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**Disparities in Adverse Childhood Experiences and Sexual Health in the US:  
Results from a Nationally Representative Sample**

A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of  
Philosophy at Virginia Commonwealth University.

by

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Abstract

**DISPARITIES IN ADVERSE CHILDHOOD EXPERIENCES AND SEXUAL HEALTH  
IN THE US: RESULTS FROM A NATIONALLY REPRESENTATIVE SAMPLE**

By **Monique Janiel Brown, Ph.D.**

A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy at Virginia Commonwealth University.

Virginia Commonwealth University, 2014

Major Director: **Dr. Steven A. Cohen**

Assistant Professor, Department of Family Medicine and Population Health  
Division of Epidemiology

**Background:** Adverse childhood experiences (ACEs) are a major public health problem in the US, and have been linked to risky sexual behavior and psychopathology. However, studies examining the link between the wide range of ACEs and sexual health outcomes and behaviors, and the associated mediational role of psychopathology are lacking.

**Objectives:** The main objectives of this dissertation project were: 1) To determine the association between ACEs and sexual health outcomes and behaviors (early sexual debut, intimate partner violence (IPV) perpetration, and HIV/STIs); 2) To examine the disparities

among selected populations; and 3) To assess the mediational role of psychopathology in the association between ACEs and sexual health.

**Methods:** Data were obtained from Wave 2 (2004-2005) of the National Epidemiologic Survey on Alcohol and Related Conditions. Logistic and linear regression models were used to determine the association between ACEs (neglect, physical/psychological abuse, sexual abuse, witnessing parental violence, and parental incarceration/psychopathology) and early age at sexual debut by sex and sexual orientation. Structural equation modeling (SEM) was used to determine the mediational role of psychopathology (PTSD, substance abuse, and depression) in the association between ACE constructs and IPV perpetration, and the role of psychopathology, early sexual debut and IPV perpetration in the association between ACEs and HIV/STIs.

**Results:** The association between ACEs and early sexual debut was generally stronger for women and sexual minorities. Among men, PTSD mediated the association between sexual abuse and IPV perpetration ( $z=0.004$ ,  $p = 0.018$ ). However, among men and women, substance abuse mediated the association between physical/psychological abuse and IPV perpetration:  $z=0.011$ ,  $p=0.036$  and  $z=0.008$ ,  $p=0.049$ , respectively. Among men, PTSD mediated abuse (physical/psychological, and sexual) and parental incarceration/psychopathology; substance abuse mediated abuse and neglect; depression and early sexual debut mediated abuse; and IPV perpetration mediated sexual abuse, and HIV/STIs. Among women, substance abuse mediated

neglect and physical/psychological abuse, and depression mediated physical/psychological abuse and HIV/STIs.

**Conclusions:** Intervention and prevention programs geared towards preventing sexual health outcomes and behaviors should employ a life course approach and address ACEs. Treatment components addressing PTSD, substance abuse, and depression should also be added to IPV perpetration and HIV/STI prevention programs.

## **CHAPTER 1: Background**

## *Adverse Childhood Experiences*

Adverse childhood experiences (ACEs) contribute to major public health problems in the US.<sup>1</sup> They are the collection of negative events that a child may experience, including emotional, physical and sexual abuse, witnessing violence in the home, loss of a parent due to death or divorce, a family member's mental illness, incarceration or substance abuse.<sup>2,3</sup> Recent estimates show that approximately six in ten people in the general population have been exposed to at least one adverse childhood event.<sup>4</sup>

ACEs are also strongly interrelated.<sup>5</sup> In one longitudinal study, 87% of participants who reported one ACE also reported at least one additional ACE. Household dysfunction, such as substance abuse occurred among approximately one in four participants (25.6%); physical abuse among approximately one in ten (10.8%); emotional abuse among one in ten (11.1%) and sexual abuse among more than one in five (22.0%).<sup>5</sup>

The number of referrals for child maltreatment in the US is alarming. The Department of Health and Human Services reported that an estimated 3.4 million referrals of child maltreatment were received by child protection service agencies in 2011,<sup>6</sup> which has increased from 2.7 million referrals in 2001.<sup>7</sup> Of those, approximately one in ten reports were of sexual abuse, 78.5% were of neglect and 17.6% were of physical abuse. Four in five perpetrators of child maltreatment were parents, of which 87.6% were the biological parents.<sup>6</sup> The lifetime economic burden due to new cases of child maltreatment, fatal and nonfatal, was estimated to be \$124 billion.<sup>8</sup> The high prevalence of ACEs, the excessive number of referrals for child maltreatment, the increase in fatalities, and high economic burden highlight the need for local and national efforts to help in the reduction of child maltreatment and associated family dysfunction.<sup>9</sup> These

statistics also underscore the need for continued research on adverse events experienced during childhood.

### *Adverse Childhood Experiences and Health*

ACEs have a major negative impact on health across the life-course.<sup>10</sup> Research has suggested an association between exposure to ACEs and adverse health outcomes,<sup>11</sup> including cancer,<sup>4,12</sup> cardiovascular disease,<sup>13,14</sup> and diabetes.<sup>13</sup> ACEs have also been linked to mental and behavioral health including substance abuse,<sup>13,15-18</sup> depression,<sup>13,15,19,20</sup> mental distress (psychological symptoms such as feeling hopeless and nervous),<sup>21,22</sup> violence in relationships in adulthood,<sup>23</sup> risky sexual behavior,<sup>24</sup> and sexually transmitted infections.<sup>25</sup>

Studies examining the long-term effects of ACEs tend to examine only one type of abuse, in particular, sexual abuse,<sup>21,26-28</sup> and physical abuse.<sup>11,24,35</sup> Few studies have assessed the impact of multiple types of abuse.<sup>5,29-34</sup> Exposure to multiple categories of ACEs, which are often interrelated, has been linked to having many health risk factors later in life.<sup>5</sup> Children who were witnesses to violence in the home were often exposed to other adverse events such as abuse, neglect, and household dysfunction.<sup>35</sup> These findings suggest that studies on ACEs should not only be limited to abuse but should examine other co-occurring adverse experiences such as witnessing parental violence, or living with a family member with mental illness.<sup>5</sup> If these additional factors are not considered, adverse health outcomes might be wrongly attributed to only specific types of abuse and not to other categories of ACEs.<sup>5</sup> A comprehensive assessment of a wide range of ACEs is crucial to understanding what specific types of ACEs may result in particular outcomes.

### *Mechanisms*

Many studies have begun to explore the mechanisms by which ACEs may affect trajectories of health.<sup>36-55</sup> Epigenetic mechanisms may be associated with an increased risk for adverse health outcomes later in life among victims of ACEs.<sup>37</sup> Findings from Seltzer et al. (2013) suggested disparities in the association between physical abuse in childhood and physiological outcomes. Girls with histories of physical abuse had higher levels of stress-induced urinary oxytocin and lower levels of salivary cortisol after the stressor, compared to girls without this history.<sup>55</sup> These findings suggest that ACEs may disrupt the stress regulation system by middle childhood among girls. This same response was not observed among boys.<sup>38</sup> Oxytocin is an element of the neuroendocrine system that is linked to complex social behaviors and appears to be dysregulated in adults reporting stress in early life such as maltreatment during childhood.<sup>39,40</sup> This dysregulation has been shown to be associated with mental health outcomes as oxytocin may function as a mediator in the psychological consequences of stressful experiences.<sup>40</sup> The release of oxytocin in response to stress seems to be enhanced in females, therefore, making their emotional and behavioral responses different than those of males. This difference may result in gender-specific psychobiological reactions to trauma and also to post-traumatic stress disorder (PTSD).<sup>41</sup> Psychosocial factors such as hopelessness and depressive symptomatology mediate the relationship between sexual abuse and physical abuse, and violent outcomes.<sup>42,43</sup> PTSD has also been found to fully mediate the relationship between violence and physical health outcomes.<sup>44</sup>

### *Rationale*

ACEs have been linked to sexually transmitted infections<sup>25</sup> and risky sexual behavior.<sup>24</sup> To date no study has examined the association between specific ACEs and age at sexual debut in a nationally representative sample of the US population. Hillis et al. (2001) examined the

relationship between ACEs and early sexual debut among a health-insured population, restricted early sex to  $\leq 15$  years of age compared to  $> 15$ , and did not consider other ACEs such as neglect. The authors carefully considered the qualitative effect of ACEs but only adjusted for age at interview and race, and did not consider other confounders such as income and education.<sup>24</sup> Early age at sexual debut is a known risk factor for other adverse health behavior and outcomes including inconsistent contraceptive use<sup>45</sup> and HIV diagnosis.<sup>46</sup> Determining what ACEs are risk factors for early age at sexual debut among a nationally representative population will be crucial in helping to reduce outcomes associated with early age at first sexual intercourse. No study has examined the association between ACEs and age at sexual debut by sexual orientation.

To date, little research has examined the association between ACEs, and IPV perpetration and HIV/STI diagnosis. No study has examined the association between ACEs and IPV perpetration, and ACEs and HIV/STI diagnosis using a structural equation modeling (SEM) approach in a nationally representative sample. We will be able to examine the pathways between ACEs and sexual health outcomes and potential mediators in these pathways. The use of multiple indicators (for example, specific ACEs or types of IPV abuse) that are correlated to form one or more latent variables (ACE or IPV constructs) in SEM may provide the opportunity to account for measurement error.<sup>47</sup> In SEM, we expect that the latent variables might not perfectly predict the observed variables. However, this expectation is modeled by specifying an error factor for each observed variable in the model.<sup>48</sup> This specification of an error factor for each observed variable will provide a better understanding of how well the theoretical model predicts actual behavior.<sup>49</sup> In addition, no study has examined the role of substance abuse and depression as mediators between ACEs and IPV perpetration. One study, which examined the association between ACEs and partner aggression, only considered PTSD as a potential



mediator.<sup>50</sup> Roberts et al. (2011) examined the association between ACEs and IPV perpetration but did not consider the role of potentially important mediators, such as PTSD, substance abuse, and depression.<sup>51</sup> Hillis et al. (2000) examined the association between ACEs and STI diagnosis but did not consider ACEs such as IPV before age 18 and neglect, and it was not clear if HIV diagnosis was a part of their definition for STIs.<sup>25</sup> The authors examined the relationship by sex and had a relatively large sample size (9,323); however, they did not use an SEM approach and did not consider important mediators such as sexual debut and psychopathology. As in previous studies, the authors only adjusted for age at interview and race, and did not consider other potential sociodemographic confounders such as income and education.

#### *Overarching Objective and Specific Aims*

The *overarching objective* of this dissertation project was to examine the association between ACEs and sexual health behavior and outcomes.

The *specific aims* of this proposal were:

***Aim 1:*** *To examine the association between ACEs and age at sexual debut*

**Sub aim 1:** To determine if the association between ACEs and sexual debut differs by sex

**Sub aim 2:** To determine if the association between ACEs and sexual debut differs by sexual orientation

**Hypotheses:** ACEs will be associated with early age at sexual debut, and the association will be stronger for women compared to men, and for sexual minorities compared to heterosexuals.

***Aim 2:*** *To examine the association between ACEs and IPV perpetration*

**Sub aim 1:** To test the role of potential mediators such as PTSD, substance abuse and depression.

**Sub aim 2:** To determine if the mediational roles of PTSD, substance abuse, and depression differed by sex.

**Hypotheses:** ACEs will be associated with IPV perpetration. PTSD, substance abuse and depression will mediate the association, and there will be differences in mediation by sex.

*Aim 3: To examine the association between adverse childhood experiences and HIV/STI diagnosis*

**Sub aim 1:** To test the role of PTSD, substance abuse, depression, early age at sexual debut, and IPV perpetration as mediators.

**Sub aim 2:** To determine if the mediational roles of PTSD, substance abuse, depression, early age at sexual debut, and IPV perpetration differ for men and women.

**Hypotheses:** ACEs will be associated with HIV/STI diagnosis. PTSD, substance abuse, depression, early age at sexual debut, and IPV perpetration, will mediate the association, and there will be differences by sex.

The current dissertation project has addressed some of the gaps identified in previous studies by examining whether victims of specific types of ACEs (not only victims of sexual abuse) are more likely to have earlier sexual debut, be perpetrators of IPV or are more likely to report HIV/STI diagnosis. This study went beyond looking at the number of ACEs and examined the type of ACEs and their relationship to sexual health. Many of the studies that examine ACEs and sexual health outcomes tend to focus on women. The current study explored

the relationship between ACEs and sexual health outcomes among men and women. Furthermore, the findings of this study have increased understanding of the relationship between specific type of ACEs, and sexual health behaviors and outcomes by taking into consideration the interconnectivity of ACEs via structural equation modeling. By understanding the relationship between ACEs and sexual health, we will be able to determine the specific types of ACEs that should be the focus of intervention and prevention programs, so as to reduce the associated adverse health outcomes and behaviors.

## **Overarching Methods**

### *Data Source*

The dissertation project used data from Wave 2 of the National Epidemiologic Survey on Alcohol-Related Conditions (NESARC). The NESARC was funded by the National Institute on Alcohol Abuse and Alcoholism with additional support from the National Institute on Drug Abuse (NIDA).<sup>52</sup> The NESARC was designed to study more than one psychological disorder or substance use disorders in the same individual,<sup>53</sup> and its main aims were to determine the extent of substance use and other mental disorders and to estimate treatment service needs in the general population.<sup>52</sup>

### *Sample Population*

The NESARC surveyed adults age 18 years and older living in the US.<sup>99</sup> This survey used the “Group Quarters Inventory” from the US Bureau of Census 2000 to obtain information from military personnel living off base, boarding houses, rooming houses, nontransient hotels and motels, shelters, facilities for housing workers, college quarters, and group homes.<sup>54</sup> However, people who resided in homeless shelters were excluded. NESARC also included

Spanish speakers<sup>52</sup> and oversampled Black and Hispanic households.<sup>54</sup> These households were oversampled due to these subgroups typically being underrepresented in surveys with a focus on comorbidity.<sup>54</sup> Sample weights are available for each observation.

### *Structural Equation Modeling*

Structural equation modeling (SEM) was the analytic technique used for Chapters 3 and 4. It is a powerful technique in which complex path models can be combined with latent variables (factors). SEM is a combination of factor analysis and regression or path analysis. Theoretical constructs, which are represented by the latent (unobserved) factor, are often the main interest in SEM.<sup>48</sup> SEM provides a general and convenient framework for statistical analysis that consists of many traditional multivariate procedures, including factor analysis and regression analysis. The structural equation models are often depicted by graphical path diagrams.<sup>48</sup> Factor analysis is a method that can be used to describe the variation among observed variables that are correlated using a lower number of unobserved variables or factors. SEM will be used to determine appropriate latent factor(s) for ACEs, mediators, and IPV perpetration.

Exploratory factor analysis (EFA) was used to determine appropriate structures for measurement models. Confirmatory factor analysis (CFA) was done to determine if the EFA model fits the data. The CFA provided a fit of these specific factor structures to the observed data. Structural or path models were then developed to determine relationships and associations among the latent factors<sup>55</sup> when the CFA was found to be adequate based on fit indices. Models with direct paths from ACEs to mediators and from the mediators to IPV perpetration, and from ACEs to IPV perpetration were tested. Fit indices from the mediational models were examined

to determine if these models fit the data well. EFA and CFA were performed in two separate portions of the dataset after splitting the data, the training dataset and the validation dataset, respectively. The weighted least squares means and variance (WLSMV) estimator was used.

### *Fit Indices*

The five fit indices that were used in modifying and evaluating models were: 1) Model  $\chi^2$  and its p value; 2) Weighted root mean square residual (WRMR); 3) Root mean square of approximation (RMSEA);<sup>56</sup> 4) Comparative fit index (CFI);<sup>57</sup> and 5) Tucker-Lewis coefficient (TLI).<sup>58</sup> These fit indices enabled the use of a variety of methods to determine to what extent the specified model had fit the empirical data.<sup>59</sup> It is necessary to take multiple criteria into consideration and to evaluate the model fit based on various measures simultaneously since there is no single statistical significance test that identifies a “correct model” given the sample data.<sup>59</sup> Each fit index was examined individually. The CFI/TLI values showed the results of comparing a specified model to a baseline model. CFI or TFI values closer to 1.0 indicated a good fit. Values  $\geq 0.96$  were indicative of good fit. WRMR was suitable when sample statistics have wide variances.<sup>60</sup> For the WRMR,  $< 0.90$  is a reasonable fit. The RMSEA values portrayed the results of testing the close-fit hypothesis, an alternative to the exact-fit hypothesis, using chi square values. The exact fit hypothesis is much more stringent than the close-fit hypothesis. An RMSEA value of  $< 0.05$  suggested close approximate fit, between 0.05 and 0.08 implied a reasonable fit.

**Chapter 2: Sex and Sexual Orientation Disparities in Adverse Childhood  
Experiences and Early Age at Sexual Debut**

## **Abstract**

**Background:** Adverse childhood experiences (ACEs) have been linked to early sexual debut. Early sexual debut is associated with multiple adverse health outcomes including unintended pregnancies and substance abuse. Sexual minorities and men tend to have earlier sexual debut compared to heterosexual populations and women, respectively. However, studies examining the association between ACEs and early sexual debut among men and sexual minorities are lacking.

**Objective:** The aim of this study will be to examine the sex and sexual orientation disparities in the association between ACEs and age at sexual debut.

**Methods:** Data were obtained from Wave 2 of the National Epidemiologic Survey on Alcohol Related Conditions. Logistic and linear regression were used to obtain crude and adjusted estimates and 95% confidence intervals adjusting for age, race/ethnicity, income, education, insurance and marital status for the association between ACE factors (neglect, physical/psychological abuse, sexual abuse, parental violence, and parental incarceration and psychopathology) and early sexual debut. Analyses were stratified by sex and sexual orientation.

**Results:** The associations were generally stronger among women and sexual minorities, particularly among men who have sex with men (MSM) and women who have sex with women (WSW). For example, women and men exposed to sexual abuse had 8.9 times (OR: 8.94; 95% CI: 7.85 – 10.2) and 3.1 times (OR: 3.09; 95% CI: 2.68 – 3.55) higher odds, respectively, of having sexual debut between 13-14 years compared to women and men who were not exposed to ACEs.

**Conclusions:** Sexual health education programs interesting in addressing delaying sexual debut should also consider addressing ACEs, such as neglect, physical, psychological and sexual abuse, witnessing parental violence, and parental incarceration and psychopathology. Target populations for these programs should include men and women but results may be greater for women and sexual minority populations.



## INTRODUCTION

Adverse childhood experiences (ACEs) include emotional, physical, or sexual abuse, witnessing violence among household members, losing a parent due to death or divorce, or residing in a household with someone who has mental illness, substance abuse or is engaging in criminal behavior.<sup>1,3</sup> ACEs pose a major public health challenge in the US.<sup>1,4</sup> Recent estimates show that six in ten adults in the general population have been exposed to at least one adverse childhood event,<sup>4</sup> and 8.7% report five or more ACEs.<sup>3</sup> ACEs have been linked to numerous poor behavioral and psychological outcomes, including suicide attempts,<sup>5,61-64</sup> using illicit drugs,<sup>5,62,64</sup> smoking,<sup>5,64,65</sup> having multiple sex partners,<sup>5,61</sup> and depression in late-life.<sup>66</sup>

Such early-life adversities are also associated with numerous sexual health outcomes in adulthood. For example, ACEs are associated with sexual debut in early adolescence compared to later adolescence or as an adult.<sup>24</sup> The median age at sexual debut in the US overall is 17.4 years, 17.2 among women and 17.6 years among men.<sup>67</sup> However, of all adolescents, 6.2% report having had sexual intercourse before age 13 years, 9.0% of boys and 3.4% of girls.<sup>68</sup> It has been hypothesized that sexual risk behaviors, such as early sexual debut, may represent attempts to obtain close interpersonal connections for individuals who have been exposed to ACEs.<sup>24</sup> One study found that adolescents who reported age at sexual debut at 15 years or younger were also more likely to report worse relationships with their mothers compared to other adolescents.<sup>69</sup>

Early age at sexual debut is associated with multiple adverse sexual health outcomes well beyond adolescence. Sexual debut before age 15 is associated with multiple unintended pregnancies<sup>70</sup> and inconsistent contraceptive use.<sup>45</sup> Early sexual debut is also associated with

having multiple sex partners in the past three months, using alcohol/drugs at last sexual intercourse, not using condom at last sexual intercourse, becoming pregnant or causing a pregnancy, being forced to have sex and being involved in physical intimate partner violence among both male and female adolescents.<sup>71</sup> Early sexual debut is associated with condom non-use among both male and female adolescents.<sup>72</sup>

### **Adverse childhood experiences and sexual health outcomes among sexual minorities**

Some populations have been identified to be “high-risk” for early sexual initiation, including sexual minorities (e.g., individuals who identify as bisexual, homosexual, or transgendered). Sexual minorities tend to have earlier sexual debut compared to heterosexuals.<sup>73,74</sup> Males who identify as homosexual or bisexual have an earlier mean age of sexual debut compared to males who identify as heterosexual.<sup>73</sup> Bisexual and lesbian women are also younger at heterosexual debut, are more likely to have multiple sexual partners, and are more likely to report sexual abuse by a male partner compared to heterosexual women.<sup>74</sup> However, bisexual women reported the earliest sexual debut compared to homosexual and heterosexual women.<sup>74</sup>

Some populations have been identified to be “high-risk” for early sexual initiation. For example, sexual minorities tend to have earlier sexual debut compared to heterosexual populations.<sup>73,74</sup> Males who identify as homosexual or bisexual have an earlier mean age of sexual debut compared to males who identify as heterosexual.<sup>73</sup> Bisexual and lesbian women also report being younger at heterosexual debut, having multiple sexual partners, and were more likely to report sexual abuse by a male partner compared to heterosexual women.<sup>74</sup> However,

bisexual women reported the earliest sexual debut compared to homosexual and heterosexual women.<sup>74</sup>

Sexual minorities are disproportionately exposed to ACEs.<sup>75,76</sup> Among men who have sex with men, sexual debut before age 16 was associated with exchanging sex for drugs or money, marijuana use, emotional and psychological problems associated with substance use, and suicide attempts.<sup>77</sup> For example, childhood sexual abuse and risky family environment, which included witnessing parental violence, relationship strain between respondent and one or both parents, or living with a problem drinker in the household, were significantly associated with identifying as a sexual minority.<sup>75</sup> Women who identified as a sexual minority tended to have fewer close friends, younger fathers, higher rates of physical abuse compared to heterosexual women. However, this association was not observed in men.<sup>75</sup> Another study showed that gay, lesbian, and bisexual adults were more likely to be exposed to child abuse (physical or sexual) and residential instability (e.g., homelessness or being forced out of their homes by parents/caregivers) compared to heterosexuals; bisexual adults were also more likely to have been abused relative to heterosexuals.<sup>76</sup> Together these findings suggest that the association between ACEs and age at sexual debut may differ based on sexual orientation.

A more in-depth understanding of modifiable risk factors of early sexual debut<sup>78</sup> is needed so as to effectively target the populations-at-risk to prevent risky sexual behaviors. By understanding if and how specific ACEs are associated with early sexual debut, these ACEs may be addressed in sexual health programs with a focus on delaying sexual debut, which may help to reduce consequent risky sexual behavior. To date, very few studies have examined the association between ACEs, such as neglect and age at sexual debut. In addition, little, if any research has examined the association between ACEs and age at sexual debut by sex and sexual

orientation among a nationally representative sample of the US. It is important to determine if there are disparities in the relationships between different types of ACEs and age at sexual debut by sex and sexual orientation to determine what adverse events may be important risk factors for early sexual debut among specific populations.

### **Disparities by sex and sexual orientation**

Sex disparities have been reported in the impact of ACEs on adverse outcomes.<sup>79-81</sup> For example, sex disparities have been reported in the association between ACEs and adult hopelessness.<sup>80</sup> This association remained statistically significant in women but not in men after adjusting for age, marital status, education, employment status, and subjective financial situation. Differences have also been seen in the prevalence of ACEs between males and females.<sup>81</sup> Girls more often experience sexual abuse, and more girls compared to boys report being affected by parental psychiatric problems (24% vs. 13%). However, boys are more likely to report parental divorce, parental unemployment and parental death.<sup>81</sup> Significant differences by sex have been observed for the association between early sexual initiation and risk behaviors including lifetime number of partners, pregnancy involvement, ever forcing a partner to have sex and condom use.<sup>79</sup> However, some studies have not found sex differences. No statistically significant differences between males and females were observed in a study examining the impact of ACEs on overall health, depressive symptoms, and tobacco, alcohol and marijuana use.<sup>82</sup>

Sexual orientation may also be a potential effect measure modifier in the association between ACEs and age at sexual debut. Although studies have shown that sexual minority populations tend to report more adverse events during childhood<sup>75,76</sup> and also tend to report

earlier age at sexual debut,<sup>73,74</sup> to date, no study has examined this potential effect measure modification in the association between ACEs and age at sexual debut.

### **Present investigation**

A more in-depth understanding of modifiable risk factors of early sexual debut is needed so as to effectively target the populations-at-risk to prevent risky sexual behaviors.<sup>78</sup> By understanding if and how specific ACEs are associated with early sexual debut, research can point to ways in which ACEs can be addressed in sexual health programs for adolescents. To date, few studies have examined the association between ACEs and age at sexual debut, and little is known about this relationship for sexual minorities. In addition, few studies have examined these associations using a nationally representative sampling frame, and thus it is unclear how extant findings apply to the wider US. It is important to investigate disparities in the relationships between qualitatively distinct types of ACEs (e.g., neglect, sexual abuse, witnessing domestic violence) and age at sexual debut by both sex and sexual orientation to determine whether specific adverse events may be more potent risk factors for early sexual debut among specific populations. The aim of this study will be to examine the sex and sexual orientation disparities in the association between ACEs and age at sexual debut.

## **METHODS**

### **Ethics Statement**

The Virginia Commonwealth University Institutional Review Board deemed the current study exempt as de-identified, secondary data were used.

