Pathways from Psychosocial Stress to Risky Sexual Behavior Among low-income inner city African American (AA) women in adolescence and emerging adulthood

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Human immunodeficiency virus (HIV) is a major health concern in the United States. As of 2011 approximately 1.2 million people are living with HIV (Center of Disease Control, 2011). Of those living with HIV, 240,000 are unaware that they are carriers of the infection (UNAIDS, 2011). African Americans comprise the highest rate of infection more than any other ethnic/racial group (CDC). According to the 2011 CDC report, African Americans make up 14% of the US population, and account for 44% of all new HIV infections (CDC). It was also reported in the 2009 CDC report that African American women account for 64% of women living with HIV (CDC, 2009).

U.S. Women account for one in four of the HIV diagnoses and deaths caused by AIDS (amfAR, 2012). In contrast, African American women account for two in three deaths caused by AIDS (Minority Women's Health). Out of all female ethnic groups, why is it that African American women hold the highest percentages of sexually transmitted infections (STIs) and HIV? According to the Minority Women's Health organization, African American women are disproportionately exposed to HIV/AIDS infection for a number of reasons. These reasons include: poverty, STIs, multiple partners, the stigma of getting tested, and the number of infected individuals within this ethnic group. However the most profound reason is the lack of awareness (Minority Women’s Health).

Community Violence Exposure - CVE

Community violence exposure (CVE) has been reported as a devastating problem within the urban areas of the United States (Voisin, 2010). It is reported that more than 85% of youth living within urban areas witnessed violence within their lifetime (McDonald, 2008). The U.S. Surgeon General’s office recognized adolescent exposure to community violence as an enormous public health concern within the United States; because of its negative effects on urban youth such as: delinquency, gang involvement, and other risk behaviors (Kliwer, 2006). United States youth represent 26% of the general population and of that number approximately 50% have witnessed or been victims of violent crimes (Voisin, 2007).

African American adolescents in particular are disproportionately exposed to violence, compared to adolescents of other racial/ethnic groups (Voisin, 2007). Violence within the African American community is at a record breaking high. In 2007, the Bureau of Justice Statistics, reported approximately 9,000 African Americans are murdered annually compared to the total U.S homicides of 16,929. This high homicide rate is comprised of approximately 93% of African Americans murdering other African Americans. In 2007, the Centers of Disease Control reported homicide as one of leading cause of death among African American youth. Homicide is ranked number 8 out of the 10 leading causes of death for African Americans.

Apart from premature mortality, CVE also has numerous negative consequences in various areas of psychological and neurological development. Witnessing and/or being victims of violence over a lengthy period of time can lead to over-activation of the biological stress-response systems. Over-activation of the stress response system severely impacts neurological development, especially during childhood and adolescence (De Bellis, 2001; Ulrich-Lai & Herman, 2009). It is suggested that neurological disruptions can cause mood disorder in adolescents (Voisin, 2005). Psychological instability caused by violence exposure also leads to mental health problems such as internalized symptoms (e.g. depression and anxiety) and/or externalized symptoms (e.g. aggression and delinquency) (Wilson, 2012).

As a result of neurological and psychological imbalances, decision making in regards to sexual activity is poor. Poor decision making leads to increased risky sexual behaviors (e.g. inconsistent condom use, multiple partners) (Voisin, 2005; Margolin, 2000). Voisin (2005) studied the relationship between violence exposure and HIV sexual risk was examined. All adolescents N= 409 reported to being sexually active. The results of this study indicated that adolescents who had been exposed to family or community violence, and/or had been victims of sexual abuse were three to four times more likely to engage in behaviors that contribute to risk of acquiring HIV infection than non-exposed adolescents. This large percentage of adolescent violence exposure often times occurs within the neighborhoods the youth live in.
Neighborhood Disadvantage

The neighborhoods where many of these adolescents are raised predispose them to sexual and behavioral risk as well as developmental disruptions. The structural characteristics of a neighborhood, such as, socioeconomic status (e.g. poverty) and unemployment rates help explain risk behaviors exhibited by inner-city youth indicating a strong correlation between neighborhood disadvantage and psychosocial development (Gorman-Smith, 2000). The major structural disadvantage occurring in Chicago inner-cities is the rapid growth in unemployment rates and its direct relationship with increased poverty.

