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Making Contact: Towards an Understanding of the Reach of a Peer Delivered Health Intervention to Reduce HIV Risk among African Americans and Hispanics Involved with Drugs in Hartford, Connecticut

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Making Contact: Towards an Understanding of the Reach of a
Peer Delivered Health Intervention to Reduce HIV Risk
among African Americans and Hispanics Involved with Drugs
in Hartford, Connecticut

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B.A., Eastern Connecticut State University, 2006

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Making Contact: Towards an Understanding of the Reach of a
Peer Delivered Health Intervention to Reduce HIV Risk
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CHAPTER 1: INTRODUCTION

Racial and ethnic minority groups in the United States continue to be disproportionately affected by the HIV/AIDS epidemic. The rate of new HIV infections among African Americans is eight times that of whites (CDC, 2015). New HIV infection rates among Hispanics and Latinos are more than three times as high as that of whites (CDC, 2015). Illicit drug use, particularly injection drug use continues to be one of the primary factors driving new HIV infection and transmission cases in the United States (CDC, 2013).

Between 2002 and 2012, the use of illicit drug by adults in the United States increased from 8.3 to 9.2 percent, or twenty-four million Americans (NIDA, 2014), with the greatest increase in illicit drug use occurring among Hispanics (SAMHSA, 2013). It has been reported that African Americans have the highest rates of substance use for more than a decade (SAMHSA, 2013), and remain most impacted by the negative health and social effects associated with addiction. This thesis seeks to explore an approach to risk reduction that involves peer-to-peer education, with particular emphasis on how this program impacts African Americans and Hispanic drug users.

In all racial and ethnic groups the use of heroin has been increasing steadily since 2007 (NIDA, 2014). This concerns health experts seeking to prevent HIV infection and transmission, as heroin users frequently inject the substance intravenously to

obtain a quick potent high (CESAR, 2015). There are multiple approaches to addressing substance use disorders. These approaches include the war on drugs (GCODP, 2013), and treatment plans with several components of support services (NIDA, 2012). The structural approach of the war on drugs, which intensified the criminalization of drug use, has prevented health programs from effectively addressing addiction. This approach has resulted in increased rates of incarceration, HIV infection, and other negative consequences especially among African Americans and Hispanics (GCODP, 2013).

This thesis will focus on an approach to reducing drug related and sexual risk behaviors among ethnic minorities, which has shown some success. That approach is peer intervention. The approach will be examined through a secondary analysis of longitudinal data containing pre and post-test measures from the Risk Avoidance Partnership (RAP) project. The RAP project was a NIDA funded Peer Driven Intervention (PDI), conducted from 2005 to 2008 by the Institute for Community Research in Hartford, Connecticut.

There were two primary classifications of study participants in the RAP Project. The first group of study participants was the Peer Health Advocates (PHAs), who would become peer educators. The second group of study participants was the Contact Referrals (CRs). The CRs were drug using peers of the PHAs, recruited by the PHAs to participate in the RAP project. The RAP project trained the PHAs

who were injection drug users (IDUs), and crack cocaine users to deliver an intervention to individuals beyond the reach of existing health outreach programs. The intervention was designed to promote harm reduction behaviors and reduce the transmission of HIV, Hepatitis C (HCV), and sexually transmitted infections in the community. This thesis will examine the reach of the RAP intervention to African American and Hispanic CRs in the city, and determine if the intervention reduced risk in those populations.

Drug Use and the Burden of Disease

Racial and ethnic minorities currently account for one third of the population in the United States. It is anticipated that these “minority” populations will become the majority population by 2050 (SAMHSA, 2014). The disease burden associated with substance use disorders has had a disproportionately high impact on communities of color. These populations continue to experience a deficiency in access to health services and substandard quality of care for mental health and substance use disorders (NAS, 2002; Marsh, Cao, Guerrero, & Shin, 2009). Racial and ethnic minorities are also underserved by available treatment plans and support services offered through the substance abuse treatment system in the United States (NAS, 2002; Marsh, Cao, Guerrero, & Shin, 2009). Many substance use treatment programs offer HIV testing, related education, and referrals to other health services to their clients (ADG, 2014). The disparity in access to health services, particularly treatment for substance use disorders increases the risk of

HIV transmission and other negative health consequences associated with drug use among racial and ethnic minorities.

The use of substance abuse treatment services for heroin dependency was disproportionately low among Hispanics and African Americans between 2002 and 2012 (TEDS, 2012). Whites accounted for sixty-five percent of all treatment admissions for heroin dependency during this time period, whereas Hispanics accounted for sixteen percent, and African American accounted for fifteen percent. The remaining four percent of admissions for heroin were identified as “other race or ethnicity (TEDS, 2012).” The average age of persons treated for heroin dependency was thirty-three years old. Eighty percent of individuals who entered treatment for heroin dependency had been in treatment prior to the current episode. Nearly one-third (27%), of all treatment admissions for heroin dependency reported five or more treatment episodes (TEDS, 2012). The high recidivism rate of treatment for heroin dependency in the United States highlights the likelihood that individuals will return to drug use behaviors which may increase their HIV risk following a treatment episode. The racial disparity in treatment admissions suggests that heroin dependent African Americans and Hispanics, are more likely than whites to be engaging in high risk drug use behaviors without access to HIV testing, related education, and other health services through the substance use treatment system.

Crack cocaine smokers account for sixty-nine percent of all cases admitted to substance use treatment programs for cocaine dependency in the United States. African Americans accounted for the highest number of admissions to substance use treatment programs for crack cocaine dependency between 2002 and 2012 (TEDS, 2012). During this time period fifty-six percent of all treatment admissions for crack cocaine dependency were African Americans, thirty-five percent were whites, and eight percent were Hispanics. The remaining three percent of admissions were identified as other race/ ethnicity (TEDS, 2012). The majority of all treatment admission during this time period were thirty-five years of age or older. The average age at admission for treatment for crack cocaine dependency was forty-two years old (TEDS, 2012).

Historically ethnicity/race has been inextricably involved in the American perception of crack cocaine use. From the inception of the war on drugs in the mid-1980's crack cocaine was erroneously believed to be used primarily by African Americans. This perception still biases law enforcement efforts, and policing strategies in communities of color. As a result African Americans continue to be arrested at disproportionately higher rates than whites and Hispanics (HRW, 2009). The criminal justice system is one of the leading sources of treatment referrals for crack cocaine dependency in the United States (TEDS, 2012), which accounts for the wide usage of treatment services for crack cocaine among African Americans. Similar to other illicit drugs or alcohol, crack cocaine dependency is a chronic

condition, such as diabetes or hypertension (NIDA, 2012). As a result people who are dependent on crack cocaine, are likely to reengage in HIV risk behaviors associated with crack cocaine use (Edlin et al., 1994; Ross, 2001; Word et al., 1997; Kral et al., 1998; Celentano & Mehta, 2008; Khan et al., 2013), following a treatment episode in the absence of appropriate support services. These factors make community health interventions designed to reduce negative health and social outcomes of crack cocaine use of critical importance particularly among African Americans who are most affected by these conditions (GCODP, 2013).

Of the more than 1.1 million Americans infected with HIV an estimated, twenty-two percent are IDUs (Lansky et al., 2014). Illicit drug use behaviors are associated with significantly high transmission rates of HIV, hepatitis C (HCV), sexually transmitted infections (STI's), and other health related harms (Lianping, Buxton, Wood, Shannon, Zhang, Montaner, & Kerr, 2012). The sharing of drug using equipment is the second most common vector for transmission of the HIV virus (Trang, Weir, Des Jarlais, Pinkerton, & Holtgrave, 2014). High risk sexual behavior associated with crack cocaine use also places crack cocaine users at significantly higher risk of HIV infection and transmission (Edlin et al., 1994; Ross, 2001; Word et al., 1997; Kral et al., 1998; Celentano & Mehta, 2008; Khan et al., 2013).

Every HIV infection generates substantial human and social costs. Following an HIV diagnosis in the United States, there is a loss of life expectancy of between nine and twenty-one years (Harrison et al., 2010), and a loss of as many as 6.4 quality adjusted life years (Hutchinson et al., 2010). In 2010, the lifetime cost of treatment for each HIV infection was calculated to be \$379,668 (CDC, 2013), totaling approximately \$418 billion for all persons living with HIV in the United States.

