Latkin CA. Residential transience and HIV risk behaviors among injection drug users. *AIDS Behav* 2007;11(6 Suppl):21–30
37. Grabovschi C, Loignon C, Fortin M. Mapping the concept of vulnerability related to health care disparities: a scoping review. *BMC Health Serv Res* 2013;13:94.
38. Zeglin RJ, Stein JP. Social determinants of health predict state incidence of HIV and AIDS: a short report. *AIDS Care* 2015;27(2):255-9.
39. Reilly ML, German D, Serio-Chapman C, Sherman SG. Structural vulnerabilities to HIV/STI risk among female exotic dancers in Baltimore, Maryland. *AIDS Care* 2015;27(6):777-82.
40. Maticka-Tyndale E, Lewis J, Clark JP, Zubick J, Young S. Social and cultural vulnerability to sexually transmitted infection: the work of exotic dancers. *Can J Public Health*, 1999;90(1):19-22.
41. Reuben J, Serio-Chapman C, Welsh C, Matens R, Sherman SG. Correlates of current transactional sex among a sample of female exotic dancers in Baltimore, MD. *J Urban Health* 2011;88(2):342-51.
42. Sherman SG, Reuben J, Chapman CS, Lilleston P. Risks associated with crack cocaine smoking among exotic dancers in Baltimore, MD. *Drug Alcohol Depend* 2011;114(2-3):249-52.
43. Nandi A, Glass TA, Cole SR, et al. Neighborhood poverty and injection cessation in a sample of injection drug users. *Am J Epidemiol* 2010;171(4):391-398.

44. Furr-Holden CD, Milam AJ, Reynolds EK, Macpherson L, Lejuez CW. Disordered neighborhood environments and risk-taking propensity in late childhood through adolescence. *J Adolesc Health* 2012;50(1):100-102.
45. Keyes KM, Cerda M, Brady JE, Havens JR, Galea S. Understanding the rural–urban differences in nonmedical prescription opioid use and abuse in the United States. *Am J Public Health* 2014;104(2):e52-e59.
46. Nabila El-Bassel, Gilbert L, Wu E, Hill J. Relationship between drug abuse and intimate partner violence: a longitudinal study among women receiving methadone. *Am J Public Health* 2005;95(3):465-70.
47. Ulibarri MD, Roesch S, Rangel MG, Staines H, Amaro H, Strathdee SA. “Amar te Duele” (“love hurts”): sexual relationship power, intimate partner violence, depression symptoms and HIV risk among female sex workers who use drugs and their non-commercial, steady partners in Mexico. *AIDS Behav* 2015;19(1):9-18.
48. Decker MR, Miller E, McCauley HL, Tancredi DJ, Anderson H, Levenson RR, Silverman JG. Recent partner violence and sexual and drug-related STI/HIV risk among adolescent and young adult women attending family planning clinics. *Sex Transm Dis* 2014.;90(145-149).
49. Illangasekare SL, Burke JG, Chander G, Gielen AC. Depression and social support among women living with the substance abuse, violence, and HIV/AIDS syndemic: a qualitative exploration. *Womens Health Issues*;2014;24(5):551-557.
50. Jennings JM, Taylor RB, Salhi RA, Furr-Holden CD, Ellen JM. Neighborhood drug markets: a risk environment for bacterial sexually transmitted infections among urban youth. *Soc Sci Med* 2012;74(8):1240-50.

51. Galea S, Ahern J, Vlahov D, Contextual determinants of drug use risk behavior: a theoretic framework. *J Urban Health* 2003;80(4):iii50-8.
52. Cooper HL, Tempalski B. Integrating place into research on drug use, drug users' health, and drug policy. *Int J Drug Policy* 2014;25(3):503-7.
53. Rhodes T. The 'risk environment': a framework for understanding and reducing drug-related harm. *Int J Drug Policy* 2002;13(2):85-94.
54. Galea S, Nandi A, Vlahov D. The social epidemiology of substance use. *Epidemiol Rev* 2004;26:36-52.
55. Cerdá M, Tracy M, Messner SF, Vlahov D, Tardiff K, and Galea S. Misdemeanor policing, physical disorder, and gun-related homicide: a spatial analytic test of "broken-windows" theory. *Epidemiology* 2009;20(4):533-541.
56. Brook JS, Lee JY, Finch SJ, Seltzer N, Brook DW. Adult work commitment, financial stability, and social environment as related to trajectories of marijuana use beginning in adolescence. *Subst Abus* 2013;34(3):298-305.
57. Sherman SG. The development of an HIV risk environment scale of exotic dance clubs (unpublished).
58. ATLAS.ti for Mac, Version 1.0.x. Scientific Software Development GmbH: Berlin. 2015.
59. Stall R, Mills TC, Williamson J, et al. Association of co-occurring psychosocial health problems and increased vulnerability to HIV/AIDS among urban men who have sex with men. *American Journal of Public Health*. 2003;93(6):939-942.
60. Mizuno Y, Purcell DW, Knowlton AR, Wilkinson JD, Gourevitch MN, Knight KR. Syndemic vulnerability, sexual and injection risk behaviors, and HIV

- continuum of care outcomes in HIV-positive injection drug users. *AIDS Behav* 2015;19(4):684-93.
61. Wilson PA, Nanin J, Amesty S, Wallace S, Cherenack EM, Fullilove R. Using syndemic theory to understand vulnerability to HIV infection among Black and Latino men in New York City. *J Urban Health* 2014;91(5):983-98.
 62. Felitti VJ, Anda RF, Nordenberg D, et al. Relationship of childhood abuse and household dysfunction to many of the leading causes of death in adults. The Adverse Childhood Experiences (ACE) Study. *Am J Prev Med* 1998;14(4):245-58.
 63. Straus MA, Hamby SL, Boney-McCoy S, Sugarman DB. The revised conflict tactics scale (CTS2): development and preliminary psychometric data. *J Family Issues* 1996;17(3):283-316.
 64. Radloff LS. The CES-D scale: A self report depression scale for research in the general population. *Applied Psychological Measurements* 1977;1(3):385-401.
 65. Lewinsohn PM, Seeley JR, Roberts RE, Allen NB. Center for Epidemiological Studies-Depression Scale (CES-D) as a screening instrument for depression among community-residing older adults. *Psychology and Aging* 1997;12:277-87.
 66. Huh J, Riggs NR, Spruijt-Metz D, Chou CP, Huang Z, Pentz M. Identifying patterns of eating and physical activity in children: a latent class analysis of obesity risk. *Obesity* 2011;19(3):652-8
 67. Dziak JJ, Lanza ST, Tan X. Effect size, statistical power and sample size requirements for the bootstrap likelihood ratio test in latent class analysis. *Struct Equ Modeling* 2014;21(4):534-552.

68. Steffen AD, Glaz K, Wilkens LR. Identifying latent classes of adults at risk for skin cancer based on constitutional risk and sun protection behavior. *Cancer Epidemiol Biomarkers Prev* 2007;16(7):1422-7.
69. Nylund KL, Asparouhov T, Muthén BO. Deciding on the number of classes in latent class analysis and growth mixture modeling: a Monte Carlo simulation study. *Struct Equ Modeling* 2007;14(4):535-69.
70. Akaike H. Factor analysis and AIC. *Psychometrika* 1987;52(3):317-32.
71. Schwarz G. Estimating the dimension of a model. *Ann Stat*, 1978;6:461-4.
72. Sclove L. Application of model-selection criteria to some problems in multivariate analysis. *Psychometrika* 1987;52(3):333-43.
73. Celeux G, Soromenho G. An entropy criterion for assessing the number of clusters in a mixture model. *J Classif* 1996;13:195-212.
74. R Development Core Team. R: A language and environment for statistical computing. 2015. R Foundation for Statistical Computing: Vienna, Austria.
75. Linzer DA, Lewis JB. poLCA: An R package for polytomous variable latent class analysis. *J Statistical Software* 2011;42(10):1-29.
76. Muthén LK, Muthén BO. Mplus User's Guide. Seventh Edition. 1998-2015, Muthén & Muthén: Los Angeles, CA.
77. Clark S, Muthén, B. Relating latent class analysis results to variables not included in the analysis. 2009. <https://www.statmodel.com/download/relatinglca.pdf>. Accessed December 21, 2015.

