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Women and Methamphetamine
By

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A thesis submitted in partial satisfaction of the requirements for the degree of
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Graduate Division

Of the

University of California at Berkeley

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DEDICATION

I would like to dedicate this thesis to the many women who dedicated their time to participate in this study. I hope that the results help to bring better health services to these women and contribute to better healthcare for all.

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Introduction

In 2009, 21% of people greater than or equal to 12 years of age in the United States (US) had used illicit drugs in the past month[1]. In the US, illicit drug use is related to unemployment and low income [1]. This literature will provide the background for a study of healthcare utilization among women who use methamphetamine in San Francisco, CA. This study hopes to better describe what factors are positively associated with receiving care among women who use methamphetamine.

This review will explain some of the definitions for addiction and drug dependence and discuss the disease model of addiction (Section 1). The literature on healthcare theory and specifically on how vulnerable population's access healthcare will be reviewed (Section 2). The effect of drug use on health will be discussed (Section 3). The history of methamphetamine use and its physical and behavioral effects will be discussed (Section 4). Studies have shown that women who use drugs have different motivations for use and differences in drug use behavior from men; these differences will be described (Section 5). The behaviors of women who use methamphetamine specifically will be addressed (Section 6) People who use drugs have different healthcare needs and have a specific issues in accessing healthcare that will be addressed (Section 5). This literature review will give the relevant background literature for each of these topics in order to understand the conceptual framework used to analyze the data gathered regarding women who use methamphetamine.

1. Drug Addiction and Dependency

Drug addiction and dependency affect many people. The concepts that describe addiction and dependency and the mechanistic theory of how addiction develops are an important groundwork to understand the issues that face drug users and to discuss how dependency on illicit drugs affects their life.

1.1 What is Addiction?

There are many different definitions of addiction. References to chronic intoxication can be traced back to the ancient world[2]. There have been many different categorizations of drug use; including drug abuse, drug dependence and addiction [2]. These conditions exist along a continuum of medical and social manifestations. No one term can explain all the aspects of addiction or all the roles a drug can play. Drugs can act as positive reinforcement (producing euphoria) or negative reinforcement (alleviating withdrawal or dysphoria). Environmental stimuli associated with drug use can induce a conditioned response [3] Social stigma and attitudes around drug use vary widely, and definitions of addiction vary from moral to medical language [2].

The most recent edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM) (IV) avoids using the term addiction and refers instead to substance abuse and dependence disorders under the overarching phrase "substance use disorders"[4]. The DSM identifies impaired control over substance use as the essential feature of dependence. This means that, despite significant socioeconomic or health problems related to the use of a given substance, an individual continues to use the drug(s). Dependence as described by the DSM is not the same as physical dependence on a drug [4]. Physical dependence refers to a series of physiologic changes that result in physical or mental symptoms when a drug is withdrawn. A patient may have dependence on a drug without physical dependence or physical dependence on a drug without dependence. Addiction to a substance (i.e. substance dependence) is a chronic relapsing, compulsive disease that occurs despite the associated negative consequences of drug use [5]. Addictive behavior includes the spectrum of

behaviors that make up substance dependence as defined by the DSM. The American Society of Addiction Medicine defines addiction as:

“A primary, chronic disease of brain reward, motivation, memory and related circuitry. Dysfunction in these circuits leads to characteristic biological, psychological, social and spiritual manifestations. This is reflected in a person’s pathologically pursuing reward and/or relief by substance use and other behaviors.

Addiction is characterized by inability to consistently abstain, impairment in behavioral control, craving, diminished recognition of significant problems with one’s behaviors and interpersonal relationships, and a dysfunctional emotional response. Like other chronic diseases, addiction often involves cycles of relapse and remission. Without treatment or engagement in recovery activities, addiction is progressive and can result in disability or premature death.” [6]

According to Goldstein and Volkow (the director of the National Institute on Drug Abuse) addiction is a “complex disease process of the brain that results from recurring drug intoxication and is modulated by genetic developmental, experiential and environmental factors” [7]. Imaging studies looking at the biological activity of the brain in addicted individuals, have documented morphological changes in the frontal lobe in various forms of drug addiction.

All of these definitions come to the same basic conclusion i.e., that addiction is continuing to use a drug that provides some change in consciousness, despite persistent negative psychosocial ramifications of use. It is important to emphasize that legal drugs, including cigarettes, alcohol, caffeine and sugar also have significant effects on an individual, however they are considered less socially unacceptable. When you examine addiction and addictive behavior, based on scientific evidence, it is clear that people who use drugs face a complex array of biological, psychological and social factors, all of which contribute to their disease. Many of the factors affecting an individual are not explained by the idea that this disease is a personal moral failing for which blame can be assigned.

1.2 Theories of Addiction

There are multiple theories describing the utility and mechanism of addictive disease. These theories include an evolutionarily based theory and an integration of neurophysiologic data with theories regarding motivation, salience and reward. These theories are outlined below and help to provide a basis for understanding the behavior of people who use drugs.

Evolutionary theory is generally based on the Darwinian theory of the survival of the fittest, i.e. that organisms that possess a certain behavior or trait that increases their reproductive fitness produce more offspring and therefore increase the frequency of the advantageous trait or behavior in the population. Addictive behavior can be viewed through the lens of evolutionary theory and can be seen as resulting from an evolutionary adaptation.

In our evolutionary environment there was finite access to psychoactive drugs (e.g. fermented fruit). The limitation of the resources in the environment meant that at some point the environmental resource being used was depleted and there was no point in seeking it further. The limitation of resources created a situation in which there was no evolutionary pressure to evolve a check on the dopamine system, because the environment always limited what was available [8]. A longing for limited resources was an evolutionarily advantageous trait when these sorts of things were in limited supply. In contrast, in modern society we have continual access to drugs if we have enough resources.

Neurologically, drug use is driven by the mesolimbic dopamine system. How the dopamine system works to drive addiction is not fully understood. There are two predominant models, the reward model and the salience model. Motivation of behavior is driven by reinforcement; by providing pleasure, dopamine reinforces the use of drugs [2, 7]. The reward model emphasizes the idea that the activation of the mesolimbic dopamine system is “hard-wired” to provide pleasure as part of rewarding certain behaviors that are evolutionarily favorable [2]. The salience model emphasizes the idea that the dopamine signal eventually serves to make drug use stand out as the most important stimulus, thereby increasing use [2, 7]

The reward model is only a partial explanation, explaining the use of dopamine in only one of its functions. The neurologic role of dopamine is currently under investigation. Dopamine is involved in both positive and negative reinforcement and has many effects on the central nervous system. The dopamine signal is used to shift attention from one relevant stimulus to another. It may be that the dopamine signal is simply serving to reallocate attention rather than to provide positively reinforcing stimuli [8].

The alternative salience model posits that dopamine, rather than providing a reward, provides a longing. The stimulus (in this case psychoactive drugs) associated with this salience becomes more attractive and demands attention, creating the longing. The dopamine system is evolved to associate a given stimulus with longing and seeking behavior. This model places dopamine within the context of a larger integrated system where it is only one factor in the neurologic decision making process. The seeking element of this model explains many of the problems associated with addictive behavior. A stimulus with that has an increased salience creates a motivation to seek it compulsively, without any signal that indicates satisfaction has been reached. Drug addiction is, at its root, an urge or longing to use repetitively [8]. The salience model of addiction is based on the idea that this salience or longing refers to the focus on a particular activity, to the exclusion of all other activities, in this case drug use [2]. The interest in using drugs takes precedence over the other activities in an individual’s life. This leads to many of the secondary consequences of drug use because personal relationships, work, and health all become less of a priority.

Imaging studies have supported the salience model. These studies have shown that the frontal cortex, which plays a supervisory role in cognitive function, is down regulated in drug addiction. This implies that the motivational, higher cognitive and self-monitoring processes of the brain are reduced. The behaviors and associated motivational states that are responsible for drug addiction can be attributed to the loss of self-directed behavior in response to automatic sensory driven situations. The drug of abuse is given primary salience at the expense of other available rewarding stimuli [7].

These theories of drug addiction posit the evolutionary reasons why we may have the inclination towards drug dependence, and why in the society for which we evolved this was an advantageous trait rather than a detrimental trait. Neuropsychologically we have evidence that the brain, specifically dopamine plays a role in our predilection for drug dependence. These theories provide a framework to understand the biological root of addictive behavior.

1.3 The Disease Model of Addiction

The biological and evolutionary theories delineated above explain some of the predispositions that individuals can have, and support the idea of a disease model of addiction with a biological component. The disease model of addiction describes addiction as a chronic relapsing disease that develops due to an interaction between the drug user, the drug of choice, and environmental factors contributing to drug use [3]. The initial choice of what drug to use is a

voluntary decision but varies based on environmental factors, such as price and availability. Different drugs have different pharmacologic effects on the body, which may increase the risk for substance dependence. Some routes of administration create a stronger addiction potential; for example, injecting a drug creates an effect on a scale of seconds, whereas snorting a drug doesn't have an effect for several minutes, in part due to the bioavailability of the drug [2].

Individuals' susceptibilities to drug addiction differ. There is a great deal of literature that suggests that genetic susceptibility is a significant risk factor for developing addiction [3]. Genetic variations influence the psychotropic effect of the initial administration of a drug and predispose an individual to addiction. In extensive studies of alcoholics, which are likely to apply to other drug users, genetic factors increase the risk of developing addiction but do not necessarily determine that someone will become an addict [2, 9]. Studies of opiate users and tobacco smokers have also shown some genetic associations. These genetic components of addiction likely cause a predisposition to addictive behavior and a vulnerability to a specific substance [9].

An addicted brain is physically and chemically distinct from the brain of someone not suffering from addiction. Neurobiological changes take place as an individual progresses from voluntary to compulsive drug use. Data show that even after a person stops using drugs there can be long-term and permanent changes in their brain. As discussed above the compulsion to use drugs, is most likely, a consequence of biological alteration to the brain, specifically permanent damage to the pleasure and reward circuits secondary to chronic drug use [2]. The mesolimbic and mesocortical dopamine system are associated with the memory and conditioned responses that have been linked to craving [7]. The reward circuitry is integrated with emotional, motivational and memory centers in the brain that increase the pleasure from drug use and teach an individual to associate certain

affective states, friends or physical locations with the use of drugs [2]. Although different drugs affect the dopamine reward system differently, they all seem to have some effect on the release and reuptake of dopamine in the reward pathways of the brain. As drug use continues, dopamine begins to decrease overall and the brain has increasing difficulty producing an adequate supply, contributing to feelings of depression and reinforcing drug craving [2].