While the overall incidence and prevalence of new HCV infections appears to be declining in the United States (Razavi, 2013), the disease burden remains driven by high risk drug use exposures (Alter, 1997). The virus continues to spread widely among IDUs through sharing of syringes and other supplies used to mix, measure, and administer intravenous drugs (Massachusetts Department of Public Health, 2012). As many as forty-eight percent of adults who test antibody positive report a history of injection drug use (Lansky et al., 2014). The virus can also be transmitted orally through the sharing of smoking pipes by crack cocaine users (Fischer, 2008). Between seventy-five and eighty percent of all HCV cases will develop chronic HCV. Of those cases sixty to seventy percent will develop chronic liver disease. In persons who develop chronic liver disease, five to twenty percent will develop cirrhosis within twenty to thirty years, and as many as five percent will die as a result (CDC, 2014). In 2011, the lifetime cost of treating an individual infected with HCV was estimated at \$64,490 (Razavi, 2013). In 2013, the annual

cost of treating advanced liver disease associated with HCV infection was estimated to be \$6.4 billion (Razavi, 2013). With increases in life expectancy, the cost of treating advanced liver disease is expected to rise to \$9.1 billion annually by 2024 (Razavi, 2013). The public sector assumes the majority of HIV and HCV related treatment costs in the United States which contributes to the country's growing spending deficit (Trang et al., 2014). The growing economic burden associated with the cost of care, necessitates far reaching and cost-effective intervention strategies to reduce infection and transmission rates.

Treatment for Substance Use Disorders

The natural history of substance use dependency follows the course of a chronic relapsing disorder (APA, 2000). As with other chronic diseases, the condition must be monitored and managed over time (ASAM, 2015). Abstaining from substance use or entering into a treatment program is the most effective way for individuals to reduce the risk of HIV and HCV infection or transmission (U.S. Dept HHS, 2014). Drug addiction is a complex condition involving the biological, psychological, social and environmental aspects of an individual. These complexities necessitate a treatment plan, which involves several components of support services. There are a number of approaches to treating addiction whose efficacy is supported with scientific evidence. These approaches are administered in a variety of settings including residential and outpatient (NIDA, 2012), primarily under an acute care format in which fixed amounts of treatment and medication are administered

(McLellan et al. 2005). The National Institute for Drug Abuse (NIDA) has established a set of core principles for effective treatment of substance abuse disorders (NIDA, 2012). NIDA recommends treatment programs provide a combination of therapies and other services to meet the needs of the individual patient (NIDA, 2012). Treatment can include behavioral or pharmacological therapies, applied separately or in combination. Since behavioral and pharmacological therapies target different aspects of addiction, these therapies are more effective in combination than when either therapy is administered as a standalone form of treatment.

Treatments types vary depending on patient's needs (NIDA, 2012). The first stage of treatment for substance use disorders often begins with detoxification through medically managed withdrawal. During detoxification a patient's body clears itself of the addictive substance or substances. A host of unpleasant and potentially fatal side effects stemming from withdrawal frequently accompany the detoxification processes. It is necessary for detoxification to be managed with medication prescribed by a physician in an inpatient or outpatient setting. There are currently prescription drug therapies available to assist in the withdrawal from opioids, benzodiazepines, alcohol, nicotine, barbiturates, and other sedatives. These medications are an integral part of the detoxification process. Detoxification addresses only the biological component of drug addiction, which is the physical dependency to one or more substances. Detoxification alone will rarely produce

the behavioral changes necessary for recovery, since it does not address the psychological, social, and behavioral problems associated with addiction. NIDA recommends that detoxification be followed by a clinical assessment, and referral to a drug addiction treatment program (NIDA, 2012).

Treatment programs continue to evolve with new innovations, and many programs do not fit conventional treatment classifications. Conventional treatment options for drug addiction encompass three modalities of services delivery: long-term residential treatment programs; short-term residential treatment programs; and outpatient treatment programs (NIDA, 2012).

Long-term residential treatment programs provide care twenty-four hours a day. These programs commonly operate in nonhospital settings, and adhere to the therapeutic community model (TC). Proponents of the TC model believe addiction is related to the social and psychological deficits of an individual. These programs focus on the "re-socialization" of the individual. During a six to twelve month enrollment period these programs assist participants in developing personal accountability and responsibility as well as socially productive lives (NIDA, 2012; Lewis et al. 1993; Sacks et al. 2008). These programs can be modified to treat individual needs of the patient and special populations, including adolescents, women, homeless individuals, people with severe mental disorders, and individuals in the criminal justice system (NIDA, 2012).

Short-term residential treatment programs provide intensive but brief treatment using behavioral therapy and the twelve-step approach for a period of three to six weeks (NIDA, 2012; Miller, 1998). The twelve-step approach outlines a course of action for overcoming addiction to drugs, alcohol, or other compulsive behaviors. It was developed by Alcoholics Anonymous as a model for people with substance use disorders to support each other in abstaining from the use of drugs or alcohol (VandenBos, 2007). Short-term residential treatment is primarily delivered as hospital based inpatient treatment. NIDA recommends patients be referred to outpatient therapy and community based self-help groups to increase the likelihood of successful recovery following the completion of short-term residential treatment (NIDA, 2012; Miller, 1998).

The portfolio of services offered by outpatient treatment programs varies in type, intensity, and effectiveness (NIDA, 2012). Low intensity outpatient treatment programs may offer only drug education. Higher intensity outpatient treatment programs offer intensive day treatment, and provide outcomes which are comparable to residential programs (NIDA, 2012). Many outpatient programs also offer group counseling and some are designed to treat patients with co-occurring substance use and mental health disorders (NIDA., 2012; McLellan, 1993). Some outpatient treatment programs provide pharmacological therapies for dependency on heroin and other opiates. A common medication used in the treatment of opioid addiction is methadone. Methadone is designed to reduce the harmful behaviors

associated with heroin use; can help heroin users reduce or stop using heroin; and help them return to productive lives. Methadone works through the same receptors in the brain as heroin and other opiates, producing reward signals in the patient's brain. With stable dosing methadone does not cause euphoria or intoxication. Methadone blocks the euphoric effects of opiates, and relieves the craving and withdrawal symptoms associated with opiate dependency. Methadone, available through approved outpatient treatment programs, is dispensed to patients on a daily basis. Other medications for treating opiate dependency are available depending on patient needs (NIDA, 2014; CDC, 2015). All treatment types are not equivalent. The cost of outpatient treatment is less than long-term residential or short-term inpatient treatment programs, making it more appealing to some consumers. It is often more suitable for consumers with jobs, or extensive social supports because it does not provide the same level of structured support offered in long-term residential or short-term inpatient treatment programs (NIDA, 2012).

While new therapeutic innovations for the treatment of substance use disorders continue to develop, current systems are unable to reduce racial and ethnic health disparities related to the detection and treatment of the early stages of addiction (Marsh et.al, 2009; Buka, 2002). The United States health care system is also limited in its capacity to provide timely and effective addiction treatment services (Friedmann et al., 2003) particularly to racial and ethnic minorities (Marsh, et.al, 2008). Rationing by waiting is a common practice which poses a significant barrier

for timely access to treatment for low income, uninsured, and methadone maintenance patients (Friedmann et al., 2003). The growing prevalence of illicit drug use among African Americans and Hispanics (SAMHSA, 2013), coupled with greater access to insurance coverage under the Affordable Care Act may actually result in demand outpacing supply if the capacity of treatment centers is not scaled up (Johnson, 2013). The shortage of treatment facilities for substance use disorders (McLellan et al., 2005; Johnson, 2013) calls for public health interventions outside of conventional programming to address HIV risk and other health related harms associated with illicit drug use (Lianping et al., 2012). Consistent with the national HIV/AIDS strategy, such an intervention should focus communities in which HIV is most heavily concentrated, and expand prevention among IDUs (CDC, 2009). The intervention should include secondary prevention through harm reduction education and training. It should reach individuals with substance use disorders who are not connected with or face barriers to entry into treatment services.

Peer Delivered Intervention

An intervention strategy, which has shown success in reducing drug related and sexual risk behaviors among racial and ethnic minorities is peer delivered intervention (PDI). For decades, PDI models have been used by interventionists seeking to prevent the social and sexual contributors to HIV and HCV risk, (Broadhead, Heckathorn, Altice, Van Hulst, Carbone, Friedlant & Selwyn, 2002;

Broadhead, Heckathorn, Grung, Stern, & Anthony, 1995; Broadhead, Heckathorn, Weakliem, Anthony, Madray, Mills, & Hughes, 1998; Friedman et al., 1987; Latkin, 1998; Valente, Foreman, Junge, & Vlahov, 1998; Weeks, Dickson-Gomez, Convey, Martinez, Radda, & Clair, 2009). PDIs are defined as, “facilitation of behavior change through the provision of information, training, and or support services to individuals by peers”(Needle et al., 1998). These interventions are designed to provide a culturally appropriate, cost effective alternative to the “provider-client” outreach model (Gwadz et al., 2011). PDIs extend disease prevention services beyond the reach of HIV prevention strategies employed by community based health programs to a larger and more diverse set of at risk individuals (Broadhead et al., 1998; Weeks et al., 2009). The application of PDIs is different from that of community based health program strategies which rely on the presence of staff in the community to deliver health education materials and training to high risk populations. While provider-client outreach models used by community based health programs have been shown to be effective in reducing HIV risk behavior. However, their scope and efficacy is limited to the contacts which professional outreach workers make with drug users in a community (Broadhead et al., 1998). PDI models have shown that drug users are more capable of reaching and communicating with one another than salaried outreach workers on matters of mutual concern related to disease prevention (CHIPS, 2015).