78. Marmot M, Friel S, Bell R, Houweling TA, Taylor S. Closing the gap in a generation: health equity through action on the social determinants of health. *Lancet* 2008;372(9650):1661-9.
79. Marmot M. Social determinants of health inequalities. *Lancet* 2005; 365(9464): 1099-1104.
80. Parkhurst JO. Structural approaches for prevention of sexually transmitted HIV in general populations: definitions and an operational approach. *J Int AIDS Soc* 2014;17:19052.
81. Auerbach JD, Parkhurst JO, Caceres CF. Addressing social drivers of HIV/AIDS for the long-term response: conceptual and methodological considerations. *Glob Public Health* 2011;6 Suppl 3:S293-309.
82. Rhodes SD, Tanner A, Duck S, et al., Female sex work within the rural immigrant Latino community in the southeast United States: an exploratory qualitative community-based participatory research study. *Prog Community Health Partnersh* 2012;6(4):417-27.
83. Dank M, Khan B, Downey PM, et al, Estimating the size and structure of the underground commercial sex economy in eight major US cities. 2014. The Urban Institute: Washington, DC.
84. Rudolph L, Caplan J, Ben-Moshe K, Dillon, L. Health in All Policies: A Guide for State and Local Governments. 2013. American Public Health Association and Public Health Institute: Washington, DC and Oakland, CA.

85. Blankenship KM, Reinhard E, Sherman SG, El-Bassel N. Structural interventions for HIV prevention among women who use drugs: a global perspective. *J Acquir Immune Defic Syndr*. 2015;69 Suppl 2:S140-5.
86. Baral S, Logie CH, Grosso A, Wirtz AL, Beyrer C. Modified social ecological model: a tool to guide the assessment of the risks and risk contexts of HIV epidemics. *BMC Public Health* 2013;13:482.
87. Harcourt C, Donovan B. The many faces of sex work. *Sex Transm Infect* 2005;81(3):201-6.
88. Sherman SG, Lileston P, Reuben J. More than a dance: the production of sexual health risk in the exotic dance clubs in Baltimore, USA. *Soc Sci Med* 2011;73(3):475–81.
89. Lileston P, Reuben J, Sherman SG. Exotic dance in Baltimore: from entry to STI/HIV risk. *Women Health* 2015;55(5):595-611.
90. Maticka-Tyndale E, Lewis J, Clark JP, Zubick J, Young S. Exotic dancing and health. *Women Health*, 2000;31(1):87-108.
91. Emsellem M, Rodriguez MN. *Advancing a Federal Fair Chance Hiring Agenda*. 2015. National Employment Law Project: New York, NY.
92. Daminger A, Hayes J, Barrows A, Wright J. *Poverty Interrupted: Applying Behavioral Science to the Context of Chronic Scarcity*. Ideas42. May 2015.
93. van Olphen J, Eliason MJ, Freudenberg N, Barnes M. Nowhere to go: how stigma limits the options of female drug users after release from jail. *Subst Abuse Treat Prev Policy* 2009;4:10.

94. Centers for Disease Control and Prevention. Diagnoses of HIV Infection in the United States and Dependent Areas, 2011. HIV Surveillance Report 2013;23.
95. Holtgrave D, Hall HI, Rhodes PH, Wolitski RJ. Updated annual HIV transmission rates in the United States, 1977-2006. *J Acquir Immune Defic Syndr* 2009;50(2):236-8.
96. Beyrer C, Crago AL, Bekker LG, et al. An action agenda for HIV and sex workers. *Lancet* 2015;385(9964):287-301.
97. Brantley M, Kerrigan D, Footer K, Lim S, Sherman S. Experiences of structural vulnerability among exotic dancers in Baltimore, Maryland: co-occurring social and economic antecedents of HIV/STI risk (Unpublished).
98. LCA outcome probability calculator (Version 1.0). 2011. The Methodology Center, Penn State: University Park.
99. Lanza ST, Rhoades BL. Latent class analysis: an alternative perspective on subgroup analysis in prevention and treatment. *Prev Sci* 2013;14(2):157-68.
100. Schwartz H, Ecola L, Leuschner KJ, Kofner A. Inclusionary Zoning Can Bring Poor Families Closer to Good Schools, in *How Housing Matters*. 2014. MacArthur Foundation.
101. Cunningham M, MacDonald G. Housing as a Platform for Improving Education Outcomes among Low-Income Children. 2012. Urban Institute.
102. Pellowski JA, Kalichman SC, Matthews KA, Adler N. A pandemic of the poor: social disadvantage and the U.S. HIV epidemic. *Am Psychol* 2013;68(4):197-209.
103. Wernham A, Teurtsch SM. Health in all policies for big cities. *J Public Health Manage Pract* 2015; 21(Suppl 1):S56-S65.

104. Blankenship KM, Bray SJ, Merson MH. Structural interventions in public health. *AIDS* 2000;14 Suppl 1:S11-21.
105. Blankenship KM, Friedman SR, Dworkin S, Mantell JE. Structural interventions: concepts, challenges and opportunities for research. *J Urban Health* 2006;83(1):59-72.
106. Burris S, Blankenship KM, Donoghoe M, et al. Addressing the “risk environment” for injection drug users: the mysterious case of the missing cop. *Milbank Q* 2004;82(1):125–56.
107. Latkin C, Weeks MR, Glasman L, Galletly C, Albarracin D. A dynamic social systems model for considering structural factors in HIV prevention and detection. *AIDS Behav* 2010;14(Suppl 2):222-38.
108. Rhodes T, Singer M, Bourgois P, Friedman SR, Strathdee SA. The social structural production of HIV risk among injecting drug users. *Soc Sci Med* 2005;61(5):1026-44.
109. Brantley M, Kerrigan D, German D, Lim S, Galai N, Sherman S. Identifying patterns of social and economic hardship among structurally vulnerable women: a latent class analysis of HIV/STI risk (Unpublished).
110. Aidala AA, Lee G, Garbers S, Chiasson MA, Sexual behaviors and sexual risk in a prospective cohort of HIV-positive men and women in New York City, 1994-2002: implications for prevention. *AIDS Educ Prev* 2006;18(1):12-32.
111. Buot ML, Docena JP, Ratemo BK, et al. Beyond race and place: distal sociological determinants of HIV disparities. *PLoS One* 2014;9(4):e91711.

112. Dank M, Khan B, Downey PM, et al, Estimating the size and structure of the underground commercial sex economy in eight major US cities. 2014. The Urban Institute: Washington, DC.
113. Elifson KW, Sterk CE, Theall KP., Safe living: the impact of unstable housing conditions on HIV risk reduction among female drug users. *AIDS Behav* 2007;11(6 Suppl):45-55.
114. Loya RM. The role of sexual violence in creating and maintaining economic insecurity among asset-poor women of color. *Violence Against Women* 2014;20(11):1299-320.
115. Hirsch HE, Dietrich SM, Landau R, et al. Every Door Closed: Barriers Facing Parents with Criminal Records. 2002. Center for Law and Social Policy: Washington, DC.
116. Carey C. No second chance: people with criminal records denied access to public housing. 2004. Human Rights Watch: New York, NY.
117. Solomon AL. In search of a job: criminal records as barriers to employment. *National Institute of Justice (NIJ) Journal* 2012;270:42-51.

APPENDICES

JOHNS HOPKINS BLOOMBERG SCHOOL OF PUBLIC HEALTH

INFORMED CONSENT DOCUMENT

Quantitative Survey Participants

Study Title: A feasibility study of the HIV/STI risk environment of vulnerable women

Principal Investigator: Susan Sherman

IRB No.: 00004824

What you should know about this study

You are being asked to join a research study to understand how exotic dancers are affected by working in exotic dance clubs. This consent form explains the research study in detail. At any time during the consent process, please ask questions about things that need clarification or do not make sense.

Purpose of research project

The purpose of this study is to examine why women started dancing, how dancing affects such HIV risk behaviors as using drugs or selling sex, and to learn about education, employment, and housing history of exotic dancers.

Why you are being asked to participate

You are being asked to participate because you work as a dancer in an exotic dance club. In total, 120 dancers will be participating in this study.

Procedures:

If you agree to join this study, the following will happen solely for research purposes:

- 1) We will ask you to participate in two surveys three months apart from one another.
- 2) For the first interview, we will interview you where we recruited you or at another convenient location.
- 3) The second interview can take place in the same location as the first or at another convenient location.
- 4) The interviews will use an audio computer-assisted self-interview or ACASI, using headphones to hear the questions. You will answer questions on a tablet, like an iPad.
- 5) Each interview will last about 45 minutes to an hour.
- 6) We will ask you to provide personal contact information so that we can locate you for a follow-up interview.