Goldstein and Volkow reviewed imaging studies to support a model of drug addiction they call the syndrome of *impaired response inhibition and salience attribution* (I-RISA), which encompasses four behaviors interconnected in a positive feedback loop (see Figure 1). The process of drug reinforcement (intoxication) is associated with activation in the prefrontal cortex and anterior cingulate gyrus.

Interestingly, these changes in activation were seen in drug abusers but not in subjects who used drugs in a non-abusive way. This finding implies that the involvement of these areas in the intoxication experience may be partially related to previous drug experiences. In individuals who have previously been exposed to their drug of choice, craving alone is sufficient to activate frontolimbic circuits. One interesting demonstration of this effect is that in cocaine abusers, shown videotapes of drug-related stimuli, craving was elicited and brain activation of the frontolimbic circuits was seen. For example, if a video were shown of someone going out to the street to "score" drugs, it would activate the brain in a way similar to using the drug. It may be that one of the stimuli for craving drugs is the recall of emotionally laden previous experiences. The

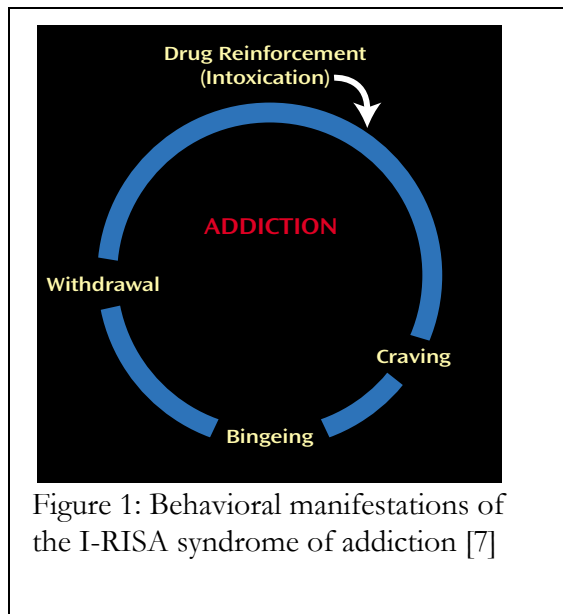


Figure 1: Behavioral manifestations of the I-RISA syndrome of addiction [7]

same patterns of cortex activity are seen during a craving response as a bingeing response, the overwhelming need to continue to use and the inability to stop. The abnormalities in the cortex associated with withdrawal are seen in imaging studies as reduced brain metabolism in the frontal cortex, where dopamine response and receptor availability are significantly reduced. In subjects who used cocaine this response is reduced for at least four months after cessation of using the drug [7].

An individual's physical, political, socioeconomic, and sociocultural environments interact with these biological attributes of individual users and contribute to the development of addiction. The biological evidence is clear that there are functional changes within the brain of someone who uses and is addicted to drugs. People who use drugs are suffering from a physical disease. They are not; as many people consider them, morally corrupt. The use of drugs creates changes within the frontal cortex and the limbic system, through alterations in the dopamine pathways. These changes lead to increased salience of the drug of choice and reduce the salience of other important sources of reinforcement. Once an addiction is established, the environment can act as a cue that becomes associated with drug use and triggers craving, as seen in the above study in which viewing of videotapes of drug-related behavior was associated with a craving for drugs. Initiation of drug use is often due to socialization, peer influences, and social pressures, and availability, which encourage experimentation with drugs and create an environment conducive to continued use. Social, economic, and health policies on a larger societal level contribute to conditions that allow drug use to thrive. There is a correlation between poor socioeconomic status, depression, hopelessness, and drug use [2]. Overall, the brain is altered in a way that makes obtaining and using a drug take precedence over all other activities, including healthcare.

2.0 Healthcare Theory

There are various theories that attempt to describe the influence of personal and social factors to healthcare access to and utilization. Why, how and for what reasons some people receive better or more extensive care is a complex question and understanding the contributory elements is important for service providers. Understanding the determinants of healthcare access allows us to pursue interventions that contribute to better healthcare utilization. Andersen provides one framework for understanding individual societal determinants of access to healthcare, this framework involves individual and group determinants of access to healthcare [10]. This is the framework that has been used in this study as a theoretical framework to inform the data analysis. The behavioral model for vulnerable populations based on Andersen's theory, and described below, is commonly used in the literature on healthcare access and drug users.

2.1 Individual Determinants of Access to Healthcare

In 1973, Andersen and Newman outlined the elements involved in individual access to healthcare [10]. The societal determinants are technology and norms. Technology comprises the available resources for providing medical care, for example the availability of an MRI within a given societal setting. The norms are the social norms by which society controls people's behavior. In drug users, norms are relevant because the use of psychoactive drugs is already challenging the societal norms of the dominant societal group. In general drug users face substantial stigma. The other important determinant contributing to an individual's access is the provision of health services. Health services provision consists of two elements, organization and resources. Resources are the personnel and labor capital designated for healthcare. The organization is the way that resources are organized. Health services combine with determinants of access to determine an individual's access to care.

An important element of this model is the change in access as the type of health service changes. The determinants of healthcare access will change with preventive care, care for a chronic illness, care for trauma or care for an acute but not traumatic medical event. In the case of preventive care, the organizational elements include primary care and vaccines for example, whereas in trauma care availability of imaging, and physicians and speed of care are much more important [10].

Andersen also outlined the factors affecting an individual that determine the use of health services there are three types of factors; predisposing factors, enabling factors and need factors. Predisposing factors are those characteristics of an individual that influence an individual's propensity for seeking care. Factors that predispose an individual to be more likely to seek care include demographic variables, social structure variables (such as family support, incarceration etc.) and attitudinal variables (such as feelings of stigma, mistrust of the healthcare system etc.). Enabling factors are those factors that facilitate or impede access to and use of healthcare. If an individual seeks care there must be a means for them to obtain care. Obtaining care involves elements such as insurance and the availability of a healthcare provider, a clinic or hospital. Need factors comprise those health conditions for which a person is likely to need care, including their severity, which is an important motivation for care. The severity of illness is a very important attribute because it creates the strongest and most immediate motivation for seeking care. For example someone who is bleeding profusely is much more likely to seek care than someone who has been having repeated headaches. These individual level factors form the basis for an individual behavioral model for seeking care [10].

The behavioral model for vulnerable populations is a revision of Andersen's original conceptual framework that takes into account the factors affecting vulnerable groups (including people who use drugs) and how these may affect healthcare access [11]. The vulnerable population model adds additional domains, allowing a more comprehensive view of the aspects of healthcare access as they affect these populations. By looking at the predisposing, enabling, and need factors, and determining their salience for an individual, we can begin to explain what accounts for reduced access to care. These domains also give us a framework for exploring the potential for interventions that improve access to care.

Among drug users, use affects each of these factors. The predisposing domain is often changed because of drug use. For example, people who are abusing substances may be more likely to have a criminal history, a social network that centers on drug use, a mental illness, and/or an unstable living situation. Furthermore, as discussed above, drug use creates a situation in which other important needs, including health needs, are ignored, causing health to take a low priority within the hierarchy of needs [12]. The enabling domain is strongly affected by drug use [11, 12]. These factors include lack of employment and consequently having no health insurance; a feeling of shame regarding drug use that creates a barrier to seeking care; and difficulty navigating a complex "system" that often can require a great deal of time and focus [13]. Need for healthcare is often increased for people who use drugs, as there are strong correlations between the use of drugs and a variety of physical and mental health conditions. Thus, utilization of healthcare is a balance between predisposing, enabling and need factors, each of which is altered among people who use drugs.

Figure 1: The Behavioral Model for Vulnerable Populations

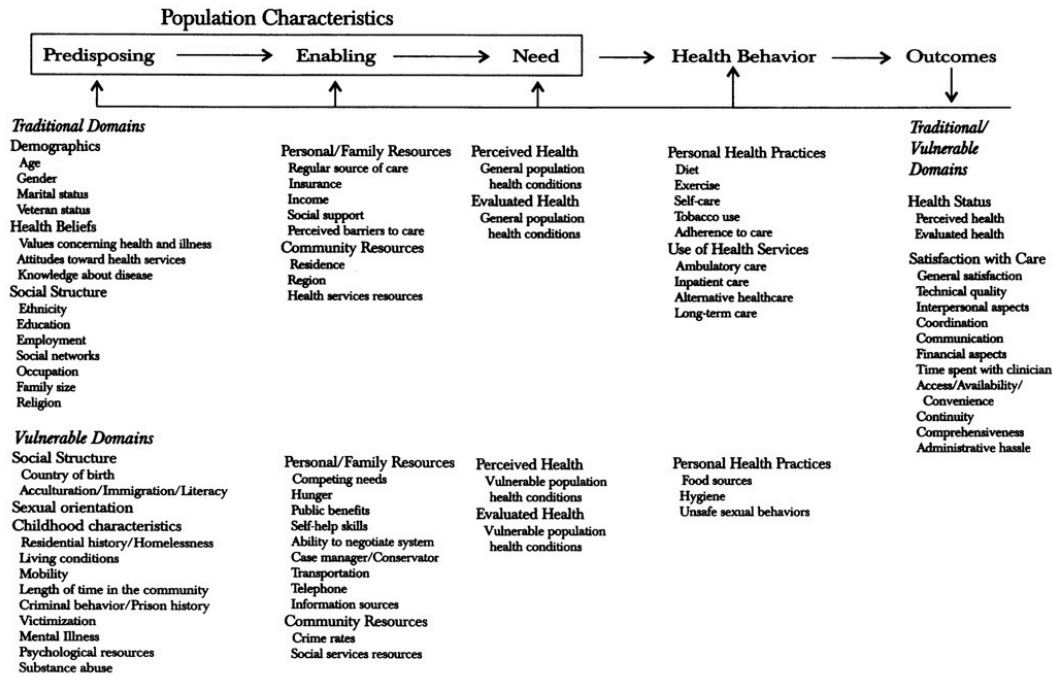


Figure 2: The behavioral model for vulnerable populations: [11]

2.2 Group Determinants of Access to Healthcare

In 1978, Andersen and Aday wrote another landmark paper that provided a framework to understand differential access to healthcare among different groups within society [14]. This model takes into account individual-level characteristics and makes the assumption that, to the extent that demographic factors such as age and sex predict healthcare access, there is equal access to care within a demographic group when taking a macro-level view of society. In the case of social variables, such as race, income, drug use, education level and insurance status, differential access to healthcare among different groups defines inequality in healthcare access on a macro-level [14].