Across target populations PDIs feature two consistent core components. The first is peer educators who deliver the intervention. The second is the contacts of peer educators. The contacts of peer educators also receive the intervention. These contacts have similar drug use or sexual risk behaviors as the peer educators. Early PDIs maintained rigorous inclusion criteria to ensure a strict selection of Popular Opinion Leaders (POLs), as peer educators. The POLs are members of the target population whose views, attitudes and behavior can influence their peers because of their social standing. The concept of selecting POLs as peer educators rests on the idea that when POLs are seen by their peers to adopt and model behavioral changes, those behaviors are perceived as good and mutually beneficial among their peers. (Kelly et al., 1991; Kelly, et al., 1992; Kelly et al., 1997). More recent PDIs have allowed any individual within a target population willing to participate in the intervention to become a peer educator (Broadhead et al., 1998; Broadhead et al., 2006; Latkin, 1998; Latkin, Metzger et al., 2009; Latkin, Forman, Knowlton, & Sherman, 2003; Weeks, Dickson-Gomez, Mosack, Convey, Martinez, & Clair, 2006; Weeks et al., 2009).

The PDI operates by deploying a large and diverse set of drug users with connections to many different drug scenes, to many different drug scenes. The peer educators disseminate health information and provide harm reduction training to peers. Through this practice and with appropriate direction and small incentives, PDIs provide more extensive community outreach, thereby facilitating a greater

level of disease prevention than provider-client outreach models (Broadhead et al., 1998).

Social and political norms which criminalize people who use illicit drugs, and marginalize people living with HIV/AIDS has lead to strong stigma around illicit drug use behaviors. This stigma may pose challenges for implementing PDIs designed to reach racial and ethnic minorities. Assessment of harm reduction interventions and policy in China, Vietnam (Hammett, Des Jarlais, Johnston, Kling, Ngu, Liu et al., 2007; Go et al., 2013), Canada (Garmaise, 2007; Symington, 2007), and Iran (Karamouzian, Haghdoost, & Sharifi, 2014) confirm such challenges. For over forty years in the United States, the criminalization of addiction through the “war on drugs” has limited the ability of programs to effectively address the health needs of people with substance use disorders. Rather than connect these people to appropriate treatment and care, the structural approach of the war on drugs has been to incarcerate this population. Consequently the war on drugs has been a driving factor in the HIV epidemic and the spread of HCV among people who use drugs (GCODP, 2013). The White House’s 2014 National Drug Control Policy Report acknowledged that the “war on drugs” approach to policy is counterproductive, inefficient and costly. The report emphasized a need for a transition from a punitive to a public health approach for treating substance use disorders (White House, 2014). This shift in focus is critical to disease prevention and to ensuring favorable social and political norms that can

support effective PDIs. Despite such conditions there is evidence to suggest that peer educators can be successful in working around these barriers to effectively promote less risky behaviors (Go et al., 2013; Semaan, Hutchins, D'Anna, & Kamb, 2010). PDI models have shown success in reducing drug and sexual related risk behaviors of peer educators when tested on populations at high risk for HIV infection or transmission including gay and bisexual men (French, Power, & Mitchell, 2000; Hays, Rebchook, & Kegeles, 2003; Kelly et al., 1992), teens living in low income housing projects (Sikkema, Anderson, Kelly, Winett, Gore-Felton, Roffman, & Brondino, 2005), women (Davey-Rothwell et al., 2011), IDUs, and crack cocaine smokers (Broadhead et al., 1998; Latkin et al., 2003; Latkin et al., 2009; Weeks et al., 2009). Gay and bi-sexual men who receive peer health education have been shown to increase their use of HIV testing, Hepatitis B vaccination, and sexual health services (Williamson et al., 2001). In populations of male IDUs, repeat exposure to at least three or more peer education sessions has been found to substantially reduce injection risk behaviors associated with HIV and HCV infection and transmission (Jain et al., 2014). In IDUs and crack cocaine users, PDI recipients have also been shown to mimic the work of peer educators by delivering health messaging and prevention materials to others within their networks (Weeks et al., 2009).

Building on these empirical findings, the emerging target of PDIs is both IDUs and their sexual partners. Traditionally the HIV prevention needs of the sex partners of

IDU and crack smokers is secondary to that of IDUs when addressing the HIV epidemic (Booth, Kwiatkowski, & Chitwood, 2000; Eritsyian et al., 2013; Karamouzian et al., 2014). The sexual partners of IDUs (Eritsyian et al., 2013), and crack cocaine users (Ross, 2001; Word et al., 1997; Kral et al., 1998; Celentano & Mehta, 2008; Khan et al., 2013; Edlin et al., 1994) are a linkage for the spread of HIV, HCV, and STIs between drug users and the general population (Eritsyian et al., 2013). PDIs targeting both drug using networks, and the networks of the non-drug using sex partners of IDUs, and crack cocaine users have the ability to cast a much wider safety net for disease prevention.

The Theoretical Context of Peer Delivered Interventions

The primary theories which guide an understanding of behavioral change associated with peer interventions are the social learning theory (Bandura, 1977), the stages of change models (Prochaska, 1996; Weeks et al, 2009), and the community health promotion and empowerment theory (Brown, 1991; Minkler, 1989). The social learning theory postulates that the cognitive process of learning occurs in a social context. Social learning theory emphasizes reciprocal determinism, which suggests individual behavior is influenced by the environment as much as the environment is influenced by the behavior of individuals (Bandura, 1977). The stages of change model postulates that change is a process which occurs through a series of five stages: pre-contemplation, contemplation, preparation, action and maintenance. In the stages of change model there is a

growing awareness that the advantages of changing a behavior outweigh the disadvantages of continuing a behavior, resulting in lasting behavioral modifications (Prochaska, 1996).

Community health promotion and empowerment theory (Brown, 1991; Minkler, 1989) posits that health status is effected by environmental conditions and health behaviors. Therefore, a comprehensive approach to improving health status should seek to create a health promoting environment. This environment should encourage individuals to embrace and maintain behaviors that prevent disease, foster health, and discourage detrimental behavior. Community health promotion and empowerment theory rests on the premise that facilitating and promoting behaviors requires social and community action to change environmental conditions and individual behavior (Brown, 1991; Minkler, 1989).

The social learning theory (Bandura, 1977; Bandura, 1994), the stages of change models (Prochaska, 1996; Prochaska, 1994), and the community health promotion and empowerment theory (Brown, 1991; Minkler, 1989), provide a conceptual understanding of the community level reduction in HIV risk which occurs in PDI models. The concepts promoted in these theories guide the understanding of how the community setting can be transformed into an environment of health promotion. Using peer intervention, the environment of health promotion is created

by training active drug users, who are behaviorally and culturally similar, to model and teach harm reduction behaviors (Li & Weeks, 2009).

Dynamic social impact theory (DSIT) (Nowak, Szamrej, & Latane, 1990) and diffusion of innovations theory (DIT) (Granovetter, 1973; Rogers, 1995) have been applied to PDIs as a guide to understanding of the process by which peer intervention delivery and harm reduction practices are accepted in a community. The DSIT uses the principles of social influence (Latané, 1981) to explain how majority and minority group members influence one another. The DSIT approach puts forth the idea that there are four factors which effect change within spatially distributed groups. Those factors are: consolidation, clustering, correlation and continued diversity (Harton, Green, Jackson & Latane, 1998). DSIT posits that consolidation occurs over time when the majority increases and the minority dwindles. Clustering of opinion occurs because people are more influenced by their closest neighbors, and so clusters of group members with similar opinions emerge. The simultaneous occurrence of consolidation and clustering produces a correlating effect. Over time group members' opinions on other issues, even ones that are not discussed in the group, converge, so that their opinions are related on a variety of matters. Clustering also has a protective effect on minorities within a group, shielding them from domination by the majority and allowing their beliefs to continue to be maintained within the group (Nowak et al., 1990).