- 7) We will contact you in about two months to schedule the 3-month follow-up interview.
- 8) You will be tested for chlamydia and gonorrhea after you complete the survey at both interviews. At the follow up interview we will also test for trichomoniasis (or “trich”), another common sexually transmitted infection (STI). Vaginal swabs will be collected for STI testing in a bathroom or private room where we conduct the interview. If you test positive, someone from the Baltimore City Health Department will contact you within one to two weeks. If you don’t hear from anyone but want to be sure of your results or if you have any questions, please feel free to call our study Project Director, Steve Huettner at 410-302-2103.

Risks/discomforts

Because of the sensitive nature of some of the questions, you may feel uncomfortable. You can, however, choose not to answer any questions and you are free to stop the interview at any time. All the information you provide about yourself and any sexual partners will not be linked directly to you.

If you test positive, you will be contacted by the Baltimore City Health Department and referred for care. You might experience discomfort in learning your STI results. STI pre and post-test counseling aims to make you more comfortable in learning your results and you will learn about community resources to provide social support and to receive treatment.

Benefits

There are no direct benefits from being a part of the study.

Payment

You will be paid \$80 to complete the first interview and \$80 dollars to complete the second interview.

Protecting data confidentiality

There is a risk that someone outside the study will see your information. We will do our best to keep your information safe by not writing down your name and we will use a code instead. Therefore, the information you provide about yourself will not be linked directly to you. We will do everything possible to keep the information that you give us confidential. We will keep your responses private and confidential. You will not be personally identified in any reports that may result from this study.

Locator information will be kept secure in a password-protected database until we follow up with you for your final interview and STI testing. We will destroy your information once we confirm your follow-up STI test results and have contacted you with the results (if positive).

We will not share any data collected with club owners, management, or other club staff.

To help us protect your privacy, we have obtained a Certificate of Confidentiality from the National Institutes of Health. This Certificate does not mean that the government approves or disapproves of this study. This Certificate adds special protection for research information that identifies you. It allows us, in some circumstances, to refuse to give out study information about you without your consent when it is sought in a legal action. Still, we may disclose identifying information about you if, for example, you need medical help.

There are only a few reasons why we would give out information about you. The research team will give information to local or state authorities:

- if they suspect abuse or neglect of a child or dependent adult;
- if certain communicable diseases are present; and
- if the team learns that you plan to harm yourself or others.

You should understand that a Certificate of Confidentiality does not prevent you from voluntarily releasing information about yourself or your involvement in this research. If an insurer, employer, or other person obtains your written consent to receive research information, then the researchers may not use the Certificate to withhold that information. If you inform us that you are planning to harm yourself or others, we are not protected by **the Certificate of Confidentiality** from telling the appropriate authorities.

Biological specimens

The vaginal swab and data collected from you during this study are important to science. You will not own the vaginal swab or data after you give it to the study. You will not receive any financial benefit from any product or idea created by the investigators using the data or materials collected from you.

Cost of participation in the study

There is no cost to participate in this study.

What happens if you leave the study early?

Your participation is completely voluntary, meaning that it is up to you. You may choose to stop taking part in the study at any time. To do so, you can tell me or another study staff person that you do not want to continue taking part in the study. If you choose to leave, we will use the data that you have given us while you were in the study.

Sharing your health information with others

People at the Johns Hopkins School of Public Health who work on the study may see the results of your chlamydia, gonorrhea, and trichomoniasis tests. If you test positive for any of these infections, this will be reported to the Baltimore City Health Department along with some of your personal information. You may be contacted by the Health Department to identify partners that could also be infected. It is required by law that

the Maryland Department of Health and Mental Hygiene also be notified. The State Health Department will be notified in writing of the following information: laboratory test date, type of test, result of test, your name, date of birth, sex, telephone number, and address. Each Health Department is required to keep your identity private and the information that identifies you will not be given out to people who are not working on the study unless you give us permission.

Authorization for Disclosure of Protected Health Information for Research

We are asking you to authorize the disclosure and use of your private health information for this research study. By signing this authorization, you agree that after you are tested for gonorrhea and chlamydia, the Baltimore City Health Department laboratory will share your test results and related private health information with us for use in this research study. Required by law, if you test positive for any of these infections, they will also share your health information with the Maryland Department of Health and Mental Hygiene. The information related to your test results is needed to carry out the above study because it will help us to understand how dancing affects the chances of getting HIV or other sexually transmitted infections like gonorrhea and chlamydia.

Your private health information that we may use for this research includes laboratory test date, type of test, result of test, your name, date of birth, sex, telephone number, and address. The health department is required to keep your identity private and the information that identifies you will not be given out to people who are not working on the study unless you give us permission. No other information from your health records will be shared.

The people who may receive or use your private health information include the researchers and their staff.

The Health Care Providers listed above are required by the Federal Privacy Rule to protect your private health information. By signing this Authorization, you permit them to release your information to the researchers for use in this research study. The researchers will try to make sure that everyone who needs to see your private information for this research keeps it confidential, but we cannot guarantee this. Although the researchers may not be covered by the Federal Privacy Rule, they will make an effort to protect your information using the same standards.

Some other people may see your private health information outside of the research team. They may include the sponsor of the study, study safety monitors, government regulators, and legal compliance staff. All these people must also keep your information confidential.

You do not have to sign this Authorization, but otherwise you may not join the study. It is your choice.

Your Authorization does not have an expiration date; it will continue as long as the research continues. You may change your mind and take back this Authorization at any time. If you take it back, the researchers may still use the private health information they have collected about you to that point. To take back the Authorization, you must contact the researcher.

Who do I call if I have questions or problems?

Call the principal investigator, Susan Sherman, at (410) 614-3518 if you have questions about the study or get sick or injured as a result of being in this study. If you are having a medical emergency, you should call 911 or go directly to the nearest emergency room.

Call or contact the Johns Hopkins Bloomberg School of Public Health IRB Office if you have questions about your rights as a study participant. Contact the IRB if you feel you have not been treated fairly or if you have other concerns. The IRB contact information is:

Address: Johns Hopkins Bloomberg School of Public Health
615 N. Wolfe Street, Suite E1100
Baltimore, MD 21205
Telephone: 410-955-3193
Toll Free: 888-262-3242
Fax: 410-502-0584
E-mail: irboffice@jhsph.edu

What does your signature on this consent form mean?

Your signature on this form means:

- You have been informed about this study’s purpose, procedures, possible benefits and risks.
- You have been given the chance to ask questions before you sign.
- You have voluntarily agreed to be in this study.

Print name of adult participant Signature of adult participant Date

Print name of person obtaining consent Signature of person obtaining consent Date

Give one copy to the participant and keep one copy in study records

JOHNS HOPKINS BLOOMBERG SCHOOL OF PUBLIC HEALTH

INFORMED CONSENT DOCUMENT

Qualitative Participants

Study Title: A feasibility study of the HIV/STI risk environment of vulnerable women

Principal Investigator: Susan Sherman

IRB No.: 00004824

What you should know about this study

You are being asked to join a qualitative study that is connected to the larger research study that you are in, which is focused on exotic dancing. Qualitative means that the interview will be more conversational, asking you questions for you to answer broadly. Both this and the larger study are interested in how exotic dance clubs relate to the health of dancers who work in the clubs.

This consent form explains the research study in detail. At any time during the consent process, please ask questions about things that need clarification or do not make sense.

Purpose of research project

We are interested in finding out more about your education, employment, how you came to work as an exotic dancer, housing history, as well as experiences working as an exotic dancer in Baltimore that might affect your risk for HIV and sexually transmitted infections.

Why you are being asked to participate

You are being asked to participate in this part of the study because you have worked as a dancer in an exotic dance club. Twenty dancers will be participating in this part of the study.

Procedures:

If you agree to join this part of the study, the following will happen solely for research purposes:

- 1) We will ask you to participate in two interviews that are like conversations.

- 2) We will interview you where we recruited you or at another convenient location for the first interview.
- 3) We will tape record the interview.
- 4) The second interview will take place approximately three months after the first.
- 5) The second interview can take place in the same location as the first or at another convenient location.
- 6) Each interview will last about 45 minutes to an hour.