In order to extend this model to advocate for a change in public health policy, the modifiability of the demographic characteristics that affect healthcare access must be taken into account. Fixed demographic variables such as age cannot be altered by policy changes. These fixed variables are unchangeable and therefore don't provide a useful target for changes in policy intended to improve access to care. However, social variables are modifiable, which makes them plausible targets for policy changes intended to improve healthcare access. Drug use, as a barrier to healthcare access is clearly a social issue that can be modified through public policy. This modification could take the form of more effective and more available drug treatment, policies that help to reduce the number of people who use drugs, and education for practitioners so they provide more culturally-sensitive care leading more drug users to come in for care.

Health insurance also plays a critical role in access to care. The National Access to Care Survey examined a national probability sample designed to be representative of the entire U.S. population. An analysis of these survey data (collected in 1994) by Baker et al. in 2000 looked at access to care for symptomatic conditions and the association with health insurance [15]. One purpose of this analysis was to address the commonly held belief that even those without health insurance have access to necessary care through public clinics and hospitals. This analysis found that there was no difference in perceived need for care among the insured and uninsured; however the uninsured were more likely to have one or more serious symptoms for which care was not received or sought. Among those who had insurance, the most common reasons for not receiving care were that the doctor they were seeing did not accept payment through their insurance company and an inability to pay for care. Over half of the uninsured who did not receive care reported one or more personal, household or work problems that resulted from the lack of medical care. The lower rate of healthcare use by the uninsured was not explained by the difference in a perceived need for care. This analysis found that being uninsured has a large overall negative effect on health and functioning [15].

Being homeless also has a profound effect on access to care. Rates of acute and chronic illness are high among the homeless, far surpassing rates in the general population [16]. In 2003, the Health Care for the Homeless Survey was conducted, using geographically-stratified, probability-proportional-to-size sampling of clinic sites that had received Health Care for the Homeless grants. An analysis published in 2010 by Baggett et al. used the behavioral model for vulnerable populations as the basis for a multivariate analysis. They found that 73% of the participants reported at least one unmet healthcare need in the past year and 49% reported two or more unmet healthcare needs. The most common reasons for having an unmet need were: inability to afford healthcare and lack of insurance, the same problems found by Baker et al. Both mental illness and food insufficiency were associated with having an unmet need for healthcare. Food insufficiency was considered a marker for competing priorities. It may be that those suffering from food insufficiency assign lower priority to healthcare and direct their energy towards the fulfillment of more immediate needs, such as food [16].

Although drug use was not specifically examined in these analyses it is a contributor to the conditions found to be most strongly connected with having an unmet healthcare need, i.e., homelessness and lack of insurance. People who use drugs are often unable to stay employed, resulting in homelessness and a lack of insurance. People who use drugs also have an additional competing priority, their need to calm their craving through obtaining and using drugs. These analyses exemplify the need to understand how drug use as another sociologic phenomenon effecting care has an effect on healthcare access. The barriers to healthcare access for people who use drugs are complex, but clearly extend beyond the factors affecting access in the general population.

3.0 Drug Use and Health

Individuals who use illicit drugs have greater healthcare needs but may not successfully access the healthcare system. Drug users are a medically underserved population, and have less access to healthcare than sociodemographically similar groups who do not use illicit drugs [17]. There have been few studies examining healthcare access for methamphetamine users as a distinct population among people who use illicit drugs. As Andersen's healthcare theory outlines the group and individual factors affecting drug users are important elements in their healthcare access.

3.1 Differential Access to Care

Sustained use of illicit drugs is associated with many acute and chronic health problems [18]. It is often difficult for drug users to prioritize care at an individual level and as a group they have many factors that determine care that are compromised.

In the lives of drug users, the day-to-day priorities of surviving and obtaining drugs are more important than obtaining healthcare, until a health condition becomes an undeniable emergency. In 2001, Chitwood et al. compared the use of primary preventive care services (as measured by going to a physician for the sole purpose of having a physical examination) among injection drug users, non-injection drug users and non-drug users [18]. They found that among all three groups combined, fewer than one third reported having a physical exam in the twelve months prior to the interview. Non-drug users were much more likely than either non-injection drug users or injection drug users to receive a physical exam. Women, African-Americans, those with health insurance, non-drug users and people who did not use alcohol all had greater odds of having received primary preventive care. Having health insurance had the biggest effect on the likelihood of receiving primary preventive care [18].

The lack of preventive primary care increases the severity of health conditions and the cost of treatment. When people do not get treatment early, the problems become more severe and more costly with resulting increased morbidity and mortality [19]. Drug users have conflicting priorities and so a trigger to seek healthcare must be more extreme in order to motivate an individual.

A study by Heinzerling et al., investigated the role of syringe exchange programs in providing preventive health services to injection drug users [20]. Data were gathered from a large sample of injection drug users recruited from syringe exchange programs throughout California. Participants were interviewed to determine what preventive services they had received in the previous six months. Services asked about included testing for HIV, testing for HCV, testing and vaccination for HBV, testing for sexually transmitted infections, testing for tuberculosis, counseling about safer injection, counseling about safer sex, counseling about drug use, and counseling about overdose prevention.

They found that 46% of the sample reported that they needed all ten of the services in the previous six months (regardless of whether they received them) and that 49% of the participants had not received any of the ten services needed in the previous six months [20]. On average, clients needed nine of the ten services but received only one of the ten; clients received 13% of the services they needed. This study found that those who accessed syringe exchange or other drug treatment programs in the past six months were more likely to have received the services of interest. The service most commonly received was HIV testing [20].

Even at a syringe exchange program, where many drug users receive services, there are low levels of preventive health services for injection drug users.

Injection drug users are a difficult patient population for whom to provide services. Syringe exchange programs, where many injection drug users have regular contact with service providers, may represent missed opportunities were being missed to provide preventive healthcare. As Chitwood has demonstrated those who use drugs receive fewer healthcare services than non-drug users. Drug users are a medically underserved population.

3.2 Satisfaction with Care

Although there have been few studies of drug users satisfaction with medical care, lack of satisfaction with care may prevent people from seeking care. Given the increased prevalence of health problems related to the injection of illicit drugs, the psychoactive properties of illicit drugs and secondary risky behaviors it is important to ensure that the healthcare system is not inhibiting

access to care because of a lack of satisfaction. In 2002, Chitwood et al. studied the satisfaction with access to healthcare among people who use drugs as compared to non-drug users [13]. They also examined whether drug use had an independent association with satisfaction with access to care. Those participants who did not use drugs were, overall, more satisfied with their access to care than those who used drugs. Other factors also had an effect on the level of satisfaction with access to care; those who received care reported greater satisfaction with access to care than those with an unmet need for care. After controlling for other variables that contributed to poor satisfaction with access to care, those who used drugs still had lower rankings for satisfaction with access to care. If we consider satisfaction an enabling factor for healthcare utilization based on Andersen's healthcare model it is an important factor that we can modify to encourage individuals to engage in care. The stigma associated with drug use likely leads to dissatisfaction due to a lack of culturally competent care. Drug users often feel that they are stigmatized by healthcare providers and hesitate to return for care.

Healthcare providers also report that substance users are difficult to treat. A multi-center European study found that regard for working with substance users, particularly those who used illicit drugs was lower than regard for working patients with depression or diabetes, also difficult conditions [21]. Across the eight countries in Europe where this study was performed and across different physician specialties this group was held in low regard. One study reported that 61% of general practitioners surveyed felt that general practice was an appropriate place to work with patients with alcohol problems but only 6% felt that it was an appropriate place to work with people who used illicit drugs [22]. Physicians across all levels of training and specialties commonly encounter and work with patients who use illicit drugs [23]. Throughout training from the third year of medical school through residency training providers believe more strongly that people who use drugs over utilize healthcare services increases [23]. Quality of care for patients who use drugs may decline as opinion of these patients in increasingly negative. A significant proportion of patient encounters are with people who use drugs [23]. This decline in opinion may have to do with feelings of hopelessness in the face of repeated relapses to drug use and complex medical illness despite physicians efforts to improve their health [24].

People who use drugs are clearly an underserved population. The lack of care for drug users may act to increase physician's frustration because with out more extensive support from the healthcare profession patients continue to relapse and present with more complex medical illness. This creates a cycle in which frustration leads to a decrease in quality of care that increases the chances of relapse.

3.3 Emergency Care Utilization

There is increasing emergency department usage nationwide [25]. Many studies have documented that drug users use emergency department care as opposed to outpatient care. For example a study by French et al. compared the utilization of health services among chronic drug users, injection drug users and non-drug users to determine the frequency of health service utilization and different costs for healthcare between these groups [26]. They found the estimated cost of healthcare services was approximately \$1000 higher per year for chronic drug users and injection drug users than those who did not use drugs. The study showed that injection drug users and chronic drug users utilized the emergency department more than non-drug users and utilized outpatient clinics less. The injection drug users and chronic drug users had a greater number of admissions to the hospital. This pattern indicates that injection drug users and chronic drug users may not be receiving primary or preventive care and may wait to seek care until they have an

emergency, which leads to hospitalization through the emergency department due to the severity of their illness.

A study by McCoy et al. evaluated some of the reasons why injection drug users and chronic drug users may not have received outpatient care and consequently ended up in the emergency room and being admitted to the hospital. Among the drug users they studied, the most common reasons for not seeking care were “not wanting treatment”, “self-treating” and “procrastinating”[17]. This study did not query participants about whether these behaviors were related to feeling stigmatized. This study also found that men and women differed; men were more likely to wait for or be uninterested in care than women. Women are likely more receptive to early preventive care than men, which may have important treatment implications.