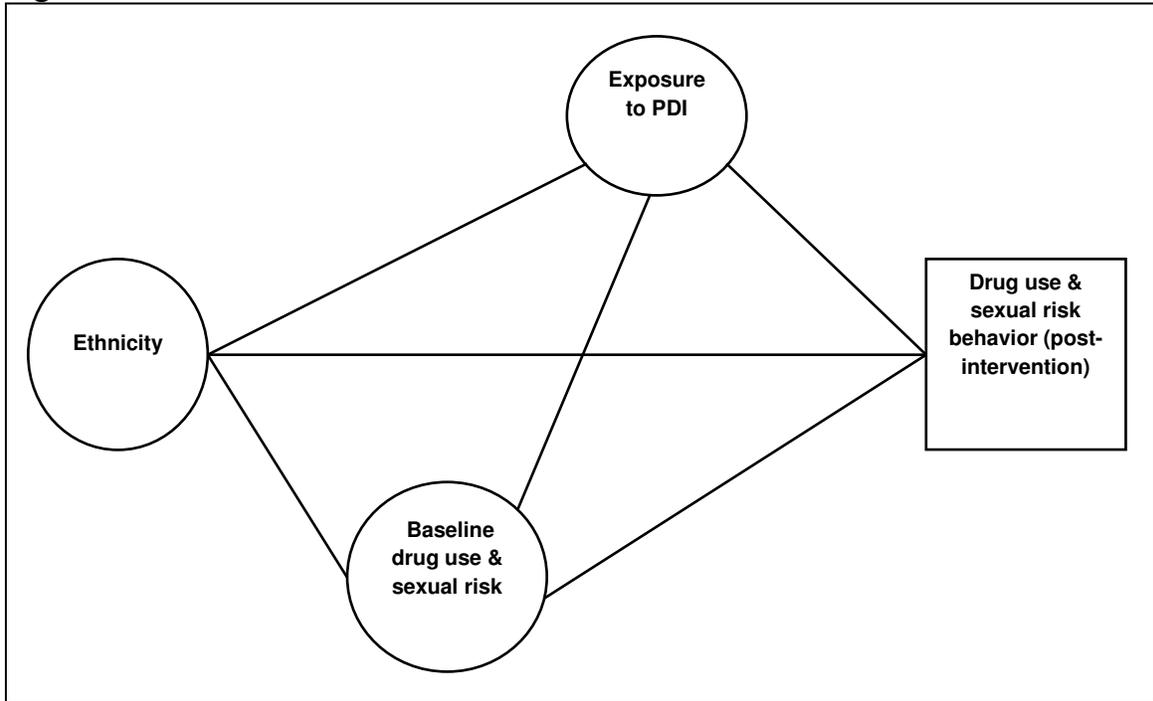
The DIT (Granovetter, 1973; Rogers, 1995) aims to understand the rate at which new ideas are adapted by cultures. In DIT, innovations are communicated over time within a social system. In the DIT process there are four main elements that drive the adaptation of new ideas. Those elements are: the innovation itself, communication channels, time, and a social system (Rogers, 1995). The diffusion process relies largely on human capital, where new ideas and understandings must be widely adopted to be sustainable. In DIT, there are four categories of innovation adopters known as: innovators, early adopters, early majority, late majority, and laggards (Rogers, 1995). Within these categories there is a point at which rate of adoption of a new idea reaches a critical mass. This process varies among cultures and environments and is specific to the characteristics of adopters and the innovation process (Rogers, 1995). Together, social impact theory and DIT specify the principles of social influence on the behavior of majority and minority group members (Nowak et al., 1990) and guide the understanding of the rate at which peer intervention components are adapted (Rogers, 1995). The theories outlined in this section provide the framework for the research questions which will be explored in this thesis.

Research Questions

The RAP project sampled a broad population of illicit drug users in Hartford to gather information on the prevalence of risk behaviors which had been changed to harm reduction behaviors. The harm reduction behaviors were intended to reduce

the risk of HIV, HCV and STI transmission and infection following exposure to the intervention. Findings showed a reduction in risk behavior among both PHAs and CRs, suggesting that PHA activity served as a catalyst for effectively driving the diffusion of health advocacy messaging within the community (Weeks et al., 2009). An understanding of the degree to which this phenomenon may differentially impact African American and Hispanic CRs remains unexplored. African Americans and Hispanics are impacted by the HIV epidemic, and other negative consequences associated with illicit drug use at disproportionately higher rates than whites (CDC, 2015; GCOOP, 2013). At the same time, there are important cultural, socioeconomic, geographical, network and drug utilization differences between African Americans and Hispanics (Weeks et al., 2002). Specific knowledge of the impact which the RAP PDI had on African Americans and Hispanics may provide insight for future health interventions to address HIV risk and promote harm reduction behaviors in these populations. This thesis will explore two questions. The first question is, was there a difference in the reach of the RAP intervention between African Americans and Hispanics? The second question is, did the intervention reduce risk in each of these populations? Figure 1 below depicts the research model for the thesis. It proposes that there are differences between the two ethnic groups in baseline drug and sexual risk and their involvement in and response to exposure to PDI. As a result ethnicity, PDI response and baseline risk behavior will have a significant impact on post PDI drug use and sexual risk behavior.

Figure 1.



Chapter 2: METHODOLOGY

Overview of the City of Hartford and its Drug Using Population

According to the 2010 census, Hartford is the third largest city in the state of Connecticut, with a population of approximately 124,775 people. There are 44,986 households, and 27,171 families residing in the city. The population density is 7,025.5 people per square mile. There were 50,644 housing units at an average density of 2,926.5 units per square mile. The racial makeup of Hartford is primarily African American (38.7%) and Hispanic (43.4%). Hispanics and Latinos were reported to be primarily of Puerto Rican origin. Whites not of Latino background accounted for 15.8 percent of the population in 2010, down from 63.9 percent in 1970 (USCB, 2015).

The following data is drawn from a previous study conducted by Weeks et al., (2002) profiling the social network characteristics of drug users in Hartford, Connecticut. Consistent with national trends (SAMSHA, 2013), the majority of drug users in the city are African American (34%), or Hispanic (53%). The remaining thirteen percent of the drug using population in the city are white, or of other ethnicities. Seventy percent of Hartford's drug users are male. The average age of Hartford's drug users is approximately thirty-seven years old. Forty-three percent of all people who use drugs in Harford are homeless. Seventy-five percent of the city's drug using population injected drugs in some combination during the past thirty days (i.e., cocaine, speedballs, heroin, or other drugs). Sixty-eight percent of people who use drugs in Harford have injected heroin in the past thirty

days, and more than fifty-five percent have smoked crack within the past thirty days. The primary drug use location of more than half (51%) of Hartford drug users is reportedly in public locations such as parks or abandoned buildings. Nearly one-third (30%) of Hartford drug users report using drugs in their own homes, and sixteen percent report using drugs in the home or apartment of another person (Weeks et al., 2002). The high prevalence of communal drug use in public spaces in Hartford, Connecticut made the city an ideal location to deploy a high impact PDI to racial and ethnic minorities.

Methods

This thesis is based on data drawn from the RAP Project, a longitudinal study containing pre and post-test measures. The RAP Project used a multi-theoretical approach to train IDUs and crack cocaine users as peer health advocates (PHAs). The role of the PHA was to deliver a peer intervention to individuals beyond the reach of standard community health outreach programs. The objective of the intervention was to reduce HIV, HCV, STI risk in the city. The RAP project had two primary classifications of study participants. The PHAs (n=112) who were the peer educators, and their Contact Referrals (CRs) (n= 222). CRs were drug using peers of the PHAs. The PHAs recruited the CRs to participate in the RAP project. Ideally every CR could receive the peer education component of the intervention from a PHAs. However, within the RAP project design there was no guarantee that CRs would receive the intervention from a PHA(Weeks et al., 2009). Primary eligibility

criteria for all participants included eighteen years of age or older, self-reported use of heroin or cocaine (injected, smoked, or sniffed) within the past thirty days, and willingness to provide informed consent and voluntary participation (Weeks et al., 2009). The RAP project combined the early PDI approach of using rigorous sampling criteria to ensure the strict selection of popular opinion leaders as peer educators (Kelly et al., 1992). More recent PDI sampling methods allowed any individual within a target population willing to participate in the intervention to become a peer educator (Latkin et al., 2003). The combination of sampling strategies was called a targeted sampling plan (Singer & Weeks, 1992; Watters & Biernacki, 1989), which used two waves to identify and recruit study participants as candidates to become PHAs (Dickson-Gomez, 2011). In both waves of recruitment, female PHAs were over sampled to ensure adequate representation (Weeks et al., 2009). It was expected that female drug users would be more difficult to reach, because they are often more isolated than males from street drug use and drug purchase settings in the community (Cruz, Mantsios, Ramos, Case, Brouwer, Ramos, & Strathdee, 2006; Sherman, Latkin & Gielen, 2001).