Risks/discomforts

Because of the sensitive nature of some of the questions, you may feel uncomfortable. You do not have to answer all the questions and you may stop the interview at any time. There is a possibility of being overheard in a public location. The information you provide about yourself and any sexual partners will not be linked directly to you.

Anticipated benefits:

There are no direct benefits from being a part of the study.

Payment

You will be paid \$40 to complete the first interview and \$40 dollars to complete the second interview.

Protecting data confidentiality

We will do everything possible to keep the information that you give us confidential. We will keep your responses private and confidential. We will do our best to keep your information safe by not writing down your name and we will use a code instead. Therefore, the information you provide about yourself will not be linked directly to you. Your name will not be on the tape and the tape will be destroyed within a year after the study is completed. We will also destroy any notes that we take during the interview at that time. You will not be personally identified in any reports that may result from this study.

Locator information will be destroyed electronically once we follow up with you for your final interview. **We will not share any data collected, including tape recordings, with club owners, management, or other club staff.**

To help us protect your privacy, we have obtained a Certificate of Confidentiality from the National Institutes of Health. This Certificate does not mean that the government approves or disapproves of this study. This Certificate adds special protection for

research information that identifies you. It allows us, in some circumstances, to refuse to give out study information about you without your consent when it is sought in a legal action. Still, we may disclose identifying information about you if, for example, you need medical help.

There are only a few reasons why we would give out information about you. The research team will give information to local or state authorities:

- if they suspect abuse or neglect of a child or dependent adult;
- if certain communicable diseases are present; and
- if the team learns that you plan to harm yourself or others.

You should understand that a Certificate of Confidentiality does not prevent you from voluntarily releasing information about yourself or your involvement in this research. If an insurer, employer, or other person obtains your written consent to receive research information, then the researchers may not use the Certificate to withhold that information.

What happens if you leave the study early?

Your participation is completely voluntary, meaning that it is up to you. You may choose to stop taking part in the study at any time. To do so, you can tell me or another study staff person that you do not want to continue taking part in the study. If you choose to leave, we will use the data that you have given us while you were in the study.

Who do I call if I have questions or problems?

Call the principal investigator, Susan Sherman, at (410) 614-3518 if you have questions about the study or get sick or injured as a result of being in this study. If you are having a medical emergency, you should call 911 or go directly to the nearest emergency room.

Call or contact the Johns Hopkins Bloomberg School of Public Health IRB Office if you have questions about your rights as a study participant. Contact the IRB if you feel you have not been treated fairly or if you have other concerns. The IRB contact information is:

Address: Johns Hopkins Bloomberg School of Public Health
615 N. Wolfe Street, Suite E1100
Baltimore, MD 21205

Telephone: 410-955-3193
Toll Free: 888-262-3242
Fax: 410-502-0584
E-mail: irboffice@jhsph.edu

What does your signature on this consent form mean?

Your signature on this form means:

- You have been informed about this study’s purpose, procedures, possible benefits and risks.
- You have been given the chance to ask questions before you sign.
- You have voluntarily agreed to be in this study.

_____	_____	_____
Print name of participant	Signature of participant	Date
_____	_____	_____
Print name of person obtaining consent	Signature of person obtaining consent	Date

Give one copy to the participant and keep one copy in study records

**Exotic Dancer In-depth Interview Guide
Interview 1**

Date:

Club ID:

Subject ID:

This interview guide is divided into several main topics. Try to address each topic during the interview; however, you may end up changing the order depending on the flow of the conversation. Under each topic, a number of sample probes are included. These are not intended as questions that must be asked during each interview. Rather, they are meant to facilitate your probing. After each interview, turn to the debriefing page and please write down notes on additional main topics for future interviews, probes that provided good insight and any reflections on the interview content.

Thanks again for talking to me today. Remember, anything that you tell me is just between us. And you don't have to answer anything that you don't want to.

Turn tape recorder on and start by stating the Participant's ID number, your name and the date of the interview

Introduction/History

Could you tell me a little bit about yourself?

Probes:

Age/children

Where did you grow up?

Where did you go to school (e.g., high school, GED, college)?

Can you tell me a bit about your **current** situation?

Probes:

Describe the place where you live (i.e., type of housing – house, apt, hotel, etc.)

Who lives at home with you (parents, kids, friends, boyfriend/girlfriend, etc.)?

[If currently no permanent place] Describe how you find a place to sleep

Current partner (s)?

Financial situation – sources of income?

Tell me about any other places where you've lived recently (~ past 6 months):

Probes (if >1 place mentioned):

What are the reasons you moved around?

What does it mean to have a stable place to live?

What are some challenges to having stable housing?

What are your main sources of financial support currently?

Probes:

Partner, other sex-partners, family, friends

Other sources support? e.g., for lifts, for childcare, just to talk to

Could you talk a little bit more about your partners and relationships?

Probes:

Current partners

Other recent partners (casual, more steady)

Can you describe how life was for you before you became a dancer?

Probes:

Describe your home/personal life

Describe your housing situation

What was your financial situation (welfare assistance, supporting family, dependent on others, jobs, money management)?

What kind of relationships did you have?

Health issues?

Time in jail or prison?

What work opportunities did you have before you decided on dancing?

Probes:

Describe types of jobs you had (full/part time, secure)

What kind of money were you making (steady/unsteady)?

[If previously employed] What are the reasons for leaving your other jobs?

[If no work opportunities] What were some barriers to finding a job, i.e., criminal record, limited education, drug use...

What parts of your life felt the most stable before you started dancing?

Before you started dancing what parts of your life were most difficult for you?

Nature of Entry Into Exotic Dance Clubs

Can you tell me a bit about how you started dancing?

Probes:

What drew you to exotic dancing (e.g., money, dancing, fun, etc.)

Who introduced you to dancing (e.g., friends, boyfriend)

Describe to me the image you had of a dancer's life before you started.

Probes:

Lots money/fun job/physically demanding/good work environment

Think back to your first day on the job.

NOTE: WALK THEM THROUGH THIS – TRY AND CREATE A VISUAL

Probes:

Envision the scene/set the physical, social scene: What were you wearing, what time of year was it, what was going on...?

Who did you talk to/what were you told?

What did you see going on?

How did you learn how you would get paid? (If not then, when/what happened?)

What did you know about what was expected of you? (i.e. shift length, being in the club certain times, type services expected of you,)

How did you feel going home after that first shift?

What else stood out in your first few shifts?

Probes:

Where did you spend your time? (i.e. on dance floor, chatting clients, back room, dressing room)

What felt safe about the club? (i.e. the type client, the layout, the way the staff treated you, the doormen, the other girls)

What was your impression of the girls working in the club?

Is there a clear sense of what's acceptable and what's not?

What was your impression of the clients?

What was enjoyable?

What was harder than you imagined (e.g., services, money management, dealing with clients)?

If we could just specifically talk for a few minutes about the payment structure:

Probes:

Describe payment structure set by the club re tip/money earned?

What do you think about the payment structure in the club where you work? (fair, consistent)

How do you figure out what you should earn in tips on top of money from the club?

How would you describe your relationships with other dancers?

Probes:

Trust others?

Competition?

How do you feel about the job now you've been here for a while?

Probes:

What has changed for you since your first shift?

Is the payment structure different to what you thought – if so, how so?(or is it set)?

Have your tips/money earned changed at all?

Do you feel more or less comfortable/safe?

Is anything more or less demanding?

What's your impression of the different shifts i.e. night v day shift (what influences your shift choice?)

Is the work more enjoyable or less enjoyable?

Are you still at the same club where you first started working? If no, reasons for moving?

Please describe your relationship with management and other staff.

Experiences of Sex Work

What did you know about sex being sold in strip clubs before you began working as a dancer?

Probes:

What did you hear from other girls/clients/staff in the club?

Have you sold sex since you started working in the club?

(If the participant reported not selling sex):

What influences your decision **not** to sell sex to customers?

Probes:

Club rules/ choice/ don't need the money

Have you been pressured to sell sex (if yes, by whom)?

What's the attitude of the staff to your decision not to sell sex?

What's the attitude of other dancers?

What's the reaction of clients?

What will you allow a client to do short of sex?

Probes:

Any acts you wouldn't perform?

Is it price dependent?

What do you know about sex being sold in the club?

Probes:

What goes on?

How does it work?

How far are girls willing to go?

Do girls talk about it – can you describe?

How does condom use get negotiated during sexual interactions in the club?

Probes:

Vary based on the type of sexual service/ payment?

