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An Exploratory Study of Adherence to Prescribed Health Care Recommendations Among a Community Sample of Drug Users and Non-Drug Users from Similar Neighborhoods in Miami-Dade County

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UNIVERSITY OF MIAMI

AN EXPLORATORY STUDY OF ADHERENCE TO PRESCRIBED HEALTH CARE
RECOMMENDATIONS AMONG A COMMUNITY SAMPLE OF DRUG USERS
AND NON-DRUG USERS FROM SIMILAR NEIGHBORHOODS IN MIAMI-DADE
COUNTY

By

Karen L. Pierre

A DISSERTATION

Submitted to the Faculty
of the University of Miami
in partial fulfillment of the requirements for
the degree of Doctor of Philosophy

Coral Gables, Florida

May 2009

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An Exploratory Study of Adherence to Prescribed Health Care Recommendations among a Community Sample of Drug Users and Non-Drug Users from Similar Neighborhoods in Miami-Dade County

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This dissertation had three specific aims: to estimate the prevalence of adherence among drug users, to determine whether drug use was directly associated with adherence, and to assess whether factors drawn from the Behavioral Model of Health Care Utilization (BMHCU) are associated with adherence. The self-reported prevalence of adherence to prescribed health care recommendations in the past 12 months among the community sample of drug users and non-drug users from similar low-income areas in the study sample ranged from 53%-74%. Non-drug users consistently had higher rates of adherence than drug users, except for adherence to female health care recommendations, yet this difference was insignificant at the bivariate level. In the multivariate analysis, when controlling for all other variables within the BMHCU, only non-injection drug use was significantly associated with adherence to mental health care recommendations.

In exploring its predictive utility, the BMHCU accounted for a range of 17% to 54% of the variance for the adherence measures. Although percentages accounted for by the BMHCU were substantial the fact that very few predictor variables were significant may indicate multicollinearity and other severe limitations with the data, such as small sample size, and the conceptualization of the adherence measure. The conceptualization of adherence remains an issue in need of further delineation. Further

studies are needed in order to develop appropriate measures of adherence. Qualitative studies may be needed to further understand adherence among drug users.

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CHAPTER 1

Introduction

The overall objective of this study is to assess whether factors drawn from the Behavioral Model of Health Care Utilization are associated with adherence to prescribed health care recommendations among a community-based sample of drug users and non-drug users from similar neighborhoods in Miami-Dade County, Florida. Adherence to prescribed health care recommendations (hereafter referred to as adherence) is defined as “the extent to which a person’s behavior (in terms of taking medication, following diets, or executing lifestyle changes) coincides with medical and health advice” (Haynes, Taylor, & Sackett, 1979). The advancement of health care in treating illness and disease has elevated the topic of adherence as a major area of interest (Christensen, 1978; Fogarty, Roter, Larson, Burke, Gillespie, & Levy, 2002; Marston, 1970; Vermeire, Hearnshaw, Van Royen, & Denekens, 2001). The importance of adherence, previously called compliance, is demonstrated in an extensive body of literature that has focused, for the past five decades, on the role of adherence in improving health outcomes and decreasing health care costs (Becker & Maiman, 1975; Fogarty, Roter, Larson, Burke, Gillespie, & Levy, 2002; Glasgow, Wilson, & McCaul, 1985; Goldberg, Cohen, & Rubin, 1998; Haynes, Taylor, & Sackett, 1979; Kyngäs, Duffy, Kroll, 2000; Leventhal & Cameron, 1987; Marston, 1970; Sherr, 2000; Vermeire, Hearnshaw, Van Royen, & Denekens, 2001; Wright, 2000; Hayes-Bautista, 1976; Simoni, Frick, Lockhart, & Liebovitz, 2002; Stimson, 1974; Wagner & Rabkin, 2000). This literature continues to expand. For example, Haynes, Taylor, and Sackett (1979) found that in 1943 fewer than ten articles focused on the concept, while in 1976 alone there were over 180 articles

concerning the topic of adherence. In a recent paper that reviewed literature about adherence focused solely on diabetes, Hearnshaw and Lindenmeyer (2005) identified two hundred ninety three articles that were published between 1997 and November 2003. Similar observations can be made about adherence to a variety of medical and health care issues.

Adherence to care is the critical link between health care utilization and positive health outcomes. Several studies have documented a direct relationship between adherence and multiple positive health outcomes (i.e., levels of morbidity and mortality from several serious illnesses) (DiMatteo, Giordani, Lepper, and Croghan, 2002; Kimmel, Peterson, Weihs, SimmensAlleyne, Cruz, & Veis, 1998; Pallela, Delaney, Moorman, Loveless, Fuhrer, Satten, Aschman, Holmberg, and the HIV Outpatient Study Investigators, 1998). For example, adherence (Andersen R. M., 1995) (Andersen, et al., 2000) to recommended colon cancer prevention screenings can significantly reduce mortality rates from colon cancer (Winawer, Flehinger, Schottenfeld, & Miller, 1993). Individuals who adhere and screen for colon cancer per national guidelines reduce their risk of dying from colon cancer by 50% to 60% (Selby, Friedman, Quesenberry, & Weiss, 1992).

Adherence to tuberculosis (TB) therapy can decrease the public health burden of the disease by limiting exposure, thereby decreasing the number of new infections (Siafakas & Bouros, 1992). The importance of adherence to TB medication extends beyond the individual to affect the entire community at large (Hovell, Blumger, Gil-Trejo, Vera, Kelley, Sipan et al., 2003). The focus on adherence has increased in the area

of TB therapy due to resistant strains. Non-adherence, including incomplete and inadequate treatment, is the primary cause of resistant strains.

Adherence to prescribed antipsychotic medication decreases relapse and admissions among schizophrenic patients (Scott, 2000) and decreases relapse of depression (Mitchell, 2006). The 1-year relapse rate among depressive patients not taking their medication is 80% compared to 30% for those who adhere to care (Myers & Branthwaite, 1992).

Adherence to highly active antiretroviral therapy (HAART), the treatment regimen for HIV/AIDS, decreases opportunistic infections, increases survival, and decreases death rate, while non-adherence to HAART increases disease progression and increases the chance of developing drug resistant viral mutations (Mayers, 1998; Patterson, Swindells, Mohr, Brester, Vergis, Squier, Wagener, Singh, 2000) which can further complicate treatment. Pallela, Delaney, Moorman, Loveless, Fuhrer, Satten, Aschman, Holmberg, and the HIV Outpatient Study Investigators (1998) reviewed charts of 1,255 HIV infected patients who attended outpatient clinics at eight national sites. The study described the changes in both morbidity and mortality rates of participants by type and intensity of antiretroviral therapy. These investigators reviewed outcomes by treatment and found that the treatment groups were 1.5 to 4.5 times more likely to have less morbidity or mortality than non-treatment groups. This finding was also evident when differences in intensity of treatment were examined. High intensity of treatment compared to low intensity of treatment was associated with a decline in morbidity and mortality.

DiMatteo, Giordani, Lepper, and Croghan (2002) conducted a meta-analysis of 63 studies that looked at the link between adherence and a variety of health outcomes. Their meta-analysis indicated that adherence is relevant, because they demonstrated that at least 26% more patients who adhered experienced positive health outcomes than patients who did not adhere.

Studies have investigated adherence to hemodialysis (Kimmel, Peterson, Weihs, Simmens, Alleyne, Cruz, & Veis, 1998), medical advice for diabetes mellitus (Glasgow, Wilson, & McCaul, 1985), diet and exercise (Näslund, Fredrikson, Hellénus, & de Faire, 1996), and mammography screenings (Phillips, Kerlikowske, Baker, Chang, & Brown, 1998). The data consistently support the conclusion that adherence makes a difference. Adherence is the critical link between health care utilization and the achievement of positive health outcomes.

While studies support the notion that adherence to prescribed health care is important and can help an individual achieve positive health outcomes, studies also demonstrate that the adherence rates among the general population vary considerably between and within the type of health care recommendation prescribed. Kyngäs, Duffy, and Kroll (2000) found that adherence ranged from 10% to 85% depending on the prescribed recommendation. Sackett and Snow (1979), when reviewing literature on adherence, found adherence ranged from 10% to 94%, and Marston (1970) found a range of 4% to 94%.

Adherence is an important area of study because following health care recommendations can decrease the levels of morbidity and mortality from disease, while non-adherence can decrease the efficacy of health care and therapeutic gains (Putnam,

Finney, Barkley, & Bonner, 1994) and can increase the cost of treatment due to complications.

Specific Aims

The overall goal of this study is to clarify and increase our understanding of the factors associated with adherence to general prescribed health care recommendations among a community-based sample of street-recruited drug users and non-drug users. The study pursues three specific aims:

- (1) Estimate the prevalence of self-reported adherence among a community-based sample of street recruited drug users and non-drug users.
- (2) Assess the independent effect of drug use on adherence when controlling for other independent variables that are elements of the three domains of the Behavioral Model of Health Care Utilization (predisposing characteristics, enabling resources, and perceived need).
- (3) Determine the utility of the Behavioral Model of Health Care Utilization as a guiding theoretical framework in understanding adherence in a non-clinically identified population of street recruited drug users and non-drug users.

Significance of the Study of Adherence among Drug Users

Drug users are more likely than the general population to experience high levels of morbidity and mortality from a variety of health conditions related to the pharmacological, the route of administration, and the lifestyle effects of drug use (Cook, McVeigh, Syed, Mutton, & Bellis, 2001; Cherubin & Sapira, 1993; Louria, Hensle, & Rose, 1967; Montoya, Atkinson, Lichtiger, & Whitsett, 2003; Morrison, Elliott, & Gruer, 1997; Sapira, 1968; Thorpe, Ouellet, Hershow, Bailey, Williams, Williamson,

Monterroso, & Garfein, 2002). The pharmacological effects of drug use, specifically the use of heroin and/or cocaine, can exacerbate physiological problems. Drug users are at risk for cardiovascular complications, and seizures (Myer & Earnest, 1984), as well as neurological and psychiatric problems (Brody, Slovis, & Wrenn, 1990; Satel & Edell, 1991). The pharmacological effects of drug use also lead to morbidity and mortality from drug overdose. Heroin overdoses are associated with increased morbidity and mortality (Warner-Smith, Darke, & Day, 2002). Warner-Smith, Darke, and Day (2002) conducted a cross-sectional study of 198 heroin users and found that 69% of the participants had experienced a heroin overdose in their lifetime, with a median of three overdoses. Forty-eight percent of the participants who experienced heroin overdoses reported hospitalization after overdosing, and 82% of the participants who experienced a heroin overdose reported having at least one overdose related morbidity symptom.

The route of administration of the drug can further affect health outcomes. Studies show high rates of soft tissue infection related to injection drug use practices (Takahashi, Merrill, Boyko, & Bradley, 2003), increased risk of HIV (Cherubin & Sapira, 1993), and increased risk of hepatitis B and C through injection drug use (Cook, McVeigh, Syed, Mutton, & Bellis, 2001; Montoya, Atkinson, Lichtiger, & Whitsett, 2003). Users of cocaine and heroin also experience high rates of pulmonary conditions (Cherubin, 1993; Louria, Hensle, & Rose, 1967).

The drug related lifestyle of street addicts also places users at higher risk for morbidity and mortality (Stephens, 1991). The drug related lifestyle makes users more likely to be victims of violent acts compared to non-drug users (McCoy, Messiah, & Yu, 2001) and increases their rate of physical trauma (Goldstein, 1985). This lifestyle may

further expose drug users to HIV and hepatitis B and C through risky sexual behaviors (Fullilove, Fullilove, Bowser, & Gross, 1990).

Many studies have investigated adherence to a variety of prescribed health care recommendations, including medication, diet and exercise, and the utilization of preventive screenings in the general population. Knowledge concerning adherence to prescribed health care recommendations is quite limited for vulnerable groups such as drug users, who because of their high rate of morbidity and mortality from disease would benefit from adherence. Most published studies of adherence that include drug users have investigated the association between illicit drug use and adherence on one specific topic: adherence to highly active antiretroviral therapy (Arnsten, Demas, Grant, Gourevitch, Farzadegan, Howard, & Schoenbaum, 2002; Bouhnik, Chesney, Carrieri, Gallais, Moatti, Obadia, Spire, MANIF 2000 Study Group, 2002; Broadhead, Heckathorn, Altice, van Hulst, Carbone, Friedland, O'Conner, & Selwyn, 2002; Broers Morabia, & Hirschel, 1994; Escobar, Campo, Martín, Fernández-Shaw, Pulido, & Rubio, 2003; Ferrando, Wall, Batki, & Sorensen, 1996; Gebo, Keruly, & Moore, 2003; Miller, Liu, Hays, Golin, Beck, Asch, Ma, Kaplan, & Wenger, 2002; O'Connor, Selwyn, & Schottenfeld, 1994; Power, Koopman, Volk, Israelski, Stone, Chesney, & Spiegel, 2003; Singh & Squier, 1996; Sorensen, Mascovich, Wall, DePhilippis, Batki, & Chesney, 1998; Strathdee, Palepu, Cornelisse, Yip, O'Shaughnessy, Montaner, Schechter, & Hogg, 1998; Tucker, Burnman, Sherbourne, Kung, & Gifford 2003; Wall, Sorensen, Batki, Delucchi, London, & Chesney, 1995). Understanding adherence to antiretroviral medications among drug users has received such attention, specifically because the use of heroin and cocaine is associated with high levels of morbidity and mortality from HIV, and injection drug use

is one of the main risk factors associated with contracting the HIV infection. These studies find that drug use is negatively associated with adherence to HAART. These investigations demonstrate that drug use is a barrier to accepting HAART (Broers Morabia, & Hirschel, 1994; Strathdee, Palepu, Cornelisse, Yip, O'Shaughnessy, Montaner, Schechter, & Hogg, 1998), and injection drug use is associated with decreased adherence to HAART (Gebo, Keruly, & Moore, 2003; Singh & Squier, 1996).

Although studying the relationship between drug use and adherence to HAART is vital it provides little information on adherence to more general prescribed health care recommendations among drug users who suffer from a variety of negative health outcomes in addition to HIV/AIDS. Increased understanding may help develop interventions which have the potential to increase adherence among drug users and decrease morbidity and mortality.

Relatively little is known about the health service behavior of drug users (Booth, 2002), although recent studies have provided basic information about the health care needs, access to care, and utilization of health care services of drug users (Chitwood, McBride, Metsch, Comerford, & McCoy, 1998; Chitwood, Sanchez, Comerford, & McCoy, 1998; Crandall, Metsch, McCoy, Chitwood, & Tobias, 2003; French, Roebuck, McGeary, Chitwood, & McCoy, 2001; Knowlton, Hoover, Chung, Celentano, Vlahov, & Latkin, 2001; McBride, Van Buren, Terry, & Goldstein, 2000; McCoy, Metsch, Chitwood, & Miles, 2001; Sterk, Theall, & Elifson, 2002). Understanding their health behavior is pertinent in order to improve health outcomes among this group. Previous research on drug users, although limited, indicates that drug use, particularly the use of heroin and/or cocaine, affects health behavior.

Research concerning drug users when compared to non-drug users finds that drug users are more likely to need care (Chitwood, McBride, Metsch, Comerford, & McCoy, 1998; Crandall, Metsch, McCoy, Chitwood, & Tobias, 2003) and less likely to receive or seek care when needed (Chitwood, McBride, Metsch, Comerford, & McCoy, 1998; Crandall, Metsch, McCoy, Chitwood, & Tobias, 2003; McCoy, Metsch, Chitwood, & Miles, 2001; Sterk, Theall, & Elifson, 2002), but their need for care can translate into a higher utilization of emergency department and inpatient care services (French, Roebuck, McGeary, Chitwood, & McCoy, 2001; McGreary & French, 2000; Sterk, Theall, & Elifson, 2002) and a higher cost of care when compared to non-drug users (French, Roebuck, McGeary, Chitwood, & McCoy, 2001). Sterk, Theall, and Elifson, (2002), when comparing female non-drug users to female drug users, found that female drug users failed to seek health care when needed, but were more likely to use an emergency department (ED) as their primary source of care. Sterk et al. (2002) found that female drug users were about three times more likely to fail to seek care when needed compared to female non-drug users. Mor, Fleishman, Dresser, and Piette (1992), in a study of HIV infected individuals, found that injection drug users were more likely to utilize the ED and inpatient services rather than outpatient services when compared to HIV infected non-injection drug users. They found that HIV infected drug users used more hospital resources than all other HIV infected groups. McGreay and French (2000) found that the use of ED care increases with drug use. Chitwood, McBride, Metsch, Comerford, and McCoy (1998) observed in their study of the health care need and health care utilization that drug users were about two to four times more likely to need health care than non-

drug users. The study also found that drug users were less likely to receive care than non-drug users.

Drug users also are less likely to receive preventive care. Chitwood, Sanchez, Comerford, and McCoy (2001) found that injection drug users and chronic drug users were less likely to receive preventative care services than their non-drug user counterparts. Crandall, Metsch, McCoy, Chitwood, and Tobias (2003) observed similar findings for reproductive health care services when they found that pregnant chronic drug users were less likely to receive prenatal care than pregnant non-drug users.

The increased use of ED and inpatient services increases cost of care among drug users compared to non-drug users. Fox, Merrill, Chang, and Califano (1995) looked at the relationship between drug use and medical cost. Although their study looked at alcohol use, smoking, and drug use in combination, it nonetheless found that 20% of Medicaid general hospital days were accounted for by substance abuse including drug use. French, McGeary, Chitwood, and McCoy (2000) found a strong relationship between drug use and health care cost. French, Roebuck, McGeary, Chitwood, and McCoy (2001) found that drug users had a higher cost of health care per year compared to non-drug users due to their higher utilization of high- cost care services (i.e., ED and inpatient services) compared to less-expensive outpatient services. Gerson, Boex, Hua, Liebelt, Zumbar, Bush, and Givens (2001) found that cost of care was higher for drug users not receiving substance abuse treatment. Masson, Sorenson, Batki, Okin, Delicchi, and Perlman (2002) found that drug users represented 5% of the cost of health care services while representing only 2% of the patient population. Drug users when compared to non-drug users are more likely to need health care services, are less likely to access the services

when they need them, but are more likely to use high-cost care services such as ED and inpatient services when they finally do access services.

Drug use affects health behavior, the need for health care, utilization of health care services, and cost of care. It is essential to understand whether drug use has a similar impact on adherence to prescribed health care recommendations in a continuum of the health care behavior.

Research Objective

The overall objective of this study is to assess whether factors drawn from the Behavioral Model of Health Care Utilization are associated with adherence to prescribed health care recommendations among a community-based sample of drug users and non-drug users from similar neighborhoods in Miami-Dade County, Florida. This study uses a unique data set to help answer the research question of whether drug use affects adherence to general prescribed health care recommendations.

This study builds upon and extends the findings of previous research on the relationship between adherence to prescribed health care recommendations and drug use. Investigations that have examined the relationship between adherence and drug use have understudied three major areas. First, few studies have investigated the association between drug use and adherence to general health care recommendations beyond HAART. Second, these studies focus primarily on clinic-based samples to the neglect of community-based samples and often lack comparison groups. Finally, these studies are limited in their use of a theoretical framework. This study endeavors to extend our knowledge of drug use and adherence to general prescribed health care recommendations in each of these areas.

This study focuses on both drug users and non-drug users who utilized health care services, were prescribed health care recommendations by a health professional, and subsequently self-reported their level of adherence to the health care recommendations that had been prescribed.

Organization of the Dissertation

The study is organized into six chapters. The first chapter presents the specific aims, introduction, and the significance of the research topic. Chapter two contains a review of the literature on adherence. Chapter three presents the theoretical framework of the Behavioral Model of Health Care Utilization that underlies the analysis and associated research questions and research hypotheses. Chapter four describes the research design, the methods used to recruit the sample and collect the data, and the conceptualization and measurement of the dependent adherence variables and the independent variables. Chapter five presents the descriptive data that characterize the sample and estimate the prevalence of adherence, and the inferential results of the data analysis. Chapter six contains the discussion that frames the results in context with other research about adherence, evaluates the utility of the Behavioral Model of Health Care Utilization for the study of adherence, and discusses the implications of these findings for future research.

CHAPTER 2

Review of the Literature

The Concept of Adherence

There has been a steady increase and incredible interest concerning the topic of adherence (Fogarty, Roter, Larson, Burke, Gillespie, & Levy, 2002; Vermeire, Hearnshaw, Van Royen, & Denekens, 2001). Studies on adherence have existed since the 1950s (Kyngäs, Duffy, & Kroll, 2000). The focus on adherence is directly related to the improvement of medical treatments and the increased knowledge of health-related behaviors that decrease morbidity and mortality from disease (Haynes, ng, & Da Mota Gomes, 1987; Marston, 1970). The term adherence is the current and widely accepted term used today. The earlier term, compliance, which was used in earlier studies of this type, is now considered obsolete because it was argued that the word “compliance” signified blame and focused the responsibility of following through on prescribed health care recommendations solely on the individual. The term adherence itself as well has been associated with placing blame on the individual (Stimson, 1974; Wright, 2000). Other terms used in research are concordance and therapeutic alliance (Kyngäs, Duffy, & Kroll, 2000; Murphy & Canales, 2001). For the purpose of this dissertation the term adherence is used throughout the text.

The study of adherence has not been without controversy not only with the terminology, but with its conceptualization. The numbers of critiques concerning the concept are plentiful (Sherr, 2000; Sorensen, 1996), but one cannot question or overestimate the relevance of adherence to positive health outcomes (DiMatteo, Giordani, Lepper, &

Croghan, 2002; Kimmel, Peterson, Weihs, Simmens, Alleyne, Cruz, & Veis, 1998; Palella, Delaney, Moorman, Loveless, Fuhrer, Satten, Aschman, Holmberg, & the HIV Outpatient Study Investigators, 1998) in a population where low adherence is common (Becker & Maiman, 1975).