Inner-city poverty rates began increasing in the 1970s with the loss of low-skill manufacturing jobs and a shift in new jobs requiring higher skill sets and more education (Rankin, 2000). The increased poverty within in these inner-city areas also swelled social disorder causing many aspiring middle-class stable families to move out of the inner city and into the suburbs (Rankin, 2000). Unfortunately, poverty in Chicago’s inner city areas remains a dominating social issue. The US Bureau of Labor Statistics (BLS) released unemployment rates of the civilian population by race, sex, and age ranging from October 2011 to October 2012. This report shows that in 2012 Caucasian Americans had an unemployment rate of 7.4% compared to the African American unemployment rate of 14.4% (BLS, 2012).

Figure 2: 2012 National Unemployment Rate by Race: The figure indicates the African American unemployment rate has risen from 7.9% in January 2007 to 14.4% in June 2012. The Caucasian unemployment rate has slightly risen from 4.2% in January 2007 to 7.4% in June 2012 (CNN 2012; BLS 2012).

Dr. Julianne Malveaux’s article entitled Double Whammy for African Americans, revealed the disproportionate unemployment and poverty rates within the African American community compared to the national population. The national unemployment rates and poverty rates were released in September 2012. The national unemployment rate dropped from 8.3 to 8.1 percent yet African American unemployment rate remained at a high of 14.1%. Furthermore, the national poverty rate slightly dropped from 15.2 to 15.1%, while African American poverty rose from 27.6 to 27.8% (Malveaux, 2012). The unemployment rate is 9.9% in Chicago’s inner city areas, compared to the national unemployment rate of 7.9% (CBS Chicago, 2012). These percentages rank Chicago as the third highest unemployed city amongst the nation’s major cities. Philadelphia ranks second with 10.1% and Los Angeles ranks first with 12.2 percent (CBS Chicago, 2012). With rates like these, it is not hard to understand why there is so much social disorder within Chicago’s inner-city.

Structural characteristics concurrently affect social order and organization within inner-city communities. With increased poverty rates, adverse social problems also occur, such as rising crime rates, gang activity, welfare dependency, and soaring teenage pregnancy (Rankin, 2000). In disadvantaged neighborhoods it is quite easy for adolescents to become involved with risk behaviors. The frequent exposure to these risky behaviors increases the probability of youth engaging in problematic situations (Margolin, 2000). Problematic situations can evolve into major social problems. On the contrary, countless stories exist where young people grow up and successfully overcome risk behaviors that dominate their neighborhood. If more social organizations such as churches, YMCAs, and after school centers were located in inner cities, then youth might have a safe alternative to engage in wholesome, constructive activities that counter opportunities for socially disruptive behaviors.

Effective social organizations are frequently seen in affluent neighborhoods, but are often absent in low-income distressed communities. This geographical discrepancy in social organizations magnifies the disadvantages experienced by inner-city youth (Rankin, 2000). An absence of social organizations can lead to a deficiency in communal and social support (Gorman-Smith, 2000). Social organizations provide benefits of positive interactions, support, and affirmation. These benefits translate into an overall sense of self-worth and self-esteem (Lincoln, 2005). According to past research, social support acts as a buffer and protects individuals from the deleterious effects of stress; social support in essence is a psychosocial resource (Lincoln, 2005). However when these resources are unavailable, there exists no opportunity to expose these healthy alternatives to adolescents; which can lead to instability both inside and outside the home.

“War Zone”

Risky behavior in urban youth is not solely a consequence of violence exposure and neighborhood disadvantage. The home setting also has impact on adolescent behavior. Several youth living in the inner-city prefer spending more time outside of their homes because their home is more like a war zone than the neighborhood streets. Although one might believe the tough neighborhoods of inner-city areas are war zones, the adolescents’ homes can actually be more chaotic. The cozy home life for a suburban adolescent is vastly different than home life for a low-income inner city adolescent (Gorman-Smith et al., 1999).