In 2005, Rockett et al. found that drug users who want to enter substance abuse treatment but are unable to obtain admission have a greater need for healthcare than drug users who have been able to enter treatment [27]. This study conducted in-person interviews and drug testing on patients in the emergency department. The participant’s needs for substance abuse treatment were not being met and those who had an unmet need for treatment exhibited increased use of hospital outpatient services and had a two-fold risk of being admitted to the hospital. Drug users use the health system more when they have more severe substance abuse issues. Drug users are also more likely to be uninsured. They are at higher risk for poor health outcomes and consequently increased cost of healthcare.

In a study of healthcare utilization that compared patients utilizing an outpatient walk-in clinic to those in a drug detoxification program, questionnaires were used to establish the frequency of healthcare utilization in the last year [28]. The study found that drug users had approximately four times the mean number of total visits to a healthcare facility, and three times the number of emergency room visits. Drug users were 6.7 times more likely than nonusers to have been hospitalized and were 2.3 times as likely to have an emergency room visit as non-drug users.

These studies reflect the high rates of healthcare service utilization among patients who use drugs. As discussed throughout this section people who use drugs are a medically underserved population. They are less satisfied with access to care. Physicians have a lower regard for patients who use drugs and feel that their “overutilization” of healthcare keeps others from getting adequate care. Emergency department utilization of patients who use illicit drugs is greater than that of people who do not use drugs. In order to decrease emergency department utilization, increase access to care, all of which lead to improved health, it is necessary to better understand the factors affecting drug users access to care.

4. Methamphetamine Use

4.1 Demographics and Prevalence

Methamphetamine use is a growing problem in the United States [29-33]. The National Survey on Drug Use and Health (NSDUH) and the Monitoring the Future (MTF) study both show the extent of the methamphetamine problem and indicate a relatively stable prevalence for methamphetamine use, last years prevalence was estimated around 0.7% [30]. These national surveys are valuable tools for assessing drug use in the population as a whole because they are the largest studies within the U.S. looking at the prevalence of drug use. Data from the Drug Abuse Warning Network (DAWN), collected by the Substance Abuse and Mental Health Services Administration (SAMHSA) about emergency department (ED) use, indicate that in 2005 there were about 109,000 methamphetamine-involved visits at a cost of around 46 million dollars, as estimated

by the RAND Corporation [34]. Data from the Treatment Episode Data Set (TEDS), which tracks admissions to drug treatment programs, indicate that treatment admissions for methamphetamine use more than doubled between 2000 and 2005 [34]. These trends need to be understood in the context of the historical regulation of methamphetamine use and the policies that control its production.

4.2 History of Methamphetamine Use

Amphetamine was first synthesized in 1893 in Japan. It was synthesized as methamphetamine, which differs by a methyl group, in 1919 [31]. Methamphetamine was widely used during World War II, when it was utilized by the armed forces in many countries to fight fatigue and improve performance among soldiers and factory workers [31]. It was available in the United States as a prescription medication until the 1960s, at which time abuse among young adults led to the Comprehensive Drug Abuse Prevention and Control Act of 1970. This act limited the availability of methamphetamine for medical use.

Consequently, motorcycle gangs began to produce methamphetamine illicitly, mostly in Oregon and California, to which its use was initially limited [30, 31]. In the 1980s, however, these motorcycle gangs began to produce methamphetamine in greater quantities and to expand their customer base. It was thought that most methamphetamine users at that time were Caucasian truck drivers, construction workers, and other “blue-collar” workers [30]. Methamphetamine expanded to Hawaii in a smokable form called “ice” [30].

In the 1990s, methamphetamine use increased as the manufacture expanded into more home-based laboratories independent of organized gangs [30]. This expansion was due to the availability of a simpler, cheaper form of the chemical synthesis process. This process used the reduction of pseudoephedrine/ephedrine rather than the previous method, which involved the reduction of phenyl-2-propanone (P2P). The new method of reduction was easier because it utilized ingredients easily diverted from legitimate uses (most notably the pseudoephedrine in cold medicine) and produced a more addictive isomer of methamphetamine in larger quantities [31]. These changes made methamphetamine less expensive and contributed to the spread of its use throughout the United States and through various groups of drug users. In 2005, the federal government passed the Combat Methamphetamine Act, which regulates the sale of products containing pseudoephedrine [30]. This regulation may help to explain stabilization and reductions in methamphetamine use around 2006. However, the use of methamphetamine remains high among certain groups and is associated with many negative health and social outcomes.

4.3 Environmental Effects

The manufacture of methamphetamine exacts a toll on the environment, law enforcement, emergency responders, manufacturers and people who are in the environment, including children [32]. The manufacture of methamphetamine often takes place in home-based laboratories. These laboratories are often located in rural areas, to reduce the risk of detection from the smell produced during the manufacturing process [30]. The chemicals used to produce methamphetamine are highly flammable and toxic [30, 32]. The environmental cleanup due to methamphetamine manufacture cost California an estimated 5.5 million dollars in 2001 [31]. These production laboratories also cause frequent fires, putting firefighters and police officers at risk when they respond to the fires or are exposed to toxic chemicals during arrests of those with a laboratory [32].

Children raised in settings where they are exposed to the chemicals associated with the manufacture of methamphetamine have serious adverse health outcomes [29, 32]. In 2002, 2,023

children were found residing in homes with laboratories, an increase from 976 in 2001 [29]. Even limited exposure to these chemicals can result in headaches, nausea and dizziness. Chronic exposure has been associated with respiratory damage, chemical burns, cancer, brain damage, and damage to the liver, kidney, spleen and immunologic systems [29]. Exposed children are also likely to be exposed to fire and drug paraphernalia and to be the victims of physical abuse, sexual abuse and neglect [29]. Exposure to methamphetamine among these children leads to negative effects on their physical, behavioral and social functioning. These children may be more likely to develop substance abuse and mental health problems as a result of their experiences [32].

Methamphetamine manufacture not only has a huge environmental impact, but as an illicit drug its distribution has a negative effect on neighborhoods. In neighborhoods where it is distributed, the violence and chaos associated with distribution of illegal substances creates a dangerous and unhealthy environment [32]. Methamphetamine exacts a large toll on society and children through its manufacture and distribution. There is also a strong physical and psychiatric toll placed on the individual user from the direct pharmacologic and sociologic effects of the drug.

4.4 Neurophysiologic Effects

Methamphetamine is a powerful synthetic stimulant that causes a rush of dopamine, norepinephrine and serotonin, producing euphoria and a heightened level of alertness [33, 35, 36]. It can be smoked, injected, ingested orally, solubilized in a beverage, taken sublingually or inserted rectally. The half-life of methamphetamine (8-12 hours) is much longer than that of cocaine (16-87 minutes)[30, 31]. The smoking and injecting of methamphetamine results in a more intense high that dissipates more quickly than other routes of administration. Other routes of administration result in longer highs with less intense initial effects [31].

The effects of acute methamphetamine use are due to excessive stimulation of the sympathetic nervous system, resulting in pronounced tachycardia, hypertension, sweating, papillary dilation, and fever. There is also a sense of euphoria, increased attentiveness, energy and curiosity; decreased anxiety; appetite suppression; and, in some cases, hypersexuality. The drug effects provide users with a sense of euphoria, well-being and excitement in the short term. The withdrawal from methamphetamine leads primarily to psychiatric problems rather than physical symptoms [31]. Repeated methamphetamine use results in catecholamine depletion. This depletion is associated with feelings of depression, dysphoria, irritability, anxiety, hypersomnia, paranoia and aggression. At times this withdrawal syndrome can be severe enough to lead to suicidal ideation that warrants inpatient psychiatric treatment [31].

A 2010 study compared a group of methamphetamine users who entered drug treatment and remained abstinent for 5 weeks to healthy controls to describe the withdrawal symptoms from methamphetamine use [37]. The participants who used methamphetamine self-reported a wide range of severe depressive symptoms (based on the Beck Depression Index). Psychosis was also prevalent. The severity of the depressive symptoms and psychosis greatly decreased after one week of abstinence. However cravings did not begin to decrease until the second week and was still quite high at the end of five weeks, the conclusion of the study.

In mammalian studies, methamphetamine causes neurotoxicity to the dopamine and serotonergic transmitter systems. Animals exposed to methamphetamine acutely or chronically show striatal dopamine depletion and destruction of dopamine terminals. These changes are somewhat reversible. Over time the dopamine function returns, often about six months after the last administration of methamphetamine. However, in human studies, positron emission tomography and autopsy findings show a continued marked decrease in dopamine even after three years of

abstinence from methamphetamine [31]. Withdrawal effects in methamphetamine users are based on alterations to the neurological system.

Methamphetamine activates the sympathetic nervous system; this causes a variety of physical effects as well as creating the sense of euphoria associated with methamphetamine intoxication. As discussed in the section on addiction the pharmacologic effects of a drug on the dopamine system contribute to addiction and contribute to the long-term changes secondary to drug use. There are many long-term physical health effects, in addition to the neurophysiologic effects associated with chronic methamphetamine use both from the drug's stimulation of the sympathetic nervous system and from the route of administration of the drug.

4.5 Physical Effects

The physical effects associated with long-term methamphetamine use include the consequences of drug administration (i.e. injection injuries and infections) as well as long-term physiological changes associated with the drug's mechanism of action. These include adverse cardiovascular affects, such as angina, arrhythmias, hypertension, cardiomyopathy, EKG changes and acute myocardial infarction, even in young users. Methamphetamine users also experience an increased rate of coronary artery disease and cardiac hypertrophy compared to non-users. Methamphetamine users often display signs of malnutrition resulting from the anorexia caused by methamphetamine [30]. The sympathetic stimulation caused by methamphetamine causes vasoconstriction, which can lead to renal failure secondary to infarction, or to rhabdomyolysis [30, 31].

Many studies also demonstrate an association between methamphetamine use and severe oral disease, known as “meth mouth” [29, 30]. It is hypothesized that this outcome is due to xerostomia (dry mouth) and poor oral hygiene in conjunction with soft-drink consumption [30, 38]. There is also an association between long-term methamphetamine use and dermatologic problems, such as self-inflicted injury from intoxication, injection of the drug resulting in infections; and burns secondary to manufacture and smoking. These lesions may be further exacerbated due to scratching and picking secondary to drug-induced perceptual distortions such as formication [30, 35].