The first wave of recruitment was guided by the target sample plan. It employed carefully structured “enhanced eligibility” criteria (Weeks et al., 2009). The focus was on selecting participants who would amplify the reach of the intervention by recruiting people to become PHAs who showed evidence of being “central,” to drug using networks (Dickson-Gomez, 2011). During the first wave of recruitment

ethnographers, who were familiar with the community, worked with RAP outreach staff which included African American and Hispanic former drug users. Together RAP outreach staff and the ethnographers engaged in walkup introductions in Hartford neighborhoods. The purpose was to identify and recruit PHAs based on their knowledge and observations of those individuals (Weeks et al., 2009). Project staff confirmed eligibility during the first wave of recruitment through indicators from a previous study which identified high risk drug use sites in the city through profiling the networks of drug users who used drugs in communal locations (Weeks et al., 2002). Findings indicated that more than two-thirds of the reported social interactions among drug users occurred at high risk drug use sites. The high level of social interaction among drug users in communal locations presented an opportunity to create prevention linkages through peer education (Weeks et al., 2002). This knowledge of the strategic locations of Hartford's drug using networks enhanced the effectiveness of the first wave of PHA recruitment.

The network study also found that strategic positioning within high risk drug using networks in Hartford is not predictive of peer influence and could not guarantee that a drug user was a popular opinion leader (Weeks et al., 2002), which presented a challenge to the first wave of PHA recruitment. To identify possible popular opinion leaders the RAP project staff also used community observations to select effective PHA candidates. The objective of using community observations in the enhanced eligibility criteria was to identify participants who may have social

influence over other drug users by showing multiple linkages to other drug users or status as a drug use site “gatekeeper” (Weeks et al., 2009). A person was determined to have multiple linkages if community observations showed them to be interacting with other drug users in the community. Gatekeepers were defined as those who approved entry of drug users into private drug use sites in the community. Gatekeepers commonly charged a fee in money or drugs for the right to use drugs at a specific location. These individuals are frequently interested in attracting drug users to their sites for the exchange of money or drugs. Gatekeepers may be willing to offer HIV prevention education, harm reduction literature, and harm reduction supplies at their site to draw drug users to their sites. However, status as a “gatekeeper” is known to accelerate addictive behaviors, which may make it difficult for these individuals to server as harm reduction ambassadors for extended periods of time (Dickson-Gomez, Weeks, Martinez & Radda, 2013).

After the first months of the project, the second wave of recruitment began. During the second wave of recruitment the eligibility criteria requirement of “central” network status was waived to open enrollment to any drug users in the city who had a desire to become a peer educator (Dickson-Gomez et al., 2011). There was no significant difference at baseline between PHAs who entered the project during the first wave of recruitment and PHAs who entered the project during the latter stage of recruitment with respect to gender, ethnicity, drug network size, retention

rate, or the dissemination of health education to peers (Weeks et al., 2009). All CRs entered the study through a respondent driven sampling method (Heckathorn, 1997) directed by the PHAs. At intake PHAs were given three referral cards and advised to give the referral cards to people who they knew were active crack cocaine or heroin users, or their current sex partner. PHAs were required to enroll a minimum of two eligible CRs. All CR referrals had to successfully enter the study by completing a ninety minute baseline survey questionnaire administered by the project staff in order for PHAs to initiate training. Project staff encouraged PHAs to give cards to people who they saw using drugs or who they used drugs with regularly. This was done to increase the likelihood that after training PHAs would provide the RAP intervention to their CRs, and that the intervention would be delivered in the presence of other drug users in the community (Weeks et al., 2009).

The RAP project, modeled after a program tested in Baltimore, Maryland using peer leaders to facilitate HIV prevention, was designed to have two levels of intervention (Latkin, 1998). The first level of the intervention was the PHA training. RAP added a partnered training component between project staff and PHAs in which they were trained together. This was done to enhance the efficacy of PHA model behavior and the diffusion of health education information (Weeks et al., 2009).

The PHA training curriculum was a ten-session, interactive training program. Sessions one through four were small group and delivered by the staff at the offices of the Institute for Community Research. Participants were trained in peer and public health advocacy (Brown, 1991; Minkler, 1989) during the initial four in-office sessions and provided with basic information on HIV, hepatitis, and STI transmission and prevention (Weeks et al., 2009). Training also included persuasive communication techniques, (Latkin et al., 2003), safety in community intervention, and the methodology for delivering the three domains of the RAP project's peer intervention (Weeks et al., 2009).

The three domains of the RAP projects peer intervention are:

- 1. The provision of prevention education** related to safe drug use and safe sex practices. This domain of the RAP intervention used health promotion slogans to promote risk reduction and harm reduction behaviors such as condom use and sterile injection practices.
- 2. The demonstration of proper HIV prevention practices** when engaging in drug use and sexual activity. This domain of the RAP intervention was designed to train drug users on harm reduction practices to reduce HIV and HCV risk. Among IDUs, it focused on raising awareness of HIV risk factors associated with injection drug use. It sought to build the confidence of IDUs to engage in sterile injection practices. PHAs discussed the importance of reducing the behaviors of

syringe re-use; syringe sharing when injecting drugs, the sharing of injection supplies and sharing of syringes when preparing drug mixing solutions with their IDU contacts. Among crack cocaine smokers, the intervention sought to increase the use of rubber tips on crack pipes to prevent HIV and HCV transmission. PHAs explained to crack smokers that smoking crack can lead to open sores, burns and cuts on the lips, which can transfer blood to a crack pipe. If the pipe is shared, even specks of blood can transmit HCV (NCHRC, 2015). PHAs taught crack smokers how rubber tips made from cut spark plugs can fit onto the stem of the crack pipe, and prevent the user from getting cut or burnt. PHAs also talked with all drug using contacts about the importance of using condoms and reducing unprotected sexual activity to prevent HIV and STI infection and transmission.

3. The delivery of prevention materials. In this domain of the RAP intervention PHAs provided their contacts with condoms, dental dams, rubber tips for pipes, and health education literature.

In each of these domains, the PHA could also be assisted or guided with the use of a field manual know as the “RAP Flipbook.” The RAP Flipbook was provided to PHAs to enhance the fidelity of the RAP intervention in the community. The RAP Flip Book illustrated and described each component of the intervention which PHAs were trained to deliver. It was designed to serve as a tool for assisting

PHAs in delivering the intervention messages in the community (Weeks et al., 2009).

Sessions five through ten of the training were held in the field. During these sessions PHAs partnered with research staff to engage in intervention delivery to the PHA's peers in the community. This one-on-one partnered training component was designed to enhance intervention fidelity and was unique to the RAP project. In these sessions a staff person observed while the PHA delivered the RAP intervention (Weeks et al., 2009). Intervention proficiency among PHAs was confirmed by staff through role play scenarios and demonstrations of intervention delivery (Weeks et al., 2006). All PHA training sessions were two hours in duration. PHA training sessions occurred in twenty-eight cycles with three to seven PHAs in each cycle between December, 2001 through August, 2004 (Weeks et al., 2009). Project staff considered a PHA to be fully trained after the completion of five or more PHA training sessions. The completion of five basic training sessions qualified a PHA to deliver the RAP peer intervention in the community. Participants received a certificate of completion after session five, and an ID card with the title of Peer Health Advocate to be used when conducting the RAP intervention (Weeks et al., 2009). PHAs who completed less than four training sessions did not qualify to participate in sessions five through ten with project staff (Weeks et al., 2009).

The second level of the intervention for the RAP project was the peer delivered intervention (PDI) component. The PDI level involved social influence, peer norms, and peer pressure that played a role in shaping individual behavior and decision-making (Dickson-Gomez, 2011). The PDI used social networks and teachable moments to normalize risk reduction and HIV prevention practices (French et al., 2000, Kelly et al., 1992; Trautmann, 1995). The PDI required PHAs to engage their peers in at least two of the three intervention domains (Weeks et al., 2009).

A pre-post survey measuring drug use risk behaviors, intervention activity, and the social networks of study participants was used to evaluate outcomes, dissemination, and diffusion of benefits associated with the RAP intervention. The survey sample included two primary groups: the first was the 112 PHAs who completed five or more sessions of the ten session training curriculum; and the second group was the 222 CRs who received the RAP PDI from PHAs (Li, Weeks, Borgatti, Clair, & Dickson-Gomez, 2012).