### **Data Source**

Data were obtained from Wave 2 of the National Epidemiologic Survey on Alcohol-Related Conditions (NESARC). The NESARC was funded by the National Institute on Alcohol Abuse and Alcoholism with support from the National Institute on Drug Abuse.<sup>52</sup> The main aims of NESARC were to determine the extent of substance use and other mental disorders and to estimate treatment service needs in the general population.<sup>52</sup>

Wave 2, fielded in 2004-2005,<sup>53</sup> was a follow-up interview of respondents from Wave 1. For Wave 1 of the study, which was fielded in 2001-2002,<sup>53</sup> a multistage sampling design resulted in a representative sample of the non-institutionalized population 18 years and older who were living in the US. Data were used from Wave 2 only as Wave 1 did not include questions on ACE variables. The NESARC obtained data using structured computer-assisted personal interviewing. The survey instrument computer software consisted of built-in skip patterns, logic and consistency checks.<sup>83</sup> Experienced lay interviewers from the US Census Bureau administered the interviews.<sup>83</sup> Interviewers provided participants with written information about the survey and obtained consent before conducting interviews.

### **Sample Population**

The NESARC used the “Group Quarters Inventory” from the US Bureau of Census 2000 to obtain information from military personnel living off base, boarding houses, rooming houses, nontransient hotels and motels, shelters, facilities for housing workers, college quarters, and group homes.<sup>54</sup> However, people residing in homeless shelters were excluded. NESARC also included Spanish speakers<sup>52</sup> and oversampled Black and Hispanic households.<sup>54</sup> These households were oversampled due to these subgroups typically being underrepresented in surveys with a focus on comorbidity.<sup>54</sup> Sample weights were available for each observation.

## **Operational Definition of Adverse Childhood Experiences**

ACEs were operationalized by questions asking about experiences during childhood: 1) *Neglect*: if a respondent was left alone or unsupervised before age 10, went without things needed (clothes, school supplies), went hungry or failed to get medical treatment; 2) *Physical/psychological abuse*: if a parent or caregiver insulted or said hurtful things to the respondent, threatened to hit or throw something at the respondent, made respondent fear that they would be physically hurt or push, grabbed, shoved, slapped or hit the respondent, or hit the respondent causing marks, bruises or injury; 3) *Sexual abuse*: if an adult or other person had touched the respondent sexually, had the respondent touched him/her sexually, attempted to have sex with the respondent, or had sex with the respondent; 4) *Parental violence*: if the respondent witnessed his/her father or other adult male push, grab, slap, or throw something at the mother, hit mother with a fist or something hard, repeatedly hit mother for at least a few minutes, threaten mother with a knife/gun or use it to hurt her. These ACEs were analyzed in binary format (Yes vs. No) and Likert Scale format: “Very often”, “Fairly often”, “Sometimes”, “Almost never” and “Never”. *Parental incarceration/psychopathology* was determined from questions asking if, before 18 years old, the respondent had lived with a parent or other adult who was a problem drinker, abused drugs, had been incarcerated, or had a mental illness, or had attempted and/or committed suicide. These questions elicited a binary response (Yes vs. No).

## **Operationalization of Age at Sexual Debut and Effect Measure Modification**

Age at sexual debut was operationalized by the question “How old were you when you first had sex/sexual intercourse, or have you never had sexual intercourse?” Self-reported age at sexual debut has been used in several prior studies,<sup>24,45,70,79</sup> and computer-assisted interviewing, as

used in the NESARC, has been found to result in increased rates of reporting sensitive behaviors,<sup>84</sup> such as age at sexual debut.

Age at sexual debut was defined as <13, 13-14, and 15-17 years among men and women to examine age at first sex as a preteen (<13), younger teenager (13-14) and older teenager (15-17). Age at sexual debut was defined as ≤14 and 15-17 for analyses examining the relationship between ACEs and sexual debut among heterosexual, bisexual, men who have sex with men (MSM) and women who have sex with women (WSW) populations. For analyses stratifying by sexual orientation, the age categories <13 and 13-14 years were combined to form one category (≤14 years) due to the small number of sexual minority respondents (bisexual, MSM and WSW) reporting age at sexual debut <13 years.

### **Potential Confounders**

Potential confounders that were considered are associated with ACEs and age at sexual debut as reported in the literature. Confounders that were considered included: age at interview (continuous),<sup>24,79</sup> race/ethnicity (Black, American Indian/Alaskan Native, Asian/Native Hawaiian/Other Pacific Islander, Hispanic vs. White),<sup>24,79</sup> income (<\$15,000, \$15,000-<\$50,000, vs. \$50,000), education (<High school, High School vs. >High School), insurance status (None, public vs. private) and marital status (Not married vs. married).<sup>45</sup> Statistically significant differences in the exposure and nonexposure to ACEs have been reported by age, race/ethnicity, annual household income, marital status and insurance status.<sup>4</sup> Racial/ethnic and sex disparities have also been shown in age at sexual debut.<sup>85</sup> For example, Black males tend to report earlier sexual debut compared to Asian, Hispanic and White males and females. Asian males and females tend to report later sexual debut compared to other racial/ethnic groups. These findings



may have resulted due to defined social expectations based on specific sex and racial groups as defined in different cultures and communities.<sup>85,86</sup>

## **Analytic Approach**

Respondents were not eligible if they answered “don’t know” or were missing on all ACE questions or reported never having sex (2,929, 8.5%). The resultant sample was (31,724). Weighting variables were used to account for weighting procedures used in the survey. Two separate sets of analyses using SAS 9.4 (SAS Institute, Cary, NC) were conducted:

- 1) *Logistic regression* was used to determine the association between ACE domains and age at sexual debut (before 18 years of age). ACE domains were operationalized as binary variables (yes vs. no). Model fit was assessed using Akaike Information Criterion (AIC), Bayesian Information Criterion (BIC) and -2 Log Likelihood values.
- 2) *Linear regression* was used to determine the association between ACE domains and age at sexual debut using the latter as a continuous variable. ACE domains were analyzed as Likert scale variables. Linearity between age at sexual debut and ACEs were assessed. Analyses were stratified by sex and sexual orientation. Model fit was assessed using adjusted  $R^2$ . Cook’s distance was calculated for each multiple linear ACE model, and was plotted with each observation. Graphs were visually observed to determine outliers and specific cut-off points in each model. Outliers that had a cook’s distance value above these cut-offs were excluded and the linear regression models were re-analyzed.

## **RESULTS**

Overall, 62.2% of the eligible population was exposed to at least one ACE. **Table 2.1** shows the distribution of sociodemographic characteristics, age at sexual debut, and sexual orientation in the overall sample and across ACE exposure groups. Approximately 50.4% of respondents who were exposed to ACEs and 54.7% unexposed to ACEs were women. About 49.6% of respondents exposed to ACEs were men while 45.3% unexposed to ACEs were men. Approximately 3.0% reported sexual debut at <13 years, 6.9% between 13 and 14 years, 34.8% between 15 and 17 years, and 55.3 % at 18 years or older. Among respondents exposed to ACEs, 98.0% identified as heterosexuals, 0.7% as MSM, 0.5% as WSW and 0.8% as bisexuals. Among respondents unexposed to ACEs, 99.1% identified as heterosexuals, 0.4% as MSM, 0.2% as WSW, 0.3% as bisexuals.

**Table 2.2** shows the distribution of sociodemographic characteristics and ACE exposure across age categories of sexual debut (<13, 13-14, 15-17, ≥18). Two-thirds of respondents reporting sexual debut at <13 years and 13-14 years were men (64.4% and 62.9%, respectively). About eight in ten respondents reporting sexual debut at <13 years reported being exposed to ACEs (85.0%) while 57.1% of respondents reporting sexual debut at 18 or older reported ACE exposure. Approximately 2.4% and 1.8% of respondents reporting sex at <13 were MSM and bisexual respondents respectively. However, 0.5% of respondents reporting age at sexual debut at 18 years or older were MSM and 0.5% were bisexual respondents. There were statistically significant differences in age at sexual debut by sex, age, race/ethnicity, income, education, insurance status, marital status and exposure to ACEs.

The associations between specific ACE domains (neglect, physical/psychological abuse, sexual abuse, parental violence, and parental incarceration and psychopathology) and early age at sexual debut (<13, 13-14, 15-17) compared to respondents with age at sexual debut at 18 years

old or older by sex are shown in **Table 2.3**. After adjusting for age, race/ethnicity, income, education, insurance and marital status, men who were neglected as children were 2.7 times as likely than men who were not exposed to any ACEs to have sexual debut before age 13 (OR: 2.67; 95% CI: 2.28 – 3.12). However, women who were neglected as children were 31.5 times as likely to have sexual debut before age 13 (OR: 31.5; 95% CI: 24.5 – 40.7) compared to women unexposed to ACEs. Men who were sexually abused had 9.9 times the likelihood as men who were not exposed to ACEs to have sexual debut before age 13 (OR: 9.90; 95% CI: 8.09 – 12.1). However, women who were sexually abused were 90.5 times as likely to have sexual debut before age 13 (OR: 90.5; 95% CI: 70.6 – 116.0). Men who witnessed parental violence were approximately four times as likely to have age at sexual debut before age 13 compared to men unexposed to ACEs (OR: 3.97; 95% CI: 3.37 – 4.67). However, women who witnessed parental violence were 41.4 times as likely to witness parental violence compared to women who were unexposed to ACEs (OR: 41.4; 95% CI: 32.4 – 53.0). Women who were exposed to parental incarceration and psychopathology as children were almost 30 times as likely as women not exposed to ACEs to have their sexual debut before age 13 (OR: 29.8; 95% CI: 23.5 – 37.7). However, men exposed to parental psychopathology were 3.46 times as likely as men not exposed to ACEs to have their sexual debut before age 13 (OR: 3.46; 95% CI: 2.93 – 4.09).

The associations between specific ACE domains and early age at sexual debut ( $\leq 14$ , 15-17) by sexual orientation are shown in **Table 2.4**. After adjusting for age, race/ethnicity, income, education, insurance and marital status, among heterosexual respondents, those who were exposed to sexual abuse were 6.6 times as likely to have their sexual debut at age 14 or younger (OR: 6.63; 95% CI: 6.09 – 7.21). However, MSM respondents exposed to sexual abuse were 122 times as likely as MSM respondents not exposed to ACEs to have their sexual debut at age

14 or younger (OR: 122.2; 95% CI: 64.4 – 231.5). Heterosexual respondents who were exposed to parental incarceration and psychopathology were approximately 3.5 times as likely to have their sexual debut at age 14 or younger compared to heterosexual respondents who were not exposed to ACEs (OR: 3.49; 95% CI: 3.23 – 3.76). However, WSW and MSM respondents who were exposed to parental incarceration and psychopathology were 13.7 times and 20.1 times as likely, respectively, to have their sexual debut at age 14 or younger compared to WSW and MSM respondents who were not exposed to ACEs (OR: 13.7; 95% CI: 10.1 – 18.6 for WSW; OR: 20.1; 95% CI: 12.1 – 33.4 for MSM).

**Table 2.5** shows the linear regression results depicting the associations between ACEs and age at sexual debut by sex and sexual orientation. After controlling for age, race/ethnicity, income, education, insurance and marital status, men, women, heterosexual and bisexual respondents who were exposed to sexual abuse had a two-year difference in sexual debut ( $\beta$ : -2.05; 95% CI: -2.57, -1.53 for men;  $\beta$ : -2.11; 95% CI: -2.32, -1.89 for women;  $\beta$ : -1.95; 95% CI: -2.16, -1.75 for heterosexual respondents; and  $\beta$ : -2.22; 95% CI: -3.03, -1.41 for bisexual respondents). MSM and WSW respondents who were exposed to sexual abuse reported sexual debut nearly three years earlier than those who were not exposed to ACEs ( $\beta$ : -2.87; 95% CI: -4.06, -1.69 for MSM respondents;  $\beta$ : -2.57; 95% CI: -3.16, -1.97 for bisexual respondents). Heterosexual respondents, and men and women exposed to parental incarceration and psychopathology had about a one-year difference in age at sexual debut ( $\beta$ : -1.22; 95% CI: -1.34, -1.10 for heterosexual respondents;  $\beta$ : -1.41; 95% CI: -1.56, -1.26 for men;  $\beta$ : -0.99; 95% CI: -1.18, -0.80 for women). However, bisexual respondents exposed to parental incarceration and psychopathology had a three-year difference ( $\beta$ : -3.09; 95% CI: -5.15, -1.02) in age at sexual

debut. After excluding outliers, some estimates and 95% CIs were changed slightly in magnitude, but the directions of the point estimates remained the same (**Appendix Table 2.3**).

## DISCUSSION

Overall, ACEs (neglect, physical/psychological abuse, sexual abuse, parental violence, and parental incarceration and psychology) were associated with early age at sexual debut, both in terms of relative age at initiation and absolute age (e.g., sexual debut as a pre-teen). The association was generally stronger for women compared to men and was stronger for sexual minorities compared to heterosexual respondents. To our knowledge, this is the first study to examine the relationship between ACEs and age at sexual debut by sexual orientation.

### *Disparities in relationships between ACEs and sexual debut for men and women*

Sex disparities have been reported in the impact of ACEs on adverse outcomes.<sup>79-81</sup> The associations between ACEs and earlier age at sexual debut in the current study were stronger among women compared to men. The stronger associations for women compared to men may suggest that women may be more susceptible to the effect of adverse childhood events on risky sexual behavior such as very early age at sexual debut. These adverse childhood experiences may be reflective of not only “fragile families” (families with unmarried parents)<sup>87</sup> but further instability and unstable environments for children. As ACEs tend to be interrelated rather than occurring independently,<sup>5</sup> this instability may result in a higher risk of separation of the family. Separation of families may lead to the absence of father in the home. Father absence has been linked to earlier sexual debut in girls, but not in boys, and is also associated with increased risky sexual behavior in girls, but not in boys.<sup>88</sup> The current findings showing an association between ACEs and early sexual debut among women support findings from Hillis et al. (2001). Hillis et

al. showed an association between physical abuse, verbal (psychological) abuse, sexual abuse, witnessing parental violence, living with incarcerated family member, household substance abuse and mental illness and sexual debut at 15 or younger among women.<sup>24</sup> The current study examined these relationships for men and women and adjusted for age, race/ethnicity, income, education, insurance and marital status, while Hillis et al., only examined these associations among women and adjusted for age and race.

#### *Disparities in relationships for ACEs and sexual debut by sexual orientation*

Sexual minorities are disproportionately exposed to ACEs.<sup>75,76</sup> Associations between ACE domains and age at sexual debut differed by sexual orientation. The strongest association between physical/psychological abuse, sexual abuse, and parental incarceration and psychopathology and age at sexual debut  $\leq 14$  years was observed among MSM. However, bisexual respondents had the strongest association between witnessing parental violence and age at sexual debut  $\leq 14$  years. Sexual abuse was strongly associated with early age of sexual debut for all groups, and this relationship was especially pronounced for sexual minority populations. The results suggest that sexual minority populations such as MSM exposed to abuse and living with a parent or adult who has been incarcerated or has psychiatric or substance use disorders as children have the strongest odds for early sexual debut. However, exposure to parental violence (e.g., male-perpetrated violence towards the maternal figure in the home) may impact bisexual populations to a greater extent than other populations. The association between ACEs and age at sexual debut may be higher for sexual minority populations as they are also more likely to report ACEs compared to heterosexual populations<sup>75,76</sup> and tend to initiate sex earlier compared to heterosexual populations.<sup>73,74</sup> Due to being exposed to ACEs, sexual minorities may also initiate sex earlier in an attempt to obtain more personal connections as adolescents.

The overall linear model showed a two-year difference in age at sexual debut among respondents exposed to sexual abuse. However, Brown et al. (2004) showed an approximate one-year difference in age at sexual debut among respondents who were victims of at least two episodes of sexual abuse but there was no statistically significant association seen between having one episode of sexual abuse and age at sexual debut.<sup>89</sup> Sexual abuse in the current study was analyzed in a Likert scale format (“Very often”, “Fairly often”, “Sometimes”, “Almost never” and “Never”) and did not differentiate between one episode of sexual abuse and having at least two episodes of sexual abuse. These disparate definitions of operationalizing sexual abuse may explain the difference in findings.

Strong associations were seen between parental incarceration and psychopathology and early age at sexual debut among sexual minorities. Few studies have examined this association,<sup>24,90</sup> with conflicting results. Ramiro et al. (2010) did not find an association between incarceration of a household member and sexual debut at age 16 or younger.<sup>90</sup> Our overall results showed an association between parental incarceration and psychopathology and sexual debut before 18 years of age. Different study populations may have explained this difference in findings as Ramiro et al. (2010) examined this association in a developing country and the current study assesses this relationship among a nationally representative sample in the US. Incarceration and psychopathology of parents or adults in the household may be an indicator of lack of parental monitoring or supervision, which may also be proxies for parenting processes such as parental warmth and parental knowledge. As parents may struggle with psychiatric and substance use disorders, and/or are incarcerated and spend less time in the home, there may be less parenting processes and reduced parental monitoring. One study examining parental processes and risky sexual behavior found that parental warmth, a measure of a child’s

perception of his/her relationship with each parent, and parental knowledge, a measure of a child's perception of how well his/her parents knew about their whereabouts, were found to have a negative association with sexual onset among adolescents.<sup>91</sup> Parental monitoring has also been shown to be a protective factor of early age at sexual debut.<sup>92,93</sup>

The current study has several strengths. First, we examined a wide range of ACEs using a nationally-representative sampling frame. Second, the study considered two different methodologic approaches: linear regression and logistic regression. By using these methods, age at sexual debut was examined both as a continuous and a categorical variable which allowed us to determine the association between ACEs and sexual debut as a preteen, as a younger teen and as an older teen compared to an adult.

However, there are some limitations. The small numbers of sexual minorities in the sample warrant caution in the interpretation of findings for sexual minority populations. However, the use of linear regression models helped to allowed for using the data with little or no information loss. Self-report of sensitive topics such as ACEs and sexual behavior such as age at first sexual debut are commonplace in the literature. This predominance of using self-report measures of ACEs and sexual behavior is due mostly to difficulty in obtaining physiological data related to these variables.<sup>94</sup> Nevertheless, computer-assisted personal interviewing (CAPI) was used as the mode of survey administration in NESARC<sup>83</sup> and has been shown to increase rates of reporting sensitive behaviors.<sup>84</sup> It is possible that there are biases in the reporting of ACEs. Hardt and Rutter (2004) suggest that there is substantial measurement error and false negatives in the reporting of ACEs.<sup>95</sup> Nevertheless, false positive reports are rare. Exposed and unexposed groups were respondents who were exposed to ACEs and those who were not exposed to any ACE, respectively, as has been done in previous studies.<sup>96-98</sup> However,



this comparison may represent two different populations as populations not exposed to any ACE may exclude respondents who may be unexposed to a specific ACE. Some ACEs such as parental separation or divorce were not included in the survey, and hence were not included in the current study. The question, which asked about age at sexual debut, unfortunately, did not differentiate between consensual and forced sexual intercourse, which may have important implications for the association between ACEs and first sexual intercourse. It is possible that the associations between ACEs and age at sexual debut may vary depending on whether first sexual intercourse was forced or consensual. The question, which was used to operationalize age at sexual debut, also did not differentiate between vaginal, oral and anal sex as was examined previously.<sup>99</sup> Results examining results by sexual orientation should also be interpreted with caution due to the relatively small sample size of homosexual and bisexual respondents.

## CONCLUSIONS

Sexual health education programs aimed at delaying sexual debut should consider addressing ACEs that may have been experienced especially during early childhood. However, interventions that are focused on reducing or preventing exposure to ACEs<sup>24</sup> such as home visitation of health care providers during early childhood years<sup>100</sup> may help to prevent ACEs. Our findings indicate that adverse experiences in childhood, such as neglect, physical, psychological and sexual abuse, witnessing parental violence and parental incarceration and psychopathology, need to be understood within a life course framework. Our results also indicate that programs that either specifically target or more directly address the needs of women and sexual minority populations are warranted. Further research addressing the risk factors of sexual health behaviors of sexual minority populations, especially among WSW, is needed.

**Table 2.1. Distribution of Characteristics in Overall Sample and across ACE Exposure Groups**

	<b>Overall N = 31,724 N (Weighted %)</b>	<b>ACEs N = 20,011 N (Weighted %)</b>	<b>No ACEs 11,713 N (Weighted %)</b>	<b>P-value<sup>a</sup></b>
<b>Sex</b>				
Men	13,357 (48.0)	8,710 (49.6)	4,647 (45.3)	<0.0001
Women	18,367 (52.0)	11,301 (50.4)	7,066 (54.7)	
<b>Age</b>				
18-34	7,375 (25.2)	4,575 (24.5)	2,800 (26.3)	<0.0001
35-49	10,346 (31.9)	6,928 (34.0)	3,418 (28.4)	
50+	14,003 (42.9)	8,508 (41.5)	5,495 (45.3)	
Mean (SD)	48.6 (0.10)	47.7 (0.11)	50.3 (0.17)	<0.0001
<b>Race/Ethnicity</b>				
White, non-Hispanic	18,497 (71.2)	11,686 (71.4)	6,811 (70.9)	<0.0001
Black, non-Hispanic	6,075 (11.1)	3,941 (11.5)	2,134 (10.5)	
AI/AN, non-Hispanic	533 (2.23)	382 (2.5)	151 (1.7)	
Asian/NH/PI, non-Hispanic	806 (3.91)	432 (3.3)	374 (5.0)	
Hispanic, any race	5,813 (11.5)	3,570 (11.3)	2,243 (11.9)	
<b>Income</b>				
<\$25,000	9,688 (25.4)	5,842 (24.6)	3,846 (26.8)	<0.0001
\$25,000 - <\$50,000	9,031 (27.8)	5,687 (27.4)	3,344 (28.4)	
\$50,000 - <\$80,000	6,694 (23.2)	4,346 (23.7)	2,348 (22.4)	
\$80,000-<\$100,000	2,268 (8.2)	1,460 (8.2)	808 (8.1)	
≥\$100,000	4,043 (15.4)	2,676 (16.0)	1,367 (14.3)	
<b>Education</b>				
<High School	4,852 (13.5)	2,855 (12.8)	1,997 (13.0)	<0.0001
High School	8,622 (27.4)	5,292 (26.8)	3,330 (27.8)	
>High School	18,250 (59.1)	11,864 (60.4)	6,386 (59.2)	
<b>Insurance</b>				
Yes	27,780 (88.0)	17,566 (88.1)	10,214 (87.9)	0.2869
No	3,922 (12.0)	2,431 (11.9)	1,491 (12.1)	
<b>Marital Status</b>				
Married/Cohabiting	17,681 (65.4)	11,165 (65.7)	6,516 (65.0)	0.0956
Widowed/Divorced/Separated	8,415 (18.9)	5,248 (18.8)	3,167 (19.3)	
Never Married	5,628 (15.6)	3,598 (15.6)	2,030 (15.7)	
<b>Age at Sexual Debut</b>				
<13	1,039 (3.0)	880 (4.1)	159 (1.2)	<0.0001
13-14	2,274 (6.9)	1,708 (8.3)	566 (4.6)	
15-17	11,203 (34.8)	7,458 (36.9)	3,745 (31.3)	
18+	17,208 (55.3)	9,965 (50.7)	7,243 (62.9)	
<b>Sexual Orientation</b>				
Heterosexual	31,017 (98.5)	19,458 (98.0)	11,559 (99.1)	<0.0001
MSM	186 (0.5)	142 (0.7)	44 (0.4)	
WSW	143 (0.4)	114 (0.5)	29 (0.2)	
Bisexual	227 (0.6)	185 (0.8)	42 (0.3)	

<sup>a</sup>P-value comparing respondents exposed and unexposed to ACEs.