Several review articles have examined issues concerning the conceptualization of the term adherence (Becker & Maiman, 1975; Christensen, 1978; DiMatteo, Giordani, Lepper, & Croghan, 2002; Hayes-Bautista, 1976; Haynes, Taylor, & Sackett, 1979; Haynes, Wang, & Da Mota Gomes, 1987; Haynes & McKibbin, 1996; Ickovics & Meisler, 1997; Kyngäs, Duffy, & Kroll, 2000; Leventhal & Cameron, 1987; Marston, 1970; Murphy & Canlas, 2001; Pescosolido, 1991; Sackett & Haynes, 1976; Sackett & Snow, 1976; Sherr, 2000; Stimson, 1974; Stone, 1979, Vermeire, Hearnshaw, Van Royen, & Denekens, 2001; Wright, 2000). In summary, these review articles conclude that there is no gold standard definition and no gold standard measure of adherence to prescribed health care recommendations (Hearnshaw & Lindenmeyer, 2005). The difficulty in creating a gold standard definition and a gold standard measure of adherence is owing to the range of health conditions being studied as well as the range of medical or health recommendations prescribed to improve health outcomes.

Studies have investigated a range of health conditions, specifically focusing on one health condition rather than general adherence to health care recommendations for a variety of health conditions. Researchers have investigated adherence to health care recommendations prescribed for diabetes mellitus (Glasgow, Wilson, & McCaul, 1985), hypertension (Dunbar & Jacob & Dwyer, 1991; Rose, Kim, Dennison, & Hill, 2000), renal failure (Kimmel, Peterson, Weihs, Simmens, Alleyne, Cruz, & Veis, 1998),

coronary heart disease (Nisbeth, Klausen, & Andersen, 2000), obesity (Becker, Maiman, Kirscht, Haefner, & Drachman, 1977), HIV (Bouhnik, Chesney, Carrieri, Gallais, Moatti, Obadia, Spire, MANIF 2000 Study Group, 2002; Sorensen, Mascovich, Wall, DePhilippis, Batki, & Chesney, 1998; Wall, Sorensen, Batki, Delucchi, London, & Chesney, 1995), cancer (Neilson & Whynes, 1995; Phillips, Kerlikowske, Baker, Chang, Sophia, & Brown, 1998), and many other chronic and infectious diseases.

The aforementioned health conditions (i.e., hypertension, renal failure, coronary heart disease, obesity, HIV, cancer) require changes in life-style or health related-behaviors, or require the use of long-term or short-term medication therapy, or both. Studies have investigated adherence to a range of health-related behaviors and medication therapy to improve health conditions, e.g., attending follow-up appointments (Sackett & Haynes, 1976), intentions to vaccinate (Gallagher & Povey, 2006), diet and exercise (Näslund, Fredrikson, Hellénus, & de Faire, 1996), taking medications (Halkitis, Kutnick, Rosof, Slater, & Parsons, 2003), hemodialysis (Kimmel, Peterson, Weihs, Simmens, Alleyne, Cruz, & Veis, 1998), following medical advice (Glasgow, Wilson, & McCaul, 1985), utilization of preventive care such as mammography (Phillips, Kerlikowske, Baker, Chang, & Brown, 1998) and colonoscopy screenings (Neilson & Whynes, 1995) to name only a few.

The range of health conditions that have been investigated and the range of health-related behaviors and prescribed medical recommendations lead to differences in defining and measuring adherence. These differences not only exist between health conditions, but also exist within the health conditions being studied. Hearnshaw and Lindenmeyer (2005) examined the definitions and measurements of adherence, focusing

on one health condition, for individuals living with diabetes. They reviewed MEDLINE abstracts from 1997 through November 2003. They found five categories of definitions and even more measures of adherence in this literature. Their study also found that few studies provide actual definitions of adherence even though they provide measures of adherence. The findings of Hearnshaw and Lindenmeyer (2005), concerning the definition and measurement of adherence, are supported by others who have conducted literature reviews on this subject (Fogarty, Roter, Larson, Burke, Gillespie, & Levy, 2002; Kyngäs, Duffy, & Kroll, 2000; Muphy & Canales, 2001; Vermeire, Hearnshaw, Van Royen, & Denekens, 2001).

Of the studies that do define adherence, the definition of Haynes, Taylor, and Sackett (1979) i.e., “the extent to which a person’s behavior (in terms of taking medication, following diets, or executing lifestyle changes) coincides with medical and health advice” is the most frequently used definition and is the definition adopted for this dissertation. The utility of the definition provided by Haynes, Taylor, and Sackett (1979) is the ability to utilize this definition to provide a global measure of adherence. To my knowledge, no studies have been published that examine general adherence to all prescribed health care recommendations.

The intent of this study is to provide a definition of adherence that is more global than previous definitions (e.g. Haynes, Taylor, & Sackett, 1979). Previous studies have mainly examined adherence in relation to one specific health condition. The unique data set used in this dissertation allows the opportunity to review adherence to more than one health condition which can provide information concerning whether drug use or other risk factors are associated with “general” adherence. This information may provide

important assistance for health care providers to identify and intervene among individuals at risk for non-adherence.

Researchers have measured adherence using a variety of methods. Researchers have measured adherence through subjective, objective, and interpersonal methods. Studies have used self-report measures (Chesney, Morin, & Sherr, 2000; Escobar, Campo, Martín, Fernández-Shaw, Pulido, & Rubio, 2003; Neilson & Whyne, 1995), objective measures such as electronic pill bottle caps (MEMs caps) and laboratory tests (Arnsten, Demas, Grant, Gourevitch, Farzadegan, Howard, & Schoenbaum, 2002), and interpersonal methods such as diaries and doctor patient communication (Bogart, Bird, Walt, Delahanty, Figler, 2004; Lutfey & Ketcham, 2005; Schilder, Kennedy, Goldstone, Ogden, Hogg, & O'Shaughnessy, 2001). These measures of adherence have both advantages and disadvantages. Self-report measures are usually overestimated. Electronic pill counts do not indicate appropriate time or quantity. Laboratory tests do not always indicate the number of missed doses or timeliness of doses and physiological factors may influence test results. Self-reports remain by far the most frequently used measure of adherence (Fogarty, Roter, Larson, Burke, Gillespie, & Levy, 2002; Kyngäs, Duffy, & Kroll, 2000; Vermeire, Hearnshaw, Van Royen, & Denekens, 2001), due to their low cost and ease of collection. This dissertation uses self-reported measures of proposed adherence that will be discussed in detail in the methods section of Chapter 4.

Few studies have examined adherence among drug users. Of the studies that have examined the relationship between drug use and adherence few utilize a theoretical framework to help guide their research. Previous theories used in the adherence literature (Becker & Maiman, 1975; Christensen, 1979; Leventhal & Cameron, 1987; Stone, 1979)

include social learning theories (Hovell, Blumger, Gil-Trejo, Vera, Kelley, Sipan, Hofstetter, Marshall, Berg, Friedman, Catanzaro, & Moser, 2003) and the health belief model (Näslund, Fredrikson, Hellénus, & de Faire, 1996; Neilson & Whynes, 1995; Scott, 2000). The key in adherence literature concerning drug users is to work towards a theory to help better understand and or predict adherence to care among this vulnerable group (Becker & Maiman, 1975; Christensen, 1979; Fogarty, Roter, Larson, Burke, Gillespie, & Levy, 2002; Leventhal & Cameron, 1987; Stone, 1979). Theory is one vital addition that can improve the understanding and conceptualization of adherence in this population (Christensen, 1978; Vermeire, Hearnshaw, Van Royen, & Denekens, 2001).

Adherence to Care and Drug Use

Studies that examine adherence to prescribed health care recommendations among drug users have primarily focused on adherence to highly active antiretroviral therapy (HAART) the medication regimen for HIV/AIDS (Bouhnik, Chesney, Carrieri, Gallais, Moatti, Obadia, Spire, MANIF 2000 Study Group, 2002; Broers Morabia, & Hirschel, 1994; Ferrando, Wall, Batki, & Sorensen, 1996; Gebo, Keruly, & Moore, 2003; Sorensen, Mascovich, Wall, DePhilippis, Batki, & Chesney, 1998; Tucker, Burnman, Sherbourne, Kung, & Gifford, 2003; Wall, Sorensen, Batki, Delucchi, London, & Chesney, 1995). The importance of research concerning the association of drug use and adherence to HAART, as stated in the introduction, is associated with the high incidence and prevalence of HIV/AIDS among drug users. The high incidence and prevalence of HIV/AIDS among drug users is associated with their drug use and sexual risk behaviors. In addition, the focus on the relationship between drug use and adherence is associated

with the ability of antiretroviral therapy to extend and improve the quality of life for people living with HIV.

Studies that have examined the relationship between drug use and adherence lack a clearly defined drug use category (measured through objective tests) and rarely provide a non-drug use comparison category. For example, Broers, Morabia, and Hirschel (1994) studied clients that were part of a Swiss HIV cohort study. They compared two categories of HIV patients, patients acquiring HIV through injection drug use and those acquiring HIV through other risk categories (sexual and or blood components). Broers, Morabia, and Hirschel (1994) found that injection drug users were as likely to adhere to HAART, and were more likely to delay seeking HAART when compared to the other risk group categories. Broers, Morabia, and Hirschel (1994) did not indicate whether those acquiring HIV through other risk group categories (sexual risk and through blood components) included individuals who used drugs but were non-injectors.

Strathdee, Palepu, Cornelisse, Yip, O'Shaughnessy, Montaner, Schechter, and Hogg (1998) examined barriers to receiving antiretroviral therapy but focused solely on a sample of HIV infected injection drug users. The study found that individual factors that affected receipt of therapy was the age of the injection drug user. Younger drug users were less likely to receive therapy. Strathdee, Palepu, Cornelisse, Yip, O'Shaughnessy, Montaner, Schechter, and Hogg (1998) had no comparison group (non-injection drug users and/or non-drug users).

Power, Koopman, Volk, Israelski, Stone, Chesney, and Spiegel (2003) examined adherence to antiretroviral therapy and included a drug use coping style measure. Their study found that using alcohol and/or drug use as a coping style decreased adherence to

antiretroviral therapy. Because drug use was measured as a coping style, it did not indicate actual frequency or type of drug used prior to the study.

Arnsten, Demas, Grant, Gourevitch, Farzadegan, Howard, and Schoenbaum (2002) examined the relationship between adherence to antiretroviral therapy and drug use. They compared former drug users with current drug users. They defined current drug use, as drug use within the 6-month study period. Their study found that current drug use when compared to former drug users were significantly more likely to be non-adherent to antiretroviral therapy. Their study did not include a non-drug user comparison group.

Ferrando, Wall, Batki, and Sorensen (1996) studied HIV-infected injection drug users in methadone maintenance treatment. Their main objective was to assess the impact of psychiatric disorders on adherence among illicit drug users. The study also examined the association of recent drug use, defined as a mean percentage of drug-positive urine tests over the 4 months of the study period, and found no association between recent drug use and adherence to antiretroviral medication. Ferrando, Wall, Batki, and Sorensen (1996) had no non-drug use comparison group.

Tucker, Burnman, Sherbourne, Kung, and Gifford (2003) used a national probability survey of 1,910 patients who reported their adherence to antiretroviral therapy over a one-week period. Drug use included both prescription drug use and illicit drug use over a 30-day period. In a multivariate analysis the study found that any drug use in the past 30 days, severity of drug use and cocaine/crack/freebase use were significantly associated with non-adherence to antiretroviral medications. The study had no comparison non-drug use category.

Gebo, Keruly, and Moore (2003) examined the association between non-adherence to antiretroviral therapy and illicit drug use. Illicit drug use was defined as any illicit drug use within the past 6 months. The study found that any illicit drug use, cocaine use, heroin use, and/or binge drug use within the past six months was significantly associated with non-adherence to antiretroviral therapy. No indication was given concerning how drug use was operationalized.

Escobar, Campo, Martín, Fernández-Shaw, Pulido, and Rubio (2003) examined factors affecting adherence to HAART among a hospital sample of HIV patients. Their drug use categories included drug abuse (alcohol and other drugs), and mode of transmission of HIV (intravenous drug use). In a univariate analysis both drug use (alcohol and/or other drug abuse) and mode of transmission (intravenous drug use) were significantly associated with non-adherence to HAART. No multivariate analyses were conducted.

Singh and Squier (1996) examined determinants of adherence to antiretroviral therapy prospectively among a sample of HIV infected clinic clients. From the point of entry into the study the clients were followed for two additional data points at 6 and 12 months. The study found a univariate relationship between intravenous drug use and adherence. Drug use was associated with a decrease in adherence. The sample size included only 46 patients.

Bouhnik, Chesney, Carrieri, Gallais, Moatti, Obadia, Spire, and the MANIF 2000 Study Group (2002) studied non-adherence among a sample of injection drug users comparing patients who had stopped injecting and clients who had continued injecting drugs. The study concluded that current injectors compared to those who stopped

injecting during the entire follow up period were more likely to be non-adherent to therapy. For individuals who continued using, their injection use was the only determinant of non-adherence.

These studies provide some support of the relationship between drug use and adherence (Arnsten, Demas, Grant, Gourevitch, Farzadegan, Howard, & Schoenbaum, 2002; Bouhnik, Chesney, Carrieri, Gallais, Moatti, Obadia, Spire, MANIF 2000 Study Group, 2002; Broers, Morabia, & Hirschel, 1994; Escobar, Campo, Martín, Fernández-Shaw, Pulido, & Rubio, 2003; Ferrando, Wall, Batki, & Sorensen, 1996; Power, Koopman, Volk, Israelski, Stone, Chesney, & Spiegel, 2003; Singh & Squier, 1996; Strathdee, Palepu, Cornelisse, Yip, O'Shaughnessy, Montaner, Schechter, & Hogg, 1998; Tucker, Burnman, Sherbourne, Kung, & Gifford, 2003).

Factors Related to Adherence

Based on the BMHCU, research on adherence to antiretroviral medication among illicit drug use, and data availability, the dissertation uses the following variables to operationalized the three domains of the BMHCU (see figure 3.1).

Predisposing characteristics that may predict adherence include such factors as age, gender, race/ethnicity, education, alcohol use, illicit drug use, and depression.

Differences in predisposing characteristics can influence adherence. sociodemographic characteristics are the most widely studied factors associated with adherence. In a study conducted by Phillips, Kerlikowske, Baker, Chang, and Brown (1998) examining factors associated with adherence to mammography screening guidelines, Phillips and colleagues found that age and education were significantly associated with adherence to mammography screening guidelines. Women aged 65 and

above were four times more likely than women less than 65 years of age to be adherent to having the appropriate lifetime number of mammography exams. Women with a high school education were two times more likely than women without a high school education to be adherent to having the appropriate lifetime number of mammography exams.

Research on the association between race or ethnicity and adherence has gilded inconsistent results. Fogarty and colleagues (2002) reviewing published and abstract reports about adherence to HIV medications found contradicting results. Of the 18 studies reviewed only nine studies found an association between race or ethnicity and adherence. Minorities were less likely than non-minorities to adhere to HIV medication.

Alcohol and/or illicit drug use may influence adherence. The pharmacological affects of alcohol or heroin and cocaine may decrease awareness and willingness to follow treatment. Studies have examined the impact of alcohol use on adherence. In a study conducted by (Murphy et al., 2002), alcohol use was associated with a decrease in an adherence to antiretroviral therapy. The researchers studied a clinical sample of 46 women with children to investigate factors associated with four adherence measures. Alcohol was associated with a decrease in adherence. Similar findings were found in studies by Hovell et al. (2003), Tucker et al. (2003), and Escobar et al. (2003). Alcohol use was directly associated with decreased adherence.

Studies that have examined adherence among drug users have examined adherence to highly active antiretroviral therapy (HAART), the medication regimen for HIV/AIDS (Bouhnik et al., 2002; Broers et al., 1994; Ferrando et al., 1996; Gebo et al.,

2003; Sorensen et al., 1998; Tucker et al., 2003; Wall et al., 1995). These studies provide some support for the association between drug use and adherence.

Predisposing psychological characteristics, such as depression, are linked to adherence. Depression is associated with decreased adherence (Gordillo et al., 1999; Kimmel et al., 1998; Simoni et al., 2002; Singh & Squier, 1996). Simoni et al., (2002) studied 50 African American participants selected from a HIV outpatient clinic. Simoni and colleagues studied the relationship between social support and five measures of adherence mediated by self-efficacy, negative affect states such as depression, and knowledge of the affects of non-adherence. The study found that depression is significantly associated with a decrease in adherence.

Enabling resources that may predict adherence include such factors as, regular source of care, insurance status, income, and the utilization of preventative health care services such as receiving a routine physical exam and receiving a routine dental exam.

Phillips et al. (1998) found that enabling resources such as income and having any form of health insurance were significantly associated with adherence to mammography screening. Individuals with increased income and individuals with health insurance were more likely to adhere to mammography screening. Social class, as measured by income and education, has been associated with adherence to colorectal screenings (Neilson & Whynes, 1995). The level of adherence increased as the social class level increased.

Utilization of preventative health services is associated with adherence (Neilson & Whynes, 1995). Neilson and Whynes (1995) studied determinants of persistent compliance with screening for colorectal cancer and found that individuals who had a routine dental exam in the past year were more likely than individuals who had no routine

dental exam to adhere to colorectal cancer screenings. Phillips et al. (1998) when examining predictors of adherence to mammography screening guidelines among a sample of women found that receiving a preventative Pap smear within the past 3 years was significantly associated with adherence to mammography screenings.

Perceived need factors that may influence adherence include such factors as perceived health status, physical activity limitations, and having a lot of physical pain in the past 12 months.

Although there seems to be conflicting information concerning the relationship between perceived need (illness-morbidity characteristics such as severity of illness and number of treatments or recommendations) and adherence, studies have found some support for the association between severity of illness and the degree of disability with adherence (Christensen, 1978; Marston, 1970; Scott, 2000).

Neilson & Whynes (1995) found a bivariate association between perceived health status and adherence to colorectal screenings. Adherers were around seven times more likely to consider their health to be good to excellent than non-adherers. Neilson and Whynes (1995) in addition found a bivariate relationship between experiences of illness and adherence to colorectal screenings. Adherers were more likely to have experienced back trouble, stomach problems, hemorrhoids, or rheumatism or arthritis compared to non-adherers.

Scott (2000) studied medication adherence among individuals with severe and disabling mental disorder. The sample of 39 participants was recruited from a hospital based outpatient clinic. Adherence was measured via a self-report and an independent assessment and operationalized as highly adherent and partially adherent. Perceived

severity of illness, defined as how ill a person felt they were compared to other patients with similar mental illness, was associated with medication adherence. Highly adherent patients were more likely to rate that their severity of illness was high.

Piette and colleagues (2007) examined the impact of comorbidity and adherence to medication. They examined adherence to medication for participants identified as taking medications for three chronic diseases, schizophrenia, diabetes, and hypertension. Piette and colleagues (2007) choose a national sample of veterans from a VA Psychosis Registry. They found that illness-morbidity characteristics such as hospitalization for medical and psychiatric disorders increased the likelihood of adherence.

Phillips and colleagues (1998) found that women with a previous breast problem were four times more likely than women with no previous breast problem to be adherent to having the appropriate lifetime number of mammography exams.

Few studies have actually looked at illness-morbidity characteristics. Wolinsky (1978) examined illness in its relationship to utilization of three health care services: hospital, dental, and physician. Wolinsky (1978) examined subjective perceived health status, limited activity, and number of health conditions and found that these illness characteristics provided a strong support for the association between illness behavior and utilization of health care services.

CHAPTER 3

Theoretical Framework

The Behavioral Model of Health Care Utilization

The theoretical framework adopted for this dissertation is the well-established Behavioral Model of Health Care Utilization (Andersen & Newman, 1973). The Behavioral Model of Health Care Utilization (BMHCU) is a frequently used theoretical framework for investigating factors associated with the utilization of health care services. (Andersen et al., 2000; Bradley et al., 2002; Gelberg et al., 2000; Gentry et al., 1999; Goodwin & Andersen, 2002; Hargraves & Hadley, 2003; Henton et al., 2002; LaVeist et al., 1995; Phillips et al., 1998; Phillips et al., 1998; Pottick et al., 1995; Smith, 2003; Wenzel et al., 2001; Wolinsky, 1978; Xu, 2002).

Although previous research has utilized the BMHCU for examining health care utilization, the model has been used in a study by Phillips and colleagues (1998) to examine adherence to mammography screening guidelines. This investigation provides some support for using this theoretical framework for examining adherence to prescribed health care recommendations.

Since its inception the BMHCU has gone through a variety of revisions (Andersen, 1995) and has been used to study health care outcomes beyond utilization (Phillips et al., 1998). The model also has been used to study a variety of at risk populations (Aday, 1994). The model has been used to study populations at high risk for decreased access and utilization of health care services. Populations considered “vulnerable” to poor health care utilization such as, women (Phillips et al., 1998), low-

socioeconomic individuals, minority groups (LaVeist et al., 1995), the homeless (Gelberg et al., 2000), individuals with mental illness (Smith, 2003), and older populations (Cherry, 2002).

This dissertation is an attempt to study the ability of the model to explain the role of drug use on adherence while controlling for other variables found in the BMHCU that explain utilization of health care.

The model has been used to study the utilization of hospital, dental, and physician care services (Wolinsky, 1978), differences in utilization of regular site of care compared to regular physician (Xu, 2002), utilization of health service directories (Cherry, 2002), utilization of prenatal care services (LaVeist et al., 1995), and utilization and unmet needs for family support services among aging families caring for adults with mental illness (Smith, 2002).

The initial intent of the BMHCU framework was to understand issues related to access of care, specifically risk factors that decrease access and utilization of health care services. Finding modifiable risk factors associated with decreased utilization of health care services was seen as the primary way of eliminating differences and/or inequitable access to health care services. The initial purpose was to use the model to identify individual risk factors that may decrease disparities in health outcomes (i.e., morbidity and mortality from disease).

The model sought to identify factors that predispose an individual to utilize health care services, to identify factors that enable or impede an individual to utilize health care services and to identify individual perceived need or actual need factors that make an individual more likely to utilize health care services. The BMHCU proposes that these

risks may be separated into three categories, predisposing characteristics, enabling resources, and perceived need (Andersen & Aday, 1978).

Predisposing characteristics refers to individual attributes that may influence utilization behavior. Predisposing characteristics include such characteristics as demographic and other individual characteristics. Demographic characteristics include age, race/ethnicity, gender, and age. Other predisposing characteristics that may influence utilization of care include an individual's psychological state, such as depression, or drug and alcohol use.

Enabling resources refers to an individual's personal resources and community resources that may enable or impede an individual from utilization of health care services in their community that may affect health care utilization. Enabling resources include a person's means for accessing services, or resources such as health insurance, income, having a regular source of care, or receiving preventative care services.