Measures of Intervention Reach

Multiple independent measures were selected for the assessment of intervention reach. The chosen measures for intervention reach consisted of three components with mutually exclusive dichotomous variables. The three components were:

1.) CRs exposure to PHAs who delivered the intervention

The measures for this component were defined by the following variables:

1. Have you received HIV Prevention Information materials from an active drug user in the last six months (who you know)?
2. Have you received HIV Prevention Information materials from an active drug user in the last six months (who you do not know)?
3. Have you received HIV Prevention Materials from a RAP Project Member?

2.) The location where CRs received the intervention

This measure was defined by the variable:

Have you Received HIV Prevention information from another drug user in a place where you normally use drugs?

Recognition of core components of the RAP intervention

The measures for the third component was assessed using the variable: Do you recognize the RAP flipbook?

Component three also included assessment of recognition of each of six health promotion slogans targeting high risk drug use and sexual behavior that were unique to the RAP intervention in the city of Hartford. These slogans were: “Play it Safe, Plan Ahead,” “If you Shoot, Do not Boot,” “15 Seconds to Safety,” “Be Aware, Do Not Share, Carry a Spare,” “Wrap it, Clean it, Live It,” and “Give a Dam.”

Measures for Intervention Effect

Risk reduction behavior following exposure to the RAP intervention was assessed across a total of thirteen items measuring crack cocaine use, injection drug use and sexual risk behavior. The measures for intervention effect are listed below.

• Crack Cocaine Use Outcome Measures

- ✓ “Number of times smoked crack”
- ✓ “Number of times rubber tips were used on crack pipes (past 6 months)”

• Injection Drug Use Outcome Measures

- ✓ “Number of times injected drugs”
- ✓ “Number of times used a shared syringe”
- ✓ “Number of times injection equipment was shared”
- ✓ “Number of times drug using solutions were mixed with another persons syringe”

• Sexual Risk Behavior Outcome Measures

- ✓ “Number of sex partners”
- ✓ “Number of unprotected sexual encounters”
- ✓ “Number of unprotected sexual encounters with a primary partner”
- ✓ “Number of unprotected sexual encounters with a non primary partner”
- ✓ “Number of unprotected sexual encounters with a IDU”

- ✓ Number of unprotected sexual encounters with a crack cocaine smoker”
- ✓ Number of unprotected sexual encounters in exchange for money or drugs”

Additionally other aspects of risk reduction following exposure to the RAP intervention were assessed by asking about “reported use of drug treatment services” and the “use of other non-injection opiates, cocaine or amphetamines”. The use of any drug treatment services at baseline and six month follow-up was based on respondents’ answers to five dichotomized variables indicating exposure to detox, inpatient treatment, outpatient treatment, methadone maintenance and self-help groups within the past six months. To use of other non-injection opiates, cocaine or amphetamines at baseline and six month follow-up was based on respondents’ answers to three continuous variables indicating the number of times a respondent used of cocaine, other non-injection opiates, and amphetamines during the past thirty days. These variables were recoded into dichotomous variables. The dichotomous variables were combined. One measure was created for baseline, and one measure for six month follow-up.

Analysis

These analyses included the 144 African American and Hispanic CRs who presented for both baseline and six month follow-up surveys. Descriptive statistics

were run on gender, race/ethnicity socio-economic and health history factors at baseline, and chi-square analysis was used to measure difference by race/ethnicity. Pearson's R correlations were run on socio-economic and health history factors with respect to all measures of intervention effect to assess for significant relationships. Descriptive statistics were used to show the frequency of drug related and sexual risk behaviors by race/ethnicity at baseline. Chi-square analysis was used to measure the difference in the use of other drugs, and the use of drug treatment services at baseline between African Americans and Hispanics. Independent T-tests were used to measure the difference in risk behaviors between African Americans and Hispanics at baseline. One-way analysis of variance (ANOVA) was used to measure the difference in the mean number of injection drug related risk behaviors, the mean number of sexual risk behaviors, and overall mean number of risk behaviors among African Americans and Hispanics at baseline.

To assess the reach of the RAP intervention to African Americans and Hispanics descriptive statistics were used to show exposure to each measure of intervention reach at six month follow-up by race/ethnicity. Chi-square analysis was used to analyze differences between each measure of intervention reach among African Americans and Hispanics. The sum of values for each of the twelve measures of intervention reach recognized by RAP CRs was calculated to create a composite scaled variable. The mean number of measures of intervention reach by

race/ethnicity was computed. One-way ANOVA, was used to measure the difference in the mean number of measures of intervention reach by race/ethnicity at six months.

Descriptive statistics were used to show the frequency of drug related and sexual risk behaviors by race/ethnicity at six month follow-up. Chi-square analysis was used to measure the difference in the use of other drugs, and the use of drug treatment services at six months between African Americans and Hispanics. Independent T-tests were used to measure the difference in risk behaviors between African Americans and Hispanics at six months. One-way ANOVA was used to measure the difference in the mean number of injection drug related risk behaviors, the mean number of sexual risk behaviors, and overall mean number of risk behaviors among African Americans and Hispanics at six months.

To determine if the intervention reduced risk among African Americans and Hispanics change scores were computed to assess the change in risk behaviors between baseline and six month follow up among African Americans, as well as the change in risk behaviors between baseline and six month follow up among Hispanics. Change scores could not be calculated for use of drug treatment services and the use of other drugs at baseline or at six month follow-up, since these measures were derived from dichotomous variables. To assess the change in the use of drug treatment services and the use of other drugs between baseline

and six month follow-up the respective percentage change between by ethnicity is reported on.

Chapter 3: RESULTS

The recruitment and referral process resulted in relatively even retention rates among African Americans and Hispanics. Previous analysis found no significant differences in sex, ethnicity, and baseline risk behaviors among RAP participants who were retained versus those who were lost to follow-up (Weeks et al., 2009). However those RAP participants who did not present for the six month follow-up interview were more likely to be homeless, unemployed, and young (Weeks et al., 2009).

This section provides an understanding of the demographic and health history characteristics of African American and Hispanic CRs in the RAP sample. It includes the range and variation of drug use and sexual risk behaviors among African American and Hispanic CRs at baseline and at six month follow-up. It also provides an understanding of the range and variation of the reach of the intervention to African American and Hispanic CRs.

Table 1 displays the baseline demographic characteristics of African American and Hispanic CRs in the RAP sample. There were no significant differences in the characteristics of gender, employment, and homelessness at baseline between African Americans and Hispanics. African Americans were significantly older than Hispanics at baseline. In comparison to African Americans, Hispanics were

significantly more likely to have less than a high school education at baseline.

Table 1

Baseline Demographics of African American and Hispanic CRs in the RAP sample (percentages except where indicated)

	African Americans (n=80)	Hispanics (n=64)	P-Value
Gender			
Male	80.0	75.0	
Female	20.0	25.0	.531
Mean Age Range (18-67)	M= 43.70 (SD = 8.34)	M= 39.20 (SD = 8.59)	.002
Socio-economic Status			
Less than high school or GED	46.3	67.2	.009
Unemployed	70.0	75.0	.317
Homeless at Baseline	38.8	46.9	.203

Table 2 displays the baseline health characteristics of all African American and Hispanic CRs in the RAP sample. In comparison to Hispanics, African Americans were significantly more likely to have a history of STI diagnosis. Hispanics were significantly more likely to have history of Hepatitis C diagnosis compared to African Americans. Pearson's R correlations were also run on all factors displayed in table 2 with respect to the demographic characteristics in table 1 and the twelve domains of risk behavior at baseline. The Pearson's R correlations revealed that Hispanic females were less likely to have been diagnosed with an STI, than Hispanic males [$r = -.291$, $n = 62$, $p = .019$]. The higher prevalence of STIs among Hispanic men in the RAP sample stands out in contrast to national trends, which show new STI rates to be nearly equal among men and women (CDC, 2014). Among Hispanics diagnosed with HIV, there was a correlation indicating the likely co-occurrence of HCV infection [$r = .303$, $n = 61$, $p = .017$]. This result is consistent with the knowledge that HIV, and HCV are often co-occurring infections (CDC, 2014).

African American females were less likely than African American males to be homeless [$r=-.235$, $n= 79$, $p=.037$]. This is consistent with national trends showing seventy-five percent of homeless adults in the United States to be male (USICOH, 2105). HIV diagnosis was also correlated with HCV co-infection [$r=.279$, $n= 74$, $p=.016$] among African Americans. Unprotected sexual activity with IDUs was correlated with a history of being diagnosed with HCV among African Americans [$r=.228$, $n= 79$, $p=.044$]. This finding is consistent with knowledge that injection drug use continues drive new HCV infections (Lansky et al., 2014).