How much control do you feel girls have over condom use

(If the participant reported selling sex):

I realize this might be uncomfortable but could you walk me through first time selling sex in the club?

Probes:

How long after you started at the club?

What influenced your decision? (E.g. expected by management, better money, drugs)

Who initiated it? (E.g. you, the client, management/bar staff/other dancer)

Can you describe your experiences of selling sex in the club since?

Probes:

What's changed about it? i.e. harder, easier

Describe typical clients

What's the typical process of how it gets set up (bartender, etc.)?

How does the payment work?

Where do you draw the line with what you'll do for a client?

Probes:

Any acts you wouldn't perform?

Would you ever have unprotected sex?

Is it price dependent?

(If been dancing for a while – ask if what they are willing to do has changed – why has it changed?)

How does condom use get negotiated during sexual interactions in the club?

Probes:

Vary based on the type of sexual service/ payment?

How much control do you feel you have over condom use?

Are condoms accessible if you need them while working in the club?

Probes:

Where do you get condoms, i.e., purchase from runner, management provides for free, etc.

If club provides, always accessible?

ASK EVERYONE:

Have you ever had sex outside the club setting for money, if yes: how does it differ from selling sex in the club?

Probes:

Safety on the street v club

Type clients

Time to negotiate price, condom use

What influenced your decision to sell sex outside the club?

Probes:

More money

Regular customer

*No area in club to have sex
Other girls suggested it*

How do you set/negotiate the price with clients outside of the club?

Probes:

At what price level are you willing to sell outside of the club?

OK now we are going to talk about experiences with violence...

Violence

Before you started dancing, did you ever experience any sexual or physical violence?

Probes:

Abuse during childhood

Rape

Partner violence

[If yes,] can you to tell me more about that?

Probes:

How has this affected you (e.g., approaches to life, relationships with intimate partners, selling sex to clients)?

[If intimate partner,] did your partner also control or take away the money you made?

Did your partner ever force you to dance or sell sex?

Have you experienced any sexual or physical violence since you started dancing?

[If yes,] can you to tell me more about that?

Probes:

How has this affected you (e.g., approaches to life, relationships with intimate partners, men generally)?

What types of harassment (if any) have you witnessed or experienced in the club since you started?

Probes:

Verbal abuse (sexual/racial)/touching/ pressure to do drugs

What types of physical violence (if any) have you witnessed or experienced in the club since you started?

Probes:

Women getting attacked/raped by clients or between staff/ fights between dancers

Have your own experiences of harassment or violence altered since you started working?

Probes:

*Experience more/less harassment?
Better able to deal with difficult clients?*

What do you think is the riskiest thing about working in the club?

Probes:

How do you manage this risk?

Alcohol Use & Drug Use

Do you drink alcohol?

If no, what influences your decision not to?

If yes:

Has your alcohol consumption changed since working in the club?

Probes:

More/Less

If more – why do you think that is?

How does it affect your experiences working in the club?

Do you use drugs (illicit)?

If no:

What influences your decision to not use drugs?

What drug use do you see going on in the club – describe?

If yes:

Can you talk about how you started using drugs?

Probes:

Was it in a club/somewhere else?

Who were you with?

What were the circumstances?

How has your drug use changed since starting work in the club?

Probes:

Do more/less drugs?

Do new/different drugs?

What influences your drug use? (i.e. makes sex easier, helps get clients, managers)

How does drug use influence your time in the club?

Probes:

Makes it more fun

Time goes quicker

Helps get you through a shift

Better relationship with clients/ girls

How have drugs and/or alcohol affected your experiences of selling sex?

Probes:

Services provided?

Condom use?

Type customers?

Health

When you started dancing, what kind of concerns did you have about possible health risks from working in the club?

Probes:

STI/HIV concerns

Pregnancy

Germs/general hygiene

What experiences have made you more aware of issues around sexual health (e.g., HIV, STDs, and pregnancy) since you started dancing, if any?

Probes:

Do dancers in the club talk about sexual health?

Do management talk about risks for HIV or other STDs with dancers?

What experiences with clients have increased your concerns related to STDs or pregnancy?

Have you experienced any sexually transmitted infections?

What do you do to protect yourself from health risks in the club?

Probes:

What do you do to protect yourself from risks related to STDs? (e.g., STI testing, condom use with partners)

What do you do to protect yourself from these risks when you are not working?

Closing

So just to bring the interview to a close I wanted to revisit some of those questions that we talked about at the beginning of the interview around stability in your life:

What would it look like to have stability in your life now?

Probes:

Secure housing

Steady income

Relationships/kids

Being clean of drugs

Do you have any goals for the immediate future i.e., next few months?

Probes:

Job ambitions

Money goals

Housing goals

Drug detox

What are some of the factors that could help you achieve those goals?

What kind of programs or services could be helpful to you or other dancers?

Probes:

Health (e.g. drug management, sexual health)

Housing

Money management

Legal support

Do you have anything else you'd like to add?

Thank you!

Interviewer's Notes:

Exotic Dancer In-depth Interview Guide Interview 2 (Follow-up)

Date:

Club ID:

Subject ID:

This interview guide is divided into several main topics. Try to address each topic during the interview; however, you may end up changing the order depending on the flow of the conversation. Under each topic, a number of sample probes are included. These are not intended as questions that must be asked during each interview. Rather, they are meant to facilitate your probing. After each interview, turn to the debriefing page and please write down notes on additional main topics for future interviews, probes that provided good insight and any reflections on the interview content.

Thanks again for talking to me today. Remember, anything that you tell me is just between us. And you don't have to answer anything that you don't want to.

Turn tape recorder on and start by stating the Participant's ID number, your name and the date of the interview

Recap/reflect on first interview

How is everything going for you these days?

During the last time we met we talked about...*[interviewer: add notes below from baseline to target relevant questions for each topic]*... How is that going/what's it like now?

[Housing/living situation]

If moved: tell me about the places where you've lived since the last time we spoke (~3 months).

Probes (if >1 place mentioned):

What are the reasons you moved around?

What are some challenges you have experienced around having stable housing?

[Finances]

[Relationships – boyfriend/girlfriend, family members, etc.]

[Incarceration]

[School/job opportunities]

[Other life circumstances previously discussed]

What else has changed/happened in your life since the last time we talked?

Probes:

Positive life changes?

New hardships/challenges?

Who is dependent on you for support (financial, emotional) at the moment?

Who are you depending on for support (financial, emotional) at the moment?

Do you feel more or less stable since the last time we talked? Explain.

Nature of Work in Exotic Dance Clubs and Experiences Dancing

Are you still dancing?

IF STILL DANCING:

Are you still working at the same club where we first met?

Probes:

If no – where are you working?

- why did you move?

- elicit how many clubs she has danced at or is dancing in since you last spoke

If yes – what influences your decision not to leave the club?

- have you worked at other clubs since we last talked? (if yes, elaborate)

What are the reasons that keep you dancing (what do you enjoy/what are the factors that continue to draw you to the work)?

During our last conversation we talked about your first day (or first few days – if early interviews) on the job. Can you walk me through your **most recent shift?**

Probes:

Envision the scene/set the physical, social scene:

What were you wearing, what time of day was it?

What did you see going on?

Where did you spend your time? (i.e. on dance floor, chatting clients, back room, dressing room)

Who was there? Describe the other dancers and staff.

What was expected of you?

How was the money?

What else stood out for you during that shift?

Probes:

What felt safe about the club? (i.e. the type client, the layout, the way the staff treated you, the doormen, the other girls)

Did anything feel unsafe?

What was your impression of the girls working in the club? The clients?

What was enjoyable?

What was harder than you imagined (e.g., services, money management, dealing with clients)?

How did you feel going home after that shift?

In general, how do you feel about the job now you've been there for a while?

Probes:

What has changed for you since we last spoke?

Is anything more or less demanding?

Is more expected of you?

What's your impression of the different shifts i.e. night vs day shift (what influences your shift choice?)

Is the work more enjoyable or less enjoyable?

How is the atmosphere in the club now, compared to when you first started?

Probes:

Are you more or less comfortable/safe?

Less drama/more drama

Drugs, etc.

Can you describe the typical scene a bit more?

[If they've worked in multiple clubs ask them about each, and how they compare.]

Probes:

Is it mostly chatting to guys or dancing?

Can girls choose to go naked or clothed?

What's it like back in the VIP/back rooms?

Is there a clear sense from the club of what's acceptable and what's not?

How do you decide what you will let clients do now? (touching, etc.)