Tension often rises within inner-city homes because of lack of parental, skills, care and supervision. Although not all inner-city parents neglect their parental role, there are some parents that do. Many inner-city youth live with one parent or guardian (e.g. grandparent, relative), and often that parent spends numerous hours away from home working to provide for his/her family (Rankin, 2000). As of 2011 in Illinois, 74% of African American children were being raised in single parent homes compared to Caucasian children with a rate of 22% (Count, 2012). Unfortunately within single parent homes 24-hour supervision and protection is not always possible allowing room for horrible things such as sexual and physical abuse to take place. Theoretically, proximal violence (e.g., home) is often perpetrated by a family member, friend, or close individuals (Wilson, 2012; Margolin & Gordis, 2000). In most child abuse cases the perpetrator is known by the child/adolescent victim (Margolin & Gordis, 2000). When the crime takes place within the home a child loses his/her sense of comfort and safety causing the home to feel like a war zone, especially when the perpetrator is a parent (Voisin, 2005). If the abuse is not addressed by a trusted parent/caretaker the victim may feel neglected or unloved. This neglect may place the child into an emotionally unhealthy state (e.g. low self-efficacy and/or depression) (Voisin, 2005) leading to increased levels psychosocial stress and sexual risk behaviors.
Children in single-parent families by race (Percent) – 2011

<table>
<thead>
<tr>
<th>Race</th>
<th>United States</th>
<th>Illinois</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-Hispanic White</td>
<td>25%</td>
<td>22%</td>
</tr>
<tr>
<td>Black or African American</td>
<td>67%</td>
<td>74%</td>
</tr>
<tr>
<td>American Indian</td>
<td>53%</td>
<td>S</td>
</tr>
<tr>
<td>Asian and Pacific Islander</td>
<td>17%</td>
<td>10%</td>
</tr>
<tr>
<td>Hispanic or Latino</td>
<td>42%</td>
<td>37%</td>
</tr>
<tr>
<td>Total</td>
<td>35%</td>
<td>34%</td>
</tr>
</tbody>
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Figure 3: National Single Parent Homes
This figure shows the national percentage of single family home by race. The figure indicates that African Americans hold the highest percentage of 67% (Kids Count, 2012)

Figure 4: Illinois Single Parent Homes
This figure shows that percentage of single parent homes within Illinois by race ranging from 10-100%. “S” represents estimates suppressed when the confidence interval around the percentage is greater than or equal to 10 percentage points. African Americans comprise the highest percentage with 74%. (Count, 2012).

Sexual abuse and victimization within homes disproportionately affects African American youth (U.S. Census Bureau, 2003). African American youth are approximately three times more likely than their Caucasian counterparts to be victims of child abuse and neglect (Voisin, 2007). Such exposure has also been associated with increased rates of riskier sexual behavior in adolescents and emerging adults (Repetti, 2002). Wilson et al. conducted a longitudinal study on children with histories of physical abuse, sexual abuse and neglect over a six wave period following the children all the way into early adulthood. Psychosocial and HIV-sexual measures were also assessed as mediators to help explain the high rates of sexual activity and promiscuity. Results of this study indicated that histories of child abuse and neglect were associated with increased possibility of riskier sexual behaviors in middle adulthood (Wilson, 2012). Studies like these show that child abuse and neglect have long-term consequences, with negative effects on sexual behavior and self-esteem (Wilson, 2008; Voisin, 2005).

Not having anyone to talk to about the abuse leaves adolescents in a constant state of war, with no refuge inside or outside of the home (Rankin, 2000). Feelings like these diminish self-esteem and self-control greatly after a sexual or physical abuse has occurs, especially when the victim is being abused repeatedly (Voisin, 2005). Females in particular who are victims of sexual abuse at a young age have extreme difficulty obtaining control in a sexual situation later in life (Voisin, 2005). Incorrect mental schemas of proper relationship behavior are created in the minds of female adolescents who have been victims of abuse (Wilson, 2008). These women find it extremely difficult to resist sexual advances, remain assertive, or enforce condom usage (Voisin, 2005).