The need for increased healthcare care utilization is discussed in Section 3. The previous sections from this chapter describe some of the physical and neurological changes to methamphetamine users specifically. The information describes what the consequences of methamphetamine are; the next sections of this chapter review some of the literature that describes the larger population of people who use methamphetamine.

4.6 In Utero Exposure to Methamphetamine

Drug use among pregnant women is important as in utero drug exposure can have lasting and large detrimental effects on the growing child. Derauf et al. reviewed the literature with regard to in utero drug exposure in 2009. This review examined the effects on the fetus of methamphetamine use by pregnant women. In mice models the exposure of the central nervous system to methamphetamine during development has been shown to cause serotonergic neurotoxic effects and synaptic remodeling of neuron terminals. The neurotoxic effects are seen in multiple brain areas including the prefrontal cortex and ventral striatum (nucleus accumbens), dorsal striatum (putamen, caudate, globus pallidus), hippocampus and cingulate gyrus, and amygdala. [39].

These brain areas are important in the development of attention, language, cognition and social relationships domains, which have been identified as areas of concern after in utero exposure to methamphetamine. In a community-based study from Sweden in 1976 exposure to amphetamine

in utero was correlated with an increased risk of behavioral problems, including attention deficit hyperactivity disorder (ADHD), learning disabilities, aggression and failure in school [39]. In recent MRI studies examining the brains of children exposed to methamphetamine in utero there was no conclusive evidence of changes visible on MRI. This was likely due to small sample size and potential confounding drug exposures. These neurologic studies have shown changes consistent with poor performance on sustained attention and poor performance on verbal memory tests.

4.7 Behaviors Associated with Methamphetamine Use

This literature review has up until this point focused on people who use any illicit drugs. The purpose of this section is to describe some of the social and use behaviors that are correlated with methamphetamine use specifically. Substance abuse is a predisposing factors based on the Behavioral Model for Vulnerable Populations. The health behaviors described here contribute to the domain of predisposing and the consequences of these behaviors may increase the need for health services.

In 2007, Nyamathi et al. explored factors associated with methamphetamine use among homeless adults in Los Angeles. They found that the lifetime prevalence of methamphetamine use ranged from 10% for homeless African Americans to over 50% for homeless whites. Close to half of users said that they used methamphetamine at least once a day, and one fourth of users said that they were injecting their methamphetamine. Among younger homeless individuals, use of multiple additional “hard” drugs and binge drinking were all associated with methamphetamine use. Overall, this study found that being white and having used multiple other drugs were associated with methamphetamine use [40]. Using multiple different drugs likely increases the harm from drug use and contributes to the predisposing domain of healthcare utilization.

There is a strong association between methamphetamine use and sexual behavior in many studies. A study in 2002 interviewed individuals in early treatment to compare the relationship between use of different drugs and sexual behavior. They found that for methamphetamine users, there was a stronger association between substance use and enjoyment of sexual behavior than there was with cocaine, alcohol or opiates. Methamphetamine users were more likely than users of other drugs to report that their sexual performance and pleasure were enhanced by drug use. Methamphetamine users also reported an increased sex drive or an “obsession with sex”, as well as reporting that they were more likely to have sex with someone other than their primary partner and that they were more likely to participate in “risky” or “unusual” sexual behaviors while under the influence of methamphetamine. Methamphetamine users reported that they believed that their drug use was so strongly associated with sex that it would be difficult to enjoy sexual behavior without the use of methamphetamine [41]. Risky sexual behavior increases the chances of contracting a sexually transmitted infection and therefore may increase the need domain of healthcare access.

Substance abuse is associated with behaviors in childhood. A study of rural stimulant-users (i.e. methamphetamine and cocaine) in eastern Arkansas and Western Kentucky by Kramer et al. 2009 did a prospective study that examined associations between; adults who used stimulants and their childhood behavior problems, rural or urban residence, parental history of substance abuse and involvement in the criminal justice system. Substance abuse or dependence in the last 12 months and spending more days incarcerated were significantly associated in bivariate analyses with having greater than or equal to 3 behavior problems as a child. The criteria used to define behavior problems were taken from the DSM-III-R. No relationship was seen between stimulant use alone and having an increased number of behavior problems. After controlling for potential confounding factors there was no association between a history of incarceration as and adult and behavior

problems as a child. There was an association between parental substance use problems and having greater than or equal to three behavior problems as a child [42]. This study lends support to the idea that substance abuse and dependence, as an adult, may be associated with having had behavior problems as a child. The association between parental substance abuse and childhood behavioral problems is similar to the association between the environment in which one grows up and substance abuse as an adult. It may also support a genetic link between childhood behavior problems and substance abuse. This contributes to the predisposing domain of healthcare utilization.

The behaviors described here, injection, polydrug use, sexual risk behaviors and the contribution of early childhood experience and behavior problems with future use of methamphetamine all serve to describe some of the features of this population that cause them to fit into the behavioral model for vulnerable populations. These behaviors associated with methamphetamine use all contribute to the need and predisposing domains used to describe healthcare utilization.

5.0 Women and Drug Use

Historically women are less likely than men to use illicit drugs. However, over the past several decades, this gap has narrowed as more women begin to use drugs [43, 44]. Furthermore, many studies confirm that female drug users progress more quickly to having severe medical, behavioral, psychological and social problems as a consequence of drug use, and women who use drugs tend to face greater stigma and discrimination than men [43, 45]. Many women who use illicit drugs are of low socioeconomic status and uninsured making it difficult for them to access services. For many female drug users the only engagement with the healthcare delivery system may come during pregnancy or after a diagnosis of HIV [45].

It is critical to understand the challenges that confront the growing population of women who use drugs. This population has unique needs beyond reproductive care, they are at risk for osteoporosis, and have different risk factors for disease and different social priorities. Women are a distinct group and need culturally competent care [46]. Women overall have different healthcare needs and a different sociologic role than men, this requires care targeted to their healthcare needs as well as healthcare planning that respects their different sociological role. This section will discuss some of the issues that are unique to women who use drugs specifically.

There is evidence that women who use drugs have different biological, psychological and sociocultural factors affecting their drug use from men, beginning with risk factors for drug use and extend through treatment and recovery [44].

5.1 Differences in Drug Use Behavior between Women and Men

The patterns of initiation, treatment engagement and needs from treatment differ between men and women. Women often initiate drug use at a later age and their initiation into drug use is often by their male partners, who remain a main source of drugs. Women who use drugs are generally less extensively involved with the criminal justice system than their male counterparts [47].

Women tend to enter treatment after a shorter period of drug use than men. Women progress to addiction more quickly than men and they face different barriers to treatment enrollment and completion than men. Women are admitted to treatment more frequently (59.2% vs. 53.9%), often enter at a younger age and tend to be still socially integrated with friends, family and work at the time they enter treatment. Men often enter treatment at an older age, after a period of social disintegration [47]. Although substance use is not as common among women as it is among men,

once drug use is initiated women are just as likely to progress to dependency as men. In addition, the gender gap in the prevalence of drug use between men and women narrowing, young women in particular are reaching a prevalence of drug dependency close to that in their male counterparts [44].

5.2 Biological Differences Between Men and Women Who Use Drugs

Biological differences between men and women contribute to their different responses to illicit drugs. Women have ovarian steroid hormones (i.e. progesterone and estrogen) that fluctuate during menstruation, changing responses to stimulants. During the follicular phase of menstruation, in which estradiol is high and progesterone is low there is a stronger psychoactive response to stimulants. The mechanism(s) underlying this stronger psychoactive response is unknown however. It is not seen in men, supporting the evidence that it is somehow related to female hormonal fluctuations [43].

There are also neuroendocrine differences in the stress and reward systems of women and men. Multiple studies have examined sex differences in the stress response and its relationship to relapse; women who use drugs may have a reduced hormonal response to stress, which may lead to greater rates of relapse [43].

There are relatively few studies but it appears that women metabolize drugs differently. This has been scientifically verified only with alcohol [44]. Drugs may have effects on menstruation and reproductive health. Drug use is often associated with risky sexual behavior (see above), which increases the risk of transmission of sexually transmitted infections and unwanted pregnancy [44]. A critical concern is the effect of drug use on the course of pregnancy and the developing fetus. Even if women reduce drug use or remain abstinent during pregnancy they may resume using drugs after the pregnancy, which often has a negative impact on their ability to properly care for a child.

Although more research is needed exploring the biological differences between men and women who use drugs, women face some unique biological challenges. Because women are responsible for carrying a fetus and are often left caring for a child, it is important to address issues of reproductive health, including family planning, STI testing, prenatal care, and around parenting. In order to provide good healthcare for women who use drugs, we must create interventions and culturally competent care that address their specific issues.

5.3 Co-Morbidity in Women Who Use Drugs

Women have a higher rate of co-morbid psychiatric disorders and drug problems than men. Women who use drugs have been found to have greater emotional distress, depression, powerlessness and low self-esteem than men. A 2007 study explored the relationship between methamphetamine use and co-morbid mood and anxiety disorders in incarcerated women [48]. In this sample, 45% of the women met criteria for lifetime dependence on more than two drugs, 38% were dependent on only one drug and 17% were not drug dependent although may have had a history of drug use. Half of the sample met criteria for being diagnosed with an affective disorder and half met the criteria for an anxiety disorder. Having a lifetime mood and anxiety disorder was a risk for cocaine dependence, but not dependence on other drugs. Dependence on methamphetamine was associated with generalized anxiety disorder and post-traumatic stress disorder (PTSD), while bipolar disorder was uncommon among women who used methamphetamine [48]. In other studies, PTSD was found to be 1.4-5 times more common in women with co-occurring substance abuse disorders than those without, perhaps related to rates of physical and sexual abuse among women with co-occurring disorders ranging from 55%-99% [43]. Some of this variation in estimates of physical and sexual abuse is based on whether or not the abuse

that is asked about is in childhood or adulthood. Those using other drugs in addition to methamphetamine scored higher on an evaluation of paranoid ideation than those subjects who were using just methamphetamine. This study found that, after controlling for a history of mood and anxiety disorders, only obsessive-compulsive symptoms and paranoid ideation were significantly associated with the use of methamphetamine [48]. These findings highlight the relatively high prevalence of mood and anxiety disorders in women who have a history of methamphetamine use. They also help to distinguish what symptoms are likely related directly to methamphetamine use, in contrast to what symptoms may be an artifact of co-existing mood and anxiety disorders.

