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Characteristics and consequences of heroin use among older adults in the United States: a review of the literature, treatment implications, and recommendations for further research

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Abstract

This review reports on the results of a comprehensive literature search of studies examining the physical and mental health characteristics of older adults in the United States who use heroin. Multiple databases were searched for papers meeting the inclusion criteria of heroin users who were age 50 years or older. A total of 14 articles covering 9 different studies met the review inclusion criteria. All of the studies were convenience samples, and seven of the nine studies

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Author Disclosure

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Contributors

Dr. Rosen and Ms. Hunsaker designed the study, determined the eligibility criteria for inclusion of articles, carried out the literature review, and wrote the first draft of the paper. Dr. Albert provided expertise on health and aging, and edited the results and discussion sections. Dr. Cornelius provided expertise on drug addiction and aging and completed editing throughout the paper. Dr. Reynolds additionally provided editing throughout the paper. All authors contributed to and have approved the final manuscript.

Conflict of Interest

All authors declare that they have no conflicts of interest.

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(77.8%) were entirely drawn from substance abuse treatment programs, primarily methadone maintenance programs. Findings from the qualitative studies suggest that the marginalization of older heroin users was a predominant experience that impacted intent to seek treatment as well as treatment retention. While articles reported high levels of physical and psychological/psychiatric comorbidities with substance misuse, research on heroin use and methadone treatment among older adults is scant and the quantitative findings are inconsistent. The articles reviewed in this study demonstrate that the needs of this population will be significant, yet the development of appropriate interventions and treatment for older adult heroin users will be contingent on empirical research that adequately describes mental and physical health problems.

Keywords

Heroin; methadone maintenance treatment; mental health disorders; physical health problems

1. Introduction

In June of 1975, the National Institute of Drug Abuse (NIDA) held a conference on Drug Abuse and the Elderly to examine older adult substance abuse (National Institute on Drug Abuse, 1975). Over thirty years later, much has been written on the epidemiology, screening and treatment of alcoholism among older individuals, but heroin use within this population remains poorly investigated (Fingerhood, 2000; Moos, Brennan, Schutte, & Moos, 2004). Previous longitudinal studies have in fact excluded older adults, age 50 and over, when exploring the natural history of addiction (Vaillant, 1966; Vaillant, 1973). The Substance Abuse and Mental Health Services Administration (SAMHSA) has produced a collection of reports documenting the increasing prevalence of older adults in substance abuse treatment, yet little of this work focuses on heroin addiction. Projections suggest an increased need for substance abuse treatment services in older adults with the aging of the population (Armstrong, 2007; Collier, Compton, Gfroerer, & Condon, 2006; Han, Gfroerer, Collier, & Penne, 2009).

An aging baby-boom population almost guarantees that the growing problem of heroin addiction among older adults will continue to worsen (Han, et al., 2009). Heroin is already the second most frequently cited primary substance of abuse (after alcohol) for all admissions to substance abuse treatment by adults over the age of 50 (M. R. Lofwall, Schuster, & Strain, 2008). Analyses of the Treatment Episodes Data Set (TEDS), which monitors federally and state funded substance abuse treatment admissions, identified that in 2005, 1 in 5.3 substance abuse admissions of 50–54 year olds were for heroin abuse (Substance Abuse and Mental Health Services Administration, 2007). Between 1992 and 2008, admissions aged 65 or older for heroin addiction increased from 7.2 percent to 16.0 percent (Substance Abuse and Mental Health Services Administration, 2010).

Part of the reason for this increase in heroin addiction amongst older adults is the high rates of substance abuse in the baby-boom cohort (persons born between 1946 and 1964; Patterson & Jester, 1999). For instance, analyses of data from the National Household Survey on Drug Abuse indicates that people born between the late 1940s and early 1960s have the highest prevalence of injection drug use ever reported in the United States (Armstrong, 2007). Other findings indicate that the estimated number of people age 50 or older in need of substance abuse treatment is expected to increase from 1.7 million in 2000/2001 to 4.4 million in 2020 (Gfroerer, Penne, Pemberton, & Folsom, 2003).