Table 2

Baseline Health Characteristics of African American and Hispanic CRs in the RAP sample (percentages except where indicated)

	African Americans (n=80)	Hispanics (n=64)	P- Value
Health History			
Ever Diagnosed with an STI	55.0	20.3	>.001
Has Hepatitis C	18.8	51.6	>.001
Has HIV	15.0	14.1	.472
Any Drug Treatment in the last 6 months	18.8	23.4	.282
HIV Knowledge			
Awareness of behaviors which increases risk of HIV transmission or infection	73.8	68.8	.317

Table 3 shows the baseline comparison of risk behaviors for African Americans and Hispanics. There were significant differences in drug related risk behaviors between African Americans and Hispanics on several of the individual measures. African Americans reported significantly greater use of rubber tips on crack pipes to prevent the spread of HCV and HIV during the past six months. Hispanics reported injecting drugs, sharing injection equipment, and sharing solution from

another person's syringe significantly more often than their African American counterparts.

It is seen in In Table 3 that the mean number of injection risk behaviors were significantly higher among Hispanics at baseline, than African Americans. The use of other drugs (e.g. non-injection opiates, cocaine or amphetamines) was also significantly greater among Hispanics (43.8%) at baseline than African Americans (22.5%), $X^2(2, n= 139)= 7.36, p = .006$. There was no significant difference in the use of drug treatment services between Hispanics (23.4%) and African Americans (18.8%), $X^2(2, n= 107)= .625, p= .282$.

TABLE 3
Mean Number of Times Engaged Risk Behaviors in Prior 30 Days at Baseline by Ethnicity

	African Americans (n= 80)	Hispanics (N=64)	P- Value
Injected Drugs	22.3	81.5	>.001
Used a previously used needle or syringe	.21	3.14	.189
Share Injection Equipment	28.57	6.76	.003
Shared Solution from other's syringe	.07	4.81	.073
Mean Number of Injection Related Risk Behaviors	.25	.89	>.001
Used Crack	103.2	63.2	.218
Used rubber tips on crack pipes past 6 months	.21	.00	>.001
Sex Partners	1.2	2.6	.074
Any unprotected Sex	2.4	4.8	.023
Unprotected sex with primary partner	1.3	3.5	.002
Unprotected sex with non-primary partner	.69	.69	.898
Unprotected sex in exchange for money or drugs	.18	.16	.791
Unprotected sex with a drug injector	.14	.23	.425
Unprotected sex with crack smoker	1.05	.30	.017
Mean Number of Sexual Risk Behaviors	1.7	1.8	.662
Overall Mean Number of Risk Behaviors	2.7	3.1	.155

Analysis of sexual risk behaviors at baseline revealed significant differences between African Americans and Hispanics on several of the individual measures of sexual risk behavior. African Americans were significantly more likely than Hispanics to be engaging in unprotected sex with crack smokers at baseline.

Hispanics reported engaging in unprotected sexual activity and having unprotected sex with a primary partner significantly more often than their African American counterparts. The mean number of sexual risk behaviors among Hispanics was slightly higher but not statistically significant from that of African Americans at baseline. The mean number of all risk behaviors reported also was slightly higher among Hispanics at baseline. Consistent with the analysis of sexual risk behavior, there was no significant difference between the mean number of all risk behaviors reported by African Americans and Hispanics at baseline.

Table 4 shows the percentage of CRs reporting exposure to each measure of intervention reach. African Americans reported the greatest exposure to the prevention slogans “Play it safe, plan ahead” (70.0%), the RAP Flip Book (68.8%), and “Be aware, do not share, carry a spare” (60.0%). African Americans also showed strong exposure to receiving HIV prevention information from an active drug user (56.3%). Hispanics reported the greatest exposure to the RAP Flip Book (57.8%), receiving HIV prevention information from an active drug user (45.3%), receiving HIV prevention information from an active drug user who they knew (42.3%) and exposure to the prevention slogan “Play it safe, plan ahead” (37.5%). African Americans reported least exposure to receiving HIV prevention information from an active drug user who was a stranger (26.3%), the prevention slogan “If you shoot, do not boot” (30.0%), and receiving HIV Prevention information from another drug user at the place where they use drugs regularly (35.0%). Hispanics

reported least exposure to the HIV prevention slogan “Wrap it, clean it, live it” (20.3%), the HIV prevention slogan, “Give a dam” (20.3%), receiving HIV prevention information from another drug user at the place where they use drugs regularly (25.0%), and the prevention slogan “If you shoot, do not boot,” (25.0%).

Chi-square analysis on each measure of intervention reach by ethnicity revealed that African Americans were significantly more likely than Hispanics to receive HIV prevention materials from a RAP PHA. African Americans also appeared to receive significantly greater exposure to the prevention slogans: “Play it safe, plan ahead”, “Be aware do not share, carry a spare”, “Wrap it, clean it, live it” and “Give a dam”.

Table 4

Percentage of RAP CRs Reporting Exposure to Measures of Intervention Reach at 6 Months (Odds Ratios and Confidence Intervals Displayed for Areas of Significance)

	African Americans (n=80)	Hispanics (n=64)	P- VALUE	OR	95% CI
Received HIV prevention information from an active drug user	56.3	45.3	.112	ns	ns
Received HIV Prevention information from an active drug user who was a stranger	26.3	14.1	.163	ns	ns
Received HIV Prevention information from an active drug user who you know	53.8	42.3	.646	ns	ns
Received HIV prevention information from a RAP PHA	47.5	28.1	.019	.404	[.183, .889]
Participant received HIV Prevention information from another drug use at the place where they use drugs regularly	35.0	25.0	.543	ns	ns
Recognized the RAP Flipbook	68.8	57.8	.206	ns	ns
Recognized, “play it safe, plan ahead”	70.0	37.5	>.001	.257	[.128, .516]
Recognized, “if you shoot, do not boot”	30.0	25.0	.317	ns	ns
Recognized, “15 seconds to safety”	38.0	31.3	.224	ns	ns
Recognized, “be aware, do not share carry a spare”	60.0	29.7	>.001	.281	[.140, .566]
Recognized, “wrap it, clean it, live it”	41.3	20.3	.006	.363	[.171, .772]
Recognized, “give a dam”	50.0	23.4	.001	.306	[.148, .632]

Overall, African Americans reported a mean recognition of 5.8 of the twelve measures of intervention reach. Hispanics reported a mean recognition of 3.8 of

the twelve measures of intervention reach. The results of the one-way ANOVA, used to measure the difference in the mean number measures of intervention reach by race/ethnicity were significant ($F(1, 143) = 12.58, p = .001$). This result indicates that African Americans received a greater level of exposure to the intervention across all measures ($M = 5.77, SD = 3.25$) than Hispanic CRs ($M = 3.79, SD = 3.14$).

Table 5 shows the percentage of RAP CRs reporting risk behaviors at six months and the change scores showing changes in risk behavior between baseline and six month follow-up by ethnicity. Both African Americans and Hispanics reduced nearly all drug related risk behaviors following exposure to the intervention. There was an increase in syringe sharing during the process of mixing and measuring the drug/water solution in preparation for intravenous drug use among African Americans. The change scores for sexual risk behaviors show that both African Americans and Hispanics reduced their number of sexual partners and unprotected sexual activity with primary and non-primary partners following exposure to the intervention. There was an increase between baseline and six month follow-up in unprotected sexual activity in exchange for money or drugs in both populations. Hispanics showed an increase in unprotected sex with IDUs, and unprotected sex with crack cocaine users. Both populations showed a reduction in the mean number of injection related risk behaviors.

The change score for the mean number of sexual risk behaviors shows that African Americans reduced their overall level of sexual related risk behaviors following exposure to the intervention. The mean level of sexual risk behavior among Hispanics increased slightly following exposure to the intervention. The change score for the mean number all risk behaviors combined shows that African Americans also reduced their overall level of risk. Overall risk behavior among Hispanics increased slightly following exposure to the intervention. In comparison to African Americans, the mean number of injection risk behaviors, and the mean number of all risk behaviors combined appeared significantly higher among Hispanics at six month follow-up. The mean number of sexual risk behaviors also appeared slightly higher among Hispanics compared to African Americans. However, no significant difference was found between the mean numbers of sexual risk behaviors reported by the two populations.