Furthermore, adolescent sexual abuse victims may see sexual activity as a method of gaining the affection of their partner (Wilson, 2008). This early exposure to sexual activity might allow for an increase in sexual partners, inconsistent condom use, and increased chance of contracting sexually transmitted infections (Wilson, 2008; Voisin, 2007). Self-reports estimate that 30%-50% of women infected with HIV had been victims of childhood sexual abuse, compared to...
the 9-32% of the women infected with HIV in the general population who had not been abused (Wilson, 2008). Aside from negative sexual risk consequences, unstable “war zone” homes; also mediate negative psychological and neurological consequences in emerging adolescences and young adults.

Community level stressors including violence exposure, neighborhood disadvantage and war zone home settings all have negative psychological outcomes (e.g., posttraumatic depression, anxiety, and low-efficacy) which are mediated by biological effects of the neuroendocrine system (Voisin, 2007; Repetti, 2002). The neuroendocrine system is a dual interaction between the nervous system and hormones excreted from the endocrine glands. Neuroendocrine functioning of emotional control and expression can be disrupted due to chronic community level stressors (Repetti, 2002). These neuroendocrine disruptions have adverse effects on the hypothalamic-pituitary-adrenocortical (HPA) axis, a system which helps to regulate and manage stress reactivity and response (Ali, 2011; Lupen 2009; Repetti, 2002). Understanding the neuroendocrine system helps explain the impact of psychosocial stress on riskier sexual behavior.

**Neurological Framework of Stress**

To better understand the impact of community level stressors in African American youth, one must understand stress as well the biological reaction to stress. External stress triggers activation of the neuroendocrine system, which then triggers the HPA-axis. Once the HPA-axis is activated, cortisol is secreted until negative feedback establishes a resting state. However before we get into all of the details, let us begin with defining stress.

Stress is defined as a state in which an organism’s internal regulatory system (homeostasis) is disturbed by external environmental challenges/stressors (Ali, 2012). Everyone deals with stress within their lives both eustress (good stress) and distress (bad stress). All stress acts as a biological disruption whether it is real or perceived as real, causing the body to adjust to the changing external environment (Stress). Psychosocial stress results when a threat towards our lives is perceived either real or imaginary. Psychosocial stressors include any threat towards self-esteem, social status, respect or social acceptance (About Stress, 2012). Nevertheless all types of chronic distress can be very unhealthy for the body with negative side effects such as depression, illness, and death (Lupien, 2009; Pearlin, 2005).

Therefore it is body’s job to offset these external stressors, when the body is placed under stress, a stress response is stimulated (Ali, 2012). The job of the stress response system is to regain homeostasis within the body. Homeostasis maintains and regulates internal stability during external disruptions. A physiological example of homeostasis regaining internal stability, is shivering when feeling cold to increase internal bodily temperature, another example is the increase of adrenaline when fleeing from a threatening situation. Internal homeostasis counters all external stressors using biological stress response systems.

The two major biological stress response systems activated by stress are the sympathetic nervous system and the hypothalamic-pituitary-adrenal (HPA) axis. The sympathetic nervous system (SNS), better known as the fight or flight system is activated immediately after a stressor is recognized by the body response system. The second response system is the hypothalumus-pituitary-adrenal (HPA) axis, which helps regulate and manage stress reactivity and response (Lupien, 2009; Repetti, 2002). Both systems are a part of the overall neuroendocrine system; however the for the purpose of this research only the HPA-axis was investigated.

**The Neuroendocrine System**

The neuroendocrine system as previously defined is a dual interaction between the nervous system and hormones excreted from the endocrine glands (Repetti, 2000). Characteristically the term ‘neuroendocrine’ refers to the hormonal signaling and communication between the hypothalamus, pituitary gland, and the body’s peripheral systems (Matteri 2000).

The neuroendocrine system consists of three brain regions: the hypothalamus, the anterior pituitary gland, and posterior pituitary gland (Repetti, 2000). The hypothalamus is bilaterally symmetric, located in the inferior region of the brain above the anterior pituitary gland (Matteri, 2000). The hypothalamus is an extremely important part of the diencephalon (interbrain) involved in autonomic and endocrine functions in addition to playing a vital role in maintaining homeostasis (Matteri, 2000).