**Table 2.2. Distribution of Characteristics across Age at Sexual Debut Categories**

	<b>&lt;13</b> <b>N = 1,039</b> <b>N (Weighted%)</b>	<b>13-14</b> <b>N = 2,274</b> <b>N (Weighted%)</b>	<b>15-17</b> <b>N = 11,203</b> <b>N (Weighted%)</b>	<b>18+</b> <b>N = 17,208</b> <b>N (Weighted%)</b>
<b>Sex</b>				
Men	631 (64.4)	1,309 (62.9)	5,152 (51.7)	6,265 (42.9)
Women	408 (35.6)	965 (37.1)	6,051 (48.3)	10,943 (57.1)
<b>Age</b>				
18-34	267 (29.4)	826 (40.0)	3,278 (31.0)	3,004 (19.4)
35-49	360 (35.0)	721 (32.9)	4,104 (36.4)	5,161 (28.8)
50+	412 (35.6)	727 (27.1)	3,821 (32.6)	9,043 (51.8)
Mean (SD)	46.7 (0.48)	43.1 (0.33)	44.8 (0.15)	52.0 (0.13)
<b>Race/Ethnicity</b>				
White, non-Hispanic	42 (54.4)	1,082 (61.7)	6,287 (70.1)	10,696 (74.0)
Black, non-Hispanic	377 (26.6)	628 (18.3)	2,504 (13.3)	2,566 (8.0)
AI/AN, non-Hispanic	34 (4.7)	47 (2.8)	219 (2.6)	233 (1.77)
Asian/NH/PI, non-Hispanic	9 (0.9)	26 (1.7)	156 (2.0)	615 (5.53)
Hispanic, any race	187 (13.5)	491 (15.5)	2,037 (11.9)	3,098 (10.7)
<b>Income</b>				
<\$25,000	453 (39.0)	843 (32.0)	3,374 (25.2)	5,018 (24.0)
\$25,000 - <\$50,000	278 (28.4)	664 (29.2)	3,248 (27.9)	4,841 (27.5)
\$50,000 - <\$80,000	181 (19.0)	429 (21.1)	2,409 (24.0)	3,675 (23.2)
\$80,000-<\$100,000	48 (4.7)	138 (7.4)	807 (8.2)	1,275 (8.5)
≥\$100,000	79 (8.9)	200 (10.3)	1,365 (14.7)	2,399 (16.8)
<b>Education</b>				
<High School	216 (20.2)	541 (23.0)	1,920 (15.4)	2,175 (10.7)
High School	329 (34.6)	663 (29.6)	3,242 (29.4)	4,388 (25.5)
>High School	494 (45.2)	1,070 (47.4)	6,041 (55.2)	10,645 (63.8)
<b>Insurance</b>				
Yes	859 (81.0)	1,858 (80.9)	9,604 (86.1)	15,459 (90.5)
No	180 (19.0)	416 (19.1)	1,590 (13.9)	1,736 (9.5)
<b>Marital Status</b>				
Married/Cohabiting	493 (56.1)	1,180 (60.2)	6,138 (63.7)	9,870 (67.7)
Widowed/Divorced/Separated	316 (23.5)	576 (19.0)	2,843 (18.5)	4,680 (19.0)
Never Married	230 (20.3)	518 (20.8)	2,222 (17.8)	2,658 (13.4)
<b>ACE Exposure</b>				
Yes	880 (85.0)	1,708 (74.7)	7,458 (66.1)	9,965 (57.1)
No	159 (15.0)	566 (25.3)	3,745 (33.9)	7,243 (42.9)
<b>Sexual Orientation</b>				
Heterosexual	975 (94.9)	2,210 (98.2)	10,983 (98.5)	16,849 (98.7)
MSM	19 (2.4)	18 (0.6)	51 (0.4)	98 (0.5)
WSW	10 (0.9)	7 (0.3)	52 (0.3)	74 (0.4)
Bisexual	22 (1.8)	27 (0.9)	78 (0.7)	100 (0.5)

<sup>a</sup>P-value comparing respondents exposed and unexposed to ACEs were all <0.0001

**Table 2.3. Association between ACE Factors and Age at Sexual Debut by Sex using Logistic Regression**

	<13 (N=1,039)		13-14 (N=2,278)		15-17 (N=11,203)	
	OR 95% CI	*Adjusted OR 95% CI	OR 95% CI	*Adjusted OR 95% CI	OR 95% CI	*Adjusted OR 95% CI
<b>Overall (N=31,785)</b>						
Neglect	<b>5.64</b> (5.04 – 6.31)	<b>5.55</b> (4.95 – 6.22)	<b>2.68</b> (2.50 – 2.87)	<b>2.59</b> (2.40 – 2.80)	<b>1.53</b> (1.46 – 1.59)	<b>1.52</b> (1.46 – 1.59)
Physical/Psychological	<b>4.61</b> (4.14 – 5.12)	<b>4.80</b> (4.31 – 5.35)	<b>2.36</b> (2.20 – 2.53)	<b>2.43</b> (2.24 – 2.63)	<b>1.50</b> (1.45 – 1.55)	<b>1.50</b> (1.44 – 1.59)
Sexual	<b>16.6</b> (14.8 – 18.7)	<b>16.1</b> (14.2 – 18.3)	<b>4.68</b> (4.31 – 5.08)	<b>4.52</b> (4.12 – 4.95)	<b>2.02</b> (1.89 – 2.15)	<b>1.97</b> (1.84 – 2.10)
Parental Violence	<b>8.58</b> (7.60 – 9.68)	<b>7.69</b> (6.79 – 8.73)	<b>3.81</b> (3.55 – 4.08)	<b>3.44</b> (3.16 – 3.75)	<b>1.89</b> (1.79 – 1.99)	<b>1.77</b> (1.67 – 1.86)
Parental Incarceration and Psychopathology	<b>6.42</b> (5.70 – 7.23)	<b>6.09</b> (5.39 – 6.88)	<b>3.13</b> (2.90 – 3.38)	<b>2.95</b> (2.71 – 3.22)	<b>1.81</b> (1.75 – 1.87)	<b>1.70</b> (1.65 – 1.76)
<b>Men (N=13,383)</b>						
Neglect	<b>2.74</b> (2.36 – 3.18)	<b>2.67</b> (2.28 – 3.12)	<b>1.86</b> (1.69 – 2.05)	<b>1.82</b> (1.64 – 2.02)	<b>1.26</b> (1.19 – 1.33)	<b>1.27</b> (1.21 – 1.35)
Physical/Psychological	<b>2.45</b> (2.16 – 2.79)	<b>2.70</b> (2.35 – 3.10)	<b>1.68</b> (1.53 – 1.84)	<b>1.80</b> (1.62 – 2.01)	<b>1.23</b> (1.18 – 1.28)	<b>1.26</b> (1.20 – 1.31)
Sexual	<b>10.1</b> (8.51 – 12.0)	<b>9.90</b> (8.09 – 12.1)	<b>3.34</b> (2.91 – 3.82)	<b>3.09</b> (2.68 – 3.55)	<b>1.63</b> (1.49 – 1.78)	<b>1.66</b> (1.51 – 1.83)
Parental Violence	<b>4.60</b> (3.96 – 5.33)	<b>3.97</b> (3.37 – 4.67)	<b>2.73</b> (2.47 – 3.02)	<b>2.46</b> (2.19 – 2.76)	<b>1.55</b> (1.44 – 1.66)	<b>1.47</b> (1.37 – 1.58)
Parental Incarceration and Psychopathology	<b>3.78</b> (3.23 – 4.41)	<b>3.46</b> (2.93 – 4.09)	<b>2.35</b> (2.13 – 2.60)	<b>2.23</b> (2.01 – 2.49)	<b>1.56</b> (1.48 – 1.63)	<b>1.48</b> (1.41 – 1.56)
<b>Women (N=18,402)</b>						
Neglect	<b>31.8</b> (24.8 – 40.6)	<b>31.5</b> (24.5 – 40.7)	<b>4.26</b> (3.84 – 4.72)	<b>4.15</b> (3.72 – 4.64)	<b>1.76</b> (1.67 – 1.86)	<b>1.74</b> (1.64 – 1.85)
Physical/Psychological	<b>23.1</b> (18.1 – 29.5)	<b>23.2</b> (18.0 – 30.0)	<b>3.64</b> (3.27 – 4.04)	<b>3.70</b> (3.32 – 4.12)	<b>1.74</b> (1.67 – 1.81)	<b>1.70</b> (1.63 – 1.77)
Sexual	<b>94.0</b> (73.6 – 119.9)	<b>90.5</b> (70.6 – 116.0)	<b>9.14</b> (8.15 – 10.3)	<b>8.94</b> (7.85 – 10.2)	<b>2.52</b> (2.34 – 2.72)	<b>2.44</b> (2.26 – 2.65)
Parental Violence	<b>45.7</b> (36.0 – 57.9)	<b>41.4</b> (32.4 – 53.0)	<b>6.39</b> (5.72 – 7.14)	<b>5.85</b> (5.22 – 6.54)	<b>2.25</b> (2.13 – 2.39)	<b>2.07</b> (1.95 – 2.19)
Parental Incarceration and Psychopathology	<b>30.9</b> (24.5 – 39.0)	<b>29.8</b> (23.5 – 37.7)	<b>4.98</b> (4.47 – 5.55)	<b>4.84</b> (4.29 – 5.45)	<b>2.07</b> (1.98 – 2.16)	<b>1.95</b> (1.87 – 2.04)

\*Adjusted for age (continuous), race/ethnicity, income, education, insurance, and marital status; Comparison group consists of respondents with age of sexual debut  $\geq 18$ .

**Bolded numbers** represent statistical significance at  $p < 0.05$

Note: AIC and BIC values showed that the adjusted models were a better fit for the data compared to crude models (data not shown)

**Table 2.4. Association between ACE Factors and Age at Sexual Debut by Sexual Orientation using Logistic Regression**

	≤14 (N=3,313)		15-17 (11,203)		≤14 (3,313)		15-17 (11,203)	
	OR 95% CI	*Adjusted OR 95% CI	OR 95% CI	*Adjusted OR 95% CI	OR 95% CI	*Adjusted OR 95% CI	OR 95% CI	*Adjusted OR 95% CI
	<b>Heterosexual (N=31,017)</b>				<b>Bisexual (N=227)</b>			
Neglect	<b>3.18</b> (2.98 – 3.39)	<b>3.08</b> (2.87 – 3.31)	<b>1.52</b> (1.45 – 1.58)	<b>1.52</b> (1.45 – 1.59)	<b>21.0</b> (14.6 – 30.2)	<b>28.6</b> (15.3 – 53.2)	<b>2.47</b> (1.57 – 3.91)	<b>1.84</b> (1.02 – 3.32)
Physical/Psychological	<b>2.75</b> (2.58 – 2.93)	<b>2.84</b> (2.64 – 3.05)	<b>1.50</b> (1.46 – 1.55)	<b>1.50</b> (1.45 – 1.55)	<b>13.3</b> (8.82 – 20.2)	<b>7.23</b> (3.27 – 16.0)	<b>2.00</b> (1.29 – 3.08)	1.07 (0.70 – 1.62)
Sexual	<b>6.80</b> (6.32 – 7.32)	<b>6.63</b> (6.09 – 7.21)	<b>1.98</b> (1.86 – 2.12)	<b>1.94</b> (1.81 – 2.08)	<b>52.8</b> (36.7 – 76.1)	<b>70.4</b> (32.9 – 150.6)	<b>4.74</b> (2.92 – 7.69)	<b>2.23</b> (1.24 – 8.90)
Parental Violence	<b>4.62</b> (4.32 – 4.95)	<b>4.19</b> (3.88 – 4.53)	<b>1.88</b> (1.79 – 1.98)	<b>1.77</b> (1.68 – 1.87)	<b>28.1</b> (17.5 – 45.1)	<b>224.3</b> (89.2 – 564.2)	<b>3.09</b> (2.13 – 4.47)	1.24 (0.68 – 2.26)
Parental Incarceration and Psychopathology	<b>3.70</b> (3.45 – 3.96)	<b>3.49</b> (3.23 – 3.76)	<b>1.81</b> (1.75 – 1.87)	<b>1.71</b> (1.65 – 1.77)	<b>26.0</b> (17.5 – 38.7)	<b>9.17</b> (3.72 – 22.6)	<b>2.79</b> (1.78 – 4.37)	1.30 (0.65 – 2.62)
	<b>MSM (N=186)</b>				<b>WSW (N=143)</b>			
Neglect	<b>24.2</b> (18.1 – 32.2)	<b>20.9</b> (13.1 – 33.3)	<b>1.61</b> (1.17 – 2.22)	<b>1.40</b> (1.01 – 1.96)	<b>11.7</b> (8.89 – 15.4)	<b>9.16</b> (7.21 – 11.6)	<b>3.16</b> (2.20 – 4.54)	<b>3.06</b> (2.17 – 4.33)
Physical/Psychological	<b>12.5</b> (9.76 – 16.0)	<b>15.9</b> (11.0 – 22.8)	<b>0.76</b> (0.56 – 1.03)	<b>0.60</b> (0.44 – 0.81)	<b>8.91</b> (7.04 – 11.3)	<b>6.89</b> (5.18 – 9.17)	<b>2.36</b> (1.67 – 3.33)	<b>1.72</b> (1.17 – 2.51)
Sexual	<b>48.8</b> (30.3 – 78.6)	<b>122.2</b> (64.4 – 231.5)	<b>1.40</b> (0.85 – 2.32)	1.26 (0.82 – 1.95)	<b>23.7</b> (18.2 – 30.8)	<b>39.3</b> (28.2 – 54.9)	<b>5.00</b> (3.65 – 6.86)	<b>6.14</b> (4.07 – 9.26)
Parental Violence	<b>19.2</b> (14.0 – 26.4)	<b>13.4</b> (5.51 – 32.6)	1.16 (0.83 – 1.62)	<b>0.78</b> (0.63 – 0.96)	<b>24.9</b> (18.4 – 33.5)	<b>60.0</b> (31.2 – 83.2)	<b>4.32</b> (3.28 – 5.69)	<b>3.04</b> (1.92 – 4.81)
Parental Incarceration and Psychopathology	<b>15.3</b> (11.3 – 20.9)	<b>20.1</b> (12.1 – 33.4)	0.83 (0.59 – 1.17)	<b>0.65</b> (0.50 – 0.84)	<b>13.9</b> (10.7 – 18.0)	<b>13.7</b> (10.1 – 18.6)	<b>3.32</b> (2.37 – 4.63)	<b>2.49</b> (1.55 – 4.00)

\*Adjusted for age (continuous), race/ethnicity, income, education, insurance, and marital status  
Comparison outcome group consisted of respondents with age of sexual debut ≥18.

**Bolded numbers** represent statistical significance at p<0.05

Note: AIC and BIC values showed that the adjusted models were a better fit for the data compared to crude models (data not shown)

**Table 2.5. Association between ACE Factors and Age at Sexual Debut by Sex and Sexual Orientation using Linear Regression**

	$\beta$	95% CI	*Adjusted $\beta$	*Adjusted 95% CI	$\beta$	95% CI	*Adjusted $\beta$	*Adjusted 95% CI	
<b>Overall (N=31,785)</b>									
Neglect	<b>-1.03</b>	<b>-1.25, -0.81</b>	<b>-0.86</b>	<b>-1.07, -0.64</b>					
Physical/Psychological	<b>-0.88</b>	<b>-0.98, -0.78</b>	<b>-0.75</b>	<b>-0.86, -0.65</b>					
Sexual	<b>-2.21</b>	<b>-2.41, -2.01</b>	<b>-2.02</b>	<b>-2.22, -1.82</b>					
Parental Violence	<b>-0.92</b>	<b>-1.04, -0.80</b>	<b>-0.65</b>	<b>-0.76, -0.54</b>					
Parental Incarceration and Psychopathology	<b>-1.54</b>	<b>-1.65, -1.42</b>	<b>-1.24</b>	<b>-1.35, -1.12</b>					
<b>Men (N=13,383)</b>					<b>Women (N=18,402)</b>				
Neglect	<b>-0.76</b>	<b>-1.19, -0.34</b>	<b>-0.63</b>	<b>-1.07, -0.19</b>	<b>-1.25</b>	<b>-1.46, -1.03</b>	<b>-1.00</b>	<b>-1.20, -0.81</b>	
Physical/Psychological	<b>-0.87</b>	<b>-1.05, -0.69</b>	<b>-0.77</b>	<b>-0.96, -0.58</b>	<b>-0.91</b>	<b>-1.04, -0.79</b>	<b>-0.75</b>	<b>-0.87, -0.63</b>	
Sexual	<b>-2.17</b>	<b>-2.61, -1.72</b>	<b>-2.05</b>	<b>-2.57, -1.53</b>	<b>-2.36</b>	<b>-2.58, -2.13</b>	<b>-2.11</b>	<b>-2.32, -1.89</b>	
Parental Violence	<b>-1.04</b>	<b>-1.28, -0.80</b>	<b>-0.70</b>	<b>-0.94, -0.46</b>	<b>-0.96</b>	<b>-1.11, -0.82</b>	<b>-0.68</b>	<b>-0.81, -0.56</b>	
Parental Incarceration and Psychopathology	<b>-1.81</b>	<b>-1.97, -1.66</b>	<b>-1.41</b>	<b>-1.56, -1.26</b>	<b>-1.21</b>	<b>-1.41, -1.00</b>	<b>-0.99</b>	<b>-1.18, -0.80</b>	
<b>Heterosexuals (N=31,017)</b>					<b>Bisexuals (N=227)</b>				
Neglect	<b>-0.99</b>	<b>-1.21, -0.77</b>	<b>-0.81</b>	<b>-1.03, -0.60</b>	<b>-1.31</b>	<b>-2.02, -0.61</b>	<b>-0.83</b>	<b>-1.66, -0.001</b>	
Physical/Psychological	<b>-0.87</b>	<b>-0.98, -0.76</b>	<b>-0.74</b>	<b>-0.85, -0.64</b>	<b>-1.19</b>	<b>-1.79, -0.58</b>	<b>-1.07</b>	<b>-1.73, -0.41</b>	
Sexual	<b>-2.16</b>	<b>-2.37, -1.95</b>	<b>-1.95</b>	<b>-2.16, -1.75</b>	<b>-2.38</b>	<b>-3.14, -1.63</b>	<b>-2.22</b>	<b>-3.03, -1.41</b>	
Parental Violence	<b>-0.91</b>	<b>-1.03, -0.79</b>	<b>-0.65</b>	<b>-0.76, -0.54</b>	<b>-1.20</b>	<b>-1.76, -0.65</b>	<b>-0.52</b>	<b>-1.24, 0.20</b>	
Parental Incarceration and Psychopathology	<b>-1.52</b>	<b>-1.64, -1.40</b>	<b>-1.22</b>	<b>-1.34, -1.10</b>	<b>-4.40</b>	<b>-6.54, -2.26</b>	<b>-3.09</b>	<b>-5.15, -1.02</b>	
<b>MSM (N=186)</b>					<b>WSW (N=143)</b>				
Neglect	<b>-4.67</b>	<b>-7.53, -1.81</b>	<b>-4.16</b>	<b>-6.44, -1.88</b>	<b>-1.18</b>	<b>-1.82, -0.53</b>	<b>-0.79</b>	<b>-1.49, -0.09</b>	
Physical/Psychological	<b>-1.86</b>	<b>-2.73, -1.00</b>	<b>-2.00</b>	<b>-2.86, -1.14</b>	<b>-0.88</b>	<b>-1.40, -0.37</b>	<b>-0.92</b>	<b>-1.47, -0.37</b>	
Sexual	<b>-2.92</b>	<b>-4.28, -1.56</b>	<b>-2.87</b>	<b>-4.06, -1.69</b>	<b>-2.63</b>	<b>-3.15, -2.11</b>	<b>-2.57</b>	<b>-3.16, -1.97</b>	
Parental Violence	-1.91	-4.47, 0.66	-0.81	-2.70, 1.09	<b>-1.56</b>	<b>-2.27, -0.85</b>	<b>-0.85</b>	<b>-1.63, -0.07</b>	
Parental Incarceration and Psychopathology	<b>-2.40</b>	<b>-4.13, -0.66</b>	<b>-2.41</b>	<b>-4.08, -0.75</b>	<b>-2.90</b>	<b>-4.46, -1.35</b>	<b>-2.07</b>	<b>-3.64, -0.50</b>	

\*Adjusted for age (continuous), race/ethnicity, income, education, insurance, and marital status

**Bolded numbers** represent statistical significance at  $p < 0.05$

Note: Adjusted  $R^2$  values showed that fully adjusted models were a better fit for the data compared to crude models (See **Appendix 2.4** and **Appendix 2.5**).

**Chapter 3: Adverse Childhood Experiences and Intimate Partner Violence  
Perpetration: Sex Differences and Similarities in Psychosocial Mediation**

## **Abstract**

**Background:** Six in ten people in the general population have been exposed to adverse childhood experiences (ACEs). Intimate partner violence (IPV) is a major public health problem in the US.

**Objective:** The main objective of this study was to assess sex differences in the role of posttraumatic stress disorder (PTSD), substance abuse, and depression as mediators in the association between ACEs and IPV perpetration.

**Methods:** Data were obtained from Wave 2 (2004-2005) of the National Epidemiologic Survey on Alcohol and Related Conditions. Structural equation modeling was used to determine the mediational role of PTSD, substance abuse and depression in the association between ACE constructs (neglect, physical/psychological abuse, sexual abuse, parental violence, and parental incarceration/psychopathology) and IPV perpetration.

**Results:** Among men, PTSD partially mediated the relationship between sexual abuse and IPV perpetration ( $z=0.004$ ,  $p=0.018$ ). However, among men and women, substance abuse fully mediated the relationship between physical and psychological abuse and IPV perpetration ( $z=0.011$ ,  $p=0.036$  for men;  $z=0.008$ ;  $p=0.049$ ).

**Conclusions:** IPV programs geared towards perpetrators should address abuse (sexual, physical and psychological), which occurred during childhood and recent substance abuse and PTSD. These programs should be implemented for men and women. Programs aimed at preventing abuse of children may help to reduce rates of depression and PTSD in adulthood, and subsequent IPV perpetration, and may help to prevent the cycle of adverse events experienced in the home.



## INTRODUCTION

Adverse childhood experiences (ACEs) are negative events experienced during childhood, including emotional, physical and sexual abuse, witnessing parental violence, or a family member's mental illness, incarceration or substance abuse.<sup>9,101</sup> Recent estimates show that six in ten adults in the general population have been exposed to at least one ACE growing up,<sup>4</sup> and studies indicate that exposure to ACEs is associated with elevated risk of numerous adverse health outcomes, including cancer,<sup>4,12</sup> cardiovascular disease,<sup>5,14</sup> and diabetes.<sup>5</sup> ACEs have also been linked to substance abuse,<sup>5,16,18,102,103</sup> depression,<sup>5,19,20,102</sup> and violence in relationships in adulthood.<sup>23</sup>

Intimate partner violence (IPV) is a major public health problem in the US.<sup>104</sup> IPV is defined as physical, sexual or psychological harm caused by a former or current intimate partner.<sup>105</sup> Approximately 36% of women and 29% of men in the US have been victims of IPV in their lifetime.<sup>104</sup> The medical and mental health costs, and loss of productivity as a result of IPV costs around \$5.8 billion every year.<sup>106</sup>

Numerous risk factors such as low academic achievement, unemployment, economic stress, mental disorders, illicit drug use, and child maltreatment are associated with IPV.<sup>107-111</sup> Child maltreatment and IPV often occur within the same household, and exposure to violence as a child, as a victim of physical or sexual abuse, or as a witness to IPV, increases the risk of both being a future victim and/or a future perpetrator of IPV.<sup>108</sup>

Research examining the association between ACEs and IPV perpetration in adulthood is scant. Nevertheless, studies have found that long-term parental separation due to adoption after age two, foster care, juvenile detention, living with relatives for six months or more, parent

mental illness, parent substance abuse, parent incarceration, witnessing parental violence, physical abuse, sexual abuse, neglect and economic adversity are associated with IPV perpetration among adolescents.<sup>43,109</sup> The association between ACEs and IPV perpetration may also be mediated by psychosocial factors.<sup>50</sup> Posttraumatic stress disorder (PTSD) has been found to mediate the association between ACEs and partner aggression.<sup>50</sup> ACEs are a risk factor for depression,<sup>112</sup> and overall mood or anxiety disorder in the past year.<sup>113</sup> Previous research has also shown a link between ACEs and substance abuse.<sup>5,16,18,102,103</sup>

The factors mediating the hypothesized link between ACEs and IPV perpetration are unknown. One conceptual framework that may elucidate the association between ACEs and IPV perpetration is the intrapersonal model approach. Intrapersonal models highlight factors that are internal to the perpetrator (as opposed to environmental factors external to the perpetrator) and may increase the tendency to perpetrate violence.<sup>114</sup> Using this model, the hypothesis is that this association may be partially mediated by internal psychosocial factors including psychopathology.<sup>50</sup> For example, posttraumatic stress disorder (PTSD) has been found to mediate the association between ACEs and partner aggression,<sup>50</sup> and ACEs are a risk factor for depression,<sup>112</sup> other mood or anxiety disorders,<sup>113</sup> and substance abuse.<sup>5,16,18,102,103</sup> These psychosocial conditions are in turn associated with IPV victimization and perpetration.<sup>115 116</sup>

To date, no study has used a structural equation modeling approach to examine multiple mediators of the association between ACEs and IPV perpetration in a nationally representative US sample. The aim of the current study is to determine the extent to which PTSD, substance abuse, and depression mediate the association between ACEs and IPV perpetration, among both men and women. By determining the mediators linking ACEs and IPV perpetration, this

research will inform the development of both clinical care and prevention and intervention programs geared towards reducing IPV perpetration.

## METHODS

### **Ethics statement**

The Virginia Commonwealth University Institutional Review Board deemed the current study exempt as de-identified, secondary data were used.

### **Data source and sample population**

Data were obtained from Wave 2 (2004-2005) of the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC) as Wave 1 (2001–2002) did not include data on ACEs. The NESARC was designed to study psychiatric and substance use disorders.<sup>53</sup> Adults age 18 years and older living in the US were surveyed.<sup>54</sup> Additionally, the “Group Quarters Inventory” from the US Bureau of Census 2000 was used to obtain information from military personnel living off base, boarding houses, rooming houses, nontransient hotels and motels, shelters, facilities for housing workers, college quarters, and group homes.<sup>54</sup> The NESARC also included Spanish speakers,<sup>52</sup> and oversampled Black and Hispanic households.<sup>54</sup> Sample weights were available for each observation.

### **Operational definition of adverse childhood experiences**

ACEs were operationalized by 23 questions asking about experiences during childhood: 1) If a respondent was left alone or unsupervised before age 10, 2) Went without things needed (clothes, school supplies), 3) Went hungry, or 4) Failed to get medical treatment; 5) If a parent or caregiver insulted or said hurtful things to the respondent, 6) Threatened to hit or throw

something at the respondent, 7) Made the respondent fear that he/she would be physically hurt, 8) Pushed, grabbed, shoved, slapped or hit the respondent, or 9) Hit the respondent causing marks, bruises or injury; 10) If an adult or other person had touched the respondent sexually, 11) Had the respondent touched him/her sexually, 12) Attempted to have sexual intercourse with the respondent, or 13) Had sexual intercourse with the respondent; 14) If the respondent witnessed his/her father or another adult male push, grab, slap, or throw something at the mother, 15) Hit mother with a fist or something hard, 16) Repeatedly hit mother for at least a few minutes, or 17) Threaten mother with a knife/gun or use it to hurt her. These ACEs were analyzed in a Likert Scale format: “Very often”, “Fairly often”, “Sometimes”, “Almost never” and “Never”. However, some ACEs which had relatively few respondents in some categories were recoded to Very often/Fairly often/Sometimes/Almost never vs. Never (sexual abuse categories) or Very often/Fairly often vs. Sometimes/Almost never vs. Never (witnessing parental violence categories).<sup>51</sup> Other ACEs were determined from questions asking if, before 18 years old, the respondent had lived with a parent or other adult who 18) Was a problem drinker, 19) Had abused drugs, 20) Had been incarcerated, 21) Had a mental illness, or 22) Had attempted and/or 23) Had committed suicide, each coded with a dichotomous (Yes vs. No) response (**Appendix 1.1**).

### **Operational definition of intimate partner violence perpetration**

IPV perpetration was operationalized by six questions taken from the Conflict Tactic Scales,<sup>117</sup> which have been validated in a population-based sample,<sup>118</sup> These questions were used to ask respondents about use of force with partners in the past year:<sup>51</sup> 1) Pushing, grabbing or shoving; 2) Slapping, kicking, biting or hitting; 3) Threatening his/her partner with a weapon like a knife or gun; 4) Cutting or bruising partner; 5) Forcing partner to have sex; and 6) Injuring

partner enough so that he/she needed medical care. Each IPV perpetration variable was categorized into a binary construct, Once/2 to 3 times/Once a month/More than once a month vs. Never, as has been used in previous studies,<sup>118-121</sup> before being used as an observed variable in structural equation modeling (SEM).