Perceived need refers to an individual's health status that may seem in their judgment as sufficient for seeking professional help and utilizing health care services. Perceived need includes perceived health status, experience of pain, and symptoms of illness.

Research Questions and Hypotheses

Specific Aim 1: Estimate the prevalence of self-reported adherence among a community-based sample of street recruited drug users and non-drug users.

Research Question 1: What is the prevalence of adherence among a community recruited sample of drug users and non-drug users?

Specific Aim 2: Assess the direct effect of drug use on adherence when controlling for other independent variables that are elements of the three domains of the Behavioral Model of Health Care Utilization (predisposing characteristics, enabling resources, and perceived need).

Research Question 2: In a multivariate model that includes all independent variables, is drug use independently associated with adherence once controlling for relevant variables in the BMHCU?

Hypothesis 1: Drug users (illicit non-injecting drug users and illicit injecting drug users) when controlling for all other 15 independent variables are *less likely* than non drug users to adhere to prescribed health care recommendations.

Specific Aim 3: Determine the utility of the Behavioral Model of Health Care Utilization as a guiding theoretical framework in understanding adherence in a non-clinically identified population of street recruited drug users and non-drug users.

Research Question 3: In a multivariate model that includes all independent variables, which of the variables from the predisposing characteristics, enabling resources, and perceived need are associated with adherence?

Predisposing Characteristics

Hypothesis 2: Participants aged 30 to 39, and participants aged 40 and above are *more likely* than participants aged 18 to 29 to adhere to prescribed health care recommendations.

Hypothesis 3: Female participants are *more likely* than male participants to adhere to prescribed health care recommendations.

Hypothesis 4: African American and Hispanic participants are *less likely* than White non-Hispanic participants to adhere to prescribed health care recommendations.

Hypothesis 5: Participants with no high school diploma or GED are *less likely* than participants with a high school diploma or GED to adhere to prescribed health care recommendations.

Hypothesis 6: Participants who are non-injection illicit drug users or injecting illicit drug users are *less likely* than participants who do not use drugs to adhere to prescribed health care recommendations.

Hypothesis 7: Participants with moderate alcohol use and heavy alcohol use are *less likely* than participants who do not use alcohol to adhere to prescribed health care recommendations.

Hypothesis 8: Participants who had major depression are *less likely* than participants with no major depression to adhere to prescribed health care recommendations.

Enabling Resources

Hypothesis 9: Participants who had no regular source of care are *less likely* than participants who had a regular source of care to adhere to prescribed health care recommendations.

Hypothesis 10: Participants who had no insurance are *less likely* than participants who had insurance to adhere to prescribed health care recommendations.

Hypothesis 11: Participants who had an income of less than \$10,000 and an income of \$10,000 to \$19,999 are *less likely* than participants who had an income of \$20,000 and above to adhere to prescribed health care recommendations.

Hypothesis 12: Participants who had no routine physical exam in the past 12 months are *less likely* than participants who had a routine physical exam in the past 12 months to adhere to prescribed health care recommendations.

Hypothesis 13: Participants who had no dental exam in the past 12 months are *less likely* than participants who had a dental exam in the past 12 months to adhere to prescribed health care recommendations.

Perceived Need

Hypothesis 14: Participants who perceived their health as fair to poor and very good to good are *more likely* than participants who perceived their health as excellent to adhere to prescribed health care recommendations.

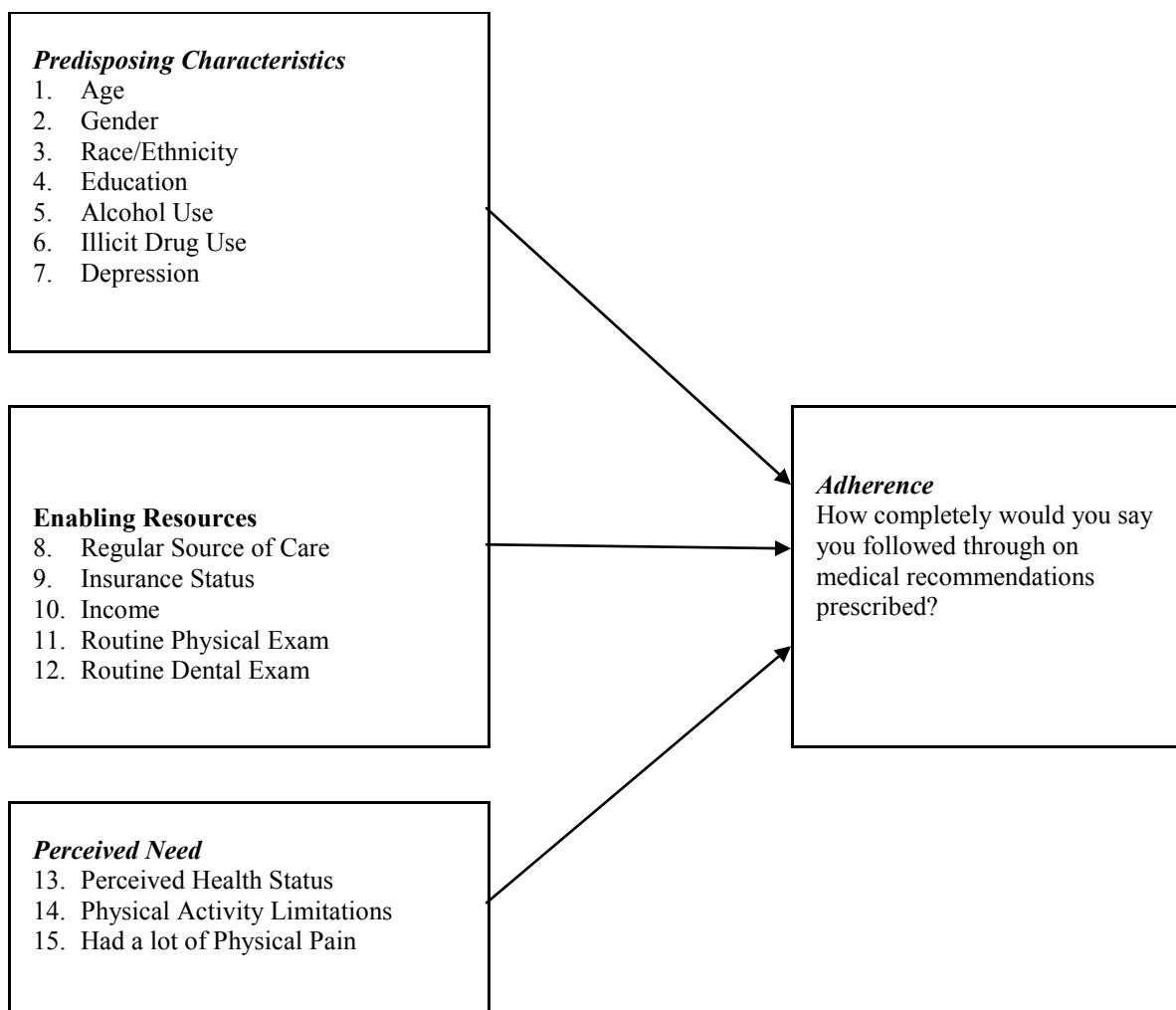
Hypothesis 15: Participants who experienced vigorous physical activity limitations, moderate physical activity limitations, and light physical activity limitations are *more likely* than participants who had no physical activity limitations in the past 12 months to adhere to prescribed health care recommendations.

Hypothesis 16: Participants who experienced no physical pain in the past 12 months are *more likely* than participants who experienced physical pain in the past 12 months to adhere to prescribed health care recommendations.

Research Question 4: Is the BMHCU a sufficient model for explaining complete adherence to prescribed health care recommendations?

Hypothesis 17: The BMHCU will be a good predictor of adherence.

Figure 3.1 Behavioral Model and Variables



CHAPTER 4

Methods

This study uses a subset of the cross-sectional survey data collected as part of the Epidemiology of Health Care Utilization Study (EHCUS) (McBride et al., 2000; McCoy et al., 2000; Rivers, 1998). The overall objective of this study, is to assess whether factors drawn from the Behavioral Model of Health Care Utilization are associated with adherence to prescribed health care recommendations among a community-based sample of drug users and non-drug users from similar neighborhoods in Miami-Dade County, and more specifically, to assess whether drug use is directly associated with adherence. This is an exploratory study extending beyond descriptive research with a multivariate component to identify relationships between predisposing characteristics, enabling resources, perceived need and adherence to prescribed health care recommendations. For the purposes of this study, adherence is studied using five dummy variables. To examine the association of the three domains (predisposing characteristics, enabling resources, and perceived need) with adherence, those who did not adhere were compared to those who adhered on fifteen independent variables.

In the following paragraphs the parent study (EHCUS) is described, this is followed by the methodology used for this dissertation.

EHCUS Parent Study

The National Institute on Drug Abuse (NIDA) funded the Health Services Research Center (HSRC) to conduct interdisciplinary research on critical issues in health services for chronic drug users. The HSRC focused on understanding the organization of health care resources of Miami-Dade, Florida. The center had three major research

components: (1) examine the health services needs and utilization of health services by drug users (EHCUS component); (2) examine the identification, the referral, and treatment of drug users by community providers; and (3) to implement a cost effective community program by recommending interventions (McBride et al., 2000). The research aim of the EHCUS was to examine the health service need, barriers to achieving the needs, and utilization of health care services among a community sample of drug users and non-drug users (Chitwood et al., 1998).

The study included sustained injecting drug users (IDUs), other sustained drug users (ODUs), and non-drug users (NDUs), in Miami-Dade County, Florida (Chitwood et al., 2001). The study sample included African-American, Hispanic, and non-Hispanic white, men and women. The study compared estimates of health services needs, barriers to services, and service utilization among drug users (ODUs and IDUs) with a tri-ethnic sample of male and female NDUs recruited from the same geographic areas (Chitwood et al., 2000). In addition to the previously mentioned goals EHCUS investigated whether participants received prescribed health care recommendations by health and medical providers after actual utilization of care, and their level of adherence to these prescribed health care recommendations.

A cross-sectional survey research design was used for the parent study. Survey research provides an efficient way for measuring attitude, orientation, and behaviors.

Sample

A stratified, network-based, non-probability, snowball sample technique was used to recruit participants from the streets of Miami-Dade County in Florida between April 1996 and September 1997. Snowball sampling is an accepted technique for the study of

hard to reach or “hidden” populations (Watters & Biernacki, 1989). Snowball sampling stresses that the best way of accessing “hidden” populations is by accessing their social networks. The snowball sampling technique involves identifying individuals who have the required characteristic (i.e., drug use) and interacting with these individuals to find others with similar characteristics.

In addition to the snowball sampling techniques a representative stratified and/or quota sampling techniques was used to insure that women constituted close to half the study sample, and each of the drug use classifications (i.e., NDUs, ODUs, and IDUs). The sample was further stratified by ethnicity to ensure adequate representation by ethnic group of each of the drug use classifications. The stratified and/or quota sampling techniques permit the examination of both gender and ethnic differences in utilization and barriers to health care.

Geographical recruitment areas were selected by identifying communities which contained high concentrations of heroin and/or cocaine users. The selection of these areas was based upon indicator data from drug treatment, criminal justice, and street outreach databases. Drug users and non-drug users were recruited from the same ZIP code areas. A total of six geographical areas determined to contain large numbers of drug users were selected to make the sample more representative than drug users selected from one geographical area.

Eligibility Criteria

In order to be included in the study non-drug users (NDUs) were persons who reported they had not used illicit drugs other than marijuana, had no evidence of track marks, and tested negative for cocaine and opiates. Persons who used marijuana less than

weekly during the past year but met the other eligibility criteria were included in this sample of non-users, but more frequent users of marijuana were excluded. Other sustained drug users (ODUs) included persons who reported that they had never injected drugs, reported that they had used cocaine or opiates on at least a weekly basis for the past 12 months, tested positive for cocaine and/or opiates on urine screen, and had no evidence of track marks from injection. Injection drug users (IDUs) were persons who reported that they had injected drugs on at least a weekly basis for the previous 12 months, had recent track marks, and tested positive on urine for cocaine and/or opiates.

Individuals were excluded from the study sample if they 1) were significantly impaired, 2) were unable or had difficulty understanding the questions, 3) were violent and/or abusive to staff, 4) misreported their eligibility as revealed by laboratory reports, 5) were frequent users of marijuana and had no history of cocaine and/or opiates, or 6) were less than 18 years of age.

Instrumentation

For the Epidemiology of Health Care Utilization Study (EHCUS), the Health Services Research Instrument (HSRI) was developed to collect survey data. The HSRI was designed to review the health care behavior of all participants in the study. A segment of the HSRI developed for the study was based on the Behavioral Model of Health Care Utilization (Aday & Andersen, 1975). The Behavioral Model of Health Care Utilization is a theoretical model used extensively in health care utilization and health behavior research (McBride et al., 2000). The HSRI included several sections that were part of existing survey instruments. The HSRI was pre-tested among individuals from each of the drug use groups (both drug users and non-drug users) (Chitwood et al., 2001).

Revisions were made to the HSRI after the pre-test. After it was determined that no additional revisions were necessary the survey was finalized. The questionnaire includes demographic data, drug use histories, and lifetime and 12-month health behavior histories. The health behavior topics addressed in the HSRI include the need for health care, actual health care utilization, failure to receive needed care, barriers to utilization of health care services, receipt of prescribed health care recommendations, and adherence to prescribed health care recommendations. A measure of depression was also collected.

The data collected from the HSRI have generated multiple articles (eg., Chitwood et al., 1998; Chitwood et al., 2001; Chitwood et al., 2002; Crandall et al., 2003; French et al., 2001; McBride et al., 2000; McCoy et al., 2000; McCoy et al., 2001). For further specifics about the ECHUS see Chitwood et al., (1998; 2001), McBride et al. (2000), McCoy et al. (2000), and French et al. (2001).

Data Collection Procedure

Data collection began after institutional review board approval was received, and a certificate of confidentiality was obtained. Outreach workers with an average of 5 years of experience working with the drug use population in Miami, Florida established initial contact with prospective participants on the street. Outreach workers introduced themselves to prospective participants as University of Miami staff and explained that they were recruiting participants and interested in their past and present health and informed them that all information would remain confidential. Once prospective participants agreed to participate they were then transported to an assessment center to determine eligibility. Eligibility was determined in an initial brief interview, a urine test to determine drug use of heroin/opiates, and a physical assessment for examination of

track marks to determine injection use status. Urine tests for cocaine and/or heroin were conducted using Abuscreen ONTRAK Assay, a self-contained single test unit which employs a latex agglutination system which can be read within 5 minutes of administration. Sensitivity of ONTRAK Assay when evaluated by comparison with gas chromatography/mass spectrometry results for 635 urine specimens was 100% for cocaine and 99% for opiates. Specificity, when compared with radioimmunoassay results, was 100% for both cocaine and opiates (Baker et al., undated; Evans, 1992). Once the analysis determined initial eligibility, the eligible volunteers were invited to participate in the study. After the study was explained, informed consent was signed by the participant.

Each participant, after signing an informed consent form, was interviewed in a private room where confidentiality was assured. The Health Services Research Instrument (HSRI) was administered to each participant by a trained interviewer. The interview took approximately 1 to 1-1/2 hours to complete.

Dissertation Study

The final analytic sample of the parent study included 1,480 individuals. The dissertation sample was extracted from the EHCUS sample. Two additional eligibility requirements were used to select a sub-sample for each of the five adherence measures. First, participants had to have been prescribed at least one health care recommendation in the past twelve months, and second, participants must have completed the 20-item Zung Depression Scale.

Measures

The HSRI included questions designed to identify drug users' health care behaviors. The sections in the original HSRI that are utilized in this dissertation study

include demographic data, alcohol and other drug use histories, and 12-month health histories. Additional items used in this dissertation study are Zung Scale depression, and HSRI health care status data (i.e., perceived health care and physical limitations). See the Appendix for a complete listing and actual questions of all variables used in this dissertation.

Dependent Variable: Several review articles have investigated issues concerning the conceptualization and measurement of adherence (Becker & Maiman, 1975; Christensen, 1978; DiMatteo et al., 2002; Hayes-Bautista, 1976; Haynes et al., 1979; Haynes et al., 1987; Ickovics, 1997; Kyngäs et al., 2000; Leventhal & Cameron, 1987; Marston, 1970; Murphy & Canales, 2001; Pescosolido, 1991; Sackett & Haynes, 1976; Sherr, 2000; Stimson, 1974; Stone, 1979; Vermeire et al., 2001; Wright, 2000). In summary, these review articles conclude that there is no gold standard measure of adherence (Hearnshaw & Lindenmeyer, 2005). For the purpose of this study, five dummy variables of adherence to prescribed health care recommendations were proposed and developed.

Participants in the study were asked if they had a health problem in the past 12 months for which they sought care. This question was asked for 17 health problems. These health systems included: female problems; male problems; respiratory/breathing problems; trauma/physical injury; muscle or bone problems; liver related problems; heart/blood or circulatory problems; stomach or digestive problems; nervous system problems; skin problems; eye, ear, nose or throat problems; STDs; dental problems; alcohol problems; drug abuse problems; mental health problems; other health problems. After affirmation that they had sought care for any of these 17 health problems,

participants who responded yes to receiving care were asked whether they received a prescribed health care recommendation. Participants were asked whether they received a prescribed health care recommendation for each health system for which they received care. Immediately after affirmation of receipt of a prescribed health care recommendation, participants were asked to rate their level of adherence for each of the 17 health problems for which they received a prescribed health care recommendation. Adherence was measured for each of the 17 health system problems by the question: How completely would you say you followed through on the prescribed medical treatment? Response options were, not at all, somewhat, considerably, and completely. For example, of the 1480 participants interviewed for the parent study, 613 were female. These 613 women were asked whether they ever had a female problem. 415 women responded that they had ever experienced a female health problem. Of these 415 women who had ever had a female health problem a total of 217 women stated they had a female health problem in the past twelve months. Of these 217 women 146 women stated they had sought care for their female health problem. Of the 146 women who stated they had sought care, 117 women stated they had received a prescribed health care recommendation. These 117 women then responded to the question how completely would you say you followed through on the prescribed medical treatment. One additional eligibility requirement was used to determine the sub-sample for adherence to female health care recommendations; participants must have completed the 20-item Zung Depression Scale. Due to these additional eligibility criteria, the final sample for adherence to female health care recommendations was 104.

For adherence to respiratory health care recommendations, of the 1480 participants interviewed for the parent study, 650 stated that they had experience a respiratory problem in their lifetime. Of these 650 participants who had ever had a respiratory health problem a total of 356 stated they had a respiratory health problem in the past twelve months. Of these 356 participants who stated they had had a respiratory health problem in the past 12 months, 196 stated they had sought care for their respiratory health problem. Of the 196 participants who stated they had sought care for their respiratory health problem in the past 12 months, 157 participants stated they had received a prescribed health care recommendation. These 157 then responded to the question how completely you would say you followed through on the prescribed medical treatment for your respiratory health problem. One additional eligibility requirement was used to determine the sub-sample for adherence to female health care recommendations; participants must have completed the 20-item Zung Depression Scale. Due to this additional eligibility criterion, the final sample for adherence to respiratory health care recommendations was 134.

For adherence to injury health care recommendations, of the 1480 participants interviewed for the parent study, 1055 stated that they had experience an injury problem in their lifetime. Of these 1055 participants who had ever had an injury health problem a total of 332 stated they had an injury health problem in the past twelve months. Of these 332 participants who stated they had had an injury health problem in the past 12 months, 218 stated they had sought care for their injury health problem. Of the 218 participants who stated they had sought care for their injury health problem in the past 12 months, 124 participants stated they had received a prescribed health care recommendation. These

125 then responded to the question how completely you would say you followed through on the prescribed medical treatment for your injury health problem. One additional eligibility requirement was used to determine the sub-sample for adherence to female health care recommendations; participants must have completed the 20-item Zung Depression Scale. Due to this additional eligibility criterion, the final sample for adherence to injury health care recommendations was 101.

For adherence to muscle health care recommendations, of the 1480 participants interviewed for the parent study, 642 stated that they had experience a muscle problem in their lifetime. Of these 642 participants who had ever had a muscle health problem a total of 516 stated they had a muscle health problem in the past twelve months. Of these 516 participants who stated they had had a muscle health problem in the past 12 months, 191 stated they had sought care for their muscle health problem. Of the 191 participants who stated they had sought care for their muscle health problem in the past 12 months, 135 participants stated they had received a prescribed health care recommendation. These 135 then responded to the question how completely you would say you followed through on the prescribed medical treatment for your muscle health problem. One additional eligibility requirement was used to determine the sub-sample for adherence to female health care recommendations; participants must have completed the 20-item Zung Depression Scale. Due to this additional eligibility criterion, the final sample for adherence to muscle health care recommendations was 122.

For adherence to mental health care recommendations, of the 1480 participants interviewed for the parent study, 626 stated that they had experience a mental problem in their lifetime. Of these 626 participants who had ever had a mental health problem a total

of 552 stated they had a mental health problem in the past twelve months. Of these 552 participants who stated they had had a mental health problem in the past 12 months, 173 stated they had sought care for their mental health problem. Of the 173 participants who stated they had sought care for their mental health problem in the past 12 months, 153 participants stated they had received a prescribed health care recommendation. These 153 then responded to the question how completely you would say you followed through on the prescribed medical treatment for your mental health problem. One additional eligibility requirement was used to determine the sub-sample for adherence to female health care recommendations; participants must have completed the 20-item Zung Depression Scale. Due to this additional eligibility criterion, the final sample for adherence to mental health care recommendations was 125.

Table 4.1 describes the distribution of adherence for each of the 17 health system problems. All 17 health systems adherence distributions were selected similar to the example provided in the previous paragraphs. Of the 17 health systems, only five of the health systems were selected for analysis: female problem; respiratory problem; injury; muscle or bone problem; and mental health problem.

It is suggested that a sample size of less than 60 may be too small to identify relationships. It is also suggested that selecting 5 cases per variable may be adequate in determining associations (Allison, 1999). The importance of all analysis is to understand the limitations, sample size, whether too small and/or too large impact results and determine utility and observations of study findings. Allison (1999) state that with small sample sizes significant variables should be taken more seriously, but in a similar way nonsignificant variables should not be considered as having no effect. As this study is an

exploratory study to examine adherence the intent is to provide preliminary data for future research in this area. With this in mind of the 17 health systems 5 health systems were selected because the sample sizes for each were greater than 100.