If we could just specifically talk for a few minutes about the payment structure:

Probes:

Has the payment structure set by the club changed at all since you started– if so, how so? (or is it set)?

Have your tips/money earned changed because of other factors – irrespective of club rules? (e.g. your own minimum)

What do you think about the payment structure in the club where you work? (fair, consistent)

How do you decide how much you should make in tips on top of what the bar pays you?

Please describe your relationship with management and other staff.

Who do you feel close to?

Who do you trust?

Who do you mistrust?

Who could you borrow money from/talk to about problems?

Could you describe your relationships with other dancers?

Probes:

Who do you feel close to?

Who do you trust?

Who do you mistrust?

Who could you borrow money from/talk to about problems?

What do other dancers think about you?

Competition?

IF NO LONGER DANCING:

When did you stop dancing?

Probes:

How many weeks/months ago was your last shift?

How long in total did you dance for?

Could you talk to me about why you stopped dancing?

Probes:

Boyfriend

New job/educational opportunities

Experiences in the club – if so what experiences in particular were influential?

(Wasn't making enough money, school, pregnancy)

What changed about the job during the time you were there?

Probes:

Did the payment structure alter – if so, how so? (or was it set)?

Did your tips/money earned change at all?

What was more or less demanding?

Was more expected of you?

How did the night shifts compare to the day shifts?

Did the work become more or less enjoyable?

Did you notice any changes in the atmosphere of the club during the time you were there?

Probes:

More/less safe

Management/staff/dancer changes

Client type changes

Policy changes

During our last conversation we talked about your first day (or first few days – if early interviews) on the job. Can you walk me through your **last shift**?

Probes:

Envision the scene/set the physical, social scene:

What were you wearing, what time of day was it?

What did you see going on?

Where did you spend your time? (i.e. on dance floor, chatting clients, back room, dressing room)

Who was there? Describe the other dancers and staff.

What was expected of you?

How was the money?

What else stood out for you during that shift?

Probes:

What felt safe about the club? (i.e. the type client, the layout, the way the staff treated you, the doormen, the other girls)

Did anything feel unsafe?

What was your impression of the girls working in the club? The clients?

What was enjoyable?

What was harder than you imagined (e.g., services, money management, dealing with clients)?

How did you feel going home after that shift?

How did relationships with dancers and/or club staff change, if at all?

Probes:

Who did you grow to trust?

Who did you mistrust?
Did you experience competition?

Do you keep in contact with anyone where you used to dance?

Probes:

Dancers

Club staff

Clients

If yes, describe the relationships...

How do you feel about dancing now that you've been away?

Probes:

Anything you miss?

Would you ever return to dancing?

What are your current sources of money?

Probes:

How has your money situation changed?

How has stopping dancing affected you?

Probes:

Drug use

Housing

Relationships

Money

School

Family

BACK TO ALL PARTICIPANTS:

Experiences of Sex Work

The last time we talked, we talked about how sex is sometimes sold in strip clubs...

IF DANCER REPORTED SELLING SEX DURING BASELINE INTERVIEW:

How have your experiences selling sex changed since we last met (now that you have been working for a while or stopped dancing)?

Probes:

More/less comfortable?

More/less money?

Safer?

Where do you draw the line with what you'll do for a client?

Probes:

Have your boundaries for what's ok (condom use, kissing) changed since last we spoke?

Any acts you wouldn't perform?(Why?)

Would you ever have unprotected sex?

Is it price dependent?

Has what you are willing to do changed at all; if yes, why?

Let's talk about the money you make selling sex in the club.

Probes:

Can you remind me of how the payment works (e.g., club/bartender sets it up in advance, etc.)

How is price negotiated?

What's the least amount of money you will accept?

Do you get paid in other ways besides cash (e.g., drugs, transportation, etc.)?

How much does the bar get compared to what you make?

How does that make you feel? Do you think you deserve more/less/right amount?

What drives your decisions to sell sex some times but not others?

How have your clients changed?

Probes:

Cheaper

More difficult to get clients?

Treat you differently?

General attitudes towards clients or male bar customers

How does condom use get negotiated during sexual interactions in the club?

Probes:

Vary based on the type of sexual service/ payment?

How much control do you feel you have over condom use?

Are condoms accessible if you need them while working in the club?

Probes:

Where do you get condoms, i.e., purchase from runner, management provides for free, etc.

If club provides, always accessible?

IF DANCER REPORTED NOT SELLING SEX DURING BASELINE INTERVIEW:

Have you sold sex since we last talked (~ 3 months ago)?

If yes (participant reports selling sex for first time during this interview):

I realize this might be uncomfortable but could you walk me through first time selling sex in the club?

Probes:

How long after you started at the club?

What influenced your decision? (e.g. expected by management, better money, drugs)

Who initiated it? (e.g. you, the client, management/bar staff/other dancer)

Can you describe your experiences of selling sex in the club since?

Probes:

What's changed about it? i.e. harder, easier

Describe typical clients

What's the typical process of how it gets set up (bartender, etc.)?

Where do you draw the line with what you'll do for a client?

Probes:

Any acts you wouldn't perform?

Would you ever have unprotected sex?

Is it price dependent?

(If been dancing for a while – ask if what they are willing to do has changed – why has it changed?)

Let's talk about the money you make selling sex in the club.

Probes:

Can you tell me how the payment works (e.g., club/bartender sets it up in advance, etc.)

How is price negotiated?

What's the least amount of money you will accept?

Do you get paid in other ways besides cash (e.g., drugs, transportation, etc.)?

How much does the bar get compared to what you make?

How does that make you feel? Do you think you deserve more/less/right amount?

What drives your decisions to sell sex some times but not others?

Money (immediate need)

Drugs/alcohol

Pressure from others

Type of customer (regular, old/young, rich, etc.)

How does condom use get negotiated during sexual interactions in the club?

Probes:

Vary based on the type of sexual service/ payment?

How much control do you feel you have over condom use?

Are condoms accessible if you need them while working in the club?

Probes:

Where do you get condoms (purchase from runner, management provides for free, etc.)

If club provides, always accessible?

If no (the participant again reports not selling sex):

What influences your decision **not** to sell sex to customers?

Probes:

Club rules/ choice/ don't need the money

Have you been pressured to sell sex (if yes, by whom)?

What's the attitude of the staff to your decision not to sell sex?

What's the attitude of other dancers?

What's the reaction of clients?

What will you allow a client to do short of sex?

Probes:

Any acts you wouldn't perform?

Is it price dependent?

Have you learned anything new about sex being sold in the club since we last talked?

Probes:

What goes on?

How does it work?

How far are girls willing to go?

Do girls talk about it – can you describe?

How does condom use get negotiated during sexual interactions in the club?

Probes:

Vary based on the type of sexual service/ payment?

How much control do you feel girls have over condom use

ASK ALL PARTICIPANTS:

Do any club staff (bouncers, bartenders, managers) or dancers operate businesses on the side?

Probes: porn (e.g. calendars), escort services, private stripper services?

Do you participate in any of these side businesses?

If yes, could you tell me more about it?

Have you ever had sex outside the club setting for money?

If yes:

How does it differ from selling sex in the club?

Probes:

Safety on the street v club

Type clients

Time to negotiate price, condom use

Where do you take/meet clients?

Probes:

Hotels

Alley

Private residence

What influences your decision to sell sex outside of the club?

Probes:

More money than in the club/ potential for good money – what is “good money”

Ownership over what I do (vs. club management)

Familiarity with clients/regular customer

Location

No area in club to have sex

Other girls suggested it

How do you set the price when you sell sex outside of the club?

Probes:

What else do you negotiate?

What are your ground rules, if any?

What is the least amount of money you will agree to? How did you come up with this?

What is the money like compared to what you make (or would make) selling sex inside the club?

Do you get paid in other ways besides cash?

Probes:

Drugs

Transportation

Housing/shelter

Protection from others

How do you find clients to meet up with outside of the club?

Probes:

Met in the club

Met online

From your perspective, what are the risks involved when it comes to selling sex outside of the club?

Probes:

Physical, sexual violence
How do you manage these risks?

If no:

What influences your decision to not sell sex outside the club?

Probes:

How does it differ from selling sex in the club?

Safety on the street v club

Type clients

Time to negotiate price, condom use

Have you heard of other dancers selling sex outside the club?

Probes:

If yes, how does it work?

Buy out at club

Arranged by the dancer in private at club, online

Where do they go (hotel, alley, residence)?