The high prevalence of co-occurring substance abuse and psychiatric disorders highlights the need for a comprehensive psychiatric assessment of methamphetamine users in clinical care. It is often difficult to do a comprehensive psychiatric assessment because it is difficult to distinguish between symptoms of drug use and underlying psychiatric problems. However, identifying underlying psychiatric problems is critical to provide effective treatment because these psychiatric disorders may make it more difficult for a drug user to care for themselves [43]. People with co-occurring psychiatric disorders have more trouble accessing care due to disorganization and complex physical and mental health problems. Individuals with co-occurring psychiatric disorders and substance abuse disorders are difficult to treat because they fail to attend appointments and to follow through with treatment plans.

Among women with substance abuse disorders, high prevalence of eating disorders have been reported. Women account for over 90% of individuals in the U.S. with anorexia nervosa and bulimia nervosa cases, and eating disorders are 2-3 times more common in women than in men. Studies show that substance abuse co-occurs with eating disorder behaviors in around 40% of women, with eating disorders [43].

5.4 Health Service Utilization

Low-income women who use drugs have decreased access to healthcare when compared to low-income women who do not use drugs. Women have the increased burden of more complex healthcare needs, including contraception, prenatal care, screening for cervical, breast and ovarian cancer, different risk factors for systemic disease including cardiovascular disease. Due to lack of health insurance, insufficient disposable income to pay for care, and living in areas without easily accessible services, many low-income women do not receive adequate reproductive health services [49]. Low-income women who use drugs are particularly vulnerable to inadequate healthcare. A study by Crandall et al. compared groups of drug using and non-drug using low-income women and found that women who were not chronic drug users were significantly more likely to have received preventive reproductive health services including, physical examination, pelvic examination, breast examination and family planning. Compared to less than 1% of the non-drug users, almost one half of the drug users in this study reported income from prostitution, which is a risk factor for sexually transmitted infections, unintended pregnancy, and violence [49].

Prior studies suggest that among women there is a link between utilization of social services and enrollment into drug treatment programs, but that healthcare service utilization is not associated with drug treatment programs[50]. This indicates that although women are in drug treatment there is no effort to ensure that they are receiving adequate healthcare, we are missing an important opportunity to provide better care while patients are engaged in drug treatment. A study in Puerto Rico by Hansen et al. examined the use of drug treatment and social and general health service by low-income women who use drugs. The women had a high prevalence of daily heroin and cocaine use and more than half met the criteria for dependence on one of these drugs. In this study 50.1% of women reported needing health services that they did not receive [50]. The study showed that

prospectively entering drug treatment was associated with receiving social services. However, there was no link with government assistance or health services and entering drug treatment. Although we may be reaching women with drug treatment services this does not mean we are providing them with adequate health services. Providing these health services is an important step in helping women to recover and maintain adequate health in order to reintegrate into society.

5.6 Drug Treatment for Women

Women with substance abuse disorders are less likely to enter substance abuse treatment than men with the same disorders [43]. There are gender differences in the source of referral to treatment, with men being more likely to be referred by the criminal justice system and women more likely to be referred by a community-based agency [43, 44]. For many women maintaining custody of their children is a very important aspect of treatment referral and engagement, especially for women [44]. The aspects of a treatment program that make it more effective and engaging for women provide insight into the problems that drug using women face and also a model for how to engage women in healthcare.

Studies have shown that having gender-specific treatment programs and interventions can help women to engage in treatment, reduce sex and drug risk behaviors and have an increased chance at prolonged sobriety. Among individuals who are in substance abuse treatment men and women are equally likely to complete treatment [43]. Unfortunately, in resource poor settings, specialized programs for women are among the first things to be de-funded [45]. Women who use drugs report more insurance coverage than men who use drugs. Women are more dependent than men on their insurance paying for drug treatment, so may have more problems from a lack of insurance coverage [43]. These gender differences with respect to factors leading to engagement in and completion of drug treatment highlight the need to evaluate women as a group distinct from men for these outcomes.

The Substance Abuse and Mental Health Services Administration's Treatment Improvement Protocol focusing on the needs of women in substance abuse treatment outlines some specific, evidence-based gender specific treatment principles. Table 1 outlines some of these key principles and their significance.

As described in the preceding paragraphs women have differences in initiation to drug use, social context, biological risk factors for drug use, and needs and desires from drug treatment. Women are often initiated into drug use by their sexual partner who is a primary source of drugs, and remains a large part of a woman's drug using network. Women play a different role in society, they are seen as having a greater responsibility as wives and mothers. They are less likely to be engaged with the criminal justice system than men. They have different risk factors for diseases and respond to different strategies for drug treatment than men.

6.0 Women Who Use Methamphetamine

6.1 Prevalence of Methamphetamine Use among Women

The prevalence of stimulant use is approaching equality among women and men. Studies further suggest that women may be more vulnerable to the effects of stimulants. One indication of the increased use of methamphetamine among women is that between 1995 and 2005 the admission of women to drug treatment for methamphetamine use more than doubled from 3.7% to 9.2% [43]. There has also been an increase in the number of women seeking treatment for stimulant use during

pregnancy, with one study reporting that methamphetamine is the primary substance of abuse for which pregnant women seek drug treatment (including alcohol but excluding nicotine) [51]. According to the National Survey on Drug Use and Health, in 2004 6.2% of girls and women greater than or equal to 12 years of age were classified as having substance dependence or abuse, but only 0.9% received treatment [44]. Women who use methamphetamine are keeping pace with the national trends in substance use, in 2003 women accounted for 40% of the stimulant related emergency department visits and 45% of methamphetamine related treatment admissions in the United States [52].

6.2 Behaviors of Women Who Use Methamphetamine and their Social Context

There are few studies that look at the behaviors of women who use methamphetamine. The behaviors associated with the use of methamphetamine contribute to the predisposing and need domains of Andersen's theory for healthcare utilization.

Women's motivations for using methamphetamine specifically include: to "get high", to "get more energy", to elevate mood, to lose weight and feel more attractive, to party and to escape[53]. Women who use methamphetamine explain their drug use as a way to cope with stressors such as lack of income, mood disorders and body image problems. The majority reported using other drugs, including regular use of alcohol and marijuana. Marijuana was often used to modulate the effects of methamphetamine, other drugs, including "downers", crack and powder cocaine. These women had high rates of felony convictions (36%). This background may be contribute to continued use of drugs, as having a felony conviction can make it difficult to obtain a job and participate in many aspects of society, which may lead to increased feelings of depression and worthlessness[53]. One of the most well-documented differences between men and women with regard to drug use is their initiation into drug treatment, sources of social support during treatment and where they access treatment.

One of the few studies by Semple et al. in 2004 that examined women whose primary drug is methamphetamine described a sample of 98 women who used methamphetamine. This sample was a subset from an intervention study that taught safer sex practices to HIV-negative men and women[53]. These women had a high prevalence of psychiatric diagnoses; and based on the Beck Depression index, 39% were moderately depressed and 17% met the criteria for severe depression. Psychiatric illness is a common problem among substance users and may play an important role in why these women choose to use methamphetamine[54]. As discussed methamphetamine can cause increasing symptoms of depression and feelings of anxiety during withdrawal, leading to repeated use to alleviate these negative affective symptoms. Women tend to use methamphetamine with a friend or sexual partner, usually in their own home or a friend's home; they rarely used methamphetamine in a public place[53]. This "hidden" methamphetamine use among women likely contributes to difficulties accessing this population. Social context has a strong effect on drug use, contributing to initiation of drug use, drug use patterns and likelihood of engaging in treatment. There is evidence that the context for drug and alcohol abuse is different in women.

In a study in 2009, by Wenzel et al., the social context of alcohol and drug use of homeless women was studied, by interviewing a sample of 445 homeless women in shelters in Los Angeles County[55]. The networks of personal relationships among this sample were evaluated to determine the effect of social context on substance abuse. They found that personal network characteristics significantly predicted days of methamphetamine and amphetamine use, as well as use of marijuana, crack cocaine, and binge drinking. When women had a higher proportion of drug users in their personal networks, they were more likely to use marijuana, cocaine, or methamphetamine.

Twenty-two percent of the sample from Semple et al.'s study in 2004 reported exchanging sex for money. The frequency of sexual activity they reported were quite high, specifically a mean of 79.2 episodes of sexual intercourse in the prior two months. Vaginal and oral sex were the most frequent forms of sexual intercourse reported although anal sex was also common (mean number of 7.5 acts) [53]. The number of times they had sex put them at an increased risk for sexually transmitted infections and pregnancy. Engagement in anal sex substantially increases the risk of sexually transmitted infections particularly HIV infection. The women in this study who used methamphetamine were socially and economically disadvantaged [53]. For women who lack financial resources, trading sex for wares may help them to meet their financial needs. It may be that using methamphetamine helps them to cope with the trauma of transactional sex [53].

A study in 2006 confirmed Semple's findings described in the preceding paragraph and expanded on the description of sexual and drug injection risks among women who inject methamphetamine in San Francisco. This study compared women who injected methamphetamine with women who injected drugs other than methamphetamine such as heroin and cocaine. Women who injected methamphetamine were significantly more likely to be under 30 years old, white and identify as lesbian or bisexual than the women who used other injection drugs [52]. The women who injected methamphetamine reported a significantly higher number of injections in the past thirty days. Injecting more frequently increases the risk for transmission of Hepatitis C virus, HIV and other infectious diseases. Women who injected methamphetamine were more likely to engage in "receptive" syringe sharing (i.e. where they used a syringe after someone else had previously injected with it). In a multivariate analysis the study found that injecting methamphetamine was associated with unprotected anal sex and multiple sexual partners when controlling for younger age and a regular sexual partner. The authors hypothesized that "drug dependence, poverty and gender are powerful factors that may interact to shape the risk behavior of women".

In the study by Wenzel et al in 2009 exploring the social context of women's drug use, a woman's primary sexual partner had a strong influence on the use of all drugs except cocaine [55]. Women were more likely than men to be introduced to methamphetamine by a sexual partner, in another study [56]. Overall, these studies illustrate the important influence of a woman's personal relationships on her use of drugs, particularly the relationship with a primary sexual partner. Women's patterns of drug use are strongly influenced by their relationships with others.