Table. 4.1

Response to the Question:

How completely would you say you followed through on the medical treatment prescribed for your health system problem? For each of the 17 Health Systems.

Health System	Not at all	Somewhat	Considerably	Completely
Female problem (N=104)	9(8.7%)	14(13.5%)	5(4.8%)	76(73.1%)
Male problem (N=10)	0(0%)	1(10%)	2(20%)	7(70%)
Respiratory problem (N=134)	13(9.7%)	25(18.7%)	17(12.7%)	79(59%)
Physical injury/accident (N=101)	18(17.8%)	15(14.9%)	14(13.9%)	54(53.5%)
Muscle or bone problem (N=122)	22(18%)	22(18%)	14(11.5%)	64(52.5%)
Liver related problem (N=26)	1(3.8%)	2(7.7%)	2(7.7%)	21(80.8%)
Circulatory problem (N=88)	7(8%)	11(12.5%)	13(14.8%)	57(64.8%)
Digestive problem (N=87)	7(8%)	9(10.3%)	11(12.6%)	60(69%)
Nervous system problem (N=60)	8(13.3%)	8(13.3%)	12(20%)	32(53.3%)
Skin problem (N=97)	9(9.3%)	12(12.4%)	13(13.4%)	63(64.9%)
EENT problem (N=84)	6(7.1%)	11(13.1%)	12(14.3%)	55(65.5%)
STD (N=34)	1(2.9%)	3(8.8%)	1(2.9%)	29(85.3%)
Dental problem (N=78)	7(9%)	4(5.1%)	6(7.7%)	61(78.2%)
Alcohol problem (N=12)	4(33.3%)	3(25%)	1(8.3%)	49(33.3%)
Drug problem (N=42)	6(14.3%)	12(28.6%)	2(4.8%)	22(52.4%)
Mental health problem (N=125)	11(8.8%)	22(17.6%)	24(19.2%)	68(54.4%)
Other health problems (N=42)	2(4.8%)	3(7.1%)	5(11.9%)	32(76.2%)

Note: EENT = Eye, Ear, Nose, and Throat; STD=Sexually Transmitted Diseases

Adherence to Female Health Care Recommendations

The dependent variable, adherence to a female health care recommendation, is

operationalized as a dummy variable It is coded: 0 = complete adherence “no”; 1 =

complete adherence “yes”. Complete adherence “no” is inclusive of participants who rated their level of adherence as not at all, somewhat, considerably. Complete adherence “yes” is inclusive of participants who rated their level of adherence as complete.

Adherence to Respiratory Health Care Recommendations

The dependent variable, adherence to a respiratory health care recommendations, is operationalized as a dummy variable It is coded: 0 = complete adherence “no”; 1 = complete adherence “yes”. Complete adherence “no” is inclusive of participants who rated their level of adherence as not at all, somewhat, considerably. Complete adherence “yes” is inclusive of participants who rated their level of adherence as complete.

Adherence to Injury Health Care Recommendations

The dependent variable, adherence to injury health care recommendations, is operationalized as a dummy variable It is coded: 0 = complete adherence “no”; 1 = complete adherence “yes”. Complete adherence “no” is inclusive of participants who rated their level of adherence as not at all, somewhat, considerably. Complete adherence “yes” is inclusive of participants who rated their level of adherence as complete.

Adherence to Muscle Health Care Recommendations

The dependent variable, adherence to a muscle health care recommendations, is operationalized as a dummy variable It is coded: 0 = complete adherence “no”; 1 = complete adherence “yes”. Complete adherence “no” is inclusive of participants who rated their level of adherence as not at all, somewhat, considerably. Complete adherence “yes” is inclusive of participants who rated their level of adherence as complete.

Adherence to Mental Health Care Recommendations

The dependent variable, adherence to a mental health care recommendation, is operationalized as a dummy variable. It is coded: 0 = complete adherence “no”; 1 = complete adherence “yes”. Complete adherence “no” is inclusive of participants who rated their level of adherence as not at all, somewhat, considerably. Complete adherence “yes” is inclusive of participants who rated their level of adherence as complete.

Independent Variables: For the majority of the independent variables, the period is within the past 12 months. The variables are presented within the three domains of the BMHCU (figure 3.1). The first value listed for each independent variable serves as the reference category for subsequent analyses. For example, the variable "age" uses "18-29" as the referent. The other two categories, "30-39" and "40 and above" are compared to "18-29" in all stages of the analysis.

It is important to note at this point that some variables are set up to provide negative associations with the dependent variables. For example, the enabling variable insurance is coded with the reference category as yes and therefore participants with no insurance in the past 12 months were compared to those with insurance. Another example is regular source of care, the referent category is yes, and therefore participants who had no regular source of care were compared to participants. The purpose for the negative association is to determine the likelihood of adherence.

PREDISPOSING CHARACTERISTICS: age, gender, race/ethnicity, education, alcohol use, illicit drug use, and depression.

Age: Age is operationalized as age at time of interview.

Age is a dummy variable. It is coded: 0 = 18-29; 1 = 30-39; 2 = 40 and above.

Gender: Gender is a dichotomous measure. Gender was determined by the interviewer. Gender is coded 0 = male; 1 = female.

Race/ethnicity: Race/ethnicity is operationalized as a dummy variable. One question determined the participant's race/ethnicity: Do you consider yourself Black, White, Hispanic (or Latino), Asian, Native America or another race? Race/ethnicity is coded 0 = White non-Hispanic; 1 = African American; 2 = Hispanic.

Education: Education is operationalized as a dummy variable that determines information on whether or not a respondent has a high school diploma/GED. Two questions determined the participant's education: "Do you have a high school diploma?" and "Do you have a GED?" Education is coded 0 = yes (high school or GED); 1 = no (no high school diploma and no GED).

Alcohol use: Alcohol use is defined as self-reported use of alcohol in the past 12 months. Two questions determined participant's alcohol use: "On the average, how often in the past 12 months have you had any alcoholic beverage?" and "On the average, how often in the past 12 months have you had five or more alcoholic drinks on the same occasion?" Alcohol use is operationalized as a dummy variable. It is coded: 0 = no alcohol use; 1 = moderate alcohol use (alcohol use but less than 5 drinks at a time); 2 = heavy alcohol use (alcohol use with one episode of drinking 5 or more drinks at a time).

Drug use: Drug use indicates any use of heroin and/or cocaine in the past twelve months. Drug use is operationalized as a dummy variable. It is coded: 0 = no drug use; 1 = other sustained drug use; 2 = sustained injection drug use.

Depression: Zung Self-Rating Depression Scale (SDS). The SDS is a 20-item self-report measure of symptoms of depression. Each item is scored on a Likert scale ranging

from 1 to 4. A total score is derived by summing the individual item scores, and ranges from 20 to 80. The SDS asks half of questions positively and half negatively. Answers scored on a 1 to 4 scale from minimal (none or a little of the time), to severe (most or all of the time). SDS index score: score 20-49: normal (non-depressed); score 50-59: minimal to mild depression; score 60-69: moderate or marked depression score 70-80: severe or extreme depression (Zung, 1965). Substantial evidence exists on the reliability and validity of the SDS as a measure for depressive symptoms with a variety of samples (Campo-Arias et al., 2006; McBride et al., 2000) due to its simple language and easy translation.

The SDS was used to assess depression. 20 questions determined the participant's depression: "I feel downhearted, blue and sad.", "Morning is when I feel the best.", "I have crying spells or feel like it.", "I have trouble sleeping through the night.", "I eat as much as I used to.", "I enjoy looking at talk to and being w/attractive fm/m.", "I notice that I am losing weight.", "I have trouble with constipation.", "My heart beats faster than usual.", "Get tired for no reason.". "My mind is clear as it used to be.", "I find it easy to do things I used to do.", "I am restless and can't keep still.", "I am hopeful about the future.", "I am more irritable than usual.", "I find it easy to make decisions.", "I feel that I am useful and needed.", "My life is pretty full.", "I still feel that others would be better off if I was dead.", and "I still enjoy things I used to do." Each item is scored on a Likert scale ranging from 1 to 4. A total score is derived by summing the individual item scores, and ranges from 20 to 80. Individuals who scored 60 or greater were deemed depressed (includes participants with moderate to marked depression (score of 60-69), and participants severe depression (score of 70 and above) (Zung, 1969). normal (non-

depressed); score 50-59: minimal to mild depression; score 60-69: moderate or marked depression score 70-80: severe or extreme depression. Previous studies have used a cut of points ranging from 50 to 60 (Fountoulakis et al., 2001; Huang et al., 2005; Kamphuis et al., 2006; Zung et al., 1993). For the purpose of this dissertation a cut off point of 60 is used. The cut off point of 60 is indicative of clinical depression requiring treatment (McBride et al., 2000; Zisook & Shuchter, 1991; Zung, 1969). Depression is operationalized as a dummy variable. It is coded: 0 = no major depression; 1 = major depression.

ENABLING RESOURCES: regular source of care, insurance status, income, routine physical exam, and routine dental exam.

Regular source of care: Regular source of care indicates whether an individual usually sought care in the same place or site such as a clinic, a health center, a doctor's office, or any other facility. Regular source of care is determined by the question "Is there a clinic, health center, doctor's office, or other place that you usually go to if you are sick or need advice about your health?" Regular source of care is a dummy variable. It is coded: 0 = yes; 1 = no.

Insurance: Insurance is defined as having one or more months of health insurance coverage in the past 12 months. Insurance coverage was measured by the response to the question “How many months in the last 12 months were you covered by any type of health insurance or health care program including MEDICAID or Jackson Card?”

Insurance is operationalized as a dummy variable. It is coded: 0 = yes; 1 = no. Insurance yes, indicates a participant had insurance in the past 12 months. Insurance no, indicates that a participant had no insurance during the past 12 months.

Income: Income is defined as annual income from both legal and illegal sources. Two questions determined the participant’s income: “In the past 12 months, approximately how much legal income did you receive from all sources?” and “In the past 12 months how much illegal or possibly illegal income did you receive from all sources?” Income is operationalized as a dummy variable. It is coded: 0 = \$20,000 and above; 1 = \$10,000 to \$ 19,999; 2 = <\$10,000

Routine physical health exam: Routine physical exam indicates whether a participant received a physical exam solely as a routine physical exam for preventative health it is operationalized as a dichotomous measure. Three questions determined the participant’s receipt of a routine physical exam: “Have you ever had a routine physical exam?”, “Was it (the routine physical exam) in the past 12 months?” and “Was the routine physical exam the primary reason you saw the doctor or health care provider?” Participants who reported their need for a routine physical exam was the primary reason they saw the doctor for health care were deemed to have received a routine physical exam. Routine physical exam is operationalized as a dummy variable. It is coded: 0 = yes; 1 = no.

Routine dental exam: is operationalized as a dummy variable. Two questions determined the participant's receipt of a routine dental exam: "Have you had a routine dental exam?" and "Was it in the past 12 months?" Participants who reported that their routine dental exam was in the past 12 months were deemed to have received a routine dental exam. It is coded: 0 = yes; 1 = no.

PERCEIVED NEED: perceived health status, limited physical activity, having a lot of physical pain, and number of prescriptions.

Perceived health status: Perceived health status is operationalized as a dummy variable. Perceived health status was measured by the question "In general, would you say your health in the past 12 months was, excellent, very good, good, fair, poor, don't know/unsure?" It is coded: 0 = excellent; 1 = very good/good; 2 = fair/poor.

Physical activity limitations: Physical activity limitation is a respondent's self-reported activity limitation in the past 12 months. Three questions determined the participant's physical activity limitation: "During the past 12 months, did your health at any time limit the kind of vigorous activity you can do?" "During the past 12 months, did your health at any time limit the kind of moderate activity you can do?" and "During the past 12 months, did your health at any time limit the kind of light activity you can do?" Physical activity limitation is operationalized as a dummy variable. Physical activity limitation is coded: 0 = no physical activity limitations; 1 = vigorous physical activity limitations; 2 = moderate physical activity limitations; 3 = light physical activity limitations. A higher score indicated a greater degree of difficulty performing activities. In other words, having

light physical activity limitations would indicate a greater degree of difficulty performing activities of daily living.

Had a lot of physical pain: Had a lot of physical pain is operationalized as a dummy variable. One question identified participants who had a lot of physical pain: “During the past 12 months, have you had a lot of physical pain or discomfort?” It is coded: 0 = yes; 1 = no.

Plan of Analysis

All statistical procedures were conducted using SPSS 11.0 for Windows. The dependent variables were adherence to female health recommendations, adherence to respiratory health recommendation, adherence to injury health recommendation, adherence to muscle health recommendations, and adherence to mental health recommendations.

Specific Aim 1: Estimate the prevalence of self-reported adherence among a community-based sample of street recruited drug users and non-drug users.

For estimating the prevalence of adherence among the community sample of drug users and non-drug users, standard descriptive epidemiological statistics are provided.

Descriptive statistics and prevalence estimates are presented in chapter four.

Specific Aims 2 and 3: Estimate the independent effect of drug use on adherence when controlling for all other independent variables in the three domains of the BMHCU.

Determine the utility of using the Behavioral Model of Health Care Utilization as a guiding theoretical framework in understanding adherence in a non-clinically identified population of street recruited drug users and non-drug users. Estimate the association of a

set of independent variables that are within the three domains of the BMHCU (predisposing characteristics, enabling resources, and perceived need) with the five measures of adherence.

In the first step data were checked for multicollinearity. In the first step correlation matrices were conducted for each of the five samples. A correlation of .60 or above indicated high correlation. Results for each correlation matrix are presented in the appendix. Next, inter-relationships between predictor variables (multicollinearity) were analyzed using the Variance Inflation Factor (VIF) and Tolerance tests (Allison, 1999; Allison 1999b). A VIF value above 2.5 and a Tolerance value of less than 0.40 indicate multicollinearity. Results of the Tolerance and VIF tests are presented. No predictor variables were removed from the model. (See appendix for VIF and Tolerance tests for all other adherence measures.)

In the second step drug use status and the predisposing characteristics, enabling resources, and perceived need variables were examined using Pearson's chi-square to test for significance at the bivariate level. Odds ratios (with 95% confidence intervals) were calculated for each independent variable for the five adherence measures.

In the third step, logistic regression was used for the five adherence measures and because this dissertation is interested in the predictive value of drug use while controlling for other variables and is interested in assessing the adequacy of the BMHCU, all independent variables were entered simultaneously (Tabachnick & Fidel, 1996).

In the final step to determine how well the model can predict adherence to prescribed health care recommendations the R^2 statistic was used (Allison, 1999).

CHAPTER 5

Results

This chapter presents both descriptive and inferential statistics of the five adherence outcome measures.

Table 5.1 describes complete adherence by health system problem. Complete adherence ranged from 52.5% to 73.1%. Of the 104 participants who received a prescribed health care recommendation for a female health problem in the past 12 months 76(73.1%) indicated they completely adhered. Of the 134 participants who received a prescribed health care recommendation for respiratory system problem in the past 12 months 79(59.0%) completely adhered. Of the 101 participants who received a health care recommendation for an injury problem in the past 2 months 54(53.5%) indicated they completely adhered. Of the 122 participants who received a prescribed health care recommendation for a muscle health problem in the past 12 months 64(52.5%) indicated they completely adhered. Of the 125 participants who received a prescribed health care recommendation for a mental health problem in the past 12 months 68(54.4%) indicated they completely adhered.

Table 5.1
Complete Adherence for the Five Health Systems

	Complete Adherence	
	No	Yes
Female problem (N=104)	28(26.0%)	76(73.1%)
Respiratory problem (N=134)	55(41.1%)	79(59.0%)
Physical injury/accident (N=101)	47(46.6%)	54(53.5%)
Muscle or bone problem (N=122)	58(47.5%)	64(52.5%)
Mental health problem (N=125)	57(45.6%)	68(54.4%)

Not all percentages equal 100%

Adherence to Female Health Care Recommendations

Adherence Female Health Problem Univariate and Bivariate Analysis

One hundred four participants received a prescribed health care recommendation for a female health problem. Table 5.2 describes the sample description by the variables included in the BMHCU. Twenty-six percent ($n=27$) were White Non-Hispanic, 44.7% ($n=46$), and 29.1% ($n=30$) were Hispanic. Forty-five percent ($n=47$) had no high school diploma or GED. Close to 40% ($n=41$) reported heavy alcohol use, and close to 30% ($n=30$) reported moderate alcohol use in the past 12 months. Most reported no use of illicit drug use (55.8%, $n=58$). A little less than half reported major depression (39.4%, $n=41$). The majority of the sample had a regular source of care (87.5%, $n=91$), some insurance (77.9%, $n=81$), and an income of less than \$10,000 (62.5%, $n=65$). Most reported that they had not received a routine physical exam in the past 12 months (59.6%, $n=52$) or a routine dental exam in the past 12 months (76.9%, $n=80$). Half the participants perceived their health status as fair or poor (50%, $n=52$). Three out of ten of the women reported light activity limitations in the past 12 months (29.8%, $n=31$). Close to half stated they had a lot of pain in the past 12 months (48.1%, $n=50$).

Table 5.2 describes the bivariate relationship of the variables in the BMHCU by adherence to female health care recommendation. Only one out of the seven predisposing variables in the model was significant for adherence, age ($p .005$). The majority of participants aged 40 and above reported complete adherence (96%) compared to 73.5% of those aged 18 through 29, and 60% of those aged 30 through 39. One out of five enabling resources variables was significant at the bivariate level, receiving a routine dental exam in the past twelve months ($p .033$). Participants who reported no routine

dental exam in the past 12 months had adherence rates of 78.8% compared to a complete adherence rate of 54.2% for participants who had a routine dental exam in the past 12 months. No perceived need variables were significant at the bivariate level.

Table 5.2
Univariate and Bivariate Distribution for Adherence to a
Female Health Care Recommendation

Predictors	Total N=104 N(%)	Complete Adherence Yes(%)	p-value
<u>Predisposing Characteristics</u>			.005
Age	34(32.7)	73.5	
18-29	45(43.3)	60.0	
30-39	25(24.0)	96.0	
40 and above			
Gender			
Male	N/A	N/A	N/A
Female			
Race/Ethnicity			.378
White non-Hispanic	27(26.2)	77.8	
African American	46(44.7)	76.1	
Hispanic	30(29.1)	63.3	
Education			.658
High school diploma or GED	57(54.8)	75.4	
No high school diploma or GED	47(45.2)	70.2	
Alcohol Used			.564
No Use	33(31.7)	72.7	
Moderate Use	30(28.8)	66.7	
Heavy Use	41(39.4)	78.0	
Illicit Drug Use			.449
No Use of Illicit Drugs	58(55.8)	74.1	
Use of Illicit Drugs Non-Injection	33(31.7)	66.7	
Use of Illicit Drugs Injection	13(12.5)	84.1	
Depression			.258
No Major Depression	63(60.6)	77.8	
Major Depression	41(39.4)	65.9	
<u>Enabling Resources</u>			
Regular Source of Care			.177
Yes	91(87.5)	70.3	
No	13(12.5)	92.3	
Insurance Status			.425
Yes	81(77.9)	75.3	
No	23(22.1)	65.2	
Income			.882
\$20,000 and Above	18(17.3)	77.8	
\$10,000-\$19,999	21(20.2)	71.4	
Less than \$10,000	65(62.5)	72.3	
Routine Physical Exam			.370
Yes	42(40.4)	78.6	
No	62(59.6)	69.4	
Routine Dental Exam			.033
Yes	24(23.1)	54.2	
No	80(76.9)	78.8	

Table 5.2
Univariate and Bivariate for Adherence to a
Female Health Care Recommendation

Predictors	Total N(%)	Complete Adherence Yes %	<i>p</i> -value
<u>Perceived Need</u>			.582
Perceived Health Status			
Excellent	10(9.6)	70.0	
Very Good/Good	42(40.4)	78.6	
Fair/Poor	52(50.0)	69.2	
Physical Activity Limitations			.497
No Activity Limitations	48(46.2)	75.0	
Vigorous Activity Limitations	11(10.6)	72.7	
Moderate Activity Limitations	14(13.5)	85.7	
Light Activity Limitations	31(29.8)	64.5	
Had a Lot of Physical Pain			.278
Yes	50(48.1)	68.0	
No	54(51.9)	77.8	

Adherence to Female Health Problem Multivariate Analysis

Table 5.3 presents the multivariate analysis for adherence to female health care recommendations. No predisposing characteristics were significant for adherence to female health care recommendations at the multivariate level. Four of the five enabling resources were significant at the multivariate level, regular source of care, insurance status, receipt routine physical exam, and receipt of a routine dental exam in the past 12 months. Participants who had no regular source of care in the past 12 months were more likely (AOR=135.81;CI,2.27,8135.66) than participants who had a regular source of care. Participants who had no health insurance in the past 12 months were less likely (AOR=.135;CI,.020,.903) to completely adhere to female health care recommendations than participants who had insurance in the past 12 months. Participants who had no

routine physical exam were less likely (AOR=.151; CI,.030,.763) to completely adhere to a female health care recommendation than participants who had received a routine physical exam in the past 12 months. Participants who had no routine dental exam in the past 12 months more less likely (AOR=23.692; CI,3.78,171.26) than participants who received a routine dental exam in the past 12 months to completely adhere to an female health care recommendation. One of the three perceived need variables was significant for adherence to female health care recommendations at the multivariate level.

Participants who perceived their health status as fair/poor were more likely (AOR=21.261;CI,1.37,331.67) to completely adhere to female health care recommendations than participants who perceived their health status as excellent.

The Nagelkerke R^2 for adherence to a female health care recommendation is .536 indicating that the model explained 54 percent of the variance in adherence to female health care recommendations.

Hypothesis 2 was not supported, participants aged 30 to 39, and participants aged 40 and above were not *more likely* than participants aged 18 to 29 to adhere to female prescribed health care recommendations.

Hypothesis 4 was not supported, African American and Hispanic participants were not *less likely* than White non-Hispanic participants to adhere to female prescribed health care recommendations.

Hypothesis 5 was not supported, participants with no high school diploma or GED were not *less likely* than participants with a high school diploma or GED to adhere to female prescribed health care recommendations.

Hypothesis 6 was not supported, participants who are non-injection illicit drug users or injecting illicit drug users were not *less likely* than participants who do not use drugs to adhere to female prescribed health care recommendations.