How does the price get set?

From your perspective, what are the risks involved when it comes to selling sex outside of the club?

Probes:

Physical, sexual violence

How do you manage these risks?

Violence

Before we talked a little bit about harassment you may have witnessed or experienced in the club since you started... have you had any experiences since we last talked that you could share?

Probes:

Verbal abuse (sexual/racial)/touching/ pressure to do drugs)

What types of physical violence (if any) have you witnessed or experienced in the club since we last spoke (~3 months ago)?

Probes:

Women getting attacked/raped by clients or between staff/ fights between dancers

Has a client forced you to do anything physical or sexual against your will?

Probes:

More men showed up than originally agreed to?

Forced anal sex?

Not wearing a condom/breaking a condom?

If yes,

What happened?

What was the setting: in club vs. outside the club?

How do you manage this risk (e.g., do you have people looking out for you, etc.)?

Have your own experiences of how you have handled harassment or violence changed since we last met?

Probes:

Experience more/less harassment?

Better able to deal with difficult clients?

What do you think is the riskiest thing about working in the club?

Probes:

How do you manage this risk?

Are there any additional experiences of violence, inside or outside the club that you would like to share?

Probes:

If reported violence during last interview, follow up if didn't ask new baseline questions

Probe on violence experienced outside the club

Alcohol Use & Drug Use

Remind me, do you drink alcohol?

If no, what influences your decision not to?

Probes:

Recovering alcoholic

Experiences with family/friends alcoholism

Want to be clear-headed

Makes me feel sick

If yes:

Has your alcohol consumption changed since we last talked?

Probes:

More/Less

If more – why do you think that is?

IF DANCER REPORTED DRUG USE AT BASELINE:

How has your drug use changed since we last talked?

Probes:

Do more/less drugs?

Do new/different drugs?

What influences your drug use? (i.e., makes sex easier, helps get clients, managers)

How does drug use influence your time in the club?

Probes:

Makes it more fun

Time goes quicker

Helps get you through a shift

Better relationship with clients/ girls

How have drugs and/or alcohol affected your experiences working as a dancer (or selling sex, if relevant)?

Probes:

Services provided?

Condom use?

Type customers

If stopped using drugs:

What motivated you to stop using drugs?

Are you in treatment?

How does the club environment impact your efforts to stay off drugs?

IF DANCER REPORTED NOT USING DRUGS AT BASELINE:

Have you used drugs since the last time we last talked (~ 3 months ago)?

If yes:

Can you talk about how you started using drugs?

Probes:

Was it in a club/somewhere else?

Who were you with?

What were the circumstances?

How has your drug use changed since starting work in the club?

Probes:

Do more/less drugs?

Do new/different drugs?

What influences your drug use? (i.e. makes sex easier, helps get clients, managers)

How does drug use influence your time in the club?

Probes:

Makes it more fun

Time goes quicker

Helps get you through a shift

Better relationship with clients/ girls

How have drugs and/or alcohol affected your experiences of working as a dancer (or selling sex if relevant)?

Probes:

Services provided?

Condom use?

Type customers?

If no:

What influences your decision to not use drugs?

Have you used drugs in the past? Explain.

What drug use do you see going on in the club – describe?

Health

You might remember us talking last time a bit about health concerns...

What impact do you think the club has had on your general health, if any?

Probes:

Had any physical health issues since you started working as a dancer?

Had any mental health issues since you started working as a dancer?

What experiences with clients have increased your concerns related to STDs or pregnancy?

Have you experienced any sexually transmitted infections?

What do you do to protect yourself from health risks related to working in the club?

Probes:

What do you do to protect yourself from risks related to STDs? (e.g., STI testing, condom use with partners)

In general, what do you do to take care of your health?

Hand washing?

Exercise?
Eat healthy?
Seek care from clinic, doctor, etc.?

What kind of experiences have you had accessing health care when you need it?

Probes:
Trouble getting health insurance?
Experienced stigma from health care providers?
Positive experiences?

Aside from direct health access, do you feel you have access to social support services if/when you need them?

Probes:
Help with housing
Child benefits
Drug treatment programs
Counseling

Closing

Do you have any goals for the immediate future i.e., next few months?

Probes:
Where do you see yourself if six months (re: housing, relationships, school, etc.)?
Still dancing?

What are some of the factors that could help you get there?

Last time we talked about programs or services that you thought could be helpful to you or other dancers. Do you have any suggestions this time?

Probes:
Health (e.g. drug management, sexual health)
Housing, money management, legal support

Do you have anything else you'd like to add?

Thank you!

Interviewer's Notes:

CURRICULUM VITAE

MEREDITH REILLY BRANTLEY

PERSONAL

Date of birth: January 8, 1982

Location of birth: Syracuse, New York, USA

EDUCATION

Doctor of Philosophy (2016, expected)

Department of Health, Behavior and Society
Johns Hopkins Bloomberg School of Public Health
Baltimore, Maryland

Certificate in Health Economics (2015)

Department of Health Policy and Management
Johns Hopkins Bloomberg School of Public Health
Baltimore, Maryland

Master of Public Health (2008)

Department of Epidemiology
Emory University Rollins School of Public Health
Atlanta, Georgia

Bachelor of Science (2004)

Department of Cellular, Molecular, and Developmental Biology
University of Michigan
Ann Arbor, Michigan

PROFESSIONAL EXPERIENCE

Johns Hopkins University

Pre-doctoral Researcher

Baltimore, Maryland

Oct 2012 – present

Department of Epidemiology, Bloomberg School of Public Health

Led design of quantitative surveys and qualitative in-depth interview guides for feasibility study investigating the HIV risk environment of indoor sex work venues; managed recruitment, data collection, and mixed methods analysis; prepared IRB submissions and amendments; developed and evaluated a direct observational measure of the physical environment of sex work venues.

Center for Child and Community Health Research, School of Medicine

Designed investigation of trends in sex partner meeting places among HIV cases in Baltimore City; conducted social venue network analyses of HIV cases to inform local prevention and control efforts; led multi-level analysis of neighborhood disorder and sexual health among adolescents in Baltimore City.

Department of Health Behavior and Society, Bloomberg School of Public Health

Conducted economic evaluation of national, multi-site HIV linkage to care program, including cost-effectiveness and cost-utility analyses per program; developed case studies on barriers to implementation among service providers; completed network analysis and reports on organization collaborations.

Centers for Disease Control and Prevention

Epidemiologist

Atlanta, Georgia

Dec 2010 – Aug 2012

Vaccine Research and Policy Team, Division of Viral Hepatitis

Led analysis of multi-state surveillance data to investigate risk of acute hepatitis B among persons with diabetes, resulting in a national vaccine policy decision to recommend immunization among unvaccinated adults with diabetes; generated model indicators and analyses for economic evaluation of hepatitis B vaccine and exposure management among healthcare personnel; coordinated nation-wide laboratory initiative to improve identification of infants born to hepatitis B-infected mothers.

Office of HIV/AIDS and Infectious Disease Policy, Department of Health and Human Services (detail)

Coordinated U.S. Viral Hepatitis Action Plan activities and provided technical assistance to senior staff on plan implementation; facilitated collaborations across Federal government and engaged non-governmental partners and other stakeholders to leverage resources and address Action Plan goals; created and reviewed viral hepatitis related documents and resources such as guidelines, websites, and official statements.

Centers for Disease Control and Prevention

Public Health Analyst

Atlanta, Georgia

Aug 2008 – Nov 2010

Country Operations Branch, Division of Global HIV/AIDS

Provided technical and operational assistance to overseas staff on HIV prevention, care, and treatment programs to improve design, implementation, management, and evaluation under the President's Emergency Plan for AIDS Relief (PEPFAR); targeted coordination of CDC's global HIV/AIDS programs, maintained communications with international and national partners, developed tracking systems for cooperative agreement management, prepared technical and administrative reports.

Epidemiology and Surveillance Branch, Division of Viral Hepatitis (detail)

Collaborated with senior scientists to assess hepatitis C risk among injection drug users in San Diego, CA; provided technical writing assistance for protocol evaluating long-term effectiveness of hepatitis B vaccine in American Samoa; assisted in outbreak investigation of possible hospital-acquired hepatitis C infection.