### **Operational definition of mediators**

History of PTSD, substance use disorder (SUD), and major depression (MD) were operationalized by questions asking about symptoms of PTSD, alcohol or drug abuse and/or dependence, and major depressive episode since Wave 1 interview (2001-2002) but before the past year. PTSD, SUDs and MD were assessed using the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV) criteria<sup>122</sup> as operationalized by the Alcohol Use Disorder and Associated Disabilities Interview Schedule-DSM-IV Version (AUDADIS-IV),<sup>123,124</sup> which is a fully-structured interview appropriate to be used by clinicians as well as trained lay interviewers.<sup>125</sup> SUDs were defined as abuse of and/or dependence on alcohol, nicotine, sedatives, tranquilizers, opioids, amphetamines, cannabis, hallucinogens, cocaine, and heroin.<sup>126</sup>

### **Potential confounders**

Potential confounders that were identified from prior research on ACEs and IPV perpetration. Previous studies have shown differences by age,<sup>3,4,127</sup> sex,<sup>128-130</sup> race/ethnicity,<sup>3,4,127,130</sup> income,<sup>4,127</sup> education,<sup>3,127</sup> marital status,<sup>4,127</sup> and insurance status<sup>4</sup> associated with ACEs. Statistically significant differences by age,<sup>131,132</sup> sex,<sup>133-136</sup> race/ethnicity,<sup>132,133,137,138</sup> income,<sup>131,139</sup> education,<sup>131,138</sup> marital status,<sup>131,134</sup> and insurance status<sup>131</sup> were associated with IPV. Therefore, the proposed study controlled for the following sociodemographic characteristics as confounders namely: age (continuous), race/ethnicity (White

(reference), Black, Other, Hispanic), income (<\$25,000, \$25,000-<\$50,000, ≥\$50,000 (reference), education (less than high school, high school, greater than high school education), marital status (married/cohabiting, widowed/divorced/separated, never married (reference)) and insurance status (insured (reference) and not insured) .

### **Analytic approach**

Respondents were excluded if answers to questions on all ACEs or all IPV perpetration variables were unknown or missing (8,999). Majority of respondents excluded were not in a relationship in the past year (N=8,732; 97%). The resultant sample size was 25,654. Weighting variables were used to account for weighting procedures. Initially, the distribution of sociodemographic characteristics across populations exposed and unexposed to ACEs, and perpetrators and non-perpetrators of IPV were examined using p-values. This stage of the analysis was conducted in SAS version 9.4 (SAS Institute, Cary, NC).

#### *Overall structural equation modeling approach*

Structural equation modeling (SEM) was used to determine appropriate latent factor(s) for ACEs and IPV perpetration. Exploratory factor analysis (EFA) was used to determine the appropriate factor structure of the ACE scale items. Confirmatory factor analysis (CFA) was then used to determine if the model from the EFA were an appropriate fit the data. Structural/path models were then developed to determine associations among ACE factors, mediators and IPV perpetration. Direct and indirect associations were examined. Sex differences have been observed in the association between ACEs and IPV perpetration.<sup>51</sup> Therefore, multiple group analysis was performed to obtain separate estimates for men and women. See Figure 1 for the mediational model showing indirect associations. Survey weights

were used for final models. SEM and mediational analyses were performed in Mplus (Muthén & Muthén, Los Angeles, CA).

### *Model building*

Measurement invariance by sex was tested. Configural invariance indicated that parameters (factor loadings and thresholds) were freely estimated.<sup>140</sup> Strong measurement invariance would indicate that the factor loadings and thresholds are fixed across sex groups.<sup>140</sup> A limitation of the chi-square test of differences across these alternative measurement models (e.g., constrained across sex vs. freely estimated for each sex) is that the test is highly influenced by sample size,<sup>141-143</sup> which may lead to overidentifying a lack of measurement invariance.<sup>144</sup> An alternative goodness-of-fit index to be used in measurement invariance analyses has been proposed, the change in the Comparative Fit Index ( $\Delta CFI$ ) ( $CFI_{\text{constrained}} - CFI_{\text{unconstrained}}$ ), which was used in the current study.<sup>145</sup> A general criterion was proposed: a value of  $\Delta CFI \leq 0.01$  indicates that the null hypothesis of measurement invariance (configural invariance) should not be rejected.<sup>145</sup>

## RESULTS

### **Weighted descriptive statistics**

In the sample overall, 62.6% were exposed to at least one ACE and 5.6% reported perpetrating IPV in the past year (**Table 3.1**). Approximately 6.3% met criteria for PTSD, 15.7% met criteria for SUD, and 6.6% met criteria for MD; each of these conditions was assessed as occurring within the past 3 years, but prior to the past year. Among men, 63.8% reported at least one ACE, 3.8% met criteria for PTSD, 19.6% met criteria for SUDs and 4.1% met criteria for MD. Approximately 4.2% reported perpetrating IPV in the past year. Among

women, 61.1% reported at least one ACE, 8.8% met criteria for PTSD, 11.7% met criteria for SUD and 9.2% met criteria for MD. Seven percent reported perpetrating IPV in the past year.

**Table 3.2** shows the distribution of sociodemographic characteristics across respondents exposed and unexposed to ACEs, and perpetrators and non-perpetrators of IPV. About eight in ten (80.9%) respondents reporting IPV perpetration were exposed to at least one ACE while only six in ten (61.4%) respondents who did not engage in IPV perpetration reported exposure to ACEs.

### **Measurement invariance**

There was strong invariance for ACEs and IPV perpetration as the difference in CFI values in comparing configural invariance and strong invariance models was  $\leq 0.01$ . For ACEs, the  $\Delta CFI$  was 0 and for IPV perpetration, the  $\Delta CFI$  was 0.01. Therefore, the null hypothesis of invariance was not rejected, and strong invariance model was preferred over the configural invariance. Therefore, the results for men and women could have been compared directly because they were corrected for measurement error.

### **Evaluation of measurement models**

Latent constructs, their factor compositions, and standardized loading coefficients for ACEs and IPV perpetration are shown in **Table 3.3**. Fit statistics for the CFA for the ACE measurement model with strong invariance were:  $\chi^2$  (df = 484) = 5127.96,  $p < 0.0001$ ;  $\chi^2$  for men = 2307.038;  $\chi^2$  for women = 2820.888; CFI = 0.991; TLI = 0.991; RMSEA = 0.027; 90% CI (0.027 – 0.028), WRMR = 4.467. Fit statistics for the CFA for the IPV measurement model with strong invariance were:  $\chi^2$  (df = 22) = 152.862,  $p < 0.0001$ ;  $\chi^2$  for men = 52.716;  $\chi^2$  for women =



100.146; CFI = 0.990; TLI = 0.986; RMSEA = 0.022; 90% CI (0.018 – 0.025), WRMR = 2.421.

These statistics indicate that the measurement models were a good fit for the data.

### **Evaluation of structural model**

#### *Direct relationships between ACEs and IPV*

After controlling for age, race/ethnicity, income, education, marital and insurance status, there were direct effects of sexual abuse ( $\beta = 0.196$ ,  $p < 0.001$ ) and parental violence ( $\beta = 0.168$ ,  $p = 0.007$ ) on IPV perpetration among men. This indicates that every unit change in sexual abuse increases IPV perpetration by 0.196 directly, not considering the role of mediators. See **Table 3.4** for standardized estimates, standard errors and p-values for direct paths. Among women, there were no statistically significant direct associations between ACEs and IPV perpetration.

#### *Indirect relationships between ACEs and IPV*

Among men, PTSD partially mediated sexual abuse and IPV perpetration ( $z = 0.004$ ,  $p = 0.018$ ) and substance abuse fully mediated physical/psychological abuse and IPV perpetration ( $z = 0.011$ ,  $p = 0.036$ ) (**Table 3.5**). For example, among men, a one unit change in sexual abuse increases IPV perpetration by 0.004 units indirectly through PTSD. Among women, substance abuse also fully mediated physical/psychological abuse and IPV perpetration ( $z = 0.008$ ,  $p = 0.049$ ). Therefore, among women, a one unit change in physical/psychological abuse increases IPV perpetration by 0.008 indirectly through substance abuse. Fit statistics for this model were:  $\chi^2$  ( $df = 1,476$ ) = 6411.409,  $p < 0.0001$ ;  $\chi^2$  for men = 3100.400;  $\chi^2$  for women = 3311.009; CFI = 0.990; TLI = 0.989; RMSEA = 0.016; 90% CI (0.016 – 0.017), WRMR = 3.684, which showed that the model was a good fit for the data.

Total effects of ACEs on IPV perpetration are shown in **Appendix 3.1**.

## DISCUSSION

The current findings suggest that psychosocial mediators between ACE factors and IPV perpetration vary by sex. However, there is a lack of studies examining the role of mediators between ACEs and IPV perpetration. SEM was the best approach for determining the sex differences in the role of mediators in the association between ACEs and IPV perpetration so as to determine measurement invariance in ACEs and IPV perpetration for men and women.

Our findings should be contextualized with the existing, although limited, research on the relationship between ACEs, psychopathology, and IPV perpetration. For example, Swopes et al. (2013), one of the few studies to examine mediation between ACEs and violent outcomes, found that PTSD mediated the association between ACEs and partner aggression among male IPV offenders.<sup>50</sup> Although the operationalization of IPV differed between the Swopes et al (2013) study (i.e., physical aggression, verbal aggression, anger and hostility toward one's partner) and the present report (i.e., latent variable as described above), the current study extends these findings to show that PTSD significantly mediated the relationship between sexual abuse, specifically, and IPV perpetration among men.

We also observed that SUDs fully mediated the relationship between both physical and psychological abuse and IPV perpetration among men and women. The current findings partially supports previous research, which showed that exposure to physical abuse<sup>146</sup> and emotional abuse<sup>147</sup> has been shown to be associated with subsequent substance abuse in adulthood among women, but not among men. The full mediation of physical and psychological abuse, and IPV perpetration seen could be due to physical and psychological abuse during

childhood being associated with substance abuse in adulthood among men and women, which has been shown to be a risk factor for IPV perpetration.<sup>115</sup> The mediation of the association between physical and psychological abuse and IPV perpetration could also be due to emotional distress. Psychological distress, which may lead to more substance abuse, has been found to mediate ACEs and alcohol problems in women,<sup>103</sup> and alcohol use has been shown to be common during IPV episodes.<sup>115</sup>

Depression was not found to be associated with IPV perpetration, and did not play a mediational role between ACEs and IPV perpetration for men or women. In other studies, depression has been linked to lifetime IPV perpetration,<sup>116</sup> and being a victim *and* being a perpetrator of IPV (Johnson KL et al., 2014), but not past-year IPV perpetration.<sup>115</sup> Johnson et al. (2014), suggests that individuals with psychiatric disorders are not likely to report violent outcomes. Nevertheless, if they do, they are more likely to report being a victim and being a perpetrator of violence more so than being a perpetrator alone.<sup>148</sup>

MD was not associated with IPV perpetration, nor did it play a mediational role between ACEs and IPV perpetration for men or women. Previous findings on the association between MD and IPV perpetration has been mixed. MD has been linked to lifetime IPV perpetration,<sup>116</sup> and being a victim *and* being a perpetrator of IPV (Johnson KL et al., 2014),<sup>148</sup> but a statistical association was not seen with past-year IPV perpetration.<sup>115</sup> Johnson et al. (2014), suggests that individuals with psychiatric disorders are not likely to report interpersonal violence.<sup>148</sup> This interpretation goes against the intrapersonal model approach,<sup>114</sup> which was used to hypothesize the mediational role for PTSD, SUDs, and MD. Nevertheless, this approach did not hold for MD in the current study as was previously hypothesized as MD, even though statistically significantly associated with physical and psychological abuse for men and women, and sexual

abuse for men, was not associated with IPV perpetration among men or women. Male IPV perpetrators may have been more likely to suffer from prior PTSD and substance abuse compared to male nonperpetrators. However, women perpetrators of IPV may have been more likely to suffer from substance abuse only compared to female nonperpetrators. The disparities by sex in the role of mediators in the association between ACEs and IPV perpetration may be due to differences in emotional, behavioral, and psychobiological responses to stress.<sup>41</sup>

In contrast to much prior research, in this study there was no statistically significant association between witnessing parental violence and IPV perpetration neither among men nor women. Although studies have shown an association between witnessing domestic violence, and internalizing problems<sup>149,150</sup> and externalizing problems<sup>149,150</sup> in children, it is possible that the association between witnessing domestic violence and externalizing behaviors (such as perpetration of violence) does not persist into adulthood. Questions obtaining information on witnessing female-to-male perpetrated violence and violence between same-sex partners in the household were not included in the survey. This exclusion of questions may have also contributed to the non-statistically significant findings.

The study must be considered with limitations in mind. First, the data were self-reported. Therefore, it is possible that ACEs, psychopathology (PTSD, SUDs, and MD), and IPV perpetration may have been underreported. However, prior research has shown adequate stability in the report of ACEs including abuse, physical neglect and family adversity.<sup>151</sup> The AUDADIS has shown fair to good reliability in the diagnosis of PTSD (kappa = 0.77),<sup>124</sup> MD (kappa = 0.59)<sup>152</sup> and for alcohol abuse and dependence (kappa=0.74)<sup>152</sup> and drug dependence and abuse diagnoses (kappa = 0.50 – 0.80).<sup>153</sup> This bias towards underreporting, if non-differential with respect to exposure and outcome groups, may suggest that effect estimates may

be conservative.<sup>154</sup> Second, even though there was no association observed between witnessing parental violence and IPV perpetration, parental violence questions only consisted of male-to-female perpetrated violence. The exclusion of witnessing female-to-male perpetrated violence and witnessing violence in the wider community may have influenced the results. Future studies should consider obtaining information on witnessing female-to-male violence in the household as well as witnessing violence perpetrated between same-sex parents.

The proposed study has several strengths. First, we were able to examine the association between ACEs and IPV perpetration among a nationally representative sample in the US. Second, we were able to consider the role of multiple mediators in this relationship, which provides a more complete picture of the relationship between ACEs and IPV. To date, this is the first study to examine the relationship between ACEs and IPV perpetration testing the role of multiple psychosocial mediators. Third, we were able to examine variation in the relationships between ACEs, psychosocial mediators and IPV perpetration by sex. These findings help to determine what psychosocial constructs may play an important role for male and female perpetrators of IPV. Fourth, we were able to establish the temporal sequence between ACEs, PTSD, SUDs and MD, and IPV perpetration. ACEs used in the analysis encapsulated events that occurred before the age of 18, and IPV perpetration reported would have occurred within the past year, and the mediators (PTSD, SUDs and MD) occurred within the past 3 years but prior to the past year.

## CONCLUSIONS

The current findings suggest that there are similarities and differences by sex in psychosocial mediation between ACE factors and IPV perpetration. Therefore, healthcare

providers should be aware of these differences and address IPV perpetration accordingly. IPV programs geared towards perpetrators should address physical/psychological, sexual abuse, PTSD, and substance abuse. “Fathers for Change”, is an example of an intervention that addresses substance abuse, domestic violence and poor parenting in fathers of young children.<sup>155</sup> The current study also suggests that interventions geared to female perpetrators of IPV are also warranted. However, men may benefit more greatly from IPV perpetration prevention programs focused on sexual abuse and subsequent PTSD. Also abuse prevention programs may reduce PTSD among men and substance abuse rates among men and women, which may reduce IPV perpetration rates. Programs geared towards reducing physical and psychological abuse in childhood may also result in lower substance abuse rates, which may consequently lower the rates of IPV perpetration. More studies examining the longitudinal effects of ACEs and mediational pathways between ACEs and violent outcomes are needed.

**Table 3.1. Distribution of Characteristics in Overall Sample**

	Number of Respondents N = 25,654	Weighted %*
Sex		
Men	11,796	50.8
Women	13,858	49.2
Age		
18-34	6,726	26.6
35-49	9,169	33.8
50+	9,759	39.7
Race/Ethnicity		
White, nH	15,211	72.0
Black, nH	4,278	9.7
AI/AN, nH	430	2.1
Asian/NH/PI, nH	764	4.4
Hispanic, any race	4,971	11.8
Income		
<\$25,000	5,770	17.0
\$25,000 - <\$50,000	7,513	16.2
\$50,000 - <\$80,000	6,201	15.9
\$80,000-<\$100,000	2,198	8.8
≥\$100,000	3,792	8.8
Education		
<High School	3,404	12.2
High School	6,779	26.9
>High School	15,471	60.9
Insurance		
Yes	22,489	88.5
No	3,144	11.5
Marital Status		
Married/Cohabiting	18,744	78.9
Widowed/Div/Sep	3,219	8.6
Never Married	3,691	12.4
ACE Exposure		
Yes	16,383	62.6
No	9,203	37.4
IPV Perpetration		
Yes	1,679	5.57
No	23,948	94.4

\*All Chi square p-values were <0.0001

**Table 3.2. Distribution of Characteristics across Respondents Exposed and Unexposed to ACEs, and to Perpetration and no Perpetration of IPV**

	<b>ACEs N(%)* N= 16,383</b>	<b>No ACEs N(%)* N= 9,271</b>	<b>P-value</b>	<b>IPV Perpetration N(%)* N=1,679</b>	<b>No IPV Perpetration N(%)* N= 23,948</b>	<b>P-value</b>
<b>Sex</b>						
Men	7,664 (51.9)	4,132 (49.0)	<0.0001	513 (38.1)	11,271 (51.6)	<0.0001
Women	8,719 (48.1)	5,139 (51.0)		1,166 (61.9)	12,677 (48.4)	
<b>Age</b>						
18-34	4,210 (26.0)	2,516 (27.5)		739 (43.4)	5,985 (25.6)	
35-49	6,099 (35.4)	3,070 (31.0)		627 (35.8)	8,533 (33.6)	
50+	6,074 (38.6)	3,685 (41.5)	<0.0001	313 (20.8)	9,430 (40.7)	<0.0001
<b>Race/Ethnicity</b>						
White, nH	9,702 (72.2)	5,509 (71.6)	<0.0001	721 (57.7)	14,476 (72.8)	<0.0001
Black, nH	2,886 (10.3)	1,392 (8.77)		491 (18.6)	3,782 (9.2)	
AI/AN, nH	315 (2.42)	115 (1.68)		46 (3.8)	383 (2.0)	
Asian/NH/PI, nH	404 (3.56)	360 (5.68)		39 (3.6)	724 (4.4)	
Hispanic, any race	3,076 (11.5)	1,895 (12.3)		382 (16.3)	4,583 (11.6)	
<b>Income</b>						
<\$25,000	3,647 (19.8)	2,123 (20.3)		610 (30.7)	5,150 (19.3)	
\$25000 - <\$50,000	4,709 (27.4)	2,804 (29.1)		521 (31.6)	6,986 (27.8)	
\$50,000 - <\$80,000	4,017 (25.7)	2,184 (24.8)		319 (21.7)	5,874 (25.5)	
\$80,000-<\$100,000	1,409 (9.17)	789 (9.27)		91 (6.1)	2,106 (9.4)	
≥\$100,000	2,601 (18.0)	1,371 (16.5)	<0.0001	138 (9.9)	3,832 (17.9)	<0.0001
<b>Education</b>						
<High School	2,047 (11.5)	1,357 (13.3)		301 (16.7)	3,098 (11.9)	
High School	4,239 (26.5)	2,540 (27.6)		530 (32.0)	6,243 (26.6)	
>High School	10,097 (62.0)	5,374 (59.1)	<0.0001	848 (51.3)	14,607 (61.5)	<0.0001
<b>Insurance</b>						
Yes	14,406 (88.6)	8,083 (88.2)	0.0979	328 (19.7)	2,815 (11.1)	<0.0001
No	1,964 (11.4)	1,180 (11.8)		1,349 (80.3)	21,115 (88.9)	
<b>Marital Status</b>						
Married/Cohabiting	11,628 (77.6)	7,116 (81.2)	<0.0001	1,075 (71.6)	17,647 (79.3)	<0.0001
Widowed/Div/Sep	2,348 (9.9)	871 (6.5)		228 (10.0)	2,986 (8.6)	
Never Married	2,407 (12.5)	1,284 (12.3)		376 (18.4)	3,315 (12.1)	
<b>ACE Exposure</b>						
Yes	--	--	--	1,379 (80.9)	14,986 (61.4)	
No				300 (19.1)	8,962 (38.6)	<0.0001
<b>IPV Perpetration</b>						
Yes	1,379 (7.2)	300 (2.8)		--	--	
No	16,365 (92.8)	8,962 (97.2)	<0.0001			

Abbreviations: ACEs, Adverse Childhood Experiences; IPV, Intimate Partner Violence; Widowed/Div/Sep, Widowed/Divorced/Separated

\*Weighted Percent



**Table 3.3. Standardized Model Results for Measurement Models with Strong Invariance<sup>a</sup> from Confirmatory Factor Analyses**

	Men		Women	
	Est. <sup>b</sup>	SE	Est. <sup>b</sup>	SE
<b>Neglect</b>				
1. Left alone before age 10	0.738	0.010	0.793	0.008
2. Went without things needed (clothes, school supplies)	0.849	0.009	0.873	0.007
3. Went hungry	0.914	0.008	0.940	0.008
4. Failed to get medical treatment	0.894	0.010	0.905	0.008
<b>Physical/Psychological Abuse</b>				
1. Parent <sup>c</sup> insulted/said hurtful things	0.869	0.006	0.895	0.004
2. Parent <sup>c</sup> threatened to hit/throw something at respondent	0.828	0.006	0.860	0.005
3. Parent <sup>c</sup> made respondent fear he/she would be physically hurt	0.916	0.004	0.947	0.003
4. Parent <sup>c</sup> pushed/grabbed/shoved/slapped respondent	0.880	0.004	0.914	0.003
5. Parent <sup>c</sup> hit respondent causing marks/bruises/injury	0.908	0.005	0.936	0.004
<b>Sexual Abuse</b>				
1. Adult <sup>d</sup> touched respondent sexually	0.973	0.007	0.964	0.005
2. Adult <sup>d</sup> had respondent touch him/her sexually	0.958	0.007	0.951	0.005
3. Adult <sup>d</sup> attempted to have sexual intercourse with respondent	0.971	0.006	0.985	0.004
4. Adult <sup>d</sup> had sexual intercourse with respondent	0.976	0.008	0.971	0.005
<b>Parental Violence</b>				
1. Father <sup>e</sup> pushed/grabbed/slapped/throw something at mother	0.965	0.003	0.974	0.002
2. Father <sup>e</sup> hit mother with a fist or something hard	0.975	0.003	0.983	0.002
3. Father <sup>e</sup> repeatedly hit mother for at least a few minutes	0.988	0.002	0.995	0.001
4. Father <sup>e</sup> threaten mother with a knife/gun or use it to hurt her	0.856	0.012	0.873	0.010
<b>Parental Incarceration/Psychopathology</b>				
1. Parent <sup>f</sup> was a problem drinker	0.882	0.016	0.904	0.015
2. Parent <sup>f</sup> had problems with drugs	0.871	0.010	0.852	0.011
3. Parent <sup>f</sup> went to jail/prison	0.878	0.012	0.897	0.011
4. Parent <sup>f</sup> was treated/hospitalized for mental illness	0.826	0.012	0.773	0.012
5. Parent <sup>f</sup> attempted suicide	0.972	0.007	0.930	0.009
6. Parent <sup>f</sup> committed suicide	0.960	0.007	0.812	0.010
<b>Intimate Partner Violence Perpetration</b>				
1. Pushed/Grabbed/Shoved spouse/partner	0.848	0.014	0.909	0.012
2. Slapped/Kicked/Bit/Hit spouse or partner	0.975	0.013	0.947	0.009
3. Threatened spouse/partner with a weapon like a knife or gun	0.956	0.017	0.898	0.019
4. Cut/Bruise spouse or partner	0.925	0.017	0.919	0.017
5. Forced spouse/partner to have sex	0.882	0.027	0.903	0.027
6. Injured spouse/partner so that he/she had to get medical care	0.972	0.017	1.002	0.022

Abbreviations: Est., Standardized estimate; SE, Standard error

<sup>a</sup>Factor loadings and threshold are fixed; residual variances are fixed in one group (males) and are freely estimated in the other (females); factor means are fixed to 0 in one group (males) and are freely estimated in the other (females)

<sup>b</sup>P-values for all factor loadings were  $p < 0.001$ .

<sup>c</sup>Parent or caregiver

<sup>d</sup>Adult/other person

<sup>e</sup>Father/other adult male

<sup>f</sup>Parent/other adult living in the home

**Table 3.4. Unstandardized Estimates for Associations between IPV Perpetration, PTSD, Depression, and Substance Abuse and Adverse Childhood Experiences among Men and Women**

Latent Variable	IPV Perpetration			PTSD			Depression			Substance Abuse		
	Est.	SE	P-value	Est.	SE	P-value	Est.	SE	P-value	Est.	SE	P-value
<b>MEN</b>												
Neglect	-0.093	0.088	0.289	0.013	0.007	0.054	-0.005	0.008	0.466	<b>-0.030</b>	<b>0.020</b>	<b>0.131</b>
Phys/Psy	-0.046	0.072	0.518	<b>0.017</b>	<b>0.005</b>	<b>0.001</b>	<b>0.025</b>	<b>0.006</b>	<b>&lt;0.001</b>	<b>0.074</b>	<b>0.016</b>	<b>&lt;0.001</b>
Sexual	<b>0.196</b>	<b>0.054</b>	<b>&lt;0.001</b>	<b>0.016</b>	<b>0.004</b>	<b>&lt;0.001</b>	<b>0.017</b>	<b>0.005</b>	<b>0.002</b>	0.009	0.012	0.446
PV	<b>0.168</b>	<b>0.062</b>	<b>0.007</b>	-0.005	0.004	0.317	-0.003	0.005	0.608	-0.001	0.011	0.931
PIP	-0.032	0.058	0.586	<b>0.008</b>	<b>0.003</b>	<b>0.020</b>	0.005	0.003	0.173	0.015	0.009	0.089
IPVP <sup>a</sup>				<b>0.246</b>	<b>0.096</b>	<b>0.010</b>	0.097	0.080	0.224	<b>0.143</b>	<b>0.060</b>	<b>0.017</b>
<b>WOMEN</b>												
Neglect	-0.047	0.042	0.268	0.008	0.008	0.311	-0.006	0.010	0.525	-0.029	0.010	0.006
Phys/Psy	0.091	0.049	0.061	<b>0.026</b>	<b>0.007</b>	<b>&lt;0.001</b>	<b>0.046</b>	<b>0.009</b>	<b>&lt;0.001</b>	<b>0.041</b>	<b>0.009</b>	<b>&lt;0.001</b>
Sexual	0.056	0.053	0.283	0.044	0.033	0.179	0.023	0.018	0.194	0.023	0.018	0.195
PV	0.046	0.037	0.212	0.003	0.006	0.547	<b>-0.019</b>	<b>0.007</b>	<b>0.009</b>	0.002	0.006	0.806
PIP	0.011	0.029	0.708	-0.001	0.006	0.835	0.012	0.007	0.087	<b>0.017</b>	<b>0.007</b>	<b>0.018</b>
IPVP <sup>a</sup>				0.064	0.045	0.152	0.128	0.066	0.054	<b>0.194</b>	<b>0.090</b>	<b>0.031</b>

Abbreviations: Est., Unstandardized estimate; IPVP, Intimate Partner Violence Perpetration; Phys/Psy, Physical/psychological abuse; PIP, Parental incarceration/psychopathology; PTSD, posttraumatic stress disorder; PV, Witnessing parental violence; SE, Standard error.