Hypothesis 7 was not supported, participants with moderate alcohol use and heavy alcohol use were not *less likely* than participants who do not use alcohol to adhere to female prescribed health care recommendations.

Hypothesis 8 was not supported, participants who had major depression were not *less likely* than participants with no major depression to adhere to female prescribed health care recommendations.

Hypothesis 9 was not supported, participants who had no regular source of care were more likely rather than *less likely* than participants who had a regular source of care to adhere to female prescribed health care recommendations.

Hypothesis 10 was supported, participants who had no insurance were *less likely* than participants who had insurance to adhere to female prescribed health care recommendations.

Hypothesis 11 was not supported, participants who had an income of less than \$10,000 and an income of \$10,000 to \$19,999 were no *less likely* than participants who had an income of \$20,000 and above to adhere to female prescribed health care recommendations.

Hypothesis 12 was supported, participants who had no routine physical exam in the past 12 months were *less likely* than participants who had a routine physical exam in the past 12 months to adhere to female prescribed health care recommendations.

Hypothesis 13 was not supported, participants who had no dental exam in the past 12 months were more likely rather than *less likely* than participants who had a dental exam in the past 12 months to adhere to female prescribed health care recommendations.

Hypothesis 14 was partially supported, participants who perceived their health as fair to poor were not *more likely* than participants who perceived their health as excellent to adhere to prescribed health care recommendations while participants who perceived their health as very good to good were not *more likely* than participants who perceived their health as excellent to adhere to female prescribed health care recommendations.

Hypothesis 15 was not supported, participants who experienced vigorous physical activity limitations, moderate physical activity limitations, and light physical activity limitations were not *more likely* than participants who had no physical activity limitations in the past 12 months to adhere to female prescribed health care recommendations.

Hypothesis 16 was not supported, participants who experienced no physical pain in the past 12 months were not *more likely* than participants who experienced physical pain in the past 12 months to adhere to female prescribed health care recommendations.

Hypothesis 17 was supported, the BMHCU predicted 54% of the variance of adherence to female health care recommendations.

Table 5.3
Adjusted Odds Ratios for Adherence to Female Health Care Recommendations

Predictors	AOR	CI	p-value
<u>Predisposing Characteristics</u>			
Age			
18-29	1.00		.012
30-39	.159	.024, 1.077	.060
40 and above	7.995	.504, 127.211	.141
Gender			
Male	N/A	N/A	N/A
Female			
Race/Ethnicity			
White non-Hispanic	1.00		.491
African American	3.210	.478, 20.383	.235
Hispanic	2.070	.277, 15.486	.478
Education			
High school diploma or GED	1.00		
No high school diploma or GED	.744	.193 3.104	.718
Alcohol Used			
No Use	1.00		.111
Moderate Use	.148	.017 1.323	.087
Heavy Use	1.330	.194 9.188	.771
Illicit Drug Use			
No Use of Illicit Drugs	1.00	.052 2.715	.129
Use of Illicit Drugs Non-Injection	.375	.521	.332
Use of Illicit Drugs Injection	9.963	190.633	.127
Depression			
No Major Depression	1.00		
Major Depression	.214	.029 1.587	.132
<u>Enabling Resources</u>			
Regular Source of Care			
Yes	1.00	2.267	
No	135.813	8135.66	.019
Insurance Status			
Yes	1.00		
No	.135	.020 .903	.039
Income			
\$20,000 and Above	1.00		.283
\$10,000-\$19,999	.569	.048 6.724	.655
Less than \$10,000	.213	.023 1.934	.169
Routine Physical Exam			
Yes	1.00		
No	.151	.030 .763	.022
Routine Dental Exam			
Yes	1.00	3.278,	
No	23.692	171.26	.002

Table 5.3
Adjusted Odds Ratios for Adherence to Female Health Care Recommendations

Predictors	AOR	CI	p-value
Perceived Need			
Perceived Health Status			
Excellent	1.00		.092
Very Good/Good	9.047	.838,97.679	.070
Fair/Poor	21.261	1.369,331.66	.029
Physical Activity Limitations			
No Activity Limitations	1.00		.458
Vigorous Activity Limitations	.899	.064,12.564	.937
Moderate Activity Limitations	8.330	.565,227.61	.122
Light Activity Limitations	1.343	.238,7.573	.738
Had a Lot of Physical Pain			
Yes	1.00		
No	.687	.129,3.656	.660
R²	.536		

Adherence to Respiratory Health Care Recommendations

Adherence Respiratory Health Problem Univariate and Bivariate Analysis

One hundred thirty four participants received a prescribed health care recommendation for a respiratory health problem. Table 5.4 describes the sample description for the variables included in the BMHCU. Nineteen percent ($n=25$) were aged 18 through 29, 33.6% ($n=45$) were aged 30 through 39, and 47.8% ($n=64$) were aged 40 and above. The majority of the sample were females (56.7%, $n=76$). Thirty percent ($n=40$) were White Non-Hispanic, 38.8% ($n=52$) were African American, and 31.3% ($n=42$) were Hispanic. More than half (57.5%, $n=77$) had a high school diploma or GED, and were heavy alcohol users (50.7%, $n=68$). Thirty-two percent ($n=43$) were non-drug users, 38.1% ($n=51$) were non-injection drug users, and 29.9% ($n=40$) were injection drug users. Forty-nine percent ($n=66$) had major depression. The majority had a regular

source of care (91.0%, $n=122$), and insurance (77.6%, $n=104$). More than half had incomes of less than \$10,000 (61.9%, $n=83$). The majority reported no routine physical exam in the past 12 months (65.7%, $n=88$), and routine dental exam (79.9%, $n=107$). Half the participants perceived their health status as fair or poor (50%, $n=67$). Thirty-one percent ($n=41$) reported experiencing light physical activity limitations in the past 12 months. Fifty-two percent ($n=70$) reported having a lot of pain in the past 12 months.

Table 5.4 describes the bivariate relationship of the variables in the BMHCU by adherence to respiratory care recommendation. None of the seven predisposing variables was significant for adherence. None of the five enabling resources variables was significant at the bivariate level. No perceived need variables were significant at the bivariate level.

Table 5.4
Univariate and Bivariate Distribution for Adherence to a Respiratory Health Care Recommendations

Predictors	Total N= N(%)	Complete Adherence Yes (%)	<i>p</i> -value
<u>Predisposing Characteristics</u>			
Age			.732
18-29	25(18.7)	52.0	
30-39	45(33.6)	60.0	
40 and above	64(47.8)	60.9	
Gender			1.00
Male	58(43.3)	58.6	
Female	76(56.7)	59.2	
Race/Ethnicity			.214
White non-Hispanic	40(29.9)	67.5	
African American	52(38.8)	50.0	
Hispanic	42(31.3)	61.9	
Education			.860
High school diploma or GED	77(57.5)	59.7	
No high school diploma or GED	57(42.5)	57.9	
Alcohol Used			.848
No Use	37(27.6)	62.2	
Moderate Use	29(21.6)	55.2	
Heavy Use	68(50.7)	58.8	
Illicit Drug Use			.927
No Use of Illicit Drugs	43(32.1)	60.5	
Use of Illicit Drugs Non-Injection	51(38.1)	56.9	
Use of Illicit Drugs Injection	40(29.9)	60.0	
Depression			.728
No Major Depression	68(50.7)	57.4	
Major Depression	66(49.3)	60.6	
<u>Enabling Resources</u>			1.00
Regular Source of Care			
Yes	122(91.0)	59.0	
No	12(9.0)	58.3	
Insurance Status			.675
Yes	104(77.6)	57.7	
No	30(22.4)	58.3	
Income			.740
\$20,000 and Above	16(11.9)	50.0	
\$10,000-\$19,999	35(26.1)	60.0	
Less than \$10,000	83(61.9)	60.2	
Routine Physical Exam			.580
Yes	46(34.3)	63.0	
No	88(65.7)	56.8	
Routine Dental Exam			.124
Yes	27(20.1)	44.4	
No	107(79.9)	62.6	

Table 5.4
Univariate and Bivariate Distribution for Adherence to a Respiratory Health Care Recommendation

Predictors	Total N(%)	Complete Adherence Yes %	<i>p</i> -value
<u>Perceived Need</u>			
Perceived Health Status			
Excellent	7(5.2)	28.6	.200
Very Good/Good	60(44.8)	63.3	
Fair/Poor	67(50.0)	58.2	
Physical Activity Limitations			
No Activity Limitations	58(43.3)	63.8	.644
Vigorous Activity Limitations	19(14.2)	47.4	
Moderate Activity Limitations	16(11.9)	56.3	
Light Activity Limitations	41(30.6)	58.5	
Had a Lot of Physical Pain			
Yes	70(52.2)	52.9	.161
No	64(47.8)	65.6	

Adherence to Respiratory Health Problem Multivariate Analysis

Table 5.5 presents the multivariate analysis for adherence to respiratory health care recommendations. No predisposing characteristics, enabling resources, and/or perceived need variables were significant for adherence to respiratory health care recommendations. The Nagelkerke R^2 for adherence to a respiratory health care recommendation is .166 indicating that the model explained 17 percent of the variance in adherence to respiratory health care recommendations.

Hypothesis 2 was not supported, participants aged 30 to 39, and participants aged 40 and above were not *more likely* than participants aged 18 to 29 to adhere to respiratory prescribed health care recommendations.

Hypothesis 3 was not supported, female participants were not *more likely* than male participants to adhere to respiratory prescribed health care recommendations.

Hypothesis 4 was not supported, African American and Hispanic participants were not *less likely* than White non-Hispanic participants to adhere to respiratory prescribed health care recommendations.

Hypothesis 5 was not, participants with no high school diploma or GED were not *less likely* than participants with a high school diploma or GED to adhere to respiratory prescribed health care recommendations.

Hypothesis 6 was not supported, participants who are non-injection illicit drug users or injecting illicit drug users were not *less likely* than participants who do not use drugs to adhere to respiratory prescribed health care recommendations.

Hypothesis 7 was not supported, participants with moderate alcohol use and heavy alcohol use were not *less likely* than participants who do not use alcohol to adhere to respiratory prescribed health care recommendations.

Hypothesis 8 was not supported, participants who had major depression were not *less likely* than participants with no major depression to adhere to respiratory prescribed health care recommendations.

Hypothesis 9 was not supported, participants who had no regular source of care were more likely rather than *less likely* than participants who had a regular source of care to adhere to respiratory prescribed health care recommendations.

Hypothesis 10 was supported, participants who had no insurance were *less likely* than participants who had insurance to adhere to respiratory prescribed health care recommendations.

Hypothesis 11 was not supported, participants who had an income of less than \$10,000 and an income of \$10,000 to \$19,999 were not *less likely* than participants who had an income of \$20,000 and above to adhere to respiratory prescribed health care recommendations.

Hypothesis 12 was supported, participants who had no routine physical exam in the past 12 months were *less likely* than participants who had a routine physical exam in the past 12 months to adhere to respiratory prescribed health care recommendations.

Hypothesis 13 was not supported, participants who had no dental exam in the past 12 months were more likely rather than *less likely* than participants who had a dental exam in the past 12 months to adhere to respiratory prescribed health care recommendations.

Hypothesis 14 was not supported, participants who perceived their health as fair to poor and/or very good to good were not *more likely* than participants who perceived their health as excellent to adhere to respiratory prescribed health care recommendations.

Hypothesis 15 was not supported, participants who experienced vigorous physical activity limitations, moderate physical activity limitations, and light physical activity limitations were not *more likely* than participants who had no physical activity limitations in the past 12 months to adhere to respiratory prescribed health care recommendations.

Hypothesis 16 was not supported, participants who experienced no physical pain in the past 12 months were not *more likely* than participants who experienced physical pain in the past 12 months to adhere to respiratory prescribed health care recommendations.

Hypothesis 17 was supported, the BMHCU predicted 17% of the variance of adherence to respiratory health care recommendations.

Table 5.5
Adjusted Odds Ratios for Adherence to Respiratory Health Care Recommendations

Predictors	AOR	CI	p-value
<u>Predisposing Characteristics</u>			
Age			
18-29	1.00		.475
30-39	2.062	.603,7.045	.248
40 and above	1.945	.579,6.530	.282
Gender			
Male	1.00		
Female	1.037	.435,2.475	.934
Race/Ethnicity			
White non-Hispanic	1.00		.181
African American	.337	.129,1.078	.069
Hispanic	.591	.189,1.849	.366
Education			
High school diploma or GED	1.00		
No high school diploma or GED	.856	.354,2.071	.730
Alcohol Used			
No Use	1.00		.698
Moderate Use	.610	.192,1.943	.403
Heavy Use	.867	.325,2.313	.776
Illicit Drug Use			
No Use of Illicit Drugs	1.00		.528
Use of Illicit Drugs Non-Injection	.557	.190,1.633	.287
Use of Illicit Drugs Injection	.859	.274,2.690	.794
Depression			
No Major Depression	1.00		
Major Depression	1.441	.590,3.523	.423
<u>Enabling Resources</u>			
Regular Source of Care			
Yes	1.00		
No	1.524	.336,6.911	.585
Insurance Status			
Yes	1.00		
No	.913	.328,2.546	.862
Income			
\$20,000 and Above	1.00		.727
\$10,000-\$19,999	1.833	.413,8.141	.425
Less than \$10,000	1.555	.378,6.400	.541
Routine Physical Exam			
Yes	1.00		
No	.788	.330,1.882	.592
Routine Dental Exam			
Yes	1.00		
No	1.982	.726,5.412	.182

Table 5.5
Adjusted Odds Ratios for Adherence to Respiratory Health Care Recommendations

Predictors	AOR	CI	<i>p</i> -value
<u>Perceived Need</u>			
Perceived Health Status			
Excellent	1.00		.332
Very Good/Good	4.421	.621,31.495	.138
Fair/Poor	3.774	.502,28.361	.197
Physical Activity Limitations			
No Activity Limitations	1.00		.662
Vigorous Activity Limitations	.470	.134,1.645	.240
	.598	.145,2.463	.476
Moderate Activity Limitations	.814	.259,2.562	.725
Light Activity Limitations			
Had a Lot of Physical Pain			
Yes	1.00		
No	2.185	.792,6.023	.131
R²	.166		

Adherence to Injury Health Care Recommendations

Adherence Injury Health Problem Univariate and Bivariate Analysis

One hundred one participants received a prescribed health care recommendation for an injury health problem. Table 5.6 describes the sample description for the variables included in the BMHCU. Twenty-two percent ($n=22$) were aged 18 through 29, 42.6% ($n=43$) were aged 30 through 39, and 35.6% ($n=36$) were aged 40 and above. The majority of the sample were males (73.3%, $n=74$). Thirty-six percent ($n=37$) were White Non-Hispanic, 36.6% ($n=37$) were African American, and 26.7% ($n=27$) were Hispanic. The majority (67.3%, $n=74$) had a high school diploma or GED, and were heavy alcohol users (64.4%, $n=65$). Thirty-two percent ($n=33$) were non-drug users, 39.6% ($n=40$) were

non-injection drug users, and 27.7% were injection drug users. Thirty-six percent ($n=37$) had major depression. The majority had a regular source of care (71.3%, $n=72$), and insurance (66.3%, $n=67$). Half had incomes of less than \$10,000 (51.5%, $n=52$). The majority reported no routine physical exam in the past 12 months (69.3, $n=70$), and routine dental exam (86.1%, $n=87$). Close to four in ten participants perceived their health status as fair or poor (35.6%, $n=36$). Thirty percent ($n=29$) reported experiencing light physical activity limitations in the past 12 months. A little less than half (43.6%, $n=44$) reported having a lot of pain in the past 12 months.

Table 5.6 describes the bivariate relationship of the variables in the BMHCU by adherence to an injury health care recommendation. None of the seven predisposing variables were significant for adherence. One out of five enabling resources variables was significant at the bivariate level, receiving a routine dental exam in the past twelve months ($p .010$). Participants who reported no routine dental exam in the past 12 months had adherence rates of 48.3% compared to a complete adherence rate of 85.7% for participants who had a routine dental exam in the past 12 months. No perceived need variables were significant at the bivariate level.

Table 5.6
Univariate and Bivariate Distribution for Adherence to an Injury Health Care
Recommendations

Predictors	Total N= N(%)	Complete Adherence Yes(%)	<i>p</i> -value
<u>Predisposing Characteristics</u>			
Age			.696
18-29	22(21.8)	54.5	
30-39	43(42.6)	48.8	
40 and above	36(35.6)	58.3	
Gender			1.00
Male	74(73.3)	54.1	
Female	27(26.7)	51.9	
Race/Ethnicity			.499
White non-Hispanic	37(36.6)	51.4	
African American	37(36.6)	48.6	
Hispanic	27(26.7)	63.0	
Education			.834
High school diploma or GED	68(67.3)	54.4	
No high school diploma or GED	33(32.7)	51.5	
Alcohol Used			.294
No Use	17(16.8)	64.7	
Moderate Use	19(18.8)	63.2	
Heavy Use	65(64.4)	47.7	
Illicit Drug Use			.068
No Use of Illicit Drugs	33(32.7)	66.7	
Use of Illicit Drugs Non-Injection	40(39.6)	40.0	
Use of Illicit Drugs Injection	28(27.7)	57.1	
Depression			.302
No Major Depression	64(63.4)	57.8	
Major Depression	37(36.6)	45.9	
<u>Enabling Resources</u>			
Regular Source of Care			1.00
Yes	72(71.3)	52.8	
No	29(28.7)	55.2	
Insurance Status			.094
Yes	67(66.3)	59.7	
No	34(33.7)	41.2	
Income			.130
\$20,000 and Above	24(23.8)	58.3	
\$10,000-\$19,999	25(24.8)	36.0	
Less than \$10,000	52(51.5)	59.6	
Routine Physical Exam			1.00
Yes	31(30.7)	54.8	
No	70(69.3)	52.9	
Routine Dental Exam			.010
Yes	14(13.9)	85.7	
No	87(86.1)	48.3	

Table 5.6
Univariate and Bivariate Distribution for Adherence to an Injury Health Care Recommendations

Predictors	Total N= N(%)	Complete Adherence Yes(%)	<i>p</i> -value
<u>Perceived Need</u>			
Perceived Health Status			.939
Excellent	11(10.9)	54.5	
Very Good/Good	54(53.5)	51.9	
Fair/Poor	36(35.6)	55.6	
Physical Activity Limitations			
No Activity Limitations	41(40.6)	56.1	.608
Vigorous Activity Limitations	19(18.8)	52.6	
Moderate Activity Limitations	12(11.9)	66.7	
Light Activity Limitations	29(44.8)	44.8	
Had a Lot of Physical Pain			
Yes	44(43.6)	54.5	1.00
No	57(56.7)	52.6	

Adherence to Injury Health Problem Multivariate Analysis

Table 5.7 presents the multivariate analysis for adherence to an injury health care recommendations. No predisposing characteristics were significant for adherence to injury health care recommendations at the multivariate level. Two of the five enabling resources were significant at the multivariate level, income, and receipt of a routine dental exam. Participants with incomes of \$10,000 to \$19,999 were less likely (AOR=.180; CI,.036,.900) to completely adhere to an injury health care recommendation than participants who earned \$20,000 and above in the past 12 months. Participants who had no routine dental exam in the past 12 months were less likely (AOR=.106; CI,.018,.617) than participants who received a routine dental exam in the past 12 months to completely adhere to an injury health care recommendation. No perceived need

variables were significant for adherence to injury health care recommendations at the multivariate level.

The Nagelkerke R^2 for adherence to an injury health care recommendation is .323 indicating that the model explained 32 percent of the variance in adherence to injury health care recommendations.

Hypothesis 2 was not supported, participants aged 30 to 39, and participants aged 40 and above were not *more likely* than participants aged 18 to 29 to adhere to injury prescribed health care recommendations.

Hypothesis 3 was not supported, female participants were not *more likely* than male participants to adhere to injury prescribed health care recommendations.

Hypothesis 4 was not supported, African American and Hispanic participants were not *less likely* than White non-Hispanic participants to adhere to injury prescribed health care recommendations.

Hypothesis 5 was not, participants with no high school diploma or GED were not *less likely* than participants with a high school diploma or GED to adhere to injury prescribed health care recommendations.

Hypothesis 6 was not supported, participants who are non-injection illicit drug users or injecting illicit drug users were not *less likely* than participants who do not use drugs to adhere to injury prescribed health care recommendations.

Hypothesis 7 was not supported, participants with moderate alcohol use and heavy alcohol use were not *less likely* than participants who do not use alcohol to adhere to injury prescribed health care recommendations.

Hypothesis 8 was not supported, participants who had major depression were not *less likely* than participants with no major depression to adhere to injury prescribed health care recommendations.

Hypothesis 9 was not supported, participants who had no regular source of care were more likely rather than *less likely* than participants who had a regular source of care to adhere to injury prescribed health care recommendations.

Hypothesis 10 was supported, participants who had no insurance were *less likely* than participants who had insurance to adhere to injury prescribed health care recommendations.

Hypothesis 11 was partially supported, participants who had an income of \$10,000 to \$19,999 were *less likely* than participants who had an income of \$20,000 and above to adhere to injury prescribed health care recommendations. While participants who had an income of less than \$10,000 were not *less likely* than participants who had an income of \$20,000 and above to adhere to injury prescribed health care recommendations.

Hypothesis 12 was supported, participants who had no routine physical exam in the past 12 months were *less likely* than participants who had a routine physical exam in the past 12 months to adhere to injury prescribed health care recommendations.

Hypothesis 13 was supported, participants who had no dental exam in the past 12 months were *less likely* than participants who had a dental exam in the past 12 months to adhere to injury prescribed health care recommendations.

Hypothesis 14 was not supported, participants who perceived their health as fair to poor and/or very good to good were not *more likely* than participants who perceived their health as excellent to adhere to injury prescribed health care recommendations.

Hypothesis 15 was not supported, participants who experienced vigorous physical activity limitations, moderate physical activity limitations, and light physical activity limitations were not *more likely* than participants who had no physical activity limitations in the past 12 months to adhere to injury prescribed health care recommendations.

Hypothesis 16 was not supported, participants who experienced no physical pain in the past 12 months were not *more likely* than participants who experienced physical pain in the past 12 months to adhere to injury prescribed health care recommendations.

Hypothesis 17 was supported, the BMHCU predicted 32% of the variance of adherence to injury health care recommendations.