![Figure 5: The Hypothalamus and Pituitary Gland](image)

The Pituitary gland “Master Gland” is an endocrine gland which secretes many hormones into the bloodstream (UPMC). The pituitary gland consist of three components (i) the anterior lobe; (ii) the posterior lobe; and (iii) the intermediate lobe (Matteri, 2000). The main difference between the two is that the anterior gland actually produces the hormones it releases, and the posterior gland does not.
These two systems together create the Hypothalamus-pituitary-adrenal (HPA) axis. The HPA is a major response mechanism of the neuroendocrine system. The HPA functions as regulator and manager of stress reactivity and response for the neuroendocrine system.

**HPA Axis**

Many stressors can trigger the activation of the Hypothalamus-pituitary-adrenal (HPA) axis. Some of the most powerful stressors are psychological (processive) stressors. Psychological (processive) stressors involve high-order sensory cognitive processing (Lupien, 2009). Psychological stressors are often present in human life as a result of learning and memory; examples include the human anticipation of potential threats through conditioned stimuli, as well as, anticipation of possible social rejection. Both examples act as potential triggers to activate the HPA axis.

When a stressor is detected by the neuroendocrine system, the HPA-axis is activated to respond to the threat. Once the HPA-axis is triggered a hormone cascade is released, concluding with the production of glucocorticoids by the adrenals; cortisol is the most important glucocorticoid (Lupien 2009; Yehuda, 2001). Once the HPA axis stress-response cascade is complete there is a dose-dependent increase in both cortisol and catecholamine based on the severity of the stressor (Yehuda, 2001; Matteri, 2000). Catecholamine supplies vital organs with energy during times of stress and cortisol the ’antistress' hormone helps to contain or shut down neural defensive reactions (Yehuda, 2001). Once the perceived stressor subsides, HPA axis activity is suppressed by the negative feedback inhibition of cortisol on the hypothalamus and pituitary (Matteri, 2000).

HPA axis suppression also occurs once the amygdala no longer detects an external threat allowing basal hormone levels to be restored (Yehuda, 2001). The HPA axis can also be inhibited by chronic stress exposure, which leads to increased cortisol levels (Yehuda, 2001). Over activation of the HPA axis can become very dangerous, leading to inadequate and impaired responses, this is called ‘allostatic load' (Ali, 2012; Pearlin, 2005; Yehuda, 2001).

An example of negative effects caused by chronic stress is seen in women suffering from prenatal stress. Prenatal stress exposure can be very dangerous to the fetus. The mother’s increased glucocorticoid (cortisol) levels, can lead to disturbances in the neurological and cognitive development of the child (Lupien, 2009). These disturbances can lead to adverse effects as the child matures such as attention deficit hyperactivity disorder (ADHD), sleep problems, depression, mood and anxiety disorders, along with drug and alcohol abuse in adolescences and adulthood (Lupien, 2009). Increased glucocorticoid basal levels were also reported in adolescents living in high stress communities in addition to adolescents who had been exposed to prenatal stress. Adolescents with increased glucocorticoid basal levels showed symptoms of from depression, while adolescents with lower glucocorticoid levels showed symptoms of PTSD (Lupien, 2009). At this point in the research PTSD was examined as a potential mediator between chronic psychosocial stress and sexual risk behaviors.

**PTSD: Potential Mediator**

Posttraumatic stress disorder is a severe anxiety disorder that can occur after witnessing or experiencing a very traumatic event approximately 8% of individuals in the United States are victims of PTSD (Gill, 2008). African Americans living within economically disadvantaged areas have higher rates of PTSD than the general population (Gill, 2008; Alim, 2006; Breslau, 2004). African American women seeking out-patient health care currently have PTSD rates as high as 23% (Gill, 2008; Alim, 2006; Schwartz, 2005). The exact mechanism of PTSD is unknown, however many physiological, genetic, and social factors are involved in the onset of PTSD (PTSD, 2012). PTSD anxiety can be triggered by nightmares, flashbacks, or uncontrollable thoughts of past traumatic events (Post-traumatic Stress Disorder). PTSD is a mental health condition that alters the body’s subsequent response to stress (Post-traumatic Stress Disorder, 2011; PTSD, 2012).