The risk factors and motivations for using drugs and drug use behavior differ significantly between men and women. Women methamphetamine users are more likely to have experienced sexual abuse as children than men [57]. Women are more likely than men to initiate methamphetamine use in order to control or lose weight or to "escape" from reality, and to continue using methamphetamine for these same reasons [56]. Women who use methamphetamine are more likely than men to report having unprotected vaginal sex with a steady sexual partner or spouse [56]. Women who use methamphetamine transition to regular use more quickly than men, although women are less likely to inject methamphetamine [57]. Women who use methamphetamine report much higher levels of family conflict than men who use methamphetamine [58]. As stated above, there is a link between women's sexual and social networks and their methamphetamine use. These various differences in risk behaviors and motivations suggest that the focus of harm reduction and treatment interventions should be tailored to women's specific needs and contexts.

These studies describe the behaviors and needs of women who use methamphetamine elucidating the behaviors that contribute to the predisposing and need domains influencing healthcare utilization. The interaction between high-risk sexual behavior and drug dependence is one that is particularly relevant for women and is important to understand in order to meet their health needs. Gender inequity predisposes women to sexual exploitation and to use their own

sexuality, as a source of income and power. The sexual behavior of women who use methamphetamine appears to create an increased need for healthcare to address STIs and pregnancy. These differences are important for drug treatment and to provide effective and competent care.

Women who use methamphetamine are more likely to have experienced sexual abuse, use methamphetamine to deal with issues around weight and depression. They inject more frequently than women who inject other drugs. They engage in risky sexual behavior. They have needs specific to their risk factors and use etiology different from men, as described in the previous section, and somewhat different from other women who use drugs.

Conclusion to Literature Review

Methamphetamine use is a significant problem in the United States, and specifically in California where my study was conducted. Women who use methamphetamine are an understudied group with complex health needs. People who use methamphetamine traditionally lack access to preventive healthcare and utilize the emergency department, putting an unnecessary burden on emergency services. Adequate access to healthcare makes a significant difference in the health outcomes of substance users. Understanding why substance users do not get the healthcare services they need is important for our ability to change their health outcomes and to improve their utilization of the healthcare. Drug use is an extensive problem in the U.S. Addiction is a complex problem with a strong evolutionary and biological basis. Individuals who use drugs have decreased access to healthcare as compared to people who do not use drugs. Drug users have increased utilization of the emergency department, which is costly to society as a whole and likely does not result in the best possible care. Methamphetamine users have increased sexual risk behavior, inject more frequently, often have injuries from drug use and injecting and suffer from a wide array of physical and mental health problems. Andersen's model of healthcare utilization provides a framework for understanding how the characteristics of methamphetamine using women described above affect utilization of healthcare. There are individual and group determinants of this group that contribute to their engagement with healthcare. It is important that we understand what factors contribute to methamphetamine using women's engagement in healthcare in order to better serve their needs.

The quantitative analysis that follows explored the correlation between women who use methamphetamine and unmet healthcare. An extensive data set containing many different measures was gathered in order to better understand women who use methamphetamine. Variables were selected from this data set using the information about women who use methamphetamine described above and their potential impact on healthcare utilization based on Andersen's model. This analysis examined unmet healthcare for chronic conditions, dermatologic conditions and women's preventive healthcare and what attributes were associated with not receiving needed care. The purpose of this analysis is to help inform better healthcare practice for healthcare delivery systems on a macro (i.e. healthcare system) and micro (i.e. individual provider) level that encourages these women to get the care they need.

Original Research: Unmet Healthcare Need Among Women Who Use Methamphetamine In San Francisco

Introduction

The use of methamphetamine, a synthetic stimulant that affects both the brain and central nervous system, has increased in prevalence in the United States since the 1990s [29, 32, 33, 36, 59]. The number of methamphetamine-related treatment admissions increased by 182% from 1994 to 2004, and the highest concentration of treatment admissions was in the Pacific and Mountain states [60]. Methamphetamine can be snorted, smoked, ingested orally or rectally, and injected [29]. Methamphetamine use in institutional and community based samples have been associated with negative physical and effects such as cardiomyopathy, appetite suppression, malnutrition, poor dentition, and soft tissue infections when injected, as well as co-morbid psychiatric problems, which are often secondary to chronic use of methamphetamine [29, 32, 61, 62]. While both men and women use methamphetamine at comparable rates, research on methamphetamine use has focused primarily on men, in particular men who have sex with men [33, 59, 63-68].

There have been few studies of women who use methamphetamine. In a sample of incarcerated women who used methamphetamine, there was an increased prevalence of co-occurring psychiatric and drug problems, emotional distress, depression, powerlessness and low self-esteem, when compared to men in previous studies [48]. In a study of injection drug users in San Francisco, Lorvick et al (2006) found that women who injected methamphetamine were more likely to engage in sharing syringes than women who injected other drugs [52]. Other studies have found a high prevalence of sexual risk behavior among methamphetamine users, including more sexual partners, higher prevalence of trading sex for money, drugs or shelter and higher odds of having unprotected sex as compared to other drug using women [52, 54, 69].

While there has been some research on the health of methamphetamine users, there is scant literature on their access to health services. Methamphetamine users (as well as other substance users) have been documented to use the emergency room more frequently than non-methamphetamine using patients, for minor trauma and other health issues, increasing the costs to the healthcare system [29, 61, 70-72]. The health risks associated specifically with injecting drugs, such as cellulitis, abscesses, HIV, viral hepatitis, and overdose as well as health risks from methamphetamine use itself, may contribute to the poor health status of methamphetamine users [73]. Dermatologic problems have been associated with methamphetamine use due to self-inflicted injury while intoxicated, injection of the drug which results in infections, or burns from manufacturing and smoking the drug [30]. Additionally, dermatological problems are exacerbated by scratching and picking secondary to drug-induced perceptual distortions such as formication, the perception of insects on the skin, a side-effect of methamphetamine use [30, 32]. Drug use has also been associated with difficulty attending appointments, caring for basic health maintenance needs and poor relationships with healthcare providers [74]. Studies have shown that the use of case management services as well as engaging with drug treatment and attending syringe exchange programs helps to decrease the unmet need for care among drug users [20, 75].

These factors all contribute to the poor health and increased need for healthcare among women who use methamphetamine. The aim of this study was to investigate the unmet, non-emergency healthcare needs of women in San Francisco who use methamphetamine. This study examined unmet need for chronic, dermatologic and women's preventative healthcare among women who used methamphetamine in San Francisco, California.

Methods

Procedures

This study was conducted in San Francisco, California from July 2007 to June 2009 and was funded by the National Institute on Drug Abuse. Participants were recruited using respondent-driven sampling (RDS) [76]. Initial participants (called “seeds”) were recruited by the research team through community outreach to service organizations that work with women and methamphetamine users in San Francisco. These study participants were then each provided with three to six coupons to recruit women who use methamphetamine into the study. This next group of participants was then given three to six coupons to recruit more eligible study participants, and so on until the sample reached the final sample size. A cash incentive was given to the recruiter for each eligible woman who was enrolled in the study. Participants received \$40 for the initial interview and received a \$10-\$20 incentive for each additional woman they recruited to the study (this incentive was increased during the study to increase study referral). Eligibility criteria for enrollment were 1) self-reported use of methamphetamine in the past 30 days, 2) aged 18 years or older, 3) biologically female, 4) at least one male sexual partner in the past six months, and 5) having been referred to the study by another study participant using an RDS coupon (except for the seeds). Participants were screened for eligibility by phone or in-person. Eligibility questions included some that were not relevant to the study in an attempt to mask the study eligibility criteria.

Eligible participants underwent an informed consent process and a quantitative interview lasting approximately one hour. A trained interviewer conducted a face-to-face interview while entering responses from participants into a computer-based personal interviewing system (Blaise®, Westat). All participants were tested for sexually transmitted infections (STIs) including HIV, syphilis, gonorrhea, Chlamydia, trichomonas, and herpes simplex virus 2. Women who tested positive for any STIs were either treated immediately or referred to San Francisco City Clinic for treatment. All participants received counseling and referrals to social and medical services as needed. All of the study procedures were approved by the Institutional Review Board at RTI International.

Outcome Variables

Unmet medical need was measured using responses to three questions about receiving medical care: A chronic health problem in the last six months was measured using answers to the question “In the past six months did you need care for an ongoing health problem?” A dermatologic problem was measured using answers to the question “In the past six months did you need skin or dermatologic care?” Women’s preventative health was measured using answers to the question “In the past year did you need a pelvic exam or pap smear “ and “IN the past year did you need a breast exam or a mammogram?”. The criterion for unmet need for women’s preventative healthcare was based on clinical practice guidelines, which recommend that sexually active women should receive an annual pap smear and that each woman over the age of forty should receive an annual mammogram [77, 78]. There were two questions about screening tests that were combined, so that if either screening test was needed and not performed, the woman was categorized as having an unmet need for women’s preventative healthcare. In this analysis, the unmet need was treated as a dichotomous categorical variable. Each category of unmet need was distinct from the other categories. It is possible that some participants had unmet needs in more than one category and that they had received care in one category but had unmet needs in another category.

Independent Variables

The following independent variables were considered as potentially associated with unmet health care need, based on previous literature about drug using women, and about people who use

drugs and healthcare access: trading sex for money, drugs, food or shelter (referred to as transactional sex); homelessness; demographic factors; substance use history for the past six months; frequency of methamphetamine use; having access to a healthcare provider (self-report); and utilization of social services. Substance use history was measured by asking about whether many drugs or combinations of drugs had been used in the past six months. Frequency of methamphetamine use was measured by asking how many days out of the previous 30 days methamphetamine had been used. Having access to a healthcare provider was based on self-report. Utilization of social services was measured by asking whether a variety of social services had been used in the past six months. Depression was assessed using the Center for Epidemiological Studies Depression scale (CES-D), which is a well validated scale designed to measure the depressive symptomology in the general population for epidemiologic studies, based on self-report [79].