Table 5.7
Adjusted Odds Ratios for Adherence to an Injury Health Care Recommendations

Predictors	AOR	CI	p-value
<u>Predisposing Characteristics</u>			
Age			
18-29	1.00		.621
30-39	1.584	.353,7.101	.548
40 and above	2.225	.444,11.149	.331
Gender			
Male	1.00		
Female	.758	.225,2.558	.656
Race/Ethnicity			
White non-Hispanic	1.00		.447
African American	.845	.283,2.9477	.792
Hispanic	1.940	.501,7.521	.338
Education			
High school diploma or GED	1.00		
No high school diploma or GED	1.084	.341,3.446	.891
Alcohol Used			
No Use	1.00		.337
Moderate Use	.847	.154,4.665	.849
Heavy Use	.351	.071,1.726	.198
Illicit Drug Use			
No Use of Illicit Drugs	1.00		.432
Use of Illicit Drugs Non-Injection	.395	.097,1.611	.195
Use of Illicit Drugs Injection	.506	.097,2.638	.419
Depression			
No Major Depression	1.00		
Major Depression	.912	.256,3.251	.887
<u>Enabling Resources</u>			
Regular Source of Care			
Yes	1.00		
No	1.443	.383,5.422	.588
Insurance Status			
Yes	1.00		
No	.515	.157,1.691	.274
Income			
\$20,000 and Above	1.00		.089
\$10,000-\$19,999	.180	.036,.900	.037
Less than \$10,000	.541	.135,2.165	.385
Routine Physical Exam			
Yes	1.00		
No	.541	.135,2.165	.385
Routine Dental Exam			
Yes	1.00		
No	.106	.018,.617	.013

Table 5.7
Adjusted Odds Ratios for Adherence to an Injury Health Care Recommendations

Predictors	AOR	CI	p-value
<u>Perceived Need</u>			
Perceived Health Status			
Excellent	1.00		.938
Very Good/Good	1.321	.235,7.435	.752
Fair/Poor	1.142	.183,7.132	.887
Physical Activity Limitations			
No Activity Limitations	1.00		.471
Vigorous Activity Limitations	.611	.141,2.613	.510
Moderate Activity Limitations	1.137	.198,6.511	.886
Light Activity Limitations	.354	.080,1.571	.172
Had a Lot of Physical Pain			
Yes	1.00		
No	.426	.131,1.383	.155
R²	.323		

Adherence to Muscle Health Care Recommendations

Adherence to Muscle Health Problem Univariate and Bivariate Analysis

One hundred and twenty two participants received a prescribed health care recommendation for a muscle health problem. Table 5.8 describes the sample description for the variables included in the BMHCU. Eleven percent ($n=13$) were aged 18 through 29, 32.8% ($n=40$) were aged 30 through 39, and 55.6% ($n=69$) were aged 40 and above. More than half the participants were females (54.9%, $n=67$). One fourth of the sample (25.4%, $n=37$) were White Non-Hispanic, four out of ten (44.3%, $n=54$) were African American, and 30% ($n=37$) were Hispanic. The majority (61.5%, $n=75$) had a high school diploma or GED. Close to half were heavy alcohol users (45.9%, $n=56$). Forty-three percent ($n=52$) were non-drug users, 25.4% ($n=31$) were non-injection drug users, and

32% ($n=39$) were injection drug users. Close to one in four (36.1%, $n=44$) had major depression. The majority had a regular source of care (91%, $n=111$), insurance (83.6%, $n=102$), and had incomes of less than \$10,000 (54.1%, $n=66$). More than half reported having no routine physical exam in the past 12 months (59%, $n=72$), and no routine dental exam (71.3%, $n=87$). Half perceived their health status as fair or poor (50%, $n=61$). Thirty-two percent ($n=39$) reported experiencing light physical activity limitations in the past 12 months. The majority (68.9%, $n=84$) reported having a lot of pain in the past 12 months.

Table 5.8 describes the bivariate relationship of the variables in the BMHCU by adherence to injury health care recommendation. None of the seven predisposing variables were significant for adherence. None of the enabling resources variables was significant at the bivariate level. No perceived need variables were significant at the bivariate level.

Table 5.8
Univariate and Bivariate for Adherence to a Muscle Health Care Recommendations

Predictors	Total N=122 N(%)	Complete Adherence Yes %	<i>p</i> -value
<u>Predisposing Characteristics</u>			
Age			.885
18-29	13(10.7)	53.8	
30-39	40(32.8)	47.5	
40 and above	69(56.6)	46.4	
Gender			.363
Male	55(45.0)	47.3	
Female	67(54.9)	56.7	
Race/Ethnicity			.139
White non-Hispanic	31(25.4)	67.7	
African American	54(44.3)	46.3	
Hispanic	37(30.3)	48.6	
Education			.265
High school diploma or GED	75(61.5)	48.0	
No high school diploma or GED	47(38.5)	59.6	
Alcohol Used			.769
No Use	35(28.7)	57.1	
Moderate Use	31(25.4)	48.4	
Heavy Use	56(45.9)	51.8	
Illicit Drug Use			.110
No Use of Illicit Drugs	52(42.6)	63.5	
Use of Illicit Drugs Non-Injection	31(25.4)	45.2	
Use of Illicit Drugs Injection	39(32.0)	43.6	
Depression			1.00
No Major Depression	78(63.9)	52.6	
Major Depression	44(36.1)	52.3	
<u>Enabling Resources</u>			
Regular Source of Care			1.00
Yes	111(91.0)	52.3	
No	11(9.0)	54.5	
Insurance Status			.328
Yes	102(83.6)	50.0	
No	20(16.4)	65.0	
Income			.220
\$20,000 and Above	19(15.6)	57.9	
\$10,000-\$19,999	37(30.3)	40.5	
Less than \$10,000	66(54.1)	57.6	
Routine Physical Exam			.098
Yes	50(41.0)	62.0	
No	72(59.0)	45.8	
Routine Dental Exam			.073
Yes	35(28.7)	65.7	
No	87(71.3)	47.1	

Table 5.8
Univariate and Bivariate for Adherence to a Muscle Health Care Recommendations

Predictors	Total N(%)	Complete Adherence Yes %	<i>p</i> -value
<u>Perceived Need</u>			
Perceived Health Status			.989
Excellent	8(6.6)	50.0	
Very Good/Good	53(43.4)	52.8	
Fair/Poor	61(50.0)	52.5	
Physical Activity Limitations			.401
No Activity Limitations	45(36.9)	48.9	
Vigorous Activity Limitations	22(18.0)	59.1	
Moderate Activity Limitations	16(13.1)	68.8	
Light Activity Limitations	39(32.0)	46.2	
Had a Lot of Physical Pain			1.00
Yes	84(68.9)	52.4	
No	38(52.6)	52.6	

Adherence to Muscle Health Problem Multivariate Analysis

Table 5.9 presents the multivariate analysis for adherence to a muscle health care recommendations. No predisposing characteristics were significant for adherence to muscle health care recommendations at the multivariate level. Two of the five enabling resources were significant at the multivariate level, receipt of a routine physical exam and receipt of a routine dental exam in the past 12 months. Participants who had no routine physical exam in the past 12 months were less likely (AOR=.331; CI,.120,.908) than participants who received a routine physical exam in the past 12 months to completely adhere to a muscle health care recommendation. Participants who had no routine dental exam in the past 12 months were less likely (AOR=.301; CI,.103,.877) than participants who received a routine dental exam in the past 12 months to completely adhere to a

muscle health care recommendation. No perceived need variables were significant for adherence to muscle health care recommendations at the multivariate level.

The Nagelkerke R^2 for adherence to a muscle health care recommendation is .315 indicating that the model explained 32 percent of the variance in adherence to muscle health care recommendations.

Hypothesis 2 was not supported, participants aged 30 to 39, and participants aged 40 and above were not *more likely* than participants aged 18 to 29 to adhere to muscle prescribed health care recommendations.

Hypothesis 3 was not supported, female participants were not *more likely* than male participants to adhere to muscle prescribed health care recommendations.

Hypothesis 4 was not supported, African American and Hispanic participants were not *less likely* than White non-Hispanic participants to adhere to muscle prescribed health care recommendations.

Hypothesis 5 was not, participants with no high school diploma or GED were not *less likely* than participants with a high school diploma or GED to adhere to muscle prescribed health care recommendations.

Hypothesis 6 was not supported, participants who are non-injection illicit drug users or injecting illicit drug users were not *less likely* than participants who do not use drugs to adhere to muscle prescribed health care recommendations.

Hypothesis 7 was not supported, participants with moderate alcohol use and heavy alcohol use were not *less likely* than participants who do not use alcohol to adhere to muscle prescribed health care recommendations.

Hypothesis 8 was not supported, participants who had major depression were not *less likely* than participants with no major depression to adhere to muscle prescribed health care recommendations.

Hypothesis 9 was not supported, participants who had no regular source of care were more likely rather than *less likely* than participants who had a regular source of care to adhere to muscle prescribed health care recommendations.

Hypothesis 10 was not supported, participants who had no insurance were not *less likely* than participants who had insurance to adhere to muscle prescribed health care recommendations.

Hypothesis 11 was not supported, participants who had an income of less than \$10,000 and an income of \$10,000 to \$19,999 were not *less likely* than participants who had an income of \$20,000 and above to adhere to muscle prescribed health care recommendations.

Hypothesis 12 was supported, participants who had no routine physical exam in the past 12 months were *less likely* than participants who had a routine physical exam in the past 12 months to adhere to muscle prescribed health care recommendations.

Hypothesis 13 was supported, participants who had no dental exam in the past 12 months were less likely than participants who had a dental exam in the past 12 months to adhere to muscle prescribed health care recommendations.

Hypothesis 14 was not supported, participants who perceived their health as fair to poor and/or very good to good were not *more likely* than participants who perceived their health as excellent to adhere to muscle prescribed health care recommendations.

Hypothesis 15 was not supported, participants who experienced vigorous physical activity limitations, moderate physical activity limitations, and light physical activity limitations were not *more likely* than participants who had no physical activity limitations in the past 12 months to adhere to muscle prescribed health care recommendations.

Hypothesis 16 was not supported, participants who experienced no physical pain in the past 12 months were not *more likely* than participants who experienced physical pain in the past 12 months to adhere to muscle prescribed health care recommendations.

Hypothesis 17 was supported, the BMHCU predicted 32% of the variance of adherence to muscle health care recommendations.

Table 5.9
Adjusted Odds Ratios for Adherence to Muscle Health Care Recommendations

Predictors	AOR	CI	p-value
<u>Predisposing Characteristics</u>			
Age	1.00		.225
18-29	3.024	.615,14.862	.173
30-39	4.010	.828,19.426	.085
40 and above			
Gender			
Male	1.00		
Female	2.446	.861,6.951	.085
Race/Ethnicity			
White non-Hispanic	1.00		.263
African American	.353	.101,1.232	.103
Hispanic	.461	.113,1.886	.282
Education			
High school diploma or GED	1.00		
No high school diploma or GED	2.001	.714,5.608	.187
Alcohol Used			
No Use	1.00		.589
Moderate Use	.556	.170,1.1.820	.332
Heavy Use	.903	.287,2.843	.861
Illicit Drug Use			
No Use of Illicit Drugs	1.00		.296
Use of Illicit Drugs Non-Injection	.362	.100,1.307	.121
Use of Illicit Drugs Injection	.605	.173,2.119	.432
Depression			
No Major Depression	1.00		
Major Depression	1.299	.454,3.722	.626
<u>Enabling Resources</u>			
Regular Source of Care			
Yes	1.00		
No	.597	.110,3.241	.550
Insurance Status			
Yes	1.00		
No	3.481	.876,13.828	.070
Income			
\$20,000 and Above	1.00		.178
\$10,000-\$19,999	.347	.088,1.376	.132
Less than \$10,000	.806	.198,3.287	.764
Routine Physical Exam			
Yes	1.00		
No	.331	.120,.908	.032
Routine Dental Exam			
Yes	1.00		
No	.301	.103,.877	.028

Table 5.9
Adjusted Odds Ratios for Adherence to Muscle Health Care Recommendations

Predictors	AOR	CI	p-value
Perceived Need			
Perceived Health Status			
Excellent	1.00		.477
Very Good/Good	2.707	.392,18.689	.312
Fair/Poor	1.681	.233,12.137	.607
Physical Activity Limitations			
No Activity Limitations	1.00		.148
Vigorous Activity Limitations	2.810	.689,11.461	.150
Moderate Activity Limitations	4.696	.918,24.018	.063
Light Activity Limitations	1.182	.323,4.321	.801
Had a Lot of Physical Pain			
Yes	1.00		
No	1.081	.332,3.517	.897
R²	.315		

Adherence to Mental Health Care Recommendations

Adherence to Mental Health Problem Univariate and Bivariate Analysis

One hundred twenty-five participants received a prescribed health care recommendation for a mental health problem. Table 5.10 describes the sample description for the variables included in the BMHCU. The majority (56%, $n=70$) were aged 40 and above, and female (57.6%, $n=72$). Close to half were African America (49.6%, $n=62$), and more than half (55.2%, $n=69$) had a high school diploma or GED. Close to half were heavy alcohol users (47.2%, $n=59$). Forty-three percent ($n=54$) were non-drug users, 34.4% ($n=43$) were non-injection drug users, and 22.4% ($n=28$) were injection drug users. Four out of ten (44.8%, $n=56$) had major depression. The majority had a regular source of care (89.6%, $n=112$), insurance (79.2%, $n=99$), had incomes of less than \$10,000 (64.6%, $n=80$). The majority also reported having no routine physical

exam in the past 12 months (57.6%, $n=72$), no routine dental exam (75.2%, $n=94$), and perceived their health status as fair or poor (54.4%, $n=68$). Three out of ten (34.4%, $n=43$) reported experiencing light physical activity limitations in the past 12 months. More than half (56%, $n=70$) reported having a lot of pain in the past 12 months.

Table 5.10 describes the bivariate relationship of the variables in the BMHCU by adherence to mental health care recommendation. None of the seven predisposing variables were significant for adherence. None of the enabling resources variables was significant at the bivariate level. No perceived need variables were significant at the bivariate level.

Table 5.10
Univariate and Bivariate for Adherence to a Mental Health Care Recommendation

Predictors	Total N=125 N(%)	Complete Adherence Yes %	<i>p</i> -value
<u>Predisposing Characteristics</u>			
Age			.915
18-29	12(9.6)	58.3	
30-39	43(34.4)	55.8	
40 and above	70(56.0)	52.9	
Gender			1.00
Male	53(42.4)	54.7	
Female	72(57.6)	54.2	
Race/Ethnicity			.004
White non-Hispanic	29(23.2)	51.7	
African American	34(27.2)	32.4	
Hispanic	62(49.6)	67.7	
Education			.859
High school diploma or GED	69(55.2)	53.6	
No high school diploma or GED	56(44.8)	55.4	
Alcohol Used			.146
No Use	38(30.4)	65.8	
Moderate Use	28(22.4)	57.1	
Heavy Use	59(47.2)	45.8	
Illicit Drug Use			.008
No Use of Illicit Drugs	54(43.2)	70.4	
Use of Illicit Drugs Non-Injection	43(34.4)	41.9	
Use of Illicit Drugs Injection	28(22.4)	42.9	
Depression			.148
No Major Depression	69(55.2)	60.9	
Major Depression	56(44.8)	46.4	
<u>Enabling Resources</u>			
Regular Source of Care			.568
Yes	112(89.6)	55.4	
No	13(10.4)	46.2	
Insurance Status			.189
Yes	99(79.2)	57.6	
No	26(20.8)	42.3	
Income			.979
\$20,000 and Above	16(12.8)	56.3	
\$10,000-\$19,999	29(23.2)	55.2	
Less than \$10,000	80(64.0)	53.8	
Routine Physical Exam			.471
Yes	53(42.4)	58.5	
No	72(57.6)	51.4	
Routine Dental Exam			.145
Yes	31(24.8)	41.9	
No	94(75.2)	58.5	

Table 5.10
Univariate and Bivariate for Adherence to a Mental Health Care Recommendation

Predictors	Total N=125 N(%)	Complete Adherence Yes %	<i>p</i> -value
<u>Perceived Need</u>			
Perceived Health Status			.904
Excellent	10(8.0)	60.0	
Very Good/Good	47(37.6)	55.3	
Fair/Poor	68(54.4)	52.9	
Physical Activity Limitations			.668
No Activity Limitations	42(33.6)	57.1	
Vigorous Activity Limitations	18(14.4)	50.0	
Moderate Activity Limitations	22(17.6)	63.6	
Light Activity Limitations	43(34.4)	48.8	
Had a Lot of Physical Pain			.588
Yes	70(56.0)	57.1	
No	55(44.0)	50.9	

Adherence to Mental Health Problem Multivariate Analysis

Table 5.11 presents the multivariate analysis for adherence to a mental health care recommendation. Only one of the seven predisposing characteristic variables was significant for adherence to mental health care recommendations at the multivariate level, drug use status. Non-injection drug users were less likely (AOR=.266; CI,.088,.806) than participants who were non-drug users to completely adhere to mental health care recommendations. One of the five enabling resources was significant at the multivariate level, insurance status. Participants who had no insurance in the past 12 months were less likely (AOR=.289; CI,.089,.940) than participants who had insurance in the past 12 months to completely adhere to mental health care recommendations. No perceived need variables were significant for adherence to mental health care recommendations at the multivariate level.

The Nagelkerke R^2 for adherence to a mental health care recommendation is .325 indicating that the model explained 33 percent of the variance in adherence to mental health care recommendations.

Hypothesis 2 was not supported, participants aged 30 to 39, and participants aged 40 and above were not *more likely* than participants aged 18 to 29 to adhere to mental health prescribed health care recommendations.

Hypothesis 3 was not supported, female participants were not *more likely* than male participants to adhere to mental health prescribed health care recommendations.

Hypothesis 4 was not supported, African American and Hispanic participants were not *less likely* than White non-Hispanic participants to adhere to mental health prescribed health care recommendations.

Hypothesis 5 was not, participants with no high school diploma or GED were not *less likely* than participants with a high school diploma or GED to adhere to mental health prescribed health care recommendations.

Hypothesis 6 was partially supported, participants who are non-injection illicit drug users were not *less likely* than participants who do not use drugs to adhere to mental health prescribed health care recommendations, while participants who are injecting illicit drug users were not *less likely* than participants who do not use drugs to adhere to mental health prescribed health care recommendations.

Hypothesis 7 was not supported, participants with moderate alcohol use and heavy alcohol use were not *less likely* than participants who do not use alcohol to adhere to mental health prescribed health care recommendations.

Hypothesis 8 was not supported, participants who had major depression were not *less likely* than participants with no major depression to adhere to mental health prescribed health care recommendations.

Hypothesis 9 was not supported, participants who had no regular source of care were more likely rather than *less likely* than participants who had a regular source of care to adhere to mental health prescribed health care recommendations.

Hypothesis 10 was supported, participants who had no insurance were *less likely* than participants who had insurance to adhere to mental health prescribed health care recommendations.

Hypothesis 11 was not supported, participants who had an income of less than \$10,000 and an income of \$10,000 to \$19,999 were not *less likely* than participants who had an income of \$20,000 and above to adhere to mental health prescribed health care recommendations.

Hypothesis 12 was not supported, participants who had no routine physical exam in the past 12 months were not *less likely* than participants who had a routine physical exam in the past 12 months to adhere to mental health prescribed health care recommendations.

Hypothesis 13 was not supported, participants who had no dental exam in the past 12 months were more likely rather than *less likely* than participants who had a dental exam in the past 12 months to adhere to mental health prescribed health care recommendations.

Hypothesis 14 was not supported, participants who perceived their health as fair to poor and/or very good to good were not *more likely* than participants who perceived

their health as excellent to adhere to mental health prescribed health care recommendations.

Hypothesis 15 was not supported, participants who experienced vigorous physical activity limitations, moderate physical activity limitations, and light physical activity limitations were not *more likely* than participants who had no physical activity limitations in the past 12 months to adhere to mental health prescribed health care recommendations.

Hypothesis 16 was not supported, participants who experienced no physical pain in the past 12 months were not *more likely* than participants who experienced physical pain in the past 12 months to adhere to mental health prescribed health care recommendations.

Hypothesis 17 was supported, the BMHCU predicted 33% of the variance of adherence to mental health care recommendations.

Table 5.11
Adjusted Odds Ratios for Adherence to Mental Health Care Recommendations

Predictors	AOR	CI	p-value
<u>Predisposing Characteristics</u>			
Age			
18-29	1.00		.589
30-39	.656	.124,3.457	.619
40 and above	.461	.087,2.453	.364
Gender			
Male	1.00		
Female	.722	.276,1.888	.507
Race/Ethnicity			
White non-Hispanic	1.00		.006
African American	.459	.133,1.584	.218
Hispanic	2.773	.841,9.145	.094
Education			
High school diploma or GED	1.00		
No high school diploma or GED	.992	.366,2.688	.987
Alcohol Used			
No Use	1.00		.783
Moderate Use	.653	.198,2.157	.485
Heavy Use	.820	.263,2.556	.732
Illicit Drug Use			
No Use of Illicit Drugs	1.00		.047
Use of Illicit Drugs Non-Injection	.266	.088,.806	.019
Use of Illicit Drugs Injection	.296	.083,1.060	.062
Depression			
No Major Depression	1.00		
Major Depression	.775	.280,2.145	.623
<u>Enabling Resources</u>			
Regular Source of Care			
Yes	1.00		
No	.741	.162,3.385	.699
Insurance Status			
Yes	1.00		
No	.289	.089,.940	.039
Income			
\$20,000 and Above	1.00		.646
\$10,000-\$19,999	.541	.116,2.522	.435
Less than \$10,000	.504	.117,2.174	.358
Routine Physical Exam			
Yes	1.00		
No	.792	.324,1.939	.610
Routine Dental Exam			
Yes	1.00		
No	2.913	.986,8.600	.053

Table 5.11
Adjusted Odds Ratios for Adherence to Mental Health Care Recommendations

Predictors	AOR	CI	p-value
Perceived Need			
Perceived Health Status			
Excellent	1.00		.802
Very Good/Good	.737	.141,3.839	.717
Fair/Poor	.561	.092,3.440	.532
Physical Activity Limitations			
No Activity Limitations	1.00		.617
Vigorous Activity Limitations	1.218	.305,4.864	.780
Moderate Activity Limitations	2.319	.538,9.990	.259
Light Activity Limitations	.979	.279,3.439	.974
Had a Lot of Physical Pain			
Yes	1.00		.
No	.701	.228,2.153	.535
R²	.325		

Summary

Of the 17 hypotheses being examined, eight variables that were significant, 7 hypotheses were supported. For adherence to female health care recommendations, four out of 17 hypotheses were supported. Women with no insurance were less likely to adhere to female health care recommendations. Women with no routine physical exam in the past 12 months were less likely to adhere to female health care recommendations. Women who perceived their health as fair/poor were more likely to adhere to female health care recommendations. Two hypotheses, although significant at the multivariate, were not in the expected direction. Women with no regular source of care were more likely to adhere to female health care recommendations, and women with no routine dental exam in the past 12 months were more likely to adhere to female health care recommendations. No hypotheses were supported for adhere to respiratory health care

recommendations. Only two hypotheses were supported for adherence to injury health care recommendations. Participants with an income of \$10,000 to \$19,999 were less likely to adhere to injury health care recommendations than those with higher incomes, and participants with no routine dental exam were less likely to adhere to injury health care recommendations. Only two hypotheses were supported for adherence to muscle health care recommendations. Participants with no routine physical and no routine dental exam in the past twelve months were less likely to adhere to muscle health care recommendations. Two hypotheses were supported for adherence to mental health care recommendations. Participants who used illicit drugs but who did not inject drugs were less likely to adhere to mental health care recommendations than non-drug users. Participants with no insurance in the past 12 months were less likely to adhere to mental health care recommendations.