Recent evidence indicates HPA axis impairment in PTSD survivors is caused by decreased basal cortisol levels and increased negative feedback regulation (Lupien, 2009; Suglia 2009; Yehuda, 2001). PTSD classically had been characterized as being similar to the body’s normal process of adaption to stress, just at a more severe state. However PTSD involves an entirely different stress adaptation

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**Figure 6: The HPA Axis and the Cortisol Negative Feedback Loop**

Figure A is a human diagram of the hormonal cascade triggered when the HPA-axis is activated, beginning with the hypothalamus and ending with cortisol produced by the adrenal glands. Figure B shows the cortisol negative feedback loop which is activated after an external stressor is no longer perceived. Once the negative feedback loop sends messages to the hypothalamus to cease the HPA stress response (VistaLife, 2011; Matteri, 2000)
pathway than chronic stress (Yehuda, 2001). PTSD survivors and victims have decreased cortisol levels, causing their bodies to stay in constant stress response, because there is not enough cortisol to offset the over activation of the HPA-axis (Lupien, 2009).

Cortisol is released in diurnal sequence, with the highest level being approximately thirty minutes after awakening and decreasing throughout the day (Suglia, 2009; Gunnar, 2002). Pediatric diurnal cortisol studies report lower cortisol levels at the time of awakening with flattened cortisol throughout the day, amongst maltreated children (Suglia, 2009). PTSD children with low cortisol levels often have internal symptoms (e.g., depression, anxiety) and external symptoms (e.g. aggression, conduct disorder) (Gordis et al., 2006). The communities where these children live also have an effect on their PTSD symptoms, particularly economically disadvantaged communities (Gordis et al., 2006). Most studies examine pediatric diurnal cortisol levels and cortisol levels in response to violence exposure separately. Very few studies examine PTSD children’s diurnal cortisol responses within violence exposed communities concurrently (Suglia, 2009).

**Future Study**

With cortisol as a biological marker might, future studies might measure the physiological levels of cortisol within PTSD and non-PTSD adolescents living in low-income inner city areas. The biological markers can then be assayed for cortisol reactivity and recovery levels in both PTSD participants and non-PTSD participants. Biological data would be obtained using a salivary collection method (e.g. oral swabs) saliva collection from the women occurs at five different time points: (1) immediately upon arrival; (2) after the demographic measure, immediately before the stressor; (3) 5 minutes after the stressor; (4) 20 minutes after the stressor; (5) 40 minutes after the stressor. Saliva must be collected in this routine to record the peaks and base-levels of cortisol reactivity and recovery. After collection all samples would be frozen at -20C until shipped on dry ice to a salivary bioscience laboratory, and assayed using a highly sensitive enzyme immunoassay. The cortisol analyzed would primarily involve correlation and multiple regression in addition to area under the curve analyses to evaluate the biological data. (Wilson, 2012; Gordis et al., 2008).

To ensure accuracy all saliva samples must be collected between 1pm and 5pm to control for normal diurnal cortisol cycles. Before salvia samples are taken, all participants should receive written instructions and phone instructions the day before reminding all participants to refrain from drinking alcohol, using illicit drugs, or visiting the dentist 24 hours prior to giving a saliva sample. Participants will also be asked not to exercise, eat, drink (except water), smoke cigarettes, or brush their teeth two hours prior to their appointment. Upon arrival all participants are asked if they had followed the given instructions and instructed to thoroughly rinse their mouths with water before giving their first saliva sample. After completing the procedure, all participants will be offered beverages and snacks by the assessor (Wilson, 2012).

Furthermore, analyzing biological marker samples gives room for ambitious predictions. The proposed study’s hypothesis is PTSD will mediate the relationship between psychosocial stress and riskier sexual behavior based on neurophysiological framework, allowing a gap in present research to be bridged. The goal of the proposed study is to better understand the neurophysiological framework behind the increasing levels of psychosocial stress and risky sexual behaviors amongst African American females in hopes of decreasing the number of new STI/HIV and PTSD cases within the African American female population. Hopefully more researchers will conduct similar studies in efforts to normalize this major health concern. With more attention given to the African American low-income inner city woman, PTSD and HIV rates will decrease benefiting not only African Americans but the entire U.S. population.

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**References**