Emory University

Clinical Research Coordinator

Atlanta, Georgia

Sep 2006 – Jul 2008

Department of Epidemiology, Rollins School of Public Health

Managed double-blind randomized clinical trial to investigate links between Vitamin D/Calcium and colorectal cancer; recruited, consented, and enrolled participants; routinely collected, managed, and reported participant data; collaborated with Emory University medical and technical staff of various departments including Epidemiology, Digestive Diseases, Pathology, IT, and other clinical and research labs.

TEACHING

Johns Hopkins University, Bloomberg School of Public Health Baltimore, Maryland

Teaching assistant

Mar 2014 – Oct 2014

- **Department of Health Behavior and Society**

Course: Methods in Social Network Analysis, September 2014-October 2014

Instructor: Dr. Cui Yang

- **Department of Population, Family and Reproductive Health**

Course: Sexually Transmitted Infections in Public Health, March 2014-May 2014

Instructor: Dr. Heather Bradley

AWARDS AND FELLOWSHIPS

NIH Ruth Kirschstein National Research Service Award

National Institute on Drug Abuse

Sep 2014 – present

Center for AIDS Research Conference Scholarship
Johns Hopkins Bloomberg School of Public Health
Jun 2014

NIH Sexually Transmitted Infections Training Grant
National Institute of Allergy and Infectious Disease
Sep 2012 – Aug 2014

Graduate Student Research Poster Award
JHU Symposium on Social Determinants of Health
Apr 2013

Employee Performance Award
Centers for Disease Control and Prevention
Jun 2009, Dec 2010, Jul 2011

Presidential Management Fellowship
US Office of Personnel Management
Aug 2008 – Aug 2010

Global Field Experience Award
Emory University Rollins School of Public Health
May 2007

PUBLICATIONS

Jain KM, Maulsby C, **Brantley M**, SIF Intervention Team, Kim JJ, Zulliger R, Riordan M, Charles V, Holtgrave DR. Cost and cost threshold analyses for 12 U.S. HIV linkage and retention in care programs focusing on underserved populations. *Under review*. AIDS Care.

Brantley M, Schumacher C, Fields EL, Perin J, Greiner-Safi A, Ellen JM, Muvva R, Chaulk P, Jennings JM. Identifying venue affiliation networks for targeted HIV control among MSM in one Mid-Atlantic U.S. City. *Under review*, AIDS and Behavior.

Schumacher C, Perin J, Juberg A, Marsiglia V, Myers R, Nganga-Good C, Muvva R, **Reilly ML**, Greiner A, Jennings JM. Recent high viral load and associated characteristics among HIV-positive individuals in Baltimore, Maryland. *Under review*, JAIDS.

Jennings J, **Reilly ML**, Perin J, Schumacher C, Sharma M, Greiner Safi A, Fields E, Perin J, Muvva R, Nganga-Good C, Chaulk P. Sex partner meeting places over time among HIV-infected Men-who-have-sex-with-Men (MSM) in Baltimore City. STD. STD 2015;42(10):549-53.

Reilly ML, German D, Serio-Chapman C, Sherman S. Structural vulnerabilities to HIV/STI risk among exotic dancers in Baltimore, Maryland. *AIDS Care* 2015;27(6):777-82.

Jennings JM, Tanner AE, Hensel DJ, **Reilly ML**, Ellen JM. Are social organizational factors independently associated with a current bacterial sexually transmitted infection among urban adolescents and young adults? *Social Science and Medicine* 2014;118C:52-60.

Hoerger TJ, Bradley C, Schillie SF, **Reilly M**, Murphy TV. Cost-effectiveness of ensuring hepatitis B protection for previously vaccinated healthcare personnel. *Infection Control and Hospital Epidemiology* 2014;35(7):845-54.

Polk S, Ellen JM, Fichtenberg C, Huettner S, **Reilly ML**, Parekh J, Jennings JM. Identifying and characterizing places for the targeted control of HIV in urban areas. *AIDS and Behavior* 2014;18(8):1476-82.

Centers for Disease Control and Prevention (CDC). CDC guidance for evaluating health-care personnel for hepatitis B virus protection and for administering postexposure management. Recommendations and Reports. *MMWR* 2013;62(RR-10):1-19.

Garfein RS, Rondinelli A, Barnes RF, Cuevas J, Metzner M, Velasquez M, Rodriquez D, **Reilly ML**, Xing J, Teshale E. HCV infection prevalence lower than expected among 18-40 year-old injection drug users in San Diego, CA. *Journal of Urban Health* 2013;90(3):516-28.

Reilly ML, Schillie SF, Smith E, Poissant T, Vonderwahl CW, Gerard K, Baumgartner J, Mercedes L, Sweet K, Muleta D, Zaccaro D, Klevens RM, Murphy TV. Increased risk of hepatitis B infection among adults with diabetes. *Journal of Diabetes Science and Technology* 2012;6(4):858-66.

Centers for Disease Control and Prevention (CDC). Use of hepatitis B vaccination for adults with diabetes mellitus: Recommendations of the Advisory Committee on Immunization Practices (ACIP). *MMWR* 2011;60(50):1709-11.

PRESENTATIONS

Reilly ML, Schumacher C, Sharma M, Fields EL, Muuva R, Nganga-Good C, Miazad R, Jennings JM. The frequency and stability of sex partner meeting places reported by HIV-infected MSM in Baltimore City, 2009-2013. 2014 CDC STD Prevention Conference, Atlanta, Georgia, June 10, 2014.

Reilly ML. Evidence for cost-effectiveness analysis: Non-cost related model inputs. Meeting of the Advisory Committee on Immunization Practices (ACIP), Atlanta, Georgia, June 20, 2012.

Reilly ML. Acute hepatitis B incidence among adults with and without diabetes – updated estimate. Meeting of the Advisory Committee on Immunization Practices (ACIP), Atlanta, Georgia, June 23, 2011.

Reilly ML, Jolley DJ. Global Health Initiative research survey in eight countries, September 2010. CDC Division of Global HIV/AIDS All-Hands Meeting, Atlanta, Georgia, June 16, 2011.

Reilly ML. Incidence of acute hepatitis B among adults with and without diabetes. Meeting of the Advisory Committee on Immunization Practices (ACIP), Atlanta, Georgia, February 24, 2011.

Reilly ML, Thompson ND, Byrd KK, Murphy TV. Estimating the proportion of adults with risk behaviors for hepatitis B virus (HBV) infection in the United States. International Conference on Emerging Infectious Diseases, Atlanta, Georgia, July 12, 2010.

ABSTRACTS

Reilly ML, Jain K, Maulsby C, Riordan M, SIF Implementation Team, Holtgrave D. Economic evaluation of eleven linkage and retention in HIV care programs across the United States. Conference on the Science of Dissemination and Implementation, Washington, District of Columbia, December 14, 2015.

Reilly ML, Schumacher C, Fields EL, Perin J, Greiner-Safi A, Ellen JM, Muvva R, Jennings JM. Venue affiliation networks of newly diagnosed HIV-infected MSM in Baltimore, Maryland. Society for Epidemiologic Research, Denver, Colorado, June 16, 2015.

Reilly ML*, Zelaya CE*, Duong Q, Flath N, Huettner S, Sherman S. Rapid observational assessments of the physical environment of exotic dance clubs: lessons from the field. National Harm Reduction Conference, Baltimore, Maryland, October 23-26, 2014.

Reilly ML, Maulsby C, Jain K, Charles V, Kinsky S, Adams A, Nortrup E, RiC Intervention Team, Holtgrave D. Innovative strategies to keep vulnerable populations in HIV care: An overview of RiC, a retention in care program. 2014 U.S. Conference on AIDS, San Diego, California, October 2-5, 2014.

Reilly ML, Zelaya C, Huettner S, Sherman S. Investigating STI risk within the social environment of exotic dance clubs in Baltimore, Maryland. 2014 CDC STD Prevention Conference, Atlanta, Georgia, June 10-11, 2014.

Reilly ML, Schumacher C, Fields E, Muuva R, Nganga-Good C, Miazad R, Olthoff G, Chaulk P, Jennings JM. Sex partner meeting places reported by newly diagnosed HIV-infected individuals in Baltimore City. Johns Hopkins University 2nd Annual Symposium on the Social Determinants of Health, Baltimore, Maryland, April 23, 2013.

Reilly ML, Poissant T, Vonderwahl CW, Gerard K, Murphy TV. Incidence of acute hepatitis B among adults with and without diabetes, 2009-2010. 49th Annual Meeting of the Infectious Diseases Society of America, Boston, Massachusetts, October 22, 2011.