\*Intimate partner violence perpetration on PTSD, depression, substance abuse; **Bolded numbers** are statistically significant at  $p < 0.05$ .

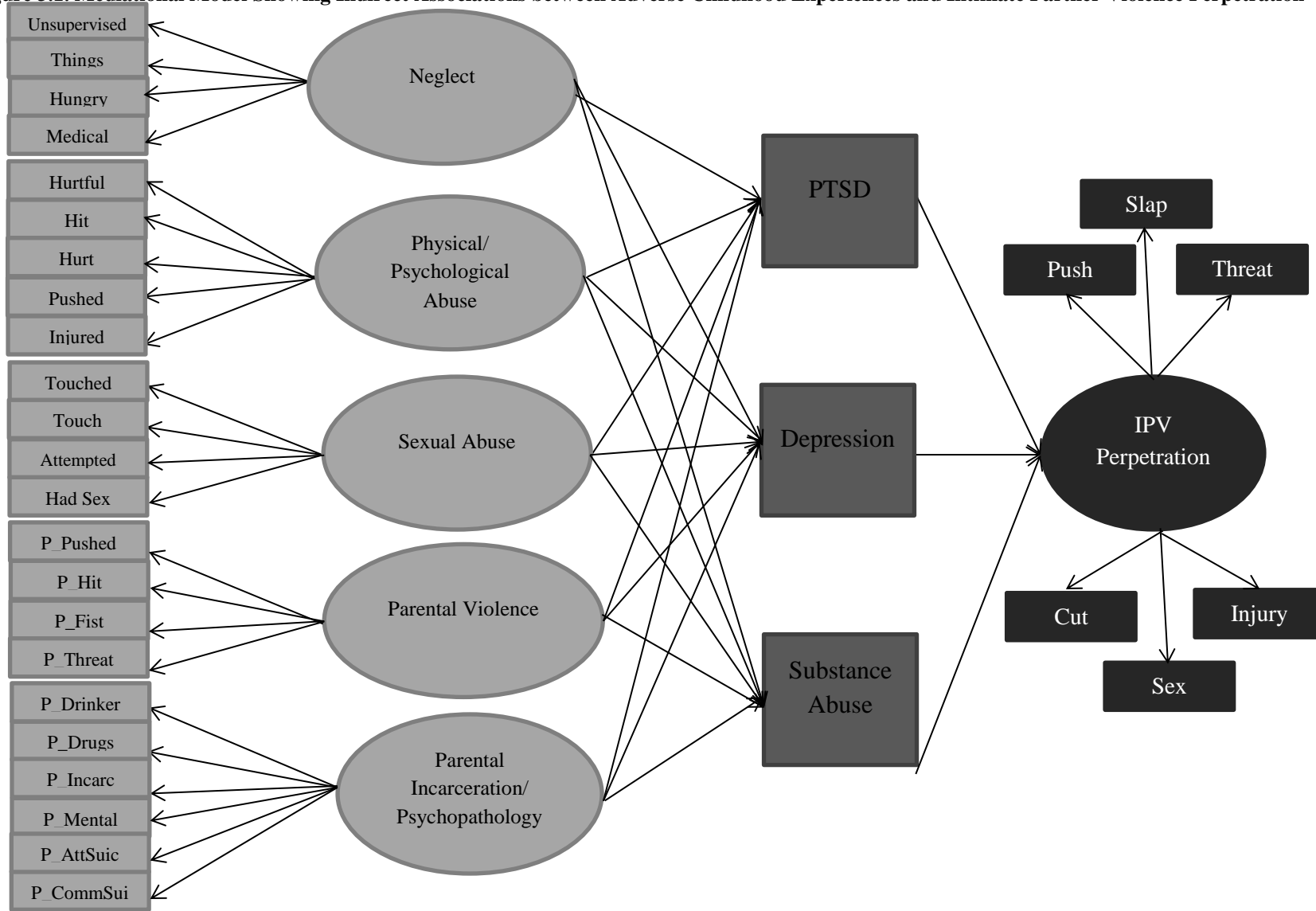
**Table 3.5. Unstandardized Estimates of Mediation Pathways of Adverse Childhood Experiences and Intimate Partner Violence Perpetration via Posttraumatic Stress Disorder, Substance Abuse, and Depression among Men and Women**

Latent Variable	Posttraumatic Stress Disorder			Substance Abuse			Depression		
	Est.	SE	P-value	Est.	SE	P-value	Est.	SE	P-value
<b>Men</b>									
Neglect	0.003	0.002	0.119	-0.004	0.003	0.183	-0.001	0.001	0.517
Physical/Psychological Abuse	0.004	0.002	0.069	<b>0.011</b>	<b>0.005</b>	<b>0.036</b>	0.002	0.002	0.233
Sexual Abuse	<b>0.004</b>	<b>0.002</b>	<b>0.018</b>	0.001	0.002	0.456	0.002	0.001	0.238
Parental Violence	-0.001	0.001	0.366	0.000	0.002	0.931	0.000	0.001	0.624
Parental Incarceration/ Psychopathology	0.002	0.001	0.071	0.002	0.002	0.200	0.000	0.000	0.344
<b>Women</b>									
Neglect	0.001	0.001	0.422	-0.006	0.003	0.087	-0.001	0.001	0.547
Physical/Psychological Abuse	0.002	0.001	0.188	<b>0.008</b>	<b>0.004</b>	<b>0.049</b>	0.006	0.003	0.069
Sexual Abuse	0.003	0.003	0.328	0.005	0.004	0.275	0.003	0.003	0.289
Parental Violence	0.000	0.000	0.572	0.000	0.001	0.808	-0.002	0.002	0.115
Parental Incarceration/ Psychopathology	0.000	0.000	0.837	0.003	0.002	0.103	0.002	0.001	0.189

Abbreviation: Est., Unstandardized estimate; PTSD, posttraumatic stress disorder; SE, Standard error;

**Bolded numbers** are statistically significant at  $p < 0.05$ .

**Figure 3.1. Mediational Model Showing Indirect Associations between Adverse Childhood Experiences and Intimate Partner Violence Perpetration**



## Figure Legend

Note: Correlation between latent variables and direct associations between ACE factors and HIV/STIs are not shown.

Abbreviations: Adverse Childhood Experiences: Attempted, Adult/Other person attempted to have sex with respondent; Had Sex, Adult/Other person had sex with respondent; Hit, Parent/Caregiver threatened to hit or throw something at the respondent; Hungry, Respondent went hungry; Hurt, Parent/Caregiver made respondent fear they would be physically hurt; Hurtful, Parent/Caregiver said insulted or said hurtful things to the respondent; Injured, Parent/Caregiver hit respondent that caused marks/bruises/injury; Medical, Respondent failed to get medical treatment; P\_AttSuic, Respondent lived with a parent/other adult who attempted suicide; P\_CommSuic, respondent lived with a parent/other adult who committed suicide; P\_Drinker, Parent/Other adult living in the home was a problem drinker; P\_Drugs, Parent/Other adult had problems with drugs; P\_Fist, Father/Other adult male hit mother with a fist or something hard; P\_Hit, Father/Other adult male repeatedly hit mother for at least a few minutes; P\_Incarc, respondent lived with a parent/other adult who was incarcerated; P\_Mental, Parent/Other adult was treated/hospitalized for mental illness; P\_Pushed, Father/Other adult male push, grab, slap or throw something at mother; P\_Threat, Father/Other adult male threaten mother with a knife/gun or use it to hurt her; Pushed, Parent/Caregiver pushed/grabbed/shoved/slapped or hit respondent; Things, Respondent went without things needed (clothes, supplies); Touch, Adult/Other person had respondent touched them sexually; Touched, Adult/Other person touched respondent sexually; Unsupervised, Respondent was left alone or unsupervised before age 10; Mediator: PTSD, posttraumatic stress disorder; Intimate Partner Violence Perpetration: Cut, Respondent cut/bruise spouse or partner; IPV, Intimate partner violence; Injury, Respondent injured spouse/partner enough that they needed medical care; Push, Respondent pushed/grabbed/shoved spouse/partner; Sex, Respondent force spouse/partner to have sex; Slap, Respondent slapped/Kicked/Bit/Hit spouse/partner; Threat, Respondent threatened spouse/partner with a weapon like a knife or gun.

**Chapter 4: Sex Disparities in the Association between Adverse Childhood Experiences and HIV/STIs: Mediation of Psychopathology and Sexual Behaviors**

## **Abstract**

**Introduction:** Adverse childhood experiences (ACEs) are defined as the negative events that a child may undergo, including abuse (emotional, physical or sexual), witnessing violence among household members, or living with someone with a mental illness. HIV and other sexually transmitted infections (STIs) are also important public health challenges in the US. ACEs may have an effect on sexual behaviors, which increase the risk of STIs.

**Objective:** To examine the sex differences in the role of posttraumatic stress disorder (PTSD), substance abuse, depression, early sexual debut, and intimate partner violence (IPV) perpetration as mediators in the association between ACEs and HIV/STIs.

**Methods:** Data were obtained from Wave 2 (2004-2005) of the National Epidemiologic Survey on Alcohol and Related Conditions. Confirmatory factor analyses were used to determine factors for ACEs and IPV perpetration. Structural equation modeling was used to determine the role of PTSD, substance abuse, depression, early sexual debut, and IPV perpetration as mediators of the relationship between ACE factors (neglect, physical/psychological abuse, sexual abuse, parental violence, and parental incarceration/psychopathology) and HIV/STIs.

**Results:** The roles of mediators varied for men and women. Among men, PTSD mediated the relationship between abuse (physical/psychological and sexual) and parental incarceration/psychopathology, and HIV/STIs among men. Substance abuse mediated all ACEs, with the exception of parental violence and HIV/STIs. Depression mediated abuse, and early age at sexual debut mediated neglect and abuse and HIV/STIs. IPV perpetration mediated sexual abuse and HIV/STIs. Among women, substance abuse mediated neglect, physical/psychological abuse, and parental incarceration/psychopathology; depression mediated physical/psychological

abuse and parental violence; and early sexual debut mediated parental incarceration/psychopathology, and HIV/STIs.

**Discussion:** HIV/STI prevention and intervention programs should use a life course approach by addressing adverse childhood events among men and women, recent PTSD and IPV perpetration especially among men; and depression, and substance abuse and early sexual debut among men and women.



## INTRODUCTION

Adverse childhood experiences (ACEs) are defined as the negative events that a child may experience, including abuse (emotional, physical or sexual), witnessing violence among household members, losing a parent due to death or divorce, or residing in a household with someone who has mental illness, substance abuse or is engaging in criminal behavior.<sup>9,101</sup> Recent estimates suggest that 63.1% of adults have been exposed to at least one adverse event during childhood.<sup>4</sup> In one study, 87% of participants who reported one ACE, reported experiencing at least one additional ACE. Household dysfunction, such as substance abuse occurred among approximately one in four participants; physical abuse among one in ten; emotional abuse among one in ten and sexual abuse among one in five.<sup>5</sup> The high prevalence estimates highlight that ACEs continue to be a major public health issue in the US.<sup>1</sup>

HIV and other sexually transmitted infections (STIs) are also important public health challenges in the US. The Centers for Disease Control and Prevention (CDC) estimates that more than 1.1 million people are living with HIV in the US, and approximately one in five are unaware of their infection.<sup>156</sup> Every year, there are about 50,000 new HIV infections.<sup>156</sup> In the US, HIV continues to disproportionately affect Black and Latino populations, and men who have sex with men (MSM).<sup>156</sup> In addition to HIV infection, other STIs also disproportionately affect MSM population,<sup>157</sup> as well as adolescents and young adults age 15 to 24.<sup>158</sup> Twenty million STIs occur in the US each year.<sup>158</sup> Some of the most common STIs among the US population include HPV, chlamydia, gonorrhea, and syphilis. Multiple adverse health outcomes may arise as a result of STIs, including cancer, adverse pregnancy outcomes, such as low birth weight and preterm delivery, and death.<sup>159-161</sup> In the US, the costs associated with STIs and their adverse outcomes are estimated to exceed \$15 billion per year.<sup>162</sup> These costs highlight the importance of

understanding potential risk factors for STIs to endeavor to reduce disease rates and associated adverse outcomes.

ACEs may have an effect on sexual risk behaviors which increase the risk of STIs.<sup>25</sup> Childhood sexual abuse and having a family member who had a mental illness are associated with sexual risk behaviors such as sex at age 16 or younger, having multiple partners and pregnancy at age 18 or younger.<sup>90</sup> Psychological abuse, physical and psychological neglect, and parental separation were also associated with having multiple partners.<sup>90</sup> A child's mother being treated violently was also associated with pregnancy before or at age 18.<sup>90</sup> ACEs such as physical abuse, sexual abuse, witnessing violence towards the maternal figure in the home, household substance abuse, and incarcerated family members were associated with STI diagnosis among men and women. However, emotional abuse and mental illness in the household were found to be risk factors for women only.<sup>25</sup>

One model that may help us to understand the association between sexual ACEs and sexual behavior and outcomes is the Traumagenic Dynamics model. The Traumagenic Dynamics model proposed by Finkelhor and Browne (1985) offers a viable framework from which to investigate the consequences related to sexual health associated with sexual abuse during childhood.<sup>26,163</sup> The four traumagenic dynamics proposed in this model, which may help the understanding of the relationship between sexual abuse and sexual health outcomes are: traumatic sexualization, betrayal, powerlessness and stigmatization.<sup>163</sup> Traumatic sexualization is the process in which a child's sexuality is developed in an inappropriate and interpersonally dysfunctional manner due to sexual abuse. Betrayal describes the dynamic, which occurs when a child discovers that someone they trusted had caused them harm. Powerlessness refers to the process of the victim feeling powerless or disempowered. Stigmatization describes the negative

connotations that are communicated to the victim as a result of their experiences.<sup>163</sup> For example, victims of sexual abuse may be more likely to engage in sexual risk behaviors and multiple partners.<sup>26,164</sup> In addition, we propose that the latter three components of the traumagenic dynamic model may be extended to understand the sexual health consequences not only associated with sexual abuse but also with other forms of abuse (physical and psychological) and household dysfunction experienced during childhood: betrayal, powerlessness and stigmatization. These components may help us to understand how adverse events experienced as a child may affect sexual behavior and outcomes later on in life.

ACEs are associated with psychiatric outcomes such as post-traumatic stress disorder (PTSD),<sup>50</sup> major depression (MD)<sup>13,15,19,20</sup> and substance use disorders (SUDs),<sup>13,15-18</sup> and with sexual health outcomes such as early age at sexual debut<sup>90</sup> and IPV perpetration.<sup>43,51,109</sup> To date, no study has examined the role of mediators in this relationship using structural equation modeling (SEM). The aim of this study was to assess the association between ACEs and HIV/STIs and to determine the roles of PTSD, MD, SUDs, early sexual debut and IPV perpetration as potential mediators. HIV/STI prevention and intervention programs and health care providers may use these findings to determine additional risk factors and associated pathways for HIV/STIs and may incorporate these factors as focal points of these programs and in provision of health care.

## METHODS

### **Ethics statement**

The Virginia Commonwealth University Institutional Review Board deemed the current study exempt as de-identified, secondary data were used.

## **Data source and sample population**

Data were obtained from Wave 2 (2004-2005) of the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC). The NESARC was designed to study psychiatric and substance use disorders.<sup>53</sup> Adults age 18 years and older living in the US were surveyed.<sup>54</sup> The “Group Quarters Inventory” from the US Bureau of Census 2000 was used to obtain information from military personnel living off base, boarding houses, rooming houses, nontransient hotels and motels, shelters, facilities for housing workers, college quarters, and group homes.<sup>54</sup> The survey also oversampled Black and Hispanic households,<sup>54</sup> and included Spanish speakers.<sup>52</sup> Sample weights were available for each observation.

## **Operationalization of adverse childhood experiences**

ACEs were operationalized by 23 questions asking about experiences during childhood:

- 1) If a respondent was left alone or unsupervised before age 10,
- 2) Went without things needed (clothes, school supplies),
- 3) Went hungry, or
- 4) Failed to get medical treatment;
- 5) If a parent or caregiver insulted or said hurtful things to the respondent,
- 6) Threatened to hit or throw something at the respondent,
- 7) Made the respondent fear that he/she would be physically hurt,
- 8) Pushed, grabbed, shoved, slapped or hit the respondent, or
- 9) Hit the respondent causing marks, bruises or injury;
- 10) If an adult or other person had touched the respondent sexually,
- 11) Had the respondent touched him/her sexually,
- 12) Attempted to have sexual intercourse with the respondent, or
- 13) Had sexual intercourse with the respondent;
- 14) If the respondent witnessed his/her father or another adult male push, grab, slap, or throw something at the mother,
- 15) Hit mother with a fist or something hard,
- 16) Repeatedly hit mother for at least a few minutes, or
- 17) Threaten mother with a knife/gun or use it to hurt her.

These ACEs were analyzed in a Likert

Scale format: “Very often”, “Fairly often”, “Sometimes”, “Almost never” and “Never”.

However, some ACEs which had relatively few respondents in some categories were recoded to Very often/Fairly often/Sometimes/Almost never vs. Never (sexual abuse categories) or Very often/Fairly often vs. Sometimes/Almost never vs. Never (witnessing parental violence categories).<sup>51</sup> Other ACEs were determined from questions asking if, before 18 years old, the respondent had lived with a parent or other adult who 18) Was a problem drinker, 19) Had abused drugs, 20) Had been incarcerated, 21) Had a mental illness, or 22) Had attempted and/or 23) Had committed suicide, each coded with a dichotomous (Yes vs. No) response (**Appendix 1.1**).

### **Operationalization of HIV/STI diagnosis**

HIV/STI was operationalized by the questions: “In the last 12 months, did you test positive for HIV, the virus that causes AIDS?” and “In the last 12 months, did you have AIDS?” and “In the last 12 months, did you have any other sexually transmitted diseases?” Self-report of HIV infection usually reflects true HIV status,<sup>165</sup> if true HIV status is known by the respondent.

### **Potential Mediators – Posttraumatic stress disorder, substance abuse, depression, intimate partner violence perpetration, early sexual debut**

PTSD, substance use disorder, and depression were determined by questions asking about symptoms of PTSD, alcohol or drug abuse and/or dependence, and major depressive episode since Wave 1 interview (2001-2002) but before the past year. Substance use disorders considered were abuse of and/or dependence on alcohol, nicotine, sedatives, tranquilizers, opioids, amphetamines, cannabis, hallucinogens, cocaine, and heroin. PTSD, substance use disorder, and major depression were diagnosed using the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV) criteria<sup>122</sup> and the Alcohol Use Disorder and

Associated Disabilities Interview Schedule-DSM-IV Version (AUDADIS-IV)<sup>123,124</sup> - a fully-structured interview appropriate to be used by trained lay interviewers.<sup>125</sup> The AUDADIS has fair to good reliability in the diagnosis of PTSD ( $\kappa = 0.77$ ),<sup>124</sup> MD ( $\kappa = 0.59$ )<sup>152</sup> and for alcohol abuse and dependence ( $\kappa=0.74$ )<sup>152</sup> and drug dependence and abuse diagnoses ( $\kappa = 0.50 - 0.80$ ).<sup>153</sup>

IPV perpetration was operationalized by six questions taken from the Conflict Tactic Scales,<sup>117</sup> which have been validated in a population-based sample.<sup>118</sup> These questions were used to ask respondents about use of force with partners in the past year:<sup>51</sup> 1) Pushing, grabbing or shoving; 2) Slapping, kicking, biting or hitting; 3) Threatening his/her partner with a weapon like a knife or gun; 4) Cutting or bruising partner; 5) Forcing partner to have sex; and 6) Injuring partner enough so that he/she needed medical care. Each IPV perpetration variable was categorized into a binary construct, Once/2 to 3 times/Once a month/More than once a month vs. Never, as has been used in previous studies,<sup>118-121</sup> before being used as an observed variable in structural equation modeling (SEM).

Age at sexual debut was determined by the question “How old were you when you first had sex/sexual intercourse, or have you never had sexual intercourse?” Debut was categorized into  $<15$  and  $\geq 15$ .<sup>24</sup> Self-reported age at sexual debut has been used in several prior studies.<sup>24,45,70,79</sup>

## **Confounders**

Potential confounders considered were associated with ACEs and HIV/STI diagnosis. Previous studies suggest that age, race/ethnicity, income, marital status and insurance status differences are associated with ACEs.<sup>4</sup> Diagnosis of STIs was independently associated with

race/ethnicity and low income.<sup>166</sup> A previous study examining the association between ACEs and STI diagnosis adjusted for age at interview and race.<sup>25</sup> Marital status<sup>167-169</sup> and socioeconomic risk factors<sup>167,168</sup> such as education<sup>169</sup> in prior studies were associated with STIs. Therefore, the following potential sociodemographic confounders were considered in the study: age (continuous), race/ethnicity (White (reference), Black, Other, Hispanic), income (<\$25,000, \$25,000-<\$50,000, ≥\$50,000 (reference), education (less than high school, high school, greater than high school education), marital status (married/cohabiting, widowed/divorced/separated, never married (reference)) and insurance status (insured (reference) and not insured).

### **Analytic Approach**

Respondents were excluded if they answered “Don’t know” to questions on ACEs and HIV/STI diagnosis (262). The resultant sample size was 34,391. The distribution of sociodemographic characteristics overall, across populations exposed and unexposed to ACEs, and populations diagnosed and not diagnosed with HIV/STIs were examined using SAS version 9.4 (SAS Institute, Cary, NC).

#### *Overall structural equation modeling approach*

Structural equation modeling (SEM) was used to determine appropriate latent factor(s) for ACEs and IPV perpetration. Exploratory factor analysis (EFA) was used to explore the possible latent structures of the observed variables for ACEs and IPV perpetration. Confirmatory factor analysis (CFA) was used to confirm the latent structures and to determine if the models obtained from the EFA were an appropriate fit for the data.<sup>170</sup> A mediation model was used to determine the roles of PTSD, depression, substance abuse, early sexual debut, and IPV perpetration between ACE factors and HIV/STIs, an observed variable. For the mediator

variables, latent variables were used for IPV perpetration, while an observed variable was used for PTSD, depression, substance abuse, and early sexual debut. **Figure 4.1** depicts the mediational model used in the analysis, showing the indirect associations. Survey weights were used for final models. SEM and mediational analyses were performed in Mplus (Muthén & Muthén, Los Angeles, CA).

### *Model building*

Measurement invariance by sex was tested. Configural invariance indicated that parameters (factor loadings and thresholds) were freely estimated.<sup>140</sup> Strong measurement invariance would indicate that the factor loadings and thresholds are fixed across sex groups.<sup>140</sup> Measurement invariance by sex was tested for ACE factors and IPV perpetration. The chi-square difference test of measurement invariance is limited as it is highly influenced by sample size.<sup>141-143</sup> This limitation may lead to misidentification of a lack of measurement invariance.<sup>144</sup> Due to the large sample size of the study population, the change in the Comparative Fit Index ( $\Delta CFI$ ) ( $CFI_{\text{constrained}} - CFI_{\text{unconstrained}}$ ) was used as an alternative goodness-of-fit index.<sup>145</sup> A general criterion was proposed: a value of  $\Delta CFI \leq 0.01$  indicates that the null hypothesis of measurement invariance should not be rejected.<sup>46</sup>

## RESULTS

### **Weighted descriptive statistics**

About six in ten respondents reported being exposed to ACEs (60.9%) and only 0.9% reported HIV/STIs diagnosis in the past year (**Table 4.1**). Approximately one in four (27.8%) respondents reporting HIV/STIs and four in ten (39.2%) respondents not reporting HIV/STIs were exposed to ACEs. Approximately half of the sample was female (52.1%) (**Table 4.2**).



## Evaluation of measurement models

**Table 4.3** shows the standardized model results for measurement models with strong invariance from the confirmatory factor analysis (CFA) models for ACEs and IPV perpetration. Model fit statistics for the CFA for the ACE measurement model were:  $\chi^2$  (df = 497) = 10169.475,  $p < 0.0001$ ;  $\chi^2$  for men = 4007.798;  $\chi^2$  for women = 6161.677; CFI = 0.989; TLI = 0.989; RMSEA = 0.034; 90% CI (0.033 – 0.034), WRMR = 5.771. Model fit statistics for the CFA for the IPV measurement model were:  $\chi^2$  (df = 22) = 157.238,  $p < 0.0001$ ;  $\chi^2$  for men = 54.680;  $\chi^2$  for women = 102.558; CFI = 0.991; TLI = 0.988; RMSEA = 0.019; 90% CI (0.016 – 0.022), WRMR = 2.410. The model fit statistics indicate that the ACE and IPV perpetration measurement models were a good fit for the data.

## Measurement invariance

There were statistically significant differences comparing configural invariance (factor loadings and thresholds were freely estimated) and strong invariance (holding factor loadings and thresholds equal across groups) models for ACE and IPV perpetration factors. The CFI difference comparing the constrained and unconstrained models was -0.001 for ACEs and 0.005 for IPV perpetration, which are both  $< 0.01$ . As a result, structural models accounted for strong invariance for ACEs and IPV perpetration across sex groups and we were able to compare findings for men and women constraining the measurement model to be equal across sex.

## Evaluation of structural model

*Direct relationships between ACEs and HIV/STIs*

**Table 4.4a** and **Table 4.4b** show the direct associations between ACEs, mediators, (PTSD, depression, substance abuse, early sexual debut, and IPV perpetration) and HIV/STIs. There were no statistically significant direct associations seen between ACEs and HIV/STIs. However, depression and substance abuse were associated with HIV/STIs among women and men. PTSD, early sexual debut and IPV perpetration were associated with HIV/STIs among men but not among women.