Table 5
Mean Number of Times Engaged Risk Behaviors in Prior 30 Days at Baseline by Ethnicity and Change Scores Measuring the Change in Risk Behaviors Between Baseline and 6 Months

	African Americans (n= 80)	Change Score African Americans	Hispanics (N=64)	Change Score Hispanics	P-Value
Injected Drugs	11.71	10.58	56.75	24.79	>.001
Used a previously used needle or syringe	.56	.125	.64	3.13	.853
Share Injection Equipment	4.67	15.5	.55	7.96	.001
Shared Solution from other's syringe	4.56	-4.5	.30	5.68	>.001
Mean Number of Injection Risk Behaviors	.200	.050	.671	.218	>.001
Used Crack					
Used rubber tips on crack pipes past 6 months	47.88	43.27	32.03	7.29	.870
	.62	-.428	.47	-5.38	.342
Sex Partners	1.44	.089	1.67	1.00	.649
Had any unprotected Sex	1.75	.641	3.70	1.29	.035
Unprotected sex with primary partner	1.19	.126	2.85	.852	.025
Unprotected sex with non-primary partner					
Unprotected sex in exchange for money or drugs	.25	.435	.13	.580	.194
	.28	-.102	.26	-.096	.895
Unprotected sex with a drug injector	0.0	.132	.90	-.355	>.001
Unprotected sex with crack smoker	2.11	.510	.57	-.300	.433
Mean Number of Sexual Risk Behaviors	1.40	.300	1.87	-.031	.086
Overall Mean Number of Risk Behaviors	2.51	.150	3.29	-.140	.042

The use of other drugs (e.g. non-injection opiates, cocaine or amphetamines), was significantly greater among Hispanics (31.3%) than African Americans (11.3%), $X^2(2, n= 140)= 8.48, p =. 003$. There was a reduction in the number of participants who reported using other drugs by 12.5% in Hispanics and 11.2% in African Americans between baseline and six month follow up. In addition The use of any drug treatment services was also significantly greater among Hispanics (45.3%) than African Americans (33.8%), $X^2(2, n= 135)= 3.04, p =.059$, at six month follow-up. There was an increase in the number of participants who reported use of drug treatment services by 21.9% in Hispanics and 15.0% in African Americans between baseline and six month follow up.

Chapter 4: DISCUSSION & CONCLUSIONS

A large percentage of both African American and Hispanic CRs reported recognition of the RAP flip book, and receiving HIV prevention information from another drug user. This finding indicates that mobilization of active drug users through PHA activity was a strong driver of intervention activity. The dissemination of HIV prevention information by active drugs users is consistent with results of a previous analysis showing PHAs to be highly effective in delivering intervention messaging to other drug users (Weeks et al., 2009).

The higher prevalence of drug use among Hispanics in Hartford (Weeks et al., 2002), did not result in greater intervention reach to Hispanics. In fact, these findings showed that African Americans received the greatest level of exposure to all measures of intervention reach. A previous study of drug using networks in Hartford found African American drug users to have a higher number of social ties to other drug users than Hispanics (Weeks et al., 2002). The greater level of reciprocal action among African American drug users in Harford may explain why intervention reach appeared stronger among African Americans.

While there was no significant difference in the overall mean number of risk behaviors reported by African Americans and Hispanics at baseline, Hispanics showed a significantly higher mean number of risk behaviors at six month follow-

up. This difference may be attributed to the fact that African Americans received a greater level of exposure to the RAP intervention than Hispanics.

Among African Americans there were significantly greater levels of crack cocaine use at both baseline and six month follow-up compared to Hispanics. There were significantly greater levels of injection drug use, and injection related risk behaviors, at both baseline and six month follow-up among Hispanics in comparison to African Americans. These results show an important need for continuing peer education to reduce HIV, HCV, and STI risk, particularly among Hispanic IDUs.

Exposure to the RAP intervention resulted in a reduction in drug related and sexual risk behaviors among African Americans. Crack cocaine use and injection drug use were two key behaviors targeted by the RAP intervention. The greatest reduction in drug related risk behavior was seen in the frequency of crack cocaine used by African Americans and the amount the injection drugs used by Hispanics. Hispanics also showed a greater reduction in the mean number of injection risk behaviors between baseline and six month follow-up in comparison to African Americans. These results suggest the RAP intervention was also effective in addressing cultural variations in drug related risk behavior.

Exposure to the intervention also facilitated an increase in the use of drug treatment services among both African Americans and Hispanics. Hispanics were significantly more likely than African Americans to increase their use of drug treatment services following exposure to the intervention. Heroin appeared to be the primary substance used by Hispanics in the RAP sample, whereas crack cocaine was the primary substance used by African Americans. The proportion of treatment admissions for heroin dependency in the United States is far greater than that of crack cocaine admissions (TEDS, 2012). The difference in treatment encounters by ethnicity can be explained by the cultural differences in drug utilization and the difference in treatment admissions for heroin and crack cocaine.

Among African Americans, change scores showed elevated risk behavior in the area of syringe sharing to mix and measure injection solutions between baseline and six month follow-up. This finding was unexpected. It suggests that despite the effectiveness of RAP curriculum, African Americans may have experienced a deficiency in access to the sterile injection supplies needed to practice the injection related harm reduction behaviors taught by the RAP intervention.

Both African Americans and Hispanics showed an increase in unprotected sexual activity in exchange for money or drugs between baseline and six month follow-up. Hispanics showed elevated risk behavior in the areas of unprotected sex with crack cocaine users and unprotected sex with IDUs between baseline and six

month follow-up. The mean level of overall risk behavior, and the mean level of overall sexual risk behavior also increased among Hispanics. The increase in sexual risk behavior among Hispanics affected the mean level of all risk behaviors among Hispanics resulting in a negative change score. In the analyses of each drug related risk behavior and the mean number of injection risk behaviors between baseline and six month follow-up change scores were positive among Hispanics. These positive change scores indicate that the intervention also reduced drug related risk among Hispanics.

The areas of increased risk behavior, particularly the increase in unprotected sex in exchange for money or drugs in both African Americans and Hispanics may be attributed to the highest risk drug users in the RAP sample. These individuals may have been far into the late stage of addiction; meaning the need for drug acquisition had a stronger influence on their behavior than peer education aimed at HIV risk reduction. These analyses did not examine what impact the stages of addiction within the community setting may have on the adoption of risk reduction behaviors and harm reduction practices taught by the RAP PDI. More evidence is needed to understand if individuals in the advanced stage of addiction face barriers to adopting the risk reduction behaviors and harm reduction practices taught by the RAP PDI. In addition the RAP curriculum did not feature an HIV prevention and education component related to transactional sex. CRs in the RAP sample were largely unemployed, and sex work may have been their only means

of generating the income needed for drug acquisition. Future PDI designs may benefit from the inclusion of an occupational safety component for sex workers who use drugs. These factors do not discount the overall ability of the RAP intervention to reach African American and Hispanic drug users and reduce risk behaviors in both populations.

African American CRs received the greatest amount of exposure to the widespread activity of the intervention. The RAP intervention proved highly effective in reducing many of the drug related and sexual risk behaviors it was designed to target among African Americans. The RAP intervention was also effective in reducing risk behavior associated with injection drug use among Hispanics. Additionally intervention activity appears to have facilitated an increase in the use of drug treatment services among both populations in the city of Hartford. These results support existing evidence that PDIs offer a cost effective way to deploy comprehensive harm reduction education and training to reduce HIV risk and promote disease prevention among ethnic minorities. These findings also suggest that the RAP PDI may be an effective tool for reducing health disparities among racial and ethnic minorities in the community setting.

Outcomes of these analyses highlight the need for a greater understanding of ethnic differences which may affect intervention reach when deploying peer interventions. These differences are of particular importance when designing PDIs

which target sexual risk behaviors among Hispanic drug users. Such an understanding may further boost the efficacy of PDIs seeking to reach these populations. The increase in unprotected transactional sex among all RAP CRs emphasizes the need for future PDIs to place a greater focus on reaching racial and ethnic minorities who trade sex in exchange for money or drugs. Future PDI designs should also place a stronger emphasis on the role of peer educators in building or expanding networks of social support among active drug users. This role is particularly important among Hispanic peer educators. Hispanics drug users are known to have fewer social ties to their drug using peers than other ethnic minority groups. PDIs designed to build social ties among Hispanic drug users could strengthen the ability of peer educators to ‘model behavior’ and increase opportunities for ‘teachable moments’ to reduce HIV, HCV and STI risk. Further research is needed to study the different impacts that PDIs may have on drug users at various stages of addiction in the community setting. This may assist researchers and health promoters in developing specialized PDIs to reach populations that face greater barriers to reducing HIV risk as a result of the natural history of drug abuse.

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