CHAPTER 6

Conclusion

Discussion

The overall objective of this study, was to assess whether factors drawn from the Behavioral Model of Health Care Utilization were associated with adherence to prescribed health care recommendations among a community-based sample of drug users and non-drug users from similar neighborhoods in Miami-Dade County, and, more specifically, to assess whether drug use was directly associated with adherence. This was an exploratory study extending beyond descriptive research with a multivariate component to identify relationships between predisposing characteristics, enabling resources, perceived need and adherence to prescribed health care recommendations. Research concerning adherence to health care recommendations has been studied over many years. The current renewed interest and proliferation of studies examining the topic of adherence to health care recommendations is due to the high rates of morbidity and mortality from HIV/AIDS and the ability for HIV medication therapy to improve health outcomes, in particular reducing morbidity and mortality from HIV/AIDS with the need for near perfect adherence to HIV medication therapy. The majority of research in adherence to HIV medication has studied mainly the drug user population, a population at high risk for contracting HIV. Not much was known about adherence to health care recommendations among drug users for other health care problems. Drug users as a population are at high risk for developing poor health outcomes (i.e., morbidity and mortality) from a variety of health conditions beyond HIV. This risk is due to the route and type of drug ingested. The stud of adherence among drug users should go beyond

adherence to HIV therapy, including the study of adherence among drug users to the recommendations for other health problems. This kind of inquiry could help to improve morbidity and mortality from disease for this vulnerable population. This study takes the initial steps in this task.

Previous research examining adherence to health care recommendations among drug users is lacking in three ways in which this study planned to address and add to the literature. The first and most important factor driving this study was the lack of previous research to provide a matching non-drug use comparison group. This study was able to address and add to the literature by the use of a unique data set that included drug users and non-drug users from similar neighborhoods. This provided an appropriate comparison group.

The second limitation of previous research on the relationship between drug use and adherence was the lack of theory driven studies. This dissertation explored the utility of the BMHCU as a guiding theoretical model to study adherence among drug users. Predictor variables were selected based on predisposing characteristics, enabling resources, and perceived need. The third and final limitation of previous research in which this dissertation attempted to add to the literature was to look beyond adherence to HIV therapy and study other health care problems. This study examined adherence among drug users for five health problems, female problems, respiratory problems, injury problem, muscular-skeletal problems, and mental health problems.

For the purpose of this study five adherence dummy variables were used and regressed on 16 independent variables selected from the BMHCU and previous literature. Dummy variables included adherence to female health care recommendations, adherence

to respiratory health care recommendations, adherence to injury health care recommendations, adherence to muscle health care recommendations, and adherence to mental health care recommendation. Logistic regression was used and the predictor variables selected based on the BMHCU. These predictors were entered simultaneously. Odds ratios and chi-square tests were used to test the predictors. The R squared test was used to determine how well the BMHCU predicted adherence to care.

The first specific aim was to determine the level of adherence among non-drug users and drug users from similar neighborhoods. It was expected that adherence among the sample would be low, this expectation was supported. Adherence rates among drug users were lower than adherence rates among non-drug users for all health care recommendation, except for female health care recommendations. This difference was not significant at the bivariate level. An expected observation was the relatively low adherence rate reported by all the participants, both drug users and non-drug users in the study. The majority of the sample reported rates as low as 53%. This low adherence rate is similar to findings from previous studies (Kyngäs, Duffy, & Kroll, 2000; Marston, 1970; Sackett & Snow, 1979) which found adherence rates as low as 4% to 94%. Another expected finding was the difference in adherence rate by health system. The highest rate of adherence was for health recommendations for STDs. This result is similar to information found in previous research, concerning expectation of treatment and differences between and within treatment types (Kyngäs, Duffy, & Kroll, 2000). Adherence rates vary by disease and by health care recommendation.

The second specific aim was to determine whether drug use was significantly associated with adherence when controlling for variables within the BMHCU. Hypothesis 6 was that drug users would be less likely to adhere than non-drug users when controlling for predictors in the BMHCU. The hypotheses was not supported for adherence to female health care recommendations, adherence to respiratory health care recommendations, adherence to injury health care recommendations, and adherence to muscle health care recommendations. Hypothesis 6 was partially supported for adherence to mental health care recommendations. Drug users were less likely to adhere to mental health care recommendation than non-drug users. Drug users, specifically non-injection drug users, were less likely to adhere to mental health care recommendations even when controlling for all other variables within the BMHCU. Previous research concerning adherence to care among drug users has primarily focused on adherence to highly active antiretroviral therapy (HAART), the medication regimen for HIV/AIDS (Bouhnik, Chesney, Carrieri, Gallais, Moatti, Obadia, Spire, MANIF 2000 Study Group, 2002; Broers Morabia, & Hirschel, 1994; Ferrando, Wall, Batki, & Sorensen, 1996; Gebo, Keruly, & Moore, 2003; Sorensen, Mascovich, Wall, DePhilippis, Batki, & Chesney, 1998; Tucker, Burnman, Sherbourne, Kung, & Gifford, 2003; Wall, Sorensen, Batki, Delucchi, London, & Chesney, 1995). Arnsten, Demas, Grant, Gourevitch, Farzadegan, Howard, and Schoenbaum (2002) examined the relationship between adherence to antiretroviral therapy and drug use. Arnsten, Demas, Grant, Gourevitch, Farzadegan, Howard, and Schoenbaum (2002) comparing former drug users with current drug users found that current drug users when compared to former drug users were significantly more likely to be non-adherent to antiretroviral therapy. Tucker, Burnman, Sherbourne, Kung, and

Gifford (2003) found that any drug use in the past 30 days, severity of drug use and cocaine/crack/freebase use were significantly associated with non-adherence to antiretroviral medications. Gebo, Keruly, and Moore (2003) found that any illicit drug use, cocaine use, heroin use, and/or binge drug use within the past six months was significantly associated with non-adherence. These studies had no non-drug use comparison group. Andersen, Bozzette, Shapiro et al.(2000) included a sample of both drug users and non-drug users and found that drug use was associated with receiving HIV therapy, but not with adherence to HIV therapy which may support the findings from this study that drug users may have difficulty accessing services, but once receiving services do not vary in adherence to health care recommendations.

The finding that drug use was associated with adherence to mental health care recommendations is not surprising. Previous studies show that drug users were less likely to adhere to mental health therapy than non-drug users. Comorbidity with mental health and drug use is high, and this creates complications in care (O'Connor, 1994; Tucker, 2003). This may be an important point of intervention, participants with comorbidity of drug use and mental health may be a group at higher risk of non-adherence.

Specific aim 3 was to assess whether factors drawn from the Behavioral Model of Health Care Utilization were associated with adherence to prescribed health care recommendations among a community-based sample of drug users and non-drug users.. There were two research questions asked for specific aim 3. First, in a multivariate model that included all independent variables, which of the variables from the predisposing characteristics, enabling resources, and perceived need domains are associated with

adherence? Second, is the BMHCU a sufficient model for explaining complete adherence and/or most often adherence to prescribed health care recommendations?

Among all five-adherence outcome measures, no predisposing characteristics were significant predictors. Predisposing characteristic hypotheses one through seven were not supported. Among perceived need variables only one hypothesis was partially supported, hypothesis 15, for adherence to female health care recommendations.

Participants who perceived their health status as fair to poor were more likely to adhere to adherence to female health care recommendations. Perceived need hypotheses fourteen and fifteen were not supported. Studies have found some support for the association between severity of illness and the degree of disability with adherence (Christensen, 1978; Marston, 1970; Scott, 2000).

Several enabling resources remained significant for four out of the five outcome measures: adherence to female health care recommendations, adherence to injury health care recommendations, adherence to muscle health care recommendation, and adherence to mental health care recommendations. No enabling resources were significant for respiratory health care recommendations. Hypothesis 8 was supported. Participants with no regular source of care were more likely to adhere to female health care recommendations. Hypothesis 8 was not supported for adherence to respiratory care, adherence to injury health recommendations, adherence to muscle health recommendations, and adherence, to mental health care recommendations. Hypothesis nine was supported for adherence to female health care recommendations and mental health care recommendations. Participants with no health insurance were less likely to adhere. Phillips et al. (1998) found that having any form of health insurance was

associated with adherence to mammography screening. Individuals with health insurance were more likely to adhere to mammography screening.

Hypothesis ten was partially supported for adherence to health care recommendations and not for adherence to female health care recommendations, adherence to respiratory health care recommendations, adherence to muscle health care recommendations, and adherence to mental health care recommendations. Participants with incomes of \$10,000 to \$19,999 were less likely to adhere than participants with an income of \$20,000 and above. Phillips et al. (1998) found that income was associated with adherence to mammography screening. Individuals with increased income were more likely to adhere to mammography screening. Neilson & Whyne (1995) found that the level of adherence to colorectal screenings increased as the social class/income level increased.

Hypothesis 11 was supported for adherence to female health care recommendations and adherence to muscle health care recommendations. Hypothesis 11 was not supported for adherence to respiratory health care recommendations, adherence to injury health care recommendations, and adherence to mental health care recommendations. Participants who had no routine physical exam were less likely to adhere to female health care recommendations and muscle health care recommendations.

Hypothesis 12 was supported for adherence to injury health care recommendations and adherence to muscle health recommendations. Participants with no dental exam were less likely to adhere to injury health care recommendations and muscle health care recommendations. Although dental exam was significant for adherence to female health care recommendations, hypothesis twelve was not supported, participants

with no dental exam were more likely to adhere to female health care recommendations. Utilization of preventative health services, such as routine physical and dental exams, have been associated with adherence (Neilson & Whynes, 1995). Neilson and Whynes (1995) found that individuals who had a routine dental exam in the past year were more likely than individuals who had no routine dental exam to adhere to colorectal cancer screenings. Phillips et al. (1998) found that receiving a preventative Pap smear within the past 3 years was significantly associated with adherence to mammography screenings. Identifying individuals who do not follow recommended screenings and health care exams might be one aspect in identifying and targeting individuals who do not adhere.

The R squared test showed that the BMHCU explained 17% to 54% of the variance. The BMHCU explained 54% of adherence to female health care recommendations, 17% of adherence to respiratory health care recommendations. The BMHCU explained close to 32% of adherence to injury health care recommendations, adherence to muscle health care recommendations, and adherence to mental health care recommendations. Although substantially high Nagelkerke R^2 were found for some of the outcome variables, very few predictor variables were significant within the model. The substantial R^2 , yet statistically insignificant odd ratios may indicate multicollinearity among the predictor variables. When reviewing the tests used for examining collinearity, correlation matrices, tolerance, and VIF no scores indicated high correlation (see appendix). Although the BMHCU has a history of use in previous studies to examine adherence to HIV medication therapy (Andersen et al., 2000) and adherence to mammography screenings (Phillips et al., 1998), these previous adherence studies may

actually have been measuring utilization. The model may not be an adequate model for studying adherence to health care recommendations.

Another difficulty in supporting the use of the BMHCU for adherence is the small sample size. The sample size for the 5 adherence measures may not be adequate to determine significance of predictor variables.

Limitations

The present study has several limitations; therefore, the results from this study are limited in several ways. The first limitation of the study is that it used cross-sectional data. The cross sectional nature of the data leads to the inability to make temporal or causal inferences about the relationship between the variables.

A second limitation of the study is that the sample is not representative of the general population because the study participants were not randomly recruited. The sample was recruited using a snowball technique. Previous research on drug users does provide support for this sample recruitment technique. To deal with this limitation the study increased the geographical selection areas of participants to include participants from six geographical areas of low-income high drug use neighborhoods in Miami-Dade County Florida.

A third limitation of the study is that it used self-report data of utilization of care, receipt of prescribed health care recommendations, and adherence. Self-report data may be biased due to a variety of factors, for example recall bias. The self-reported nature of the data on adherence determines the respondents' perception of adherence rather than actual adherence to prescribed health care recommendations. The findings may therefore overestimate or underestimate adherence to prescribed health care recommendations.

Nevertheless, one cannot assume that participants in this study reported adherence levels differently from that of the general population.

A fourth limitation of the study is the inability to determine the type and extent of health care recommendations prescribed. No information exists concerning the actual count and/or the type of prescribed health care recommendations participants received. For example, an individual may have been prescribed more than one health care recommendation for a female health problem. In addition, one has no idea on the extent or intensity of health care recommendation prescribed. For example and individual may have been prescribed follow up appointments, or prescribed medications. Nevertheless, the intent of this dissertation was to examine a subjective measure of adherence to determine if risk factors exist that supersedes all types of health care recommendations.

The final limitation is the small sample size. Although this was an exploratory study; all findings are limited due to the small sample sizes for each of the 5 adherence measures. Non-significant findings may not indicate no association due to small sample size. Yet, significant findings may show relevant associations that should be taken seriously (Allison, 1999).

Future Directions

This dissertation is not a definitive study of adherence; further studies are needed to understand the process of adherence among drug users. What is clear in this study is that adherence remains a topic of concern, the low level of adherence within the entire sample studied supports low levels of adherence found in previous research among the general population. Knowledge on the impact and role of non-adherence on health outcomes and cost of care supports the need for further research in understanding why

low levels of adherence continue even with current knowledge of the benefits of medical treatment. Unfortunately, this study supports previous research and reviews on the conceptualization of adherence. There remains a need to develop better measures of adherence. The lack of significant predictors found in this study may be a result of the small sample size for each of the five adherence measures, yet when domains were analyzed (using logistic regression) separately the lack of significant predictors remained even with fewer variables in the analysis. The lack of significant predictors may be due to the conceptualization of adherence. The main question for future research is to ask what decisions drug users make in order to determine their level of adherence. How does their drug use affect their adherence? Qualitative research may help add insight in this area. The future ideal study may be to connect qualitative research on adherence to health care recommendations with quantitative clinical trials observing personal behaviors (eg., taking medication, following diets, and/or executing lifestyle changes). Connecting to clinical trials will provide longitudinal data rather than cross-sectional data to understand better the process of adherence. Data collection may include diaries and other qualitative research techniques. Qualitative studies connected to clinical trials studying medical treatment aimed at improving health outcome can help in understanding the process of how individuals adhere to medical treatment.

APPENDIX A

Correlation Matrices

Correlation of Physical Activity Limitation Measures and Female Adherence

	(1)	(2)	(3)	(4)
Female Complete Adherence - 1	1.00			
Vigorous Activity Limitations - 2	-.075	1.00		
Moderate Activity Limitations - 3	-.068	.785**	1.00	
Light Activity Limitations - 4	-.126	.513**	.691**	1.00

*. Correlation is significant at the .05 level (2-tailed).

** . Correlation is significant at the .01 level (2-tailed).

Correlation of Physical Activity Limitation Measures and Respiratory Adherence

	(1)	(2)	(3)	(4)
Female Complete Adherence - 1	1.00			
Vigorous Activity Limitations - 2	-.080	1.00		
Moderate Activity Limitations - 3	.000	.733**	1.00	
Light Activity Limitations - 4	-.006	.533**	.751**	1.00

*. Correlation is significant at the .05 level (2-tailed).

** . Correlation is significant at the .01 level (2-tailed).

Correlation of Physical Activity Limitation Measures and Injury Adherence

	(1)	(2)	(3)	(4)
Female Complete Adherence - 1	1.00			
Vigorous Activity Limitations - 2	-.041	1.00		
Moderate Activity Limitations - 3	-.016	.656**	1.00	
Light Activity Limitations - 4	-.110	.458**	.739**	1.00

*. Correlation is significant at the .05 level (2-tailed).

** . Correlation is significant at the .01 level (2-tailed).

Correlation of Physical Activity Limitation Measures and Muscle Adherence

	(1)	(2)	(3)	(4)
Female Complete Adherence - 1	1.00			
Vigorous Activity Limitations - 2	.022	1.00		
Moderate Activity Limitations - 3	-.011	.672**	1.00	
Light Activity Limitations - 4	-.087	.507**	.734**	1.00

*. Correlation is significant at the .05 level (2-tailed).

** . Correlation is significant at the .01 level (2-tailed).

Correlation of Physical Activity Limitation Measures and Mental Health Adherence

	(1)	(2)	(3)	(4)
Female Complete Adherence - 1	1.00			
Vigorous Activity Limitations - 2	-.029	1.00		
Moderate Activity Limitations - 3	-.026	.644**	1.00	
Light Activity Limitations - 4	-.081	.433**	.673**	1.00

*. Correlation is significant at the .05 level (2-tailed).

** . Correlation is significant at the .01 level (2-tailed).

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Female problem adherence - 1	1.00							
Age - 2	.152	1.00						
Race/ethnicity - 3	-.117	-.052	1.00					
Education - 4	-.041	-.179	.094	1.00				
Alcohol use - 5	.049	.150	-.116	-.191*	1.00			
Illicit drug use - 6	-.023	.288**	-.202*	.085	.372**	1.00		
Depression - 7	-.131	.225**	-.058	.019	.160	.468**	1.00	
Regular source of care - 8	.077	.096	-.075	-.149	.055	.192	.112	1.00
Insurance status - 9	-.028	.043	-.084	.009	.075	.111	.092	-.313**
Income - 10	.005	.016	.134	.162	-.007	-.235*	-.141	-.227*
Routine physical exam - 11	-.054	.228**	-.122	-.092	.149	.229*	.263**	.187*
Routine dental exam - 12	.225*	-.015	-.222*	.014	-.029	-.042	.068	.093
Perceived health status - 13	-.082	.140	.035	.009	.053	.279**	.342**	-.043
Physical activity limitations - 14	-.084	-.057	.110	-.001	.030	.128	.210*	-.077
Had a lot of pain - 15	.092	-.166	-.199	.133	-.082	-.022	-.287**	.040

*. Correlation is significant at the .05 level (2-tailed).
 **. Correlation is significant at the .01 level (2-tailed).

Correlation among variables in the BMHCU and Adherence		(9)	(10)	(11)	(12)	(13)	(14)	(15)
Female problem adherence - 1								
Age - 2								
Race/ethnicity - 3								
Education - 4								
Alcohol use - 5								
Illicit drug use - 6								
Depression - 7								
Regular source of care - 8								
Insurance status - 9	1.00							
Income - 10	-.078	1.00						
Routine physical exam - 11	.054	-.049	1.00					
Routine dental exam - 12	.146	.067	.088	1.00				
Perceived health status - 13	.000	-.019	.208*	-.205*	1.00			
Physical activity limitations - 14	-.167	-.036	.007	-.174	.355**	1.00		
Had a lot of pain - 15	.047	-.059	-.134	.137	-.309**	-.495**	1.00	

*. Correlation is significant at the .05 level (2-tailed).
 **. Correlation is significant at the .01 level (2-tailed).

Correlation among variables in the BMHCU and Respiratory Adherence								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Respiratory Adherence - 1	1.00							
Age - 2	.023	1.00						
Gender - 3	.043	.120	1.00					
Race/ethnicity - 4	-.073	-.174*	.030	1.00				
Education - 5	.069	-.187*	.212**	.152	1.00			
Alcohol use - 6	-.064*	.146	-.239**	-.199*	-.136	1.00		
Illicit drug use - 7	-.053*	.217**	-.176**	-.060	-.198*	.234**	1.00	
Depression - 8	.003**	-.043	-.172*	.019	.088	.100	.199*	1.00
Regular source of care - 9	.010	-.210**	.258**	.031	-.017	.095	.138	.057
Insurance status - 10	.041	-.122	-.128	-.075	.009	-.021	.165*	.044
Income - 11	.023	.102	-.051	.124	.199*	-.065	-.163*	-.064
Routine physical exam - 12	-.045	-.069	-.118	-.125	.064	.067	.090	.084
Routine dental exam - 13	.114	.080	-.064	.009	.031	.005	.066	.160
Perceived health status - 14	.010	.176*	.094	.065	.097	-.027	.047	.338**
Physical activity limitations - 15	-.005	.075	.001	.052	-.197*	.165	.144	.279**
Had a lot of pain - 16	.075	-.267**	-.054	.028	.054	-.125	.127	-.285**

*. Correlation is significant at the .05 level (2-tailed).

** . Correlation is significant at the .01 level (2-tailed).

Correlation among variables in the BMHCU and Respiratory Adherence		(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Respiratory adherence - 1									
Age - 2									
Gender - 3									
Race/ethnicity - 4									
Education - 5									
Alcohol use - 6									
Illicit drug use - 7									
Depression - 8									
Regular source of care - 9	1.00								
Insurance status - 10	-.263**	1.00							
Income - 11	.033	-.009	1.00						
Routine physical exam - 12	.217**	.194**	.013	1.00					
Routine dental exam - 13	.075	.165*	.251**	.050	1.00				
Perceived health status - 14	.011	.006	-.072	.027	.159	1.00			
Physical activity limitations - 15	.120	-.017	-.089	.115	.004	.303**	1.00		
Had a lot of pain - 16	.057	.095	.088	.016	-.032	-.408**	-.495**	1.00	

*. Correlation is significant at the .05 level (2-tailed).
 **. Correlation is significant at the .01 level (2-tailed).