#### *Mediation results among men*

*PTSD* fully mediated the relationship between physical/psychological abuse ( $\beta=0.0002$ ;  $p=0.012$ ), sexual abuse ( $\beta=0.0002$ ;  $p=0.003$ ) and parental incarceration and psychopathology ( $\beta=0.0001$ ;  $p=0.032$ ) and HIV/STIs. For example, a one unit change in physical/psychological abuse affects HIV/STIs by 0.0002 indirectly through PTSD. *Substance abuse* fully mediated neglect ( $\beta=-0.0006$ ;  $p=0.008$ ), physical/psychological abuse ( $\beta=0.001$ ;  $p<0.001$ ), and sexual abuse ( $\beta=0.0004$ ;  $p=0.002$ ) and HIV/STIs. *Depression* fully mediated physical/psychological abuse ( $\beta=0.0003$ ;  $p=0.004$ ) and sexual abuse ( $\beta=0.0002$ ;  $p=0.006$ ) and HIV/STIs. *Early sexual debut* ( $\beta=0.0002$ ;  $p=0.015$ ) and *IPV perpetration* ( $\beta=0.0003$ ;  $p=0.007$ ) fully mediated sexual abuse and HIV/STIs.

#### *Mediation results among women*

*Substance abuse* fully mediated neglect (negative mediation) ( $\beta=-0.0004$ ;  $p=0.003$ ) and physical/psychological abuse ( $\beta=0.005$ ;  $p<0.001$ ), parental incarceration/psychopathology ( $\beta=0.0002$ ;  $p=0.028$ ) and HIV/STIs. *Depression* fully mediated physical/psychological abuse ( $\beta=0.0005$ ;  $p<0.001$ ) and parental violence ( $\beta=-0.0002$ ;  $p=0.012$ ) and HIV/STIs. For example, a one unit change in physical/psychological abuse mediated HIV/STIs by 0.0005 indirectly

through depression. *Early sexual debut* fully mediated parental incarceration/psychopathology ( $\beta=-0.0002$ ;  $p=0.043$ ). Total effects of ACEs HIV/STIs are shown in **Appendix 4.1**.

## DISCUSSION

The primary finding of this study was that the mediational roles of psychopathology and sexual behaviors varied by sex. The non-statistically significant results between ACEs and HIV/STIs in the mediation model suggest that the effect of ACEs was explained fully through the statistically significant mediators in the model: PTSD and early sexual debut for men, and substance abuse and depression for men and women. Early sexual debut mediated sexual abuse and HIV/STIs among men. However, this relationship was not statistically significant among women in our sample.

Our results support previous findings that IPV perpetration is associated HIV/STI diagnosis among men.<sup>171,172</sup> IPV perpetration was associated with HIV/STI diagnosis among men but not among women. However, there were no direct effects observed between ACEs and HIV/STIs in the mediation model, which conflicts prior research showing that new HIV infections have been shown to be common in women who were exposed to emotional, sexual and physical abuse during childhood.<sup>102</sup> However, depression and substance abuse were associated with HIV/STIs among women and men in the current study while PTSD was associated with HIV/STIs among men. These findings support previous studies, which found that depression and PTSD are associated with STI symptoms.<sup>173</sup> Psychological disorders may have been associated with HIV/STI through their link with risky sexual behavior.<sup>174</sup> Depression, has been independently linked with risky sexual behavior.<sup>174</sup> However, while PTSD has not been

independently associated with risky sexual behavior, individuals with both PTSD and depression were more likely to report risky sexual behavior.<sup>174</sup>

In the current study, the indirect effects between sexual abuse and HIV/STIs via PTSD, early sexual debut, and IPV perpetration were statistically significant among men. These findings support prior research showing that posttraumatic stress symptoms have been shown to mediate the relationship between sexual revictimization and HIV symptom severity among HIV positive men.<sup>175</sup> The current study did not address sexual revictimization but examined overall sexual abuse experienced as a child, which may include revictimization. Victims of sexual abuse may be at risk for peritraumatic dissociation, the dissociation (the disruption or disturbance in a person's thoughts, awareness, identity, consciousness or memory<sup>176</sup>) that occurs during and immediately after a traumatic exposure.<sup>175,177-179</sup> This increased risk may result in further vulnerability to PTSD<sup>175</sup> and consequent risk for HIV/STI diagnosis. PTSD has been found to be associated with HIV risk behavior including lack of condom use<sup>174,180</sup> and using intravenous drugs, being treated for an STI, exchanging sex for money/drugs.<sup>174</sup> Findings also support studies showing that sexual abuse has been linked to early sexual debut,<sup>181,182</sup> IPV victimization<sup>132,182</sup> and IPV perpetration.<sup>132</sup> Male perpetrators of physical and sexual IPV tend to engage in risky sexual behavior, including main partner infidelity and paying money for sex.<sup>183</sup> In addition, this perpetration of IPV, which has been linked to sexual abuse, may result from the exertion of power over partners due to feelings of powerlessness that may have been experienced during episodes of sexual abuse during childhood.

SUDs played a significant mediational role for men and women. However, SUDs negatively mediated neglect and HIV/STIs in both groups. There was a negative association between neglect and SUDs, which contradicts previous studies. Neglect, as assessed by

reporting inadequate food, clothing, medical care, inadequate supervision, and inappropriate chores was shown to be associated with substance abuse.<sup>184</sup> The current neglect factor did not include inappropriate chores, which may have explained the disparate findings. However, childhood maltreatment, including neglect may also be associated with resilience (experiencing adversity and then showing better emotional well-being than expected<sup>185</sup>),<sup>186</sup> which may be a protective factor of SUDs. A positive association was observed between SUDs and HIV/STI diagnosis, which has been previously established.<sup>187-189</sup>

MD mediated the relationship between sexual abuse and HIV/STIs for men but this association was not statistically significant for women. Kendler et al., (2014) showed that childhood sexual abuse had a stronger effect on MD in men compared to women.<sup>190</sup> The current study supports these findings as sexual abuse was statistically significantly associated with MD in men but this relationship was not significant in women. The current findings also suggest that sexual abuse may also have a stronger effect on PTSD and SUDs among men compared to women due to the direct associations between childhood sexual abuse and these disorders, as well as the mediational role of PTSD, SUDs and MD in the association between sexual abuse and HIV/STIs.

The Traumagenic Dynamics model, which includes traumatic sexualization, betrayal, powerlessness and stigmatization, may help in understanding the relationship between sexual abuse and sexual health outcomes. Therefore, this model may help to explain the mediational role of PTSD, MD, SUDs, early sexual debut, and IPV perpetration between sexual abuse and HIV/STIs. Men who have been exposed to childhood sexual abuse, may undergo traumatic sexualization, feelings of betrayal, and stigmatization, which may result in PTSD, abuse of substances, depressive symptoms. The tendency to perpetrate IPV may be one way of exuding

power due to feelings of powerlessness that resulted during childhood sexual abuse. A modified version of the Traumagenics Dynamics model including the latter three components, betrayal, powerlessness, and stigmatization, may also be used to understand the mediational role of substance abuse and depression between physical/psychological abuse and HIV/STIs among men and women. Men and women may feel betrayed, powerless and may feel stigmatized due to physical and/or psychological abuse experienced during childhood, which may result in a higher likelihood of substance abuse and depression, resulting in a higher tendency to be diagnosed with HIV/STIs.

The study had several strengths. To date, this study is the first to examine the association between ACEs and HIV/STI using an SEM modeling approach. Using SEM allows for the use of latent variable constructs based on a larger number of indicator variables, and testing among variables while accounting for measurement error. This study is also the first study to examine the role of mediators in the association between ACEs and HIV/STI. In considering psychosocial and behavioral mediators, this study has helped to determine key factors that may need to be considered in HIV/STI prevention program planning, such as early sexual debut and long-term social, environmental and familial events that occurred during childhood<sup>25</sup> as well as psychiatric and SUDs, and IPV perpetration that may have occurred with the past year.

The findings of this study should be considered with some limitations. First, the low prevalence of HIV/STIs reported may have resulted in estimates biased towards the null. Furthermore, due to the nature of the survey, we were unable to consider biomarkers for HIV/STI diagnosis. Although self-reported measures of sexual behavior and HIV/STI diagnosis have questionable validity,<sup>191,192</sup> reporting of STIs was found to have good reliability, excellent specificity and moderate sensitivity.<sup>193</sup> Second, one study suggested that ACEs are

underreported among STI populations.<sup>194</sup> Therefore, it is possible that ACEs might have been underreported among those who were diagnosed with HIV/STI. This additional underreporting may have also contributed to biased estimates towards the null. Third, we were unable to consider potential effect measure modifiers such as sexual orientation as previous research has shown that men who have sex with men (MSM) are at increased risk for STIs<sup>157</sup> due to the small sample sizes of sexual minorities and of those diagnosed with HIV/STI in the study sample. Therefore, the findings presented in the current study may be more generalizable to heterosexual populations more so than sexual minority populations.

## CONCLUSIONS

The main finding was that role of mediators in the relationship between ACEs and HIV/STIs varied by sex. HIV/STI prevention and intervention programs should use a life course approach by addressing adverse events that may have occurred during childhood (especially physical and psychological abuse), recent depression, and substance abuse among men and women. While programs for men and women should also address sexual abuse (and the peritraumatic dissociation that may occur as a result, parental incarceration and psychopathology, PTSD, early sexual debut, and recent IPV perpetration, our findings suggest that men may benefit greatly from these prevention efforts. Future research may include examining the association between ACEs and HIV/STIs using longitudinal studies and larger samples of respondents who have been diagnosed with HIV/STIs. Future studies should also examine the mediational roles in the relationship between ACEs and HIV/STIs by race/ethnicity and sexual orientation.

**Table 4.1. Distribution of Characteristics of Overall Sample**

<b>Characteristics*</b>	<b>Overall</b>
Sex	
Men	47.9 (14,453)
Women	52.1 (19,938)
Age	
18-34	25.5 (7,988)
35-49	31.1 (10,966)
50+	43.4 (15,437)
Race/Ethnicity	
White, nH	71.0 (20,025)
Black, nH	11.0 (6,541)
Other, nH	6.4 (1,520)
Hispanic, any race	11.6 (6,305)
Income	
<\$25,000	26.3 (10,826)
\$25000 - <\$50,000	27.8 (9,758)
≥\$50,000	45.9 (13,807)
Education	
<High School	14.0 (5,452)
High School	27.5 (9,377)
>High School	58.6 (19,562)
Insurance	
Yes	87.7 (30,034)
No	12.3 (4,325)
Marital Status	
Married/Cohabiting	63.8 (18,752)
Widowed/Divorced/Separated	18.8 (9,058)
Never Married	17.36 (6,581)
ACE Exposure	
Yes	60.9 (21,254)
No	39.1 (13,137)
HIV/STI	
Yes	0.9 (365)
No	99.1 (34,026)

\*All characteristics were statistically significant at alpha level 0.05 (p<0.0001)



**Table 4.2. Distribution of Characteristics across Respondents Exposed and Unexposed to ACEs and Reporting or not Reporting HIV/STIs**

	ACEs	No ACEs	P-value	HIV/STIs	No HIV/STIs	P-value
<b>Sex</b>						
Men	49.5 (9,236)	45.4 (5,217)	<0.0001	45.1 (145)	48.0 (14,308)	0.0693
Women	50.4 (12,018)	54.6 (7,920)		54.9 (220)	52.0 (19,718)	
<b>Age</b>						
18-34	24.8 (4,885)	26.5 (3,103)	<0.0001	39.2 (130)	25.3 (7,858)	<0.0001
35-49	33.4 (7,253)	27.5 (3,713)		42.6 (154)	31.0 (10,812)	
50+	41.7 (9,116)	46.0 (6,321)		18.3 (81)	43.6 (15,356)	
<b>Race/Ethnicity</b>						
White, nH	71.2 (12,383)	70.7 (7,642)	<0.0001	62.7 (182)	71.1 (19,843)	<0.0001
Black, nH	11.4 (4,158)	10.5 (2,383)		19.3 (110)	11.0 (6,431)	
Other, nH	6.1 (906)	6.9 (614)		5.0 (13)	6.4 (1,507)	
Hispanic, any race	11.4 (3,807)	11.9 (2,498)		13.0 (60)	11.6 (6,245)	
<b>Income</b>						
<\$25,000	25.3 (6,369)	27.8 (4,457)	<0.0001	39.7 (171)	26.2 (10,655)	<0.0001
\$25000 - <\$50,000	27.5 (6,034)	28.4 (3,724)		26.8 (90)	27.9 (9,668)	
≥\$50,000	47.1 (8,851)	43.8 (4,956)		33.5 (104)	46.0 (13,7003)	
<b>Education</b>						
<High School	13.1 (3,116)	15.3 (2,336)	<0.0001	15.9 (62)	14.0 (5,390)	0.1001
High School	26.7 (5,618)	28.6 (3,759)		28.6 (109)	27.5 (9,268)	
>High School	60.1 (12,520)	56.1 (7,042)		55.5 (194)	58.6 (19,368)	
<b>Insurance</b>						
Yes	88.0 (18,634)	87.3 (11,400)	0.0029	85.0 (302)	87.7 (29,732)	0.0006
No	12.0 (2,601)	12.7 (1,724)		15.0 (63)	12.3 (4,262)	
<b>Marital Status</b>						
Married/Cohabiting	64.3 (11,633)	63.1 (7,119)	0.0004	44.4 (125)	64.0 (18,627)	<0.0001
Widowed/Div/Sep	18.6 (5,537)	19.1 (3,521)		22.6 (101)	18.8 (8,957)	
Never Married	17.0 (4,084)	17.8 (2,497)		32.9 (139)	17.2 (6,442)	
<b>ACE Exposure</b>						
Yes	--	--	<0.0001	72.2 (273)	60.8 (20,981)	<0.0001
No				27.8 (92)	39.2 (13,045)	
<b>HIV/STI</b>						
Yes	1.1 (273)	0.7 (92)	<0.0001	--	--	<0.0001
No	98.9 (20,981)	99.3 (13,045)				

**Table 4.3. Standardized Model Results for Measurement Models with Strong Invariance<sup>a</sup> from Confirmatory Factor Analyses**

	Men		Women	
	Est. <sup>b</sup>	SE	Est. <sup>b</sup>	SE
<b>Neglect</b>				
1. Left alone before age 10	0.709	0.007	0.759	0.005
2. Went without things needed (clothes, school supplies)	0.841	0.007	0.862	0.005
3. Went hungry	0.903	0.007	0.933	0.005
4. Failed to get medical treatment	0.894	0.007	0.895	0.005
<b>Physical/Psychological Abuse</b>				
1. Parent <sup>c</sup> insulted/said hurtful things	0.861	0.004	0.895	0.003
2. Parent <sup>c</sup> threatened to hit/throw something at respondent	0.829	0.004	0.829	0.004
3. Parent <sup>c</sup> made respondent fear he/she would be physically hurt	0.908	0.003	0.952	0.002
4. Parent <sup>c</sup> pushed/grabbed/shoved/slapped respondent	0.875	0.003	0.905	0.002
5. Parent <sup>c</sup> hit respondent causing marks/bruises/injury	0.899	0.003	0.929	0.002
<b>Sexual Abuse</b>				
1. Adult <sup>d</sup> touched respondent sexually	0.971	0.006	0.961	0.005
2. Adult <sup>d</sup> had respondent touch him/her sexually	0.959	0.007	0.947	0.005
3. Adult <sup>d</sup> attempted to have sexual intercourse with respondent	0.975	0.005	0.985	0.003
4. Adult <sup>d</sup> had sexual intercourse with respondent	0.972	0.006	0.967	0.005
<b>Parental Violence</b>				
1. Father <sup>e</sup> pushed/grabbed/slapped/throw something at mother	0.930	0.002	0.945	0.002
2. Father <sup>e</sup> hit mother with a fist or something hard	0.934	0.002	0.945	0.002
3. Father <sup>e</sup> repeatedly hit mother for at least a few minutes	1.024	0.003	1.026	0.002
4. Father <sup>e</sup> threaten mother with a knife/gun or use it to hurt her	0.832	0.007	0.738	0.005
<b>Parental Incarceration/Psychopathology</b>				
1. Parent <sup>f</sup> was a problem drinker	0.907	0.016	0.927	0.014
2. Parent <sup>f</sup> had problems with drugs	0.852	0.010	0.830	0.011
3. Parent <sup>f</sup> went to jail/prison	0.869	0.011	0.894	0.011
4. Parent <sup>f</sup> was treated/hospitalized for mental illness	0.811	0.011	0.748	0.011
5. Parent <sup>f</sup> attempted suicide	0.967	0.006	0.917	0.008
6. Parent <sup>f</sup> committed suicide	0.962	0.007	0.909	0.009
<b>Intimate Partner Violence Perpetration</b>				
1. Pushed/Grabbed/Shoved spouse/partner	0.851	0.014	0.917	0.011
2. Slapped/Kicked/Bit/Hit spouse or partner	0.977	0.013	0.955	0.008
3. Threatened spouse/partner with a weapon like a knife or gun	0.957	0.016	0.903	0.017
4. Cut/Bruise spouse or partner	0.929	0.016	0.923	0.013
5. Forced spouse/partner to have sex	0.886	0.025	0.910	0.020
6. Injured spouse/partner so that he/she had to get medical care	0.974	0.017	0.996	0.018

Abbreviations: Est., Standardized estimate; SE, Standard error

<sup>a</sup><sup>b</sup>Factor loadings and threshold are fixed; residual variances are fixed at 1 in one group (males) and are freely estimated in the other (females); factor means are fixed at 0 in one group (males) and are freely estimated in the other (females).

<sup>b</sup>P-values for all factor loadings were  $p < 0.001$ .

<sup>c</sup>Parent or caregiver

<sup>d</sup>Adult/other person

<sup>e</sup>Father/other adult male

<sup>f</sup>Parent/other adult living in the home

**Table 4.4a. Unstandardized Estimates for Associations between HIV/STIs, PTSD, Depression, and Substance Abuse and Adverse Childhood Experiences among Men and Women, National Epidemiologic Survey on Alcohol and Related Conditions, 2004-2005**

	HIV/STIs			PTSD			Depression			Substance Abuse		
MEN												
	Est.	SE	P-value	Est.	SE	P-value	Est.	SE	P-value	Est.	SE	P-value
Neglect	-0.003	0.002	0.224	0.010	0.006	0.105	-0.012	0.007	0.106	<b>-0.047</b>	<b>0.016</b>	<b>0.003</b>
Phys/Psy	0.002	0.002	0.396	<b>0.019</b>	<b>0.005</b>	<b>&lt;0.001***</b>	<b>0.032</b>	<b>0.006</b>	<b>&lt;0.001***</b>	<b>0.085</b>	<b>0.013</b>	<b>&lt;0.001***</b>
Sexual	0.002	0.002	0.337	<b>0.023</b>	<b>0.004</b>	<b>&lt;0.001***</b>	<b>0.019</b>	<b>0.005</b>	<b>&lt;0.001***</b>	<b>0.034</b>	<b>0.010</b>	<b>&lt;0.001***</b>
PV	0.000	0.002	0.847	-0.006	0.004	0.125	-0.007	0.005	0.163	-0.016	0.011	0.156
PIP	0.002	0.001	0.269	<b>0.008</b>	<b>0.003</b>	<b>0.006**</b>	<b>0.009</b>	<b>0.003</b>	<b>0.013*</b>	<b>0.022</b>	<b>0.008</b>	<b>0.008**</b>
HIV/STI*				<b>0.009</b>	<b>0.003</b>	<b>0.001**</b>	<b>0.010</b>	<b>0.003</b>	<b>&lt;0.001***</b>	<b>0.012</b>	<b>0.002</b>	<b>&lt;0.001***</b>
WOMEN												
Neglect	0.001	0.003	0.605	-0.005	0.008	0.530	<b>-0.022</b>	<b>0.009</b>	<b>0.022*</b>	<b>-0.043</b>	<b>0.010</b>	<b>&lt;0.001***</b>
Phys/Psy	0.000	0.002	0.886	<b>0.037</b>	<b>0.007</b>	<b>&lt;0.001***</b>	<b>0.056</b>	<b>0.008</b>	<b>&lt;0.001***</b>	<b>0.051</b>	<b>0.008</b>	<b>&lt;0.001***</b>
Sexual	0.001	0.002	0.591	0.048	0.036	0.190	0.031	0.024	0.197	0.028	0.022	0.197
PV	0.001	0.002	0.454	0.007	0.005	0.113	<b>-0.017</b>	<b>0.006</b>	<b>0.003**</b>	0.002	0.006	0.672
PIP	0.001	0.002	0.410	-0.003	0.005	0.581	0.012	0.006	0.052	<b>0.017</b>	<b>0.006</b>	<b>0.009</b>
HIV/STI*				<b>0.004</b>	<b>0.002</b>	<b>0.035*</b>	<b>0.009</b>	<b>0.002</b>	<b>&lt;0.001***</b>	<b>0.009</b>	<b>0.002</b>	<b>&lt;0.001***</b>

Note: Direct associations between ACE factors and mediators (PTSD, depression, substance abuse), between mediators and HIV/STIs, and between ACE factors and HIV/STIs. Abbreviations: Est., Unstandardized estimate; Phys/Psy, Physical/psychological abuse; PIP, Parental incarceration/psychopathology; PTSD, posttraumatic stress disorder; PV, Witnessing parental violence; SE, Standard error.

\*HIV/STI on PTSD, depression, substance abuse; **Bolded numbers** are statistically significant at  $p < 0.05^*$ ,  $p < 0.01^{**}$ ,  $p < 0.001^{***}$ .

**Table 4.4b. Unstandardized Estimates for Associations between Early Sexual Debut, IPV Perpetration and Adverse Childhood Experiences among Men and Women, National Epidemiologic Survey on Alcohol and Related Conditions, 2004-2005**

Latent Variable	Early Sexual Debut			IPV Perpetration		
	Men					
	Est.	SE	P-value	Est.	SE	P-value
Neglect	<b>-0.036</b>	<b>0.011</b>	<b>0.001**</b>	-0.120	0.094	0.201
Phys/Psy	<b>0.041</b>	<b>0.009</b>	<b>&lt;0.001***</b>	0.087	0.069	0.211
Sexual	<b>0.056</b>	<b>0.007</b>	<b>&lt;0.001***</b>	<b>0.232</b>	<b>0.050</b>	<b>&lt;0.001***</b>
PV	0.007	0.008	0.387	0.055	0.053	0.306
PIP	<b>0.011</b>	<b>0.006</b>	<b>0.048*</b>	0.016	0.052	0.746
HIV/STI*	<b>0.006</b>	<b>0.002</b>	<b>0.004**</b>	<b>0.002</b>	<b>0.001</b>	<b>0.007**</b>
Women						
Neglect	-0.012	0.007	0.065	-0.170	0.085	0.046
Phys/Psy	0.005	0.005	0.315	<b>0.252</b>	<b>0.095</b>	<b>0.008**</b>
Sexual	0.066	0.050	0.187	0.120	0.103	0.242
PV	0.004	0.004	0.254	0.041	0.042	0.320
PIP	<b>0.009</b>	<b>0.004</b>	<b>0.031*</b>	0.042	0.044	0.345
HIV/STI*	<b>0.017</b>	0.003	<b>&lt;0.001***</b>	-0.002	0.001	0.267

Note: Direct associations between ACE factors and mediators (early sexual debut, and IPV perpetration), between mediators and HIV/STIs, and between ACE factors and HIV/STIs.

Abbreviations: Est., Unstandardized estimate; IPVP, Intimate Partner Violence Perpetration; Phys/Psy, Physical/psychological abuse; PIP, Parental incarceration/psychopathology; PTSD, posttraumatic stress disorder; PV, Witnessing parental violence; SE, Standard error.