Statistical Analysis

Three hundred and twenty-two women were interviewed, of whom 24 were excluded in this analysis because they tested HIV antibody positive, leaving a total of 298 women in the analysis. HIV positive women were excluded due to the differences in the need for and access to healthcare. [80, 81]

Bivariate analysis using χ^2 and t-tests for significance ($p < 0.05$) were used to determine the association between each unmet need and each independent variable. Those variables that had a p-value of less than 0.10 in bivariate analysis were considered as candidate variables for inclusion in multivariate logistic regression models for the unmet need outcomes. We used forward and backward stepwise logistic regression to fit parsimonious models. Final logistic regression models included only independent variables that were significant at the $p < 0.05$ level. This analysis used STATA version 11 [82].

Although the sample was gathered using RDS methods, our final analyses did not use RDS methods to analyze and present the data. In order to use RDS to its fullest potential, it is necessary in the analysis to account for the interdependence of study participants who refer each other to the study. However, there are many unresolved issues regarding the representativeness of RDS samples, as well as the use of RDS weighted data in multivariate analysis [83-86]. Because we did not analyze our data using RDS methods, the study is not necessarily generalizable to the larger population of all women who use methamphetamine.

Results

The sample was ethnically diverse, with almost half being African-American, one third White, and 21% another race/ethnicity (Table 1). The women in the sample were predominantly unemployed and over half considered themselves homeless. The mean number of days of methamphetamine use was 18 out of the last 30 days. Poly-substance use was common, with three-quarters of the women reporting use of crack cocaine and over half of the women reporting having injected drugs within the last six months.

Fifty-two percent of women had received health care for a chronic condition in the past six months, 11% reported having received dermatologic care in the past six months, 56% received women's preventative healthcare (Table 2). Sixteen percent of women reported an unmet need for a chronic health condition, 22% had an unmet need for dermatologic care 66% had no need for dermatologic care and did not need or receive it and 55% had an unmet need for women's healthcare (Table 2).

In bivariate analysis women who reported having access to a healthcare provider were more likely to have utilized case management services within the past six months ($p < 0.01$). In the

multivariate analysis, women who reported having a person they identified as a healthcare provider had lower odds of reporting an unmet need for a chronic health condition. Participants with higher CES-D scores on a brief screening for depression (CES-D) had higher odds of having an unmet chronic healthcare need (Table 3).

Women who had used a case manager in the last six months had lower odds of having an unmet need for dermatologic care (Table 4). Women with a recent history of incarceration and women who reported having had overnight hospital stays had higher odds of having an unmet need for dermatologic healthcare in the last six months (Table 4). Women who reported having a person they identified as a healthcare provider had lower odds of having an unmet need for women's preventative healthcare over the last year (OR = 0.58 [0.36-0.93]).

Discussion

The majority of the women in this study who reported having received health care for chronic conditions and women's preventative healthcare and 11% of the sample had received dermatologic care, with 66% saying they had no need for dermatologic care. This study was conducted in San Francisco, which has many healthcare and social service venues for low-income individuals and for those who use drugs. Despite the resources available to these women, many of them still reported an unmet healthcare need.

Our data suggest that having a health care provider available or working with a case manager may be an important component of successful engagement across all the domains of healthcare we studied. Furthermore, having a chronic healthcare condition may motivate patients to pursue care. Those who have a chronic health condition may be more likely to establish a relationship with a provider due to the increased necessity and frequency of health visits.

A history of incarceration and hospitalization were associated with higher odds of needing dermatologic care. One explanation for this finding may be that those individuals who are incarcerated tend to have worse overall health, including dermatologic problems [87-89]. This finding indicates that more attention on dermatologic care is needed in institutional settings.

Fifty-five percent of the women in this sample reported an unmet need for women's preventative healthcare, and 62% of our sample reported engaging in transactional sex. Women who engage in transactional sex may be more at risk for STI's as well as unintended pregnancy [90, 91]. The lack of women's preventative healthcare implies that these women are not receiving sufficient contraceptives or annual STI screenings, which in standard clinical practice are combined with pap smears. Prior studies have found a correlation between practicing transactional sex and hesitancy to seek care due to stigma [92, 93].

The mean age of women in the sample was 40 years. Older women may be less likely to seek care related to women's preventative healthcare because they are not of child-bearing age or because they are not seen as a sexually active population. However, these women are still at risk for breast cancer, cervical cancer, and STIs, and have an even greater need for regular mammograms than younger women because their age puts them at increased risk for breast cancer [94, 95].

Having a healthcare provider was associated with a decreased odds of having unmet need for women's preventative healthcare. The high prevalence of transactional sex and the relatively older age of the population in this study highlight the need for funding that increases access to women's preventative healthcare. With increasing age women have a greater clinical need for mammograms and are a greater risk for secondary consequences of untreated STI's including cervical cancer. Clinics may need to create policies that encourage sensitive care for women's preventative healthcare targeted at drug users and women engaged in transactional sex. Encouraging engagement in care

with a healthcare provider through policy may be an important intervention to increase access to care.

The frequency of methamphetamine use was not significantly associated with any unmet healthcare need nor was the use of any other illicit drug. This finding may reflect that the overall social situation of these women has a greater impact on their health than use of an individual drug. This combination of substance use and socioeconomic disadvantage may both be contributing to their healthcare needs being unmet.

There are limitations to our study design to be considered when interpreting its results. In this study, having a healthcare provider was self-reported and may reflect a participant's impression that she has a healthcare provider available to her, something that we did not attempt to verify. Nevertheless, this measure is meaningful because it captures the sense of participants that they have someone accessible to them when they need healthcare. The generalizability of the study results are limited by the difficulty of sampling women who use methamphetamine, an illegal and highly stigmatized behavior. This sample was not a random sample, nor did we analyze the data using RDS methods, so selection bias may be present. All participants were recruited in San Francisco, CA, which may have more healthcare resources than other cities making it unrepresentative of other cities. In cities with fewer healthcare options for impoverished women, unmet healthcare need may be even more common than we found in this study. All of the healthcare utilization data were based on participant self-report, which is vulnerable to social desirability and poor recall [96]. It should be noted that we removed HIV positive women from the analysis because of their differential access to healthcare, limiting the sample to those who were HIV negative. These results are not generalizable to women with HIV and future studies will want to examine unmet healthcare needs within that sub-population.

Despite these limitations, our study is important because it provides information about the factors associated with unmet health care needs for women who use methamphetamine. Women who used a case manager or had access to a health care provider had significantly lower odds of having an unmet healthcare need. This association provides evidence that engagement in social services is a critical element in meeting the healthcare needs of this high-risk, impoverished population at increased risk for morbidity and mortality. These results emphasize the importance of provider engagement with this population of women who use methamphetamine. Future research should focus on policy interventions that make healthcare providers more accessible to women who use methamphetamine and encourage culturally competent care for women engaged in transactional sex. Given the social stigma with which drug users are often treated it may be that the most important element of service engagement is for drug users to feel less stigmatized in a primary care setting so that they are willing to return for follow-up and preventative care rather than waiting until an acute problem develops.

Table 1. Demographics of a Sample of HIV Negative Women Who Use Methamphetamine in San Francisco, California July 2007- June 2009

	Percentage (N=298)		
Categorical Variables			
Less than 12 years of education	28 %		
Ward of the State	35 %		
Homeless	58 %		
Engaged in Transactional Sex	62%		
Work Status			
Unemployed	64%		
Employed	10%		
Disabled	26%		
Race/ Ethnicity			
European-Americans	33%		
African-American	46%		
Other	21%		
Substance Use (past six months)			
Injection of heroin alone or in combination with cocaine or methamphetamine	33%		
Crack cocaine use	78%		
Use of marijuana	63%		
Use of any injection drug	55%		
Continuous variables			
	Mean	SD	95% CI
Age (in years)	40.31	0.63	39.06-41.56
CES-D* score (0-60)	32.29	0.78	30.75-33.83
Days of methamphetamine use (in the last 30 days)	18.22	0.75	16.75-19.70

*Center for Epidemiologic Studies Depression Scale

Table 2. Prevalence of Healthcare Received and Unmet Needs among HIV Negative Women Who Use Methamphetamine in San Francisco July 2007 to June 2009

	Percentage
Received Care	(N=298)
Chronic	52%
Women's Preventative Care	56%
Dermatologic	11%
Unmet Need*	
Chronic	16%
Women's Preventative Care	55%
Dermatologic	22%

*defined as self-report of a healthcare problem for which care was not received

Table 3. Multivariate Model of Unmet Need for Chronic Healthcare Conditions in the Last Six Months among HIV Negative Women Who Use Methamphetamine in San Francisco July 2007 to June 2009 (N=298)

	Adjusted OR (95% CI)
Healthcare provider ¹	0.21 (0.09-0.44)
CES-D ² score	1.02 (1.0-1.05)

¹ Self-report of a regular provider available to address health needs

² Center for Epidemiologic Studies Depression Scale

Table 4. Multivariate Model of Unmet Dermatologic Healthcare Need in the Last Six Months among HIV Negative Women Who Use Methamphetamine in San Francisco July 2007-June 2009 (N=67)

	Adjusted OR (95%CI)
Prison	4.9 (1.2-20.6)
Overnight hospital stay	2.4 (1.3-4.5)
Use of a case manager	0.43 (0.24-0.78)

Table 1: Key Principles for Gender Specific Evidence-Based Treatment.	
<i>Acknowledge the importance and role of socioeconomic issues and differences among women.</i>	It is important to address women’s substance abuse issues in the context of their situation. Women are more likely to be financially dependent on a partner with whom they use drugs [97].
<i>Recognize the role and significance of relationships in women’s lives</i>	Women even more so than men have sexual and social relationships that encourage their drug use. They may find that they have a greater “disconnect” from their relationships as a consequence of drug use[44].
<i>Address women’s unique health concerns</i>	Women have distinct risk factors related to use and have a greater propensity for health-related consequences as well as more co-existing disorders [44, 45, 98]
<i>Attend to the relevance and influence of various caregiver roles that women often assume throughout the course of their lives</i>	Women throughout their life often embody many different caregiver roles. One of the most influential on their treatment success is that of being a mother. Women who are responsible for children need extra support to enroll in drug treatment. It is helpful for them to have childcare provided or be able to incorporate children into residential treatment as often there is no one else to care for them, or they are hesitant to be separated from them [44, 99]
[44]	

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