Correlation among variables in the BMHCU and Injury Adherence								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Injury Adherence - 1	1.00							
Age - 2	.079	1.00						
Gender - 3	-.001	-.024	1.00					
Race/ethnicity - 4	.035	-.088	-.073	1.00				
Education - 5	-.089	.006	.039	.215*	1.00			
Alcohol use - 6	-.212*	.316**	-.072	-.141	.158	1.00		
Illicit drug use - 7	-.095	.102	-.041	-.014	.008	.242**	1.00	
Depression - 8	-.115	-.059	.237**	.009	.084	.226*	.419**	1.00
Regular source of care - 9	-.001	-.249**	-.131	.019	-.149	-.048	.030	.017
Insurance status - 10	-.190*	-.196*	-.149	.129	.088	-.017	.141	.111
Income - 11	.083	.321**	.053	.113	.235**	.086	-.167	-.056
Routine physical exam - 12	-.075	.020	.101	-.043	.135	.077	-.145	.105
Routine dental exam - 13	-.196*	.010	.008	.101	-.015	-.059	-.064	-.111
Perceived health status - 14	.050	-.033	.191*	.093	.001	.081	.321**	.383**
Physical activity limitations - 15	-.053	.062	.088	.098	.091	.240**	.127	.251**
Had a lot of pain - 16	-.041	-.060	-.221*	.072	.028	-.162	-.265**	-.285**

*. Correlation is significant at the .05 level (2-tailed).

** . Correlation is significant at the .01 level (2-tailed).

Correlation among variables in the BMHCU and Injury Adherence		(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Injury adherence - 1									
Age - 2									
Gender - 3									
Race/ethnicity - 4									
Education - 5									
Alcohol use - 6									
Illicit drug use - 7									
Depression - 8									
Regular source of care - 9	1.00								
Insurance status - 10	.227*	1.00							
Income - 11	-.170	-.161	1.00						
Routine physical exam - 12	-.015	.171	-.018	1.00					
Routine dental exam - 13	.209*	.125	-.002	.003	1.00				
Perceived health status - 14	.120	-.104	.006	.044	-.064	1.00			
Physical activity limitations - 15	-.177*	.013	-.107	.038	-.118	.237**	1.00		
Had a lot of pain - 16	.175	-.006	-.013	-.081	.070	-.255**	-.488**	1.00	

*. Correlation is significant at the .05 level (2-tailed).
 **. Correlation is significant at the .01 level (2-tailed).

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Muscle Adherence - 1	1.00							
Age - 2	.041	1.00						
Gender - 3	.110	-.181**	1.00					
Race/ethnicity - 4	-.070	-.107	.007	1.00				
Education - 5	.119	.090	.004	.242*	1.00			
Alcohol use - 6	-.056	.182*	-.234**	-.146	.020	1.00		
Illicit drug use - 7	-.157	.231**	-.206	-.076	-.100	.238**	1.00	
Depression - 8	-.003	.005	.063	-.095	.037	.109	.213*	1.00
Regular source of care - 9	.021	.001	.066	-.194*	-.184*	.075	.037	.121
Insurance status - 10	.088	-.071	-.122	-.231**	-.122	.014	-.062	-.102
Income - 11	.107	.123	-.103	.120	.204*	-.024	-.329**	-.183*
Routine physical exam - 12	-.147	.201*	-.032	.121	-.043	.055	-.013	.071
Routine dental exam - 13	-.115	.149	-.031	.075	-.010	.018	.113	.024
Perceived health status - 14	.045	.045	.170*	.044	.277**	.114	.151	.247**
Physical activity limitations - 15	.028	.094	-.098	.015	-.024	.175*	.138	.192*
Had a lot of pain - 16	-.031	-.130	.044	.051	-.029	-.174*	-.124	-.358**

*. Correlation is significant at the .05 level (2-tailed).
 **. Correlation is significant at the .01 level (2-tailed).

Correlation among variables in the BMHCU and Muscle Adherence		(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Muscle adherence - 1									
Age - 2									
Gender - 3									
Race/ethnicity - 4									
Education - 5									
Alcohol use - 6									
Illicit drug use - 7									
Depression - 8									
Regular source of care - 9	1.00								
Insurance status - 10	.369**	1.00							
Income - 11	-.104	-.005	1.00						
Routine physical exam - 12	.192*	.135	.111	1.00					
Routine dental exam - 13	.015	.165	.048	.023	1.00				
Perceived health status - 14	-.043	-.143	.021	.046	.056	1.00			
Physical activity limitations - 15	.009	-.024	.078	.140	-.082	.382**	1.00		
Had a lot of pain - 16	.029	.113	-.027	-.113	.095	-.329**	.498**	1.00	

*. Correlation is significant at the .05 level (2-tailed).
 **. Correlation is significant at the .01 level (2-tailed).

Correlation among variables in the BMHCU and Mental Health Adherence								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Mental Health Adherence - 1	1.00							
Age - 2	.079	1.00						
Gender - 3	-.034	-.154	1.00					
Race/ethnicity - 4	-.036	-.105	.035	1.00				
Education - 5	.173*	-.153	.263**	.227**	1.00			
Alcohol use - 6	.063	.029	-.253**	-.152	.023	1.00		
Illicit drug use - 7	-.225**	.007	-.121	-.094	-.052	.261**	1.00	
Depression - 8	-.219**	-.024	.057	-.095	-.003	.178*	.280**	1.00
Regular source of care - 9	-.144	-.034	-.051	-.009	-.031	.047	-.011	-.096
Insurance status - 10	-.031	-.130	.033	.109	.039	-.033	-.129	.026
Income - 11	-.032	-.182*	.015	.027	.063	.055	-.281**	-.060
Routine physical exam - 12	-.010	.024	-.038	.123	.002	.087	.088	.057
Routine dental exam - 13	-.065	.090	-.016	-.029	-.040	.030	.002	-.153
Perceived health status - 14	.100	.048	.018	.070	.077	.062	.069	.403**
Physical activity limitations - 15	-.099	-.141	-.031	.054	-.040	.140	.077	.284**
Had a lot of pain - 16	-.074	.061	.025	.010	-.128	-.084	-.035	-.248**

*. Correlation is significant at the .05 level (2-tailed).
 **. Correlation is significant at the .01 level (2-tailed).

Correlation among variables in the BMHCU and Mental Health Adherence		(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Mental Health adherence - 1									
Age - 2									
Gender - 3									
Race/ethnicity - 4									
Education - 5									
Alcohol use - 6									
Illicit drug use - 7									
Depression - 8									
Regular source of care - 9	1.00								
Insurance status - 10	.293**	1.00							
Income - 11	.049	-.037	1.00						
Routine physical exam - 12	-.014	.118	-.081	1.00					
Routine dental exam - 13	.124	.015	.083	.030	1.00				
Perceived health status - 14	-.175**	-.134	-.055	.061	.003	1.00			
Physical activity limitations - 15	-.057	-.060	-.058	.011	-.089	.362**	1.00		
Had a lot of pain - 16	.125	.104	.188*	-.025	-.047	-.411**	-.451**	1.00	

*. Correlation is significant at the .05 level (2-tailed).
 **. Correlation is significant at the .01 level (2-tailed).

APPENDIX B

Tolerance and VIF

Collinearity Statistics of Physical Activity Limitations
for Female Adherence

	Tolerance	VIF
Vigorous Activity Limitations	.383	2.612
Moderate Activity Limitations	.272	3.680
Light Activity Limitations	.521	1.921

Collinearity Statistics of Physical Activity Limitations for
Respiratory Adherence

	Tolerance	VIF
Vigorous Activity Limitations	.463	2.161
Moderate Activity Limitations	.282	3.547
Light Activity Limitations	.436	2.295

Collinearity Statistics of Physical Activity Limitations for
Muscle Adherence

	Tolerance	VIF
Vigorous Activity Limitations	.549	1.823
Moderate Activity Limitations	.341	2.936
Light Activity Limitations	.461	2.169

Collinearity Statistics of Physical Activity Limitations for
Mental Health Adherence

	Tolerance	VIF
Vigorous Activity Limitations	.585	1.709
Moderate Activity Limitations	.394	2.540
Light Activity Limitations	.547	1.829

Collinearity Statistics Adherence to Female Health
Recommendations

	Tolerance	VIF
Age	.810	1.235
Race/Ethnicity	.805	1.243
Education	.807	1.239
Alcohol Use	.782	1.279
Illicit Drug Use	.543	1.843
Depression	.653	1.531
Regular Source of Care	.735	1.360
Insurance Status	.790	1.266
Income	.869	1.151
Routine Physical Exam	.818	1.223
Routine Dental Exam	.808	1.238
Perceived Health Status	.674	1.483
Physical Activity Limitations	.639	1.565
Had a lot of physical pain	.622	1.608

Collinearity Statistics Adherence to Respiratory Health
Recommendations

	Tolerance	VIF
Age	.701	1.427
Gender	.750	1.334
Race/Ethnicity	.846	1.181
Education	.797	1.254
Alcohol Use	.829	1.206
Illicit Drug Use	.755	1.324
Depression	.709	1.411
Regular Source	.808	1.238
Insurance Status	.814	1.228
Income	.782	1.278
Routine Physical	.850	1.177
Routine Dental Exam	.844	1.185
Perceived Health Status	.662	1.510
Physical Activity Limitations	.655	1.528
Had a lot of physical pain	.576	1.736

Collinearity Statistics Adherence to Injury Health
Recommendations

	Tolerance	VIF
Age	.694	1.442
Gender	.782	1.278
Race	.834	1.199
Education	.789	1.268
Alcohol Use	.641	1.560
Illicit Drug Use	.567	1.765
Depression	.630	1.588
Regular Source of Care	.798	1.253
Insurance Status	.777	1.287
Income	.693	1.442
Routine Physical Exam	.781	1.281
Routine Dental Exam	.921	1.086
Perceived Health Status	.713	1.403
Physical Activity Limitations	.645	1.551
Had a lot of physical pain	.656	1.525

Collinearity Statistics Adherence to Muscle Health
Recommendations

	Tolerance	VIF
Age	.778	1.286
Gender	.779	1.284
Race	.741	1.350
Education	.763	1.311
Alcohol Use	.835	1.198
Illicit Drug Use	.667	1.499
Depression	.769	1.301
Regular Source of Care	.744	1.343
Insurance Status	.685	1.460
Income	.736	1.359
Routine Physical Exam	.795	1.259
Routine Dental Exam	.906	1.104
Perceived Health Status	.649	1.541
Physical Activity Limitations	.607	1.647
Had a lot of physical pain	.561	1.783

Collinearity Statistics Adherence to Mental Health
Recommendations

	Tolerance	VIF
Age	.821	1.218
Gender	.781	1.281
Race/Ethnicity	.821	1.217
Education	.731	1.368
Alcohol Use	.732	1.366
Illicit Drug Use	.733	1.365
Depression	.713	1.403
Regular Source of Care	.866	1.155
Insurance Status	.798	1.253
Income	.721	1.386
Routine Physical Exam	.946	1.058
Routine Dental Exam	.883	1.133
Perceived Health Status	.657	1.521
Physical Activity Limitations	.652	1.534
Had a lot of physical pain	.612	1.634

APPENDIX C

Instrument

*Dependent Variable***Adherence**

B12g. How completely would you say you followed through on the medical treatment prescribed for your female problems?

(READ LIST)

NOT AT ALL	1
SOMEWHAT	2
CONSIDERABLY	3
COMPLETELY	4

B13g. How completely would you say you followed through on the medical treatment prescribed for your male problems?

(READ LIST)

NOT AT ALL	1
SOMEWHAT	2
CONSIDERABLY	3
COMPLETELY	4

B14g. How completely would you say you followed through on the medical treatment prescribed for your respiratory system or breathing problems?

(READ LIST)

NOT AT ALL	1
SOMEWHAT	2
CONSIDERABLY	3
COMPLETELY	4

B15g. How completely would you say you followed through on the medical treatment prescribed for your trauma or physical injury?

(READ LIST)

NOT AT ALL	1
SOMEWHAT	2
CONSIDERABLY	3
COMPLETELY	4

B16g. How completely would you say you followed through on the medical treatment prescribed for your muscle or bone problems?

(READ LIST)

NOT AT ALL	1
SOMEWHAT	2
CONSIDERABLY	3
COMPLETELY	4

B17g. How completely would you say you followed through on the medical treatment prescribed for your liver related problems?

(READ LIST)

NOT AT ALL	1
SOMEWHAT	2
CONSIDERABLY	3
COMPLETELY	4

B18g. How completely would you say you followed through on the medical treatment prescribed for your heart, blood or circulatory problems?

(READ LIST)

NOT AT ALL	1
SOMEWHAT	2
CONSIDERABLY	3
COMPLETELY	4

B19g. How completely would you say you followed through on the medical treatment prescribed for your stomach and digestive problems?

(READ LIST)

NOT AT ALL	1
SOMEWHAT	2
CONSIDERABLY	3
COMPLETELY	4

B20g. How completely would you say you followed through on the medical treatment prescribed for your nervous system problems?

(READ LIST)

NOT AT ALL	1
SOMEWHAT	2
CONSIDERABLY	3
COMPLETELY	4

B21g. How completely would you say you followed through on the medical treatment prescribed for your skin problems?

(READ LIST)

NOT AT ALL	1
SOMEWHAT	2
CONSIDERABLY	3
COMPLETELY	4

B22g. How completely would you say you followed through on the medical treatment prescribed for your eye, ear, nose or throat problems?

(READ LIST)

NOT AT ALL	1
SOMEWHAT	2
CONSIDERABLY	3
COMPLETELY	4

B23g. How completely would you say you followed through on the medical treatment prescribed for your STDs?

(READ LIST)

NOT AT ALL	1
SOMEWHAT	2
CONSIDERABLY	3
COMPLETELY	4

Independent Variables

Predisposing Characteristics

Age

E2. What is your date of birth?

E2a. MONTH				
E2b. DAY				
E2c. YEAR				
E2d. How old are you?				

Gender

E1. INTERVIEWER: CODE GENDER OF RESPONDENT.

MALE	1
FEMALE	2

Race/ethnicity

E5. Do you consider yourself Black, White, Hispanic (or Latino), Asian, Native American, or another race?

(CIRCLE ONLY ONE ANSWER.)

Black (not of Hispanic origin)	1
White (not of Hispanic origin)	2
Hispanic/Latino (ASK E6 BELOW)	3
Asian (or Pacific Islander)	4
(Specify: _____)	
Native American (American Indian) or Alaskan native	5
Other (Specify: _____)	6

Education

	NO	YES
E7a. Do you have a high school diploma? (IF NO, ASK E7b) _____	1	2
E7b. Do you have a GED?	1	2

Alcohol use

D16. On the average, how often in the past 12 months have you had any alcoholic beverage?

(READ LIST - SHOW ALCOHOL CARD)

Not used alcohol in the last 12 months (SKIP TO D20)	0
1 or 2 days in the past 12 months	1
3 to 5 days in the past 12 months	2
Every other month or so (6 to 11 days per year)	3
1 to 2 times per month (12 to 24 days per year)	4
Several times a month (about 25 to 51 days per year)	5
About 1 or 2 days a week	6
Almost daily or 3 to 6 days a week	7
Daily in the past 12 months	8

D17. On the average, how often in the past 12 months have you had five or more alcoholic drinks on the same occasion? By "occasion" I mean at the same time, or within a couple of hours of each other.

(SHOW ALCOHOL CARD)

Used alcohol in the last 12 months but did <u>not</u> have five or more drinks on the same occasion	0
1 or 2 days in the past 12 months	1
3 to 5 days in the past 12 months	2
Every other month or so (6 to 11 days per year)	3
1 to 2 times per month (12 to 24 days per year)	4
Several times a month (about 25 to 51 days per year)	5
About 1 or 2 days a week	6
Almost daily or 3 to 6 days a week	7
Daily in the past 12 months	8

Drug Use

S6. OUTREACH CLASSIFICATION

Injection Drug User	1
Other chronic drug user	2
Non-drug user	3

Depression***20-item Zung Depression Scale*****A. I FEEL DOWNHEARTED, BLUE AND SAD**

- 1= none or a little of the time
- 2= some of the time
- 3= a good part of the time
- 4= most or all of the time

B. MORNING IS WHEN I FEEL THE BEST

- 1= none or a little of the time
- 2= some of the time
- 3= a good part of the time
- 4= most or all of the time

C. I HAVE CRYING SPELLS OR FEEL LIKE IT

- 1= none or a little of the time
- 2= some of the time
- 3= a good part of the time
- 4= most or all of the time

D. I HAVE TROUBLE SLEEPING THROUGH THE NIGHT

- 1= none or a little of the time
- 2= some of the time
- 3= a good part of the time
- 4= most or all of the time

E. I EAT AS MUCH AS I USED TO

- 1= none or a little of the time
- 2= some of the time
- 3= a good part of the time
- 4= most or all of the time

F. I ENJOY LOOKING AT TALKING TO AND BEING WITH ATTRACTIVE FEMALE/MEN

- 1= none or a little of the time
- 2= some of the time
- 3= a good part of the time
- 4= most or all of the time

G. I NOTICE THAT I AM LOSING WEIGHT

- 1= none or a little of the time
- 2= some of the time
- 3= a good part of the time
- 4= most or all of the time

H. I HAVE TROUBLE WITH CONSTIPATION

- 1= none or a little of the time
- 2= some of the time
- 3= a good part of the time
- 4= most or all of the time

I. MY HEART BEATS FASTER THAN USUAL

- 1= none or a little of the time
- 2= some of the time
- 3= a good part of the time
- 4= most or all of the time

J. MY MIND IS CLEAR AS IT USED TO BE

- 1= none or a little of the time
- 2= some of the time
- 3= a good part of the time
- 4= most or all of the time

K.

- 1= none or a little of the time
- 2= some of the time
- 3= a good part of the time
- 4= most or all of the time

L. I FIND IT EASY TO DO THINGS I USED TO DO

- 1= none or a little of the time
- 2= some of the time
- 3= a good part of the time
- 4= most or all of the time

M. I AM RESTLESS AND CAN'T KEEP STILL

- 1= none or a little of the time
- 2= some of the time
- 3= a good part of the time
- 4= most or all of the time

N. I AM HOPEFUL ABOUT THE FUTURE

- 1= none or a little of the time
- 2= some of the time
- 3= a good part of the time
- 4= most or all of the time

O. I AM MORE IRRITABLE THAN USUAL

- 1= none or a little of the time
- 2= some of the time
- 3= a good part of the time
- 4= most or all of the time

P. I FIND IT EASY TO MAKE DECISIONS

- 1= none or a little of the time
- 2= some of the time
- 3= a good part of the time
- 4= most or all of the time

Q. I FEEL THAT I AM USEFUL AND NEEDED

- 1= none or a little of the time
- 2= some of the time
- 3= a good part of the time
- 4= most or all of the time

R. MY LIFE IS PRETTY FULL

- 1= none or a little of the time
- 2= some of the time
- 3= a good part of the time
- 4= most or all of the time

S. I STEEL FEEL THAT OTHERS WOULD BE BETTER OFF IF I WAS DEAD

- 1= none or a little of the time
- 2= some of the time
- 3= a good part of the time
- 4= most or all of the time

T I STILL ENJOY THINGS I USED TO DO

- 1= none or a little of the time
- 2= some of the time
- 3= a good part of the time
- 4= most or all of the time

Enabling Resources***Regular source of care***

A5. Is there a clinic, health center, doctor's office, or other place that you usually go to if you are sick or need advice about your health?

NO (SKIP TO A8)1
 YES2

Insurance Status

- A9. How many months in the last 12 months were you covered by any type of health insurance or health care program including MEDICAID or Jackson Card?
 (IF NONE SKIP TO SECTION B) |__|__|

Income

- E20. In the past 12 months, approximately how much legal income did you receive from all sources?

(SHOW INCOME CARD)

\$0	00
\$1-\$4,999	01
\$5,000-\$9,999	02
\$10,000-\$14,999	03
\$15,000-\$19,999	04
\$20,000-\$24,999	05
\$25,000-\$29,999	06
\$30,000-\$34,000	07
\$35,000-\$39,999	08
\$40,000-\$44,999	09
\$45,000-\$49,999	10
\$50,000-\$59,999	11
\$60,000-\$69,999	12
\$70,000-\$79,999	13
\$80,000-\$89,999	14
\$90,000-\$99,999	15
\$100,000 and above	16
DK	77
REFUSED	88

E21. In the past 12 months how much illegal or possibly illegal income did you receive from all sources?

(SHOW INCOME CARD)

\$0	00
\$1-\$4,999	01
\$5,000-\$9,999	02
\$10,000-\$14,999	03
\$15,000-\$19,999	04
\$20,000-\$24,999	05
\$25,000-\$29,999	06
\$30,000-\$34,000	07
\$35,000-\$39,999	08
\$40,000-\$44,999	09
\$45,000-\$49,999	10
\$50,000-\$59,999	11
\$60,000-\$69,999	12
\$70,000-\$79,999	13
\$80,000-\$89,999	14
\$90,000-\$99,999	15
\$100,000 and above	16
DK	77
REFUSED	88

Routine Physical Exam

B30. Have you ever had a routine physical exam?

NO (SKIP TO B31)	1
YES	2

B30a. Was it in the past 12 months?

NO (SKIP TO B31)	1
YES	2

B30c. Was the routine physical exam the primary reason you saw the doctor or health care provider?

NO	1
YES	2

Routine Dental Exam

B32. Have you had a routine dental exam?

NO (IF FEMALE SKIP TO B33; IF MALE SKIP TO B39)	1
YES	2

B32a. Was it in the past 12 months?

NO (IF FEMALE SKIP TO B33; IF MALE SKIP TO B39)	1
YES	2

Perceived Need Variables***Perceived health status***

A1.	In general, would you say your health in the past 12 months was...		
	Excellent	1	
	Very Good	2	
	Good	3	
	Fair	4	
	Poor	5	
	DK/UNSURE	6	

Physical activity limitations

A3.	During the past 12 months, did your health at any time limit the kind of		
		NO	YES
	A3a. vigorous activity you can do?	1	2
	A3b. moderate activity you can do?	1	2
	A3c. light activity you can do?	1	2

Physical pain

A4.	During the past 12 months, have you		
		NO	YES
	A4b. Had a lot of physical pain or discomfort?	1	2

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