\*HIV/STIs on early sexual debut and IPV perpetration

**Bolded numbers** are statistically significant at  $p < 0.05^*$ ,  $p < 0.01^{**}$ ,  $p < 0.001^{***}$ .

**Table 4.5. Unstandardized Estimates of Mediation Pathways of Adverse Childhood Experiences and HIV/STI Diagnosis via Posttraumatic Stress Disorder, Substance Abuse, Depression, Early Sexual Debut and Intimate Partner Violence Perpetration among Men and Women**

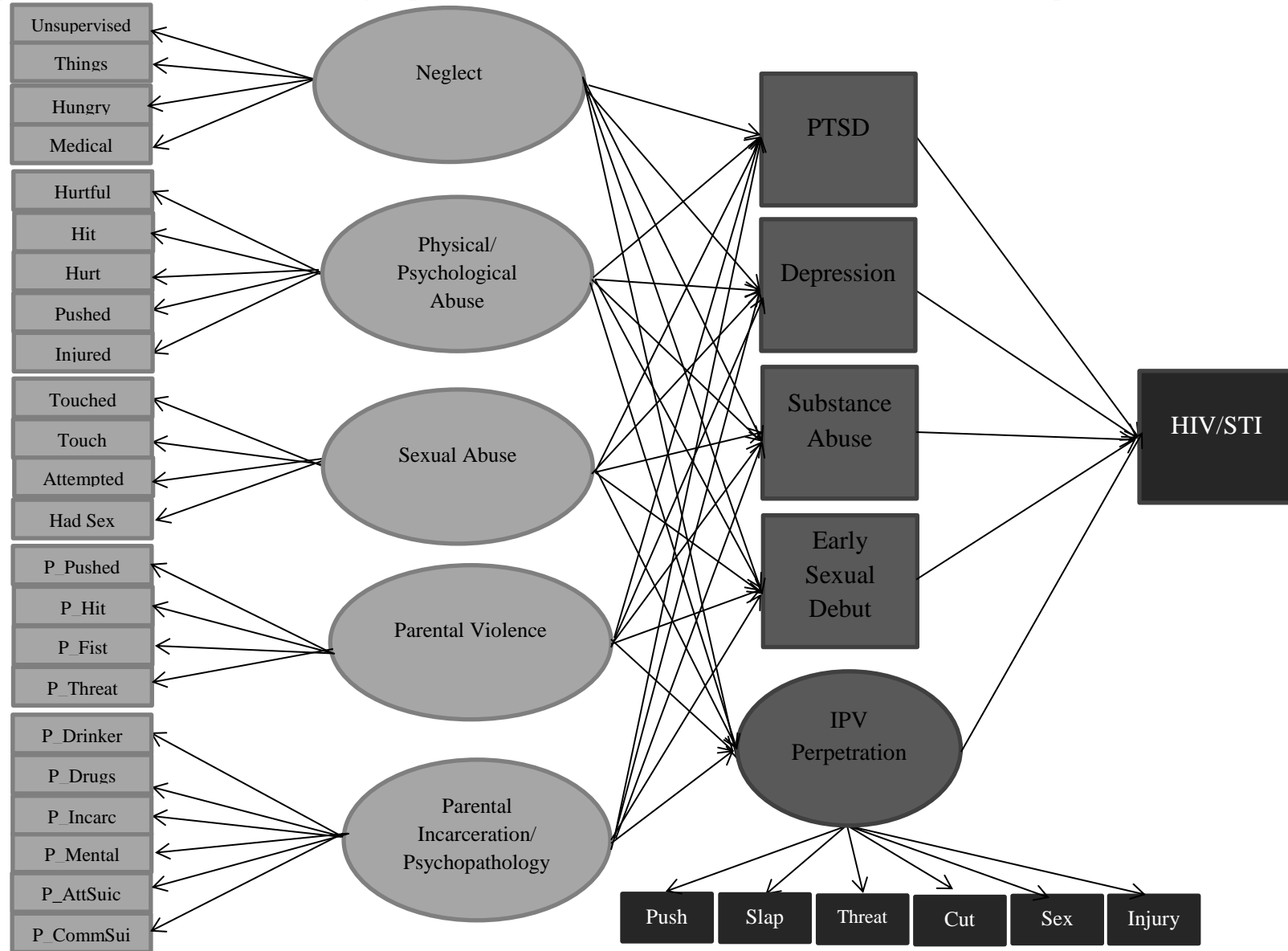
Latent Variable	Posttraumatic Stress Disorder		Substance Abuse		Depression		Early Sexual Debut		IPV Perpetration	
	Est. <sup>a</sup>	P-value	Est. <sup>a</sup>	P-value	Est. <sup>a</sup>	P-value	Est. <sup>a</sup>	P-value	Est. <sup>a</sup>	P-value
	<b>Men</b>									
Neglect	0.0001	0.145	<b>-0.0006</b>	<b>0.008**</b>	-0.0001	0.142	-0.0002	0.031	-0.0002	0.247
Physical/Psychological Abuse	<b>0.0002</b>	<b>0.012*</b>	<b>0.0010</b>	<b>&lt;0.001***</b>	<b>0.0003</b>	<b>0.004**</b>	<b>0.0002</b>	<b>0.015*</b>	0.0002	0.263
Sexual Abuse	<b>0.0002</b>	<b>0.003**</b>	<b>0.0004</b>	<b>0.002**</b>	<b>0.0002</b>	<b>0.006**</b>	<b>0.0003</b>	<b>0.007**</b>	<b>0.0005</b>	<b>0.012*</b>
Parental Violence	-0.0001	0.166	-0.0002	0.167	-0.0001	0.209	0.0000	0.411	0.0001	0.336
Parental Incarceration/ Psychopathology	<b>0.0001</b>	<b>0.032*</b>	<b>0.0000</b>	<b>0.015*</b>	0.0002	0.058	0.0001	0.100	0.0000	0.766
	<b>Women</b>									
Neglect	0.0000	0.549	<b>-0.0004</b>	<b>0.003**</b>	-0.0002	0.052	-0.0002	0.078	0.0003	0.266
Physical/Psychological Abuse	0.0001	0.053	<b>0.0005</b>	<b>&lt;0.001***</b>	<b>0.0005</b>	<b>&lt;0.001***</b>	0.0001	0.317	-0.0005	0.235
Sexual Abuse	0.0002	0.267	0.0003	0.216	0.0003	0.218	0.0110	0.194	-0.0018	0.388
Parental Violence	0.0000	0.207	0.0000	0.675	-0.0002	0.012	0.0001	0.267	-0.0001	0.415
Parental Incarceration/ Psychopathology	0.0000	0.596	0.0002	0.028	0.0001	0.084	0.0002	0.043	-0.0001	0.462

Abbreviation: Est., Unstandardized estimate; PTSD, posttraumatic stress disorder; SE, Standard error;

**Bolded numbers** are statistically significant at  $p < 0.05^*$ ,  $p < 0.01^{**}$ ,  $p < 0.001^{***}$ .

<sup>a</sup>Standard errors for all estimates are  $< 0.001$

**Figure 4.1. Mediational Model Showing Hypothesized Indirect Associations between Adverse Childhood Experiences and HIV/STIs**



## Figure Legend

Note: Correlation between latent variables and direct associations between ACE factors and HIV/STIs are not shown.

Abbreviations: Adverse Childhood Experiences: Attempted, Adult/Other person attempted to have sex with respondent; Had Sex, Adult/Other person had sex with respondent; Hit, Parent/Caregiver threatened to hit or throw something at the respondent; Hungry, Respondent went hungry; Hurt, Parent/Caregiver made respondent fear they would be physically hurt; Hurtful, Parent/Caregiver said insulted or said hurtful things to the respondent; Injured, Parent/Caregiver hit respondent that caused marks/bruises/injury; Medical, Respondent failed to get medical treatment; P\_AttSuic, Respondent lived with a parent/other adult who attempted suicide; P\_CommSuic, respondent lived with a parent/other adult who committed suicide; P\_Drinker, Parent/Other adult living in the home was a problem drinker; P\_Drugs, Parent/Other adult had problems with drugs; P\_Fist, Father/Other adult male hit mother with a fist or something hard; P\_Hit, Father/Other adult male repeatedly hit mother for at least a few minutes; P\_Incarc, respondent lived with a parent/other adult who was incarcerated; P\_Mental, Parent/Other adult was treated/hospitalized for mental illness; P\_Pushed, Father/Other adult male push, grab, slap or throw something at mother; P\_Threat, Father/Other adult male threaten mother with a knife/gun or use it to hurt her; Pushed, Parent/Caregiver pushed/grabbed/shoved/slapped or hit respondent; Things, Respondent went without things needed (clothes, supplies); Touch, Adult/Other person had respondent touched them sexually; Touched, Adult/Other person touched respondent sexually; Unsupervised, Respondent was left alone or unsupervised before age 10; Mediator: PTSD, posttraumatic stress disorder; Intimate Partner Violence Perpetration: Cut, Respondent cut/bruise spouse or partner; IPV, Intimate partner violence; Injury, Respondent injured spouse/partner enough that they needed medical care; Push, Respondent pushed/grabbed/shoved spouse/partner; Sex, Respondent force spouse/partner to have sex; Slap, Respondent slapped/Kicked/Bit/Hit spouse/partner; Threat, Respondent threatened spouse/partner with a weapon like a knife or gun; HIV/STI – HIV/Sexually transmitted infection

## **Chapter 5: Summary**



Adverse childhood experiences (ACEs) continue to be a major public health problem in the US.<sup>1,4</sup> Sexual health behaviors and outcomes such as early age at sexual debut,<sup>68</sup> intimate partner violence,<sup>104</sup> and diagnosis of HIV/AIDS,<sup>156</sup> and other sexually transmitted infections (STIs)<sup>158</sup> continue to be prevalent issues among the US population. The aim of this dissertation project was to examine the association between ACEs and early age at sexual debut, intimate partner violence perpetration, and diagnosis of HIV/STIs and to examine the disparities by sex and sexual orientation. The second aim of this project was to determine the role of potential mediators, including posttraumatic stress disorder (PTSD), substance abuse, and depression in the associations between ACEs and sexual health outcomes: IPV perpetration and HIV/STI diagnosis.

Chapter 2, entitled “Sex and sexual orientation disparities in adverse childhood experiences and early age at sexual debut”, examined the relationship between ACEs and early age at sexual debut, and the disparities by sex and by sexual orientation. Logistic regression and linear regression models were used for analyses. We found that the association between ACEs and early age at sexual debut differed by sex and sexual orientation. The associations were generally stronger among women and sexual minorities, particularly among men who have sex with men (MSM) and women who have sex with women (WSW). These results suggest that sexual health education programs interesting in addressing delaying sexual debut should also consider addressing ACEs, by using a life span approach, by addressing neglect, physical, psychological and sexual abuse, witnessing parental violence and parental incarceration and psychopathology during childhood. Target populations should include men and women but results may be greater for women and sexual minority populations. Reducing ACEs may delay

sexual debut, which may decrease the rates of associated adverse outcomes, such as risky sexual behaviors and low birth weight.

Chapter 3, entitled “Adverse childhood experiences and intimate partner violence perpetration: Sex differences and similarities in psychosocial mediation”, assessed the association between ACEs and IPV perpetration and considered the role of potential mediators: PTSD, substance abuse, and depression. Structural equation modeling was used for mediation analysis and multi-group analysis was used to obtain results separately for men and women. Among men, PTSD mediated the relationship between sexual abuse and IPV perpetration. However, among men and women, substance abuse mediated the relationship between physical and psychological abuse and IPV perpetration. The clinical approach from intrapersonal models was used to help to understand the mediational role of depression and substance abuse in the association as the approach suggests that IPV perpetrators are more likely to have higher levels of psychopathology compared to nonperpetrators of IPV.<sup>114</sup> IPV programs geared towards perpetrators should address physical/psychological, sexual abuse, PTSD, and substance abuse. These programs should be implemented for men and women. However, men may benefit more greatly from IPV perpetration prevention programs focused on sexual abuse and subsequent PTSD. In addition, abuse prevention programs may reduce PTSD among men and substance abuse rates among men and women, which may consequently reduce IPV perpetration rates.

The final chapter, Chapter 4, which was entitled “Sex disparities in the association between adverse childhood experiences and HIV/STIs: Mediation of psychopathology and sexual behaviors”, examined the association between ACEs and HIV/AIDS/STI diagnosis and considered the role of potential mediators: PTSD, substance abuse, depression, early age at sexual debut, and IPV perpetration. Structural equation modeling was used for mediation

analysis and multi-group analysis was used to determine results for men and women separately. The roles of mediators varied for men and women. Among men, PTSD mediated the relationship between abuse (physical/psychological and sexual) and parental incarceration/psychopathology, and HIV/STIs among men. Substance abuse mediated all ACEs, with the exception of parental violence and HIV/STIs. Depression mediated abuse, and early age at sexual debut mediated neglect and abuse and HIV/STIs. IPV perpetration mediated sexual abuse and HIV/STIs. However, among women, substance abuse mediated neglect, physical/psychological abuse, and parental incarceration/psychopathology; depression mediated physical/psychological abuse and parental violence; and early sexual debut mediated parental incarceration/psychopathology, and HIV/STIs. The Traumagenic Dynamics Model, which includes traumatic sexualization, betrayal, powerlessness, and stigmatization,<sup>163</sup> was used to understand the role of the mediators between sexual abuse, specifically and HIV/STIs among men; and a modified version of the model was used to understand the role of the mediators between other ACEs and HIV/STIs among men and women. HIV/STI prevention and intervention programs should use a life course approach by addressing adverse events that may have occurred during childhood and recent depression, and substance abuse, and early sexual debut among men and women. While programs for men and women should also address PTSD, and recent IPV perpetration, our findings suggest that men may benefit greatly from these prevention efforts.

## IMPLICATIONS FOR PUBLIC HEALTH

Overall, programs that are geared towards addressing sexual health outcomes and behaviors, including delaying age at sexual debut, preventing and reducing IPV rates, and reducing HIV/STI rates should employ a life course approach addressing adverse events that

may have occurred during childhood, recent psychopathology including PTSD, depression, substance abuse.

IPV perpetration programs should be implemented separately for men and women. “Fathers for Change”, is an example of an intervention that addresses substance abuse, domestic violence and poor parenting in fathers of young children.<sup>155</sup> The current findings show that programs such as “Fathers for change” and other programs addressing IPV among women perpetrators may also be helpful in preventing the cycle of violence, which consequently contributes to adverse events experienced by children. These programs should also include treatment components addressing substance abuse and PTSD.

Treatment components<sup>195</sup> addressing PTSD, substance abuse, and depression should be also be added to HIV/STI prevention programs. HIV/STI prevention programs should also address recent IPV perpetration, especially among men. Programs aimed at delaying sexual debut may also reduce HIV/STI rates. The results show that preventing adverse events during childhood may also reduce the rates of associated psychopathology, may delay sexual debut and adverse sexual health outcomes and behaviors in adulthood. Therefore, there is a need for early interventions for populations exposed to adverse childhood events<sup>195</sup> as these populations are at risk for psychopathology and adverse sexual health outcomes and behaviors. There is also a need for validated tools for use by health care providers to identify individuals who have been exposed to ACEs, and to subsequently address these adverse events.<sup>195</sup>

## FUTURE RESEARCH

Future studies are needed to determine if early exposure to ACEs as well as later exposure to ACEs will have an effect on sexual health outcomes in adulthood. Therefore,

surveys should ask age of exposure to adverse events so the temporality of ACE exposure can be considered in future analyses. Future studies should also endeavor to include more respondents with HIV/STIs, so as to have better estimates of the effect of ACEs on HIV/STIs. By doing so, studies will have the power to examine potential mediators, such as PTSD, depression, and substance abuse in the relationship between ACEs and HIV/STIs by race/ethnicity and by sexual orientation. Questionnaires soliciting information on ACEs should also consider obtaining information on witnessing female-to-male violence in the household as well as witnessing violence perpetrated between same-sex parents. The findings from the current study show that higher proportions of women report IPV perpetration, so it would also be interesting to see if children of female perpetrators would report experiencing violence in the home among same-sex parents. These additional questions will allow us to have a more comprehensive view of witnessing violence in the home as an adverse childhood event, which will help to determine the effect of ACEs via a more thorough assessment of ACE exposure.

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## **Appendices**



**Appendix 1.1. Operationalization of Adverse Childhood Experiences**

<b>Variable</b>	<b>Operationalization</b>
<b>Neglect</b>	
Left alone or unsupervised before age 10	Very often/Fairly often/Sometimes/Almost Never/Never
Went without things needed (clothes, school supplies)	Very often/Fairly often/Sometimes/Almost Never/Never
Went hungry	Very often/Fairly often/Sometimes/Almost Never/Never
Failed to get medical treatment	Very often/Fairly often/Sometimes/Almost Never/Never
<b>Physical/Psychological Abuse</b>	
Parent <sup>a</sup> insulted or said hurtful things to respondent	Very often/Fairly often/Sometimes/Almost Never/Never
Parent <sup>a</sup> threatened to hit or throw something at respondent	Very often/Fairly often/Sometimes/Almost Never/Never
Parent <sup>a</sup> made respondent fear they would be physically hurt	Very often/Fairly often/Sometimes/Almost Never/Never
Parent <sup>a</sup> pushed/grabbed/shoved/slapped or hit respondent	Very often/Fairly often/Sometimes/Almost Never/Never
Parent <sup>a</sup> hit respondent that caused marks/bruises/injury	Very often/Fairly often/Sometimes/Almost Never/Never
<b>Sexual Abuse</b>	
Adult <sup>b</sup> touched respondent sexually	Very often/Fairly often/Sometimes/Almost Never vs. Never
Adult <sup>b</sup> had respondent touched him/her sexually	Very often/Fairly often/Sometimes/Almost Never vs. Never
Adult <sup>b</sup> attempted to have sexual intercourse with respondent	Very often/Fairly often/Sometimes/Almost Never vs. Never
Adult <sup>b</sup> had sexual intercourse with respondent	Very often/Fairly often/Sometimes/Almost Never vs. Never
<b>Witnessing Parental Violence</b>	
Father <sup>c</sup> pushed/grabbed/slapped/threw something at mother	Very often/Fairly often vs. Sometimes/Almost Never vs. Never
Father <sup>c</sup> hit mother with a fist or something hard	Very often/Fairly often vs. Sometimes/Almost Never vs. Never
Father <sup>c</sup> repeatedly hit mother for at least a few minutes	Very often/Fairly often vs. Sometimes/Almost Never vs. Never
Father <sup>c</sup> threaten mother with a knife/gun or use it to hurt her	Very often/Fairly often vs. Sometimes/Almost Never vs. Never
<b>Parental Incarceration/Psychopathology</b>	
Parent <sup>d</sup> was a problem drinker	Yes vs. No
Parent <sup>d</sup> had problems with drugs	Yes vs. No
Parent <sup>d</sup> went to jail/prison	Yes vs. No
Parent <sup>d</sup> was treated/hospitalized for mental illness	Yes vs. No
Parent <sup>d</sup> attempted suicide	Yes vs. No
Parent <sup>d</sup> committed suicide	Yes vs. No

<sup>a</sup>Parent or Caregiver

<sup>b</sup>Adult/other person

<sup>c</sup>Father/Other adult male

<sup>d</sup>Parent/other adult living in the home

**Appendix 2.1. Association between ACE Factors and Age at Sexual Debut by Sex using Logistic Regression (<15 vs. ≥18)**

	OR	95% CI	Adjusted OR	Adjusted 95% CI
Overall (N=31,785)				
Neglect	3.28	3.07 – 3.49	3.18	2.97 – 3.41
Physical/Psychological	2.81	2.64 – 3.00	2.90	2.70 – 3.12
Sexual	7.09	6.59 – 7.62	6.95	6.40 – 7.54
Parental Violence	4.77	4.46 – 5.10	4.31	3.99 – 4.66
Parental Incarceration and Psychopathology	3.79	3.54 – 4.06	3.58	3.31 – 3.86
Men (N=13,383)				
Neglect	2.07	1.90 – 2.26	2.03	1.84 – 2.23
Physical/Psychological	1.87	1.71 – 2.03	2.01	1.82 – 2.22
Sexual	4.98	4.39 – 5.66	4.85	4.20 – 5.59
Parental Violence	3.18	2.89 – 3.50	2.85	2.55 – 3.17
Parental Incarceration and Psychopathology	2.70	2.47 – 2.95	2.53	2.29 – 2.80
Women (N=18,402)				
Neglect	6.40	5.81 – 7.06	6.29	5.68 – 6.97
Physical/Psychological	5.16	4.69 – 5.67	5.22	4.72 – 5.76
Sexual	15.8	14.3 – 17.4	15.5	14.0 – 17.2
Parental Violence	9.46	8.55 – 10.5	8.61	7.79 – 9.52
Parental Incarceration and Psychopathology	7.00	6.33 – 7.74	6.78	6.08 – 7.55

**Appendix 2.2. Association between ACE Factors and Age at Sexual Debut by Sexual Orientation using Logistic Regression (<18 vs. ≥18)**

ACEs	OR	*Adjusted OR	OR	*Adjusted OR
	95% CI	95% CI	95% CI	95% CI
	Heterosexual		Bisexual	
Neglect	<b>1.78</b> (1.71 – 1.84)	<b>1.75</b> (1.68 – 1.82)	<b>3.68</b> (2.44 – 5.54)	<b>2.93</b> (1.82 – 4.71)
Physical/Psychological	<b>1.70</b> (1.65 – 1.75)	<b>1.69</b> (1.63 – 1.75)	<b>2.73</b> (1.80 – 4.15)	<b>1.52</b> (1.02 – 2.26)
Sexual	<b>2.74</b> (2.60 – 2.89)	<b>2.62</b> (2.47 – 2.78)	<b>7.86</b> (5.12 – 12.1)	<b>5.12</b> (3.06 – 8.57)
Parental Violence	<b>2.31</b> (2.22 – 2.42)	<b>2.13</b> (2.03 – 2.23)	<b>4.71</b> (3.24 – 6.85)	1.58 (0.84 – 2.95)
Parental Incarceration and Psychopathology	<b>2.10</b> (2.04 – 2.17)	<b>1.96</b> (1.90 – 2.03)	<b>4.30</b> (2.83 – 6.52)	<b>1.94</b> (1.01 – 3.73)
	MSM		WSW	
Neglect	<b>2.76</b> (2.05 – 3.71)	<b>2.32</b> (1.71 – 3.14)	<b>4.14</b> (3.02 – 5.67)	<b>3.90</b> (2.92 – 5.21)
Physical/Psychological	<b>1.36</b> (1.03 – 1.79)	1.18 (0.89 – 1.55)	<b>3.11</b> (2.30 – 4.21)	<b>2.38</b> (1.69 – 3.33)
Sexual	<b>3.81</b> (2.36 – 6.17)	<b>4.11</b> (2.53 – 6.65)	<b>7.14</b> (5.50 – 9.28)	<b>9.99</b> (7.15 – 14.0)
Parental Violence	<b>2.08</b> (1.54 – 2.81)	<b>1.59</b> (1.12 – 2.26)	<b>6.67</b> (5.11 – 8.70)	<b>5.33</b> (3.48 – 8.15)
Parental Incarceration and Psychopathology	<b>1.57</b> (1.15 – 2.15)	<b>1.51</b> (1.14 – 1.99)	<b>4.53</b> (3.38 – 6.07)	<b>3.53</b> (2.36 – 5.28)

\*Adjusted for age (continuous), race/ethnicity, income, education, insurance, and marital status

**Bolded numbers** represent statistical significance at p<0.05

**Appendix 2.3. ACE Factors and Age at Sexual Debut by Sex and Sexual Orientation using Linear Regression excluding Outliers**

	$\beta$	95% CI	*Adjusted $\beta$	*Adjusted 95% CI	$\beta$	95% CI	*Adjusted $\beta$	*Adjusted 95% CI
<b>Overall</b>								
Neglect	<b>-1.13</b>	<b>-1.31, -0.95</b>	<b>-0.96</b>	<b>-1.12, -0.79</b>				
Physical/Psychological	<b>-0.91</b>	<b>-1.01, -0.81</b>	<b>-0.78</b>	<b>-0.88, -0.68</b>				
Sexual	<b>-2.24</b>	<b>-2.43, -2.04</b>	<b>-2.04</b>	<b>-2.24, -1.85</b>				
Parental Violence	<b>-0.93</b>	<b>-1.05, -0.80</b>	<b>-0.66</b>	<b>-0.77, -0.55</b>				
Parental Incarceration and Psychopathology	<b>-1.53</b>	<b>-1.64, -1.41</b>	<b>-1.23</b>	<b>-1.34, -1.11</b>				
<b>Men</b>								
Neglect	<b>-1.01</b>	<b>-1.31, -0.71</b>	<b>-0.89</b>	<b>-1.18, -0.61</b>	<b>-1.25</b>	<b>-1.46, -1.03</b>	<b>-1.00</b>	<b>-1.20, -0.81</b>
Physical/Psychological	<b>-0.91</b>	<b>-1.07, -0.74</b>	<b>-0.81</b>	<b>-0.98, -0.64</b>	<b>-0.93</b>	<b>-1.05, -0.81</b>	<b>-0.77</b>	<b>-0.89, -0.66</b>
Sexual	<b>-2.17</b>	<b>-2.61, -1.72</b>	<b>-2.05</b>	<b>-2.57, -1.53</b>	<b>-2.39</b>	<b>-2.61, -2.17</b>	<b>-2.14</b>	<b>-2.34, -1.93</b>
Parental Violence	<b>-1.03</b>	<b>-1.27, -0.79</b>	<b>-0.69</b>	<b>-0.93, -0.45</b>	<b>-0.97</b>	<b>-1.11, -0.83</b>	<b>-0.69</b>	<b>-0.82, -0.57</b>
Parental Incarceration and Psychopathology	<b>-1.21</b>	<b>-1.41, -1.00</b>	<b>-0.99</b>	<b>-1.18, -0.80</b>	<b>-1.79</b>	<b>-1.95, -1.64</b>	<b>-1.40</b>	<b>-1.55, -1.25</b>
<b>Women</b>								
<b>Heterosexuals</b>								
Neglect	<b>-1.09</b>	<b>-1.27, -0.91</b>	<b>-0.92</b>	<b>-1.09, -0.75</b>	<b>-1.31</b>	<b>-2.02, -0.61</b>	<b>-0.83</b>	<b>-1.66, -0.001</b>
Physical/Psychological	<b>-0.90</b>	<b>-1.00, -0.80</b>	<b>-0.78</b>	<b>-0.88, -0.68</b>	<b>-1.19</b>	<b>-1.79, -0.58</b>	<b>-1.07</b>	<b>-1.73, -0.41</b>
Sexual	<b>-2.19</b>	<b>-2.40, -1.98</b>	<b>-1.98</b>	<b>-2.18, -1.78</b>	<b>-2.38</b>	<b>-3.14, -1.63</b>	<b>-2.22</b>	<b>-3.03, -1.41</b>
Parental Violence	<b>-0.92</b>	<b>-1.04, -0.80</b>	<b>-0.66</b>	<b>-0.76, -0.55</b>	<b>-1.20</b>	<b>-1.76, -0.65</b>	<b>-0.52</b>	<b>-1.24, 0.20</b>
Parental Incarceration and Psychopathology	<b>-1.51</b>	<b>-1.63, -1.39</b>	<b>-1.21</b>	<b>-1.33, -1.10</b>	<b>-4.40</b>	<b>-6.54, -2.26</b>	<b>-3.09</b>	<b>-5.15, -1.02</b>
<b>Bisexuals</b>								
<b>MSM</b>								
Neglect	<b>-4.67</b>	<b>-7.53, -1.81</b>	<b>-4.16</b>	<b>-6.44, -1.88</b>	<b>-1.18</b>	<b>-1.82, -0.53</b>	<b>-0.79</b>	<b>-1.49, -0.09</b>
Physical/Psychological	<b>-1.86</b>	<b>-2.73, -1.00</b>	<b>-2.00</b>	<b>-2.86, -1.14</b>	<b>-0.88</b>	<b>-1.40, -0.37</b>	<b>-0.92</b>	<b>-1.47, -0.37</b>
Sexual	<b>-2.92</b>	<b>-4.28, -1.56</b>	<b>-2.87</b>	<b>-4.06, -1.69</b>	<b>-2.63</b>	<b>-3.15, -2.11</b>	<b>-2.57</b>	<b>-3.16, -1.97</b>
Parental Violence	<b>-1.91</b>	<b>-4.47, 0.66</b>	<b>-0.81</b>	<b>-2.70, 1.09</b>	<b>-1.56</b>	<b>-2.27, -0.85</b>	<b>-0.85</b>	<b>-1.63, -0.07</b>
Parental Incarceration and Psychopathology	<b>-2.40</b>	<b>-4.13, -0.66</b>	<b>-2.41</b>	<b>-4.08, -0.75</b>	<b>-2.90</b>	<b>-4.46, -1.35</b>	<b>-2.07</b>	<b>-3.64, -0.50</b>
<b>WSW</b>								

**Appendix 2.4.** Adjusted R<sup>2</sup> values for simple and multiple linear regression models for adverse childhood experiences and early sexual debut by sex.

	<b>Adjusted R<sup>2</sup></b>	
	<b>Simple Model</b>	<b>Multiple Model</b>
<b>Neglect</b>		
Overall	0.005887	0.1161
Men	0.002772	0.1086
Women	0.009912	0.1473
<b>Physical/Psychological</b>		
Overall	0.01500	0.1230
Men	0.01266	0.1165
Women	0.01844	0.1533
<b>Sexual</b>		
Overall	0.03326	0.1400
Men	0.01002	0.1162
Women	0.06119	0.1897
<b>Parental Violence</b>		
Overall	0.006455	0.1153
Men	0.004884	0.1088
Women	0.009756	0.1460
<b>Parental Incarceration and Psychopathology</b>		
Overall	0.03903	0.1425
Men	0.02537	0.1215
Women	0.05339	0.1772

**Appendix 2.5.** Adjusted R<sup>2</sup> values for simple and multiple linear regression models for adverse childhood experiences and early sexual debut by sexual orientation.

	<b>Adjusted R<sup>2</sup></b>	
	<b>Simple Model</b>	<b>Multiple Model</b>
	<b>Neglect</b>	
Overall	0.005887	0.1161
Heterosexual	0.005418	0.1179
MSM	0.07318	0.1539
WSW	0.01666	0.1368
Bisexual	0.02110	0.1884
	<b>Physical/Psychological</b>	
Overall	0.01500	0.1230
Heterosexual	0.01445	0.1248
MSM	0.05492	0.1597
WSW	0.03001	0.1563
Bisexual	0.05883	0.2209
	<b>Sexual</b>	
Overall	0.03326	0.1400
Heterosexual	0.02990	0.1389
MSM	0.1196	0.2035
WSW	0.1836	0.2954
Bisexual	0.1694	0.3188
	<b>Parental Violence</b>	
Overall	0.006455	0.1153
Heterosexual	0.006340	0.1175
MSM	0.01553	0.1057
WSW	0.02543	0.1386
Bisexual	0.01549	0.1834
	<b>Parental Incarceration and Psychopathology</b>	
Overall	0.03903	0.1425
Heterosexual	0.03842	0.1428
MSM	0.06084	0.1561
WSW	0.07712	0.2358
Bisexual	0.1770	0.3436

**Appendix 3.1.** Total Effects (Unstandardized Direct + Indirect Effects) of Adverse Childhood Experiences on Intimate Partner Violence Perpetration among Men and Women

	<b>Men</b>			
	<b>PTSD*</b>	<b>Substance Abuse*</b>	<b>Depression*</b>	<b>ACE Effect**</b>
Neglect	-0.090	-0.097	-0.094	-0.095
Physical/Psychological	-0.042	-0.035	-0.044	-0.029
Sexual	0.200	0.197	0.200	0.203
Parental Violence	0.167	0.168	0.167	0.167
Parental Incarceration and Psychopathology	-0.032	-0.030	-0.030	-0.028
	<b>Women</b>			
Neglect	-0.046	-0.053	-0.048	-0.053
Physical/Psychological	0.093	0.099	0.097	0.107
Sexual	0.059	0.061	0.059	0.067
Parental Violence	0.046	0.046	0.044	0.044
Parental Incarceration and Psychopathology	0.011	0.014	0.013	0.016

\*PTSD, Substance Abuse and Depression values are the total of each indirect effect (through PTSD, substance abuse, and depression) and the direct effect between each ACE construct and intimate partner violence perpetration.

\*\*Each ACE Effect calculation is the total effect calculated from the addition of all indirect estimates based on each ACE construct and all mediators, and direct estimates between each ACE construct and intimate partner violence perpetration.

**Appendix 4.1.** Total Effects (Unstandardized Direct + Indirect Effects) of Adverse Childhood Experiences on HIV/STIs among Men and Women

	<b>Men</b>					
	<b>PTSD*</b>	<b>Substance Abuse*</b>	<b>Depression*</b>	<b>Early Sexual Debut*</b>	<b>IPV Perpetration*</b>	<b>ACE Effect**</b>
Neglect	-0.0031	-0.0036	-0.0031	-0.0032	-0.0032	-0.0040
Physical/Psychological	0.0022	0.0030	0.0023	0.0022	0.0022	0.0039
Sexual	0.0022	0.0024	0.0022	0.0023	0.0025	0.0036
Parental Violence	-0.0001	-0.0002	-0.0001	0.0000	0.0001	0.0003
Parental Incarceration and Psychopathology	0.0021	0.0020	0.0022	0.0021	0.0020	0.0024
	<b>Women</b>					
Neglect	0.0010	0.0006	0.0008	0.0008	0.0013	0.0005
Physical/Psychological	0.0001	0.0005	0.0005	0.0001	-0.0005	0.0007
Sexual	0.0012	0.0040	0.0013	0.0120	-0.0008	0.0110
Parental Violence	0.0010	0.0010	0.0008	0.0011	0.0009	0.0009
Parental Incarceration and Psychopathology	0.0010	0.0010	0.0011	0.0012	0.0009	0.0014

\*PTSD, Substance Abuse, Depression, Early Sexual Debut, IPV Perpetration values are the total of each indirect effect (through PTSD, substance abuse, depression, early sexual debut, and intimate partner violence perpetration) and the direct effect between each ACE construct and intimate partner violence perpetration.

\*\*Each ACE Effect calculation is the total effect calculated from the addition of all indirect estimates based on each ACE construct and all mediators, and direct estimates between each ACE construct and intimate partner violence perpetration.



## Vita

Monique Janiel Brown was born on September 1, 1985 in Montego Bay, Jamaica, and is a Jamaican citizen. She graduated from Montego Bay High School, in Montego Bay, Jamaica in 2001 and from Hampton School in St. Elizabeth, Jamaica in 2003. She received her Bachelor of Science (Honors) degree in Spanish from Bates College in Lewiston, Maine, and her Master of Public Health degree from the Brown University School of Public Health. She subsequently worked as a Data Analyst at the Boston Public Health Commission in Boston, Massachusetts from 2009 to 2011.

### I. POST-SECONDARY AWARDS

**Graduate:** Emerging Scholar and Professional Organization Poster Award, Gerontological Society of America 2014  
Graduate Student Travel Award, 2014  
Departmental Travel Award, APHA Conference, 2014  
Charles C. Clayton Fellowship Award, 2014  
Graduate Student Mentorship Scholarship, 2014  
Phi Kappa Phi Award, 2013  
Black History in the Making Award, 2013  
Poster Award, VA Public Health Association Meeting (Third Place), 2013  
Graduate Student Travel Award, 2013  
Departmental Travel Award, APPA Conference, 2013  
Poster Award, National Conference on Health Statistics (First Place), 2012  
Golden Key International Honor Society, 2012  
Departmental Travel Award, APHA Conference, 2012  
Departmental Travel Award, National Conference on Health Stats, 2012  
Forbes Research Honors Colloquium, 2012  
Virginia Network Conference Scholarship, 2012  
Departmental Travel Award, ISPE Mid-Year Meeting, 2012  
Excellence in Science Program, American Association for the Advancement of Science, 2012  
Departmental Travel Award, APHA Conference, 2011  
Samuel M. Nabrit Award for Scholarship, 2008

**Undergraduate:**

Alfred J. Wright Foreign Language Award, 2007  
Rodney F. Johonnot Graduate Award, 2007  
Benjamin E. Mays Award, 2007  
College Key, 2007  
Barlow Research Grant (\$1000), 2006  
Dreyfus Fellow Award, 2005  
Dana Scholar, 2004  
Deans' List, 2003, 2004, 2006, 2007  
International Award, 2003-2007

## II. RESEARCH EXPERIENCE

- 2011-2014**                    **Graduate Research Assistant**  
Virginia Commonwealth University School of Medicine, Richmond, VA
- 2009–2011**                    **Data Analyst**, Research and Evaluation Office  
Boston Public Health Commission, Boston, MA
- 2008–2009**                    **Data Manager**, Rhode Island Violent Death Reporting System  
Office of State Medical Examiners, Providence, RI
- 2007**                            **Research Assistant**  
Memorial Hospital of Rhode Island, Providence, RI
- 2007**                            **Interviewer**, New England Family Study  
Brown University, Providence, RI
- 2004–2005**                    **Research Assistant**, Chemistry Department  
Bates College, Lewiston, ME

## III. TEACHING EXPERIENCE

- 2012, 2014**                    **Teaching Assistant**, Principles of Epidemiology  
Virginia Commonwealth University School of Medicine  
Richmond, VA
- 2014**                            **Teaching Assistant**, Hubert H. Humphrey Fellows Workshop  
“How to Obtain Data to Inform Policy and Practice”  
Virginia Commonwealth University School of Medicine

- 2013**                    **Guest Lecturer**, Analysis of Health Datasets  
Virginia Commonwealth University School of Medicine  
Richmond, VA
- 2012**                    **Guest Lecturer**, Principles of Epidemiology  
Virginia Commonwealth University School of Medicine  
Richmond, VA
- 2011**                    **Math Tutor**, HTCR Tutoring and Academic Enrichment Center  
Randolph, MA
- 2007**                    **Teaching Assistant**, Spanish Department  
Bates College, Lewiston, ME
- 2004-2006**            **Laboratory Teaching Assistant**, Biology Department  
Bates College, Lewiston, ME

#### **IV. PEER-REVIEWED PUBLICATIONS (most recent to oldest)**

- 1) **Brown MJ**, Masho SW, Mezuk B, Perera R, Cohen SA. Sex and sexual orientation disparities in adverse childhood experiences and early age at sexual debut in the US: results from a nationally representative sample. *Child Abuse & Neglect* (under review).
- 2) **Brown MJ**, Perera R, Masho SW, Mezuk B, Cohen SA. Adverse Childhood Experiences and Intimate Partner Violence Perpetration in the US: Sex Differences in Psychosocial Mediation. *Social Science and Medicine* (under review).
- 3) **Brown MJ**, Pugsley R, Cohen SA. Meeting Sex Partners through the Internet, Risky Sexual behavior and HIV Testing among STI Clinic Patients. *Archives of Sexual Behavior* (In press).
- 4) **Brown MJ**, Cohen SA, Mezuk B. Time in the US and Suicidality among Racial/Ethnic Minority Immigrants. *Social Psychiatry and Psychiatric Epidemiology* 10 Aug 2014 (Epub ahead of print) doi: 10.1007/s00127-014-0947-4.
- 5) Anglin DM, Lighty Q, Yang L, Greenspoon M, Miles R, Slonim, T, Isaac K, **Brown MJ**. Discrimination, Arrest History and Major Depressive Disorder in the US Black Population. *Psychiatry Research* 2014;219:114-121 doi: 10.1016/j.psychres.2014.05.020.

- 6) **Brown MJ**, Cohen SA. Abusive and Non-abusive Adverse Childhood Experiences and Diagnosis of Cancer in Wisconsin, USA. *Journal of Community Medicine and Health Education* S2: 008 doi: 10.4172/2161-0711.S2-008.
- 7) Do EK, Cohen SA, **Brown MJ**. Socioeconomic and Demographic Factors Modify the Association between Informal Caregiving and Health in the Sandwich Generation. *BMC Public Health* 14:362 doi: 10.1186/1471-2458-14-362.
- 8) Cohen SA, **Brown MJ**, Chui KKH. Informal Caregiving and Health Outcomes in the United States: Effect Modification by Rurality. *The International Journal of Aging and Society* 2013;2:37-51.
- 9) **Brown MJ**, Weitzen S, Lapane KL. Association between Intimate Partner Violence and Screening Behaviors among Women. *Journal of Women's Health* 2013;22:947-52 doi:10.1089/jwh.2012.4222.
- 10) **Brown MJ**, Thacker RL, Cohen SA. Adverse Childhood Experiences and Diagnosis of Cancer. *PLoS One* 2013;8:e65524 doi: 10.1371/journal.pone.0065524. Erratum in *PLoS One* 2014;9(1).
- 11) Lapane KL, Yang S, **Brown MJ**, Jawahar R, Pagliasotti C, Rajpathak S. Sulfonylureas and Risk of Falls and Fractures: A Systematic Review. *Drugs and Aging* 2013; 30:527-47 doi: 10.1007/s40266-013-0081-0.
- 12) **Brown MJ**, Mezuk B. Brains, Bones, and Aging: Psychotropic Medications and Bone Health among Older Adults. *Current Osteoporosis Reports*. 2012;10:303-311.
- 13) Simmons EM, **Brown MJ**, Slye K, Ma M, Sutton MY, McLellan-Lemal E. Barriers and Facilitators to HIV Testing in Primary Care among Health Care Providers. *J Natl Med Assoc* 2011;103(5):432-438.
- 14) Dignam CF, Randall LA, Blacken RD, Cunningham PR, Lester S, **Brown MJ**, French SC, Aniagyei SE, Wenzel TJ. Carboxymethylated cyclodextrin derivatives as chiral NMR discriminating agents. *Tetrahedron: Asymmetry* 2006;7(8):1199-1208.

### **In Preparation**

- 1) **Brown MJ**, Perera R, Masho SW. Adverse Childhood Experiences and HIV/STI Diagnosis: A Mediation Analysis. Intended to *AIDS Behavior*.

- 2) **Brown MJ**, Cohen SA, Heh V. A Structural Equation Modeling Approach to Evaluate the Association between Adverse Childhood Experiences and Risky Behaviors. Intended to *International Journal of Social Research Methodology*.
- 3) Cohen SA, **Brown MJ**. How caring for a child at home modifies the association between caregiver burden and caregiver health. Intended to *BMC Public Health*.
- 4) **Brown MJ**, Cohen SA, Masho SW. Justification of Intimate Partner Violence, and Consent to HIV testing and HIV seropositivity. Intended to *International Journal of Gynecology and Obstetrics*.
- 5) **Brown MJ**, Cohen SA, DeShazo JP. Psychopathology and HIV Diagnosis among Older Adults in the US.

#### V. PUBLISHED ABSTRACT

- 1) **Brown MJ**, Cohen SA, Mezuk B. Suicidality and Immigration: Stress from Migration or a “Failed Promise”? *Comprehensive Psychiatry* 2013;54:e17

#### VI. NON-PEER REVIEWED PUBLICATIONS/PAPERS (most recent to oldest)

- 1) **Co-Author**, Substance Abuse Chapter, Health of Boston 2011, Boston Public Health Commission, Boston, MA.
- 2) **Content Contributor**, Health Chapter, State of Black Boston 2011, Boston Public Health Commission, National Urban League, Boston Chapter, Boston, MA.
- 3) **First Author**, Sexual Health Chapter, Health of Boston 2011 Report, Boston Public Health Commission, Boston, MA.
- 4) **Co-Author**, Low Birth Weight: A Public Health Briefing, Boston Public Health Commission, Boston, MA (2010).
- 5) **First Author**, Sexual Health Chapter, Health of Boston 2010 Report. Boston Public Health Commission, Boston, MA.
- 6) **First Author**, “Intimate Partner Violence: Prevalence and Socio-economic Risk Factors in Seven States and Territories, 2006”. Submitted for MPH Analytic Internship.

Quantitative analysis of Behavioral Risk Factor Surveillance System survey data from the Centers for Disease Control and Prevention.

- 7) **First Author**, “Circumstances Surrounding Suicides among Males Age 35-64 in Rhode Island, 2004-2007”. Submitted for MPH thesis requirement. Quantitative Analysis of Rhode Island Violent Death Reporting System data, Office of State Medical Examiners.

## **VII. INVITED ORAL PRESENTATIONS (most recent to oldest)**

- 1) Cohen SA, **Brown MJ**. Protecting the Health of “Sandwiched” Caregivers: Associations between Caregiving Intensity and Four Domains of Caregiver Burden among Sandwiched Generation Caregivers from the New National Study of Caregivers. Gerontological Society of America Annual Scientific Meeting, Washington, DC, November 2014.
- 2) **Brown MJ**. Adverse Childhood Experiences and Intimate Partner Violence Perpetration: A Mediation Analysis. Group of Research on Epidemiology of Mobility, Aging and Psychiatry (GREMAP), Virginia Commonwealth University School of Medicine, Richmond, VA, February 2014.
- 3) **Brown MJ**, Heh V. Association between Adverse Childhood Experiences and Risky Behaviors. American Public Health Association Annual Meeting, Boston, MA, November 2013.
- 4) **Brown MJ**, Mezuk B. Depression among Racial/Ethnic Minority Immigrants in the US. American Public Health Association Annual Meeting, Boston, MA, November 2013.
- 5) **Brown MJ**, Cohen SA. Adverse Childhood Experiences and Adult Cancer Diagnosis. American Public Health Association Annual Meeting, Boston, MA, November 2013.
- 6) Do E, **Brown MJ**, Cohen SA. Informal Caregiving to Older Adults in the “Sandwich Generation”: Modification by Race, Ethnicity, Income, and Household size. American Public Health Association Annual Meeting, Boston, MA, November 2013.
- 7) Cohen SA, Chui KKH, **Brown MJ**, Orr CA. Preventive Health Behaviors and Overall Health in the Alaskan Senior Population: Evidence from a National Survey. Gerontological Society of America, New Orleans, LA, November 2013.

- 8) Do E, **Brown MJ**, Cohen SA. Socioeconomic and Demographic Moderators of Informal Caregiving and Health in the "Sandwich Generation": Evidence from a National Survey The Gerontological Society of America's 66<sup>th</sup> Annual Scientific Meeting, New Orleans, LA, November 2013.
- 9) **Brown MJ**, Cohen SA, Mezuk B. Suicidality among Racial/Ethnic Minority Immigrants in the US. Department of Family Medicine and Population Health Seminar, Virginia Commonwealth University School of Medicine, Richmond, VA. March 2013.
- 10) **Brown MJ**, Weitzen S, Lapane KL. Association between Intimate Partner Violence and Preventive Screening Behaviors. Forbes Research Colloquium, Virginia Commonwealth University School of Medicine, Richmond, VA. May 2012
- 11) **Brown MJ**. Health of Boston 2010. Boston Public Health Commission, Boston, MA. 2011
- 12) **Brown MJ**, Conley L. Addressing Racial Inequities in Low Birth Weight Births in Boston. Boston Public Health Commission, Boston, MA. 2011.
- 13) **Brown MJ**, Taher R. The Health of Boston Youth. Boston Public Health Commission, Boston, MA. 2010.
- 14) Shah S, Deshpande A, **Brown MJ**. The Health of Boston 2009. Boston Public Health Commission, Boston, MA. 2010.

#### **VIII. POSTER PRESENTATIONS (most recent to oldest)**

- 1) **Brown MJ**, Cohen SA, DeShazo JP. Psychopathology and HIV Diagnosis among Older Adults in the US. Gerontological Society of America Annual Scientific Meeting, Washington, November 2014.
- 2) **Brown MJ**, Masho SW, Mezuk B, Perera R, Cohen SA. Adverse Childhood Experiences and Age at Sexual Debut among Sexual Minorities. The American Public Health Association Annual Meeting, New Orleans, LA, November 2014.
- 3) **Brown MJ**, Masho SW, Mezuk B, Perera R, Cohen SA. Adverse Childhood Experiences and Intimate Partner Violence Perpetration. The American Public Health Association Annual Meeting, New Orleans, LA, November 2014.

- 4) **Brown MJ**, Masho SW, Mezuk B, Pugsley R, Perera R, Cohen SA. Adverse Childhood Experiences and HIV/STIs. The American Public Health Association Annual Meeting, New Orleans, LA, November 2014.
- 5) Cohen SA, Phillips A, Sherif Y, **Brown MJ**. Associations between caregiver intensity and caregiver burden in sandwiched caregivers: Results from the new National Study of Caregiving. The American Public Health Association Annual Meeting, New Orleans, LA, November 2014.
- 6) Cohen SA, **Brown MJ**, Chui KKH. The Impact of Rurality on the Association between Informal Caregiving and Health in the United States: A County Level Assessment. The Population Association of America Annual Meeting, New Orleans, LA. April, 2013.
- 7) **Brown MJ**, Cohen SA, Mezuk B. Suicidality and Immigration in the US. The American Psychopathology Association Annual Meeting, New York, NY. March, 2013.
- 8) **Brown MJ**, Cohen SA, Mezuk B. Suicidal Ideation, Suicide Attempts and Immigration in the US. The Virginia Public Health Association Annual Meeting, Richmond, VA. February, 2013.
- 9) Cohen SA, **Brown MJ**, Chui KKH. Informal caregiving and health outcomes in the United States: Effect modification by rurality. Aging and Society: An Interdisciplinary Conference, Vancouver, BC. November 2012.
- 10) **Brown MJ**, Weitzen S, Lapane KL. Examining the Link between Intimate Partner Violence and Screening Behaviors among Women. American Public Health Association Annual Meeting, San Francisco, CA. October 2012.
- 11) **Brown MJ**, Weitzen S, Lapane KL. Beyond Battering: Association between Intimate Partner Violence and Preventive Screening Behaviors among Women. National Conference on Health Statistics, Washington DC. August 2012.
- 12) **Brown MJ**, Lapane KL, Weitzen S. Beyond Battering: Association between Intimate Partner Violence and Preventive Screening Behaviors among Women. Women's Health Research Day, Virginia Commonwealth University, Richmond, VA, April 2012.
- 13) Magnusson BM, **Brown MJ**, Masho SW, Lapane KL. Age at First Intercourse and Subsequent Gaps in Contraceptive Use. Annual American Public Health Association Meeting, Washington, DC, October 2011.



- 14) **Brown MJ**, Verhoek-Oftedahl W, Gilson, T. The Circumstances of Suicide among Middle-Aged Males in Rhode Island, 2004-2007. Public Health Research Day, Brown University, Providence, RI, 2009.
- 15) **Brown MJ**, Simmons E. The Feasibility of Implementing Routine HIV Testing in Primary Care Settings. Nabrit Black Graduate Students Association, 2008.
- 16) **Brown, MJ**, Baker P. Governmental and Non-Governmental HIV/AIDS Public Health Efforts in South Africa. Mount David Summit, Bates College, 2007.

## **IX. INVITED PANELS (more recent to older)**

- 1) **Brown MJ**, Atkinson A, Kelley A, Lancaster A. Emerging Healthcare Leaders Career Panel. Virginia Commonwealth University, Richmond, VA. March 2014.
- 2) **Brown MJ**, Geiss M, Hunter A, Kapila K. Diversity in Public Health Panel. Bates College, Lewiston, ME. October 2011.

## **X. PROFESSIONAL SERVICE**

### **HIV/AIDS Section Councilor**

**2014** HIV/AIDS Section, American Public Health Association

### **Chair and Judge**

**2014** Virginia Junior Academy of Science

### **Member**

**2014** HIV/AIDS Policy Workgroup, American Public Health Association

### **Moderator for Conference Sessions**

**2014** HIV/AIDS Section, American Public Health Association

**2013-2014** Caucus on Refugee and Immigrant Health, American Public Health Association

**2013** Student Assembly, American Public Health Association

### **Reviewer for Scientific Manuscripts**

**2014** *BMC Public Health*

**2014**            *Journal of Psychosomatic Research*  
**2014**            *American Journal of Preventive Medicine*  
**2013-2014**    *Social Science and Medicine*  
**2013**            *PLoS One*

**Reviewer for Conference Abstracts**

**2013**            Caucus on Refugee and Immigrant Health, American Public Health Association  
**2012-2013**    Student Assembly, American Public Health Association

**XIII. COMMUNITY LEADERSHIP**

**2014**            **Executive Board Chair**, Honor System  
Virginia Commonwealth University, Richmond, VA

**2014**            **MCV Campus Representative**, Honor System Review Committee  
Virginia Commonwealth University, Richmond, VA

**2013-2014**    **Mentor**, Graduate School Mentorship Program  
Virginia Commonwealth University, Richmond, VA

**2013-2014**    **Advisor**, Honor System  
Virginia Commonwealth University, Richmond, VA

**2012-2014**    **Member**, Assessment Committee, Division of Epidemiology,  
Department of Family Medicine and Population Health,  
VCU School of Medicine, Richmond, VA

**2013**            **Volunteer Coordinator**, VCU Health Fair  
Richmond, VA

**2011-2013**    **Member**, Operations Committee, VCU Health Fair  
Richmond, VA

**2010-2011**    **Member**, Low Birth Weight Committee, Boston Public Health  
Commission, Boston, MA

**2010–2011**    **Member**, STI Committee, Boston Public Health Commission  
Boston, MA

- 2008-2009**            **Member**, Vision Team, Graduate and Medical Students' Christian Association, Brown University, Providence, RI
- 2007–2008**            **Member**, Conference Committee, Nabrit Black Graduate Students Association, Brown University, Providence, RI
- 2006-2007**            **Senior Admissions Fellow**, Admissions Office  
Bates College, Lewiston, ME
- 2005–2007**            **Resident Coordinator**, Housing and Residential Life  
Bates College, Lewiston, ME
- 2004-2007**            **Class Co-President/Class Representative**, Student Government  
Bates College, Lewiston, ME
- 2004-2005**            **Co-Coordinator**, International Club  
Bates College, Lewiston, ME
- 2004-2005**            **Treasurer**, Bates Christian Fellowship  
Bates College, Lewiston, ME

## **XI. VOLUNTEER EXPERIENCE**

- 2012**                    **Volunteer**, VCU Health Fair  
Richmond, VA
- 2011**                    **Health Educator**, IHPA Kroger Outreach Day  
Richmond, VA
- 2009**                    **Assistant Administrator/Spanish Interpreter**, Flu Clinic  
Dorchester House Multi-Service Center, Boston, MA
- 2006**                    **Volunteer**, Hospital de La Princesa  
Madrid, Spain
- 2005**                    **Volunteer**, Transportation Department  
St. Mary's Medical Center, Lewiston, ME

- 2005**                    **Volunteer**, OB/GYN and Family Medicine Health Centers  
Sumpango and Chimaltenango, Guatemala
- 2005**                    **Volunteer**, Emergency Department  
Central Maine Medical Center, Lewiston, ME
- 2004**                    **Volunteer/Intern**, Renaissance House  
Lewiston, ME
- 2004**                    **Volunteer/Intern**, Emergency Department  
Johns Hopkins Medical Center, Baltimore, MD

## **XII. MEDIA COVERAGE**

June 26, 2013. Research highlighted on GoodTherapy.org: “Childhood Sexual Abuse Increases Risk of Cancer in Adulthood” by Jen Wilson. URL:

<http://www.goodtherapy.org/blog/childhood-sexual-abuse-increases-cancer-risk-in-adulthood-0626132>

September 10, 2012. Won First Place Student Poster Prize at 2012 Conference on Health Statistics. URL: <http://www.cdc.gov/nchs/events/2012nchs/>  
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## **XIII. MEMBERSHIP IN ASSOCIATIONS/GROUPS**

American Public Health Association, Caucus on Refugee and Immigrant Health

American Public Health Association, Epidemiology Section

American Public Health Association, HIV Section

American Public Health Association, Student Assembly

Gerontological Society of America, Behavioral and Social Sciences

Golden Key International Honor Society

Group of Research on Epidemiology of Mobility, Aging and Psychiatry (GREMAP)

Phi Kappa Phi, Virginia Commonwealth University