To understand this issue, we conducted a systematic literature review of studies that focused on adults over the age of fifty and heroin addiction. The decision to define older adults as

those individuals over the age of fifty was based on the high rates of mortality in this population, along with data indicating that many heroin users die in their fifties (Darke & Zador, 1996; Smyth, Hoffman, Fan, & Hser, 2007). Therefore, in the epidemiology of substance use, time to death may be a more important age than time since birth. This methodical review is focused on the clinical characteristics of this population with the goal of highlighting co-occurring physical, psychological and psychosocial problems as heroin users enter later life.

Given the projected increase of older adults in treatment for heroin addiction it is critical to assess the health and mental health needs that these individuals face, which may, in turn, impinge upon their adherence to and success in substance abuse treatment. While heroin is the second most common reason older adults will enter substance abuse treatment after alcohol, the nature of treatment for opiate addiction is quite different than alcohol dependence. Methadone maintenance programs, that require frequent attendance, offer a rare opportunity to appropriately address the mental and physical health problems associated with aging in a substance abusing population.

2. Methods

Medline/PubMed, PsycINFO, and Web of Science were searched for relevant articles using a combination of the search terms: heroin, opiate, addict, junkie, methadone and injection drug; with aging, elderly and older adult. In Medline/PubMed, the Medical Subject Headings (MeSH) Heroin Dependence and Aged were also used. The websites of NIDA and SAMHSA were searched for grey literature, including reports and policy briefs.

These searches resulted in a total of 4283 references. Articles were then limited to human subject studies published in English between 1990 and 2009, resulting in 1503 references. The titles and abstracts of these articles were reviewed to determine whether they presented studies on older adult heroin users or older adults in methadone treatment, resulting in 105 articles. References for these articles, as well as citations of these articles, were reviewed to determine whether any additional articles should be included. The abstracts of these resulting articles were reviewed to determine whether they met the following criteria: 1) Qualitative or quantitative studies characterizing the physical, psychological and/or psychiatric well-being of older adults using heroin and/or in methadone treatment; 2) Study participants with a mean age of 50 years or older; and 3) Sample size of 20 or more older adults, defined as 50 years or older. As older adults using heroin and/or in methadone treatment were the focus of this review, articles that only examined abuse of opioid pain medication were excluded.

Using the above criteria, a total of 14 articles that presented findings from 9 different studies were selected for review. Results from each study describing drug use characteristics, physical health problems, and mental health disorders of the study sample are summarized.

3. Results

3.1 Description of Reviewed Studies

Nine articles reported quantitative findings (Firoz & Carlson, 2004; Hser, 2007; Hser, et al., 2004; Hser, Hoffman, Grella, & Anglin, 2001; Hser, Huang, Chou, & Anglin, 2007; M.R. Lofwall, Brooner, Bigelow, Kindbom, & Strain, 2005; Rajaratnam, Sivesind, & Todman, 2009; Rosen, 2004; Rosen, Smith, & Reynolds, 2008) and five articles qualitative results (Anderson & Levy, 2003; Conner & Rosen, 2008; Hamilton & Grella, 2009; Levy & Anderson, 2005; Smith & Rosen, 2009; Table 1). Four of the articles (Hser, 2007; Hser, et al., 2004; Hser, et al., 2001; Hser, Huang, et al., 2007) emerged from a three-decade

longitudinal study (1974–1997) examining different outcomes of a heroin-addicted population as they aged. All of the studies were convenience samples, and seven of the nine studies (77.8%) were entirely drawn from substance abuse treatment programs, primarily methadone maintenance programs. One study recruited participants from a methadone maintenance program and from the community (Hamilton & Grella, 2009) and one study recruited participants through a street outreach program (Anderson & Levy, 2003; Levy & Anderson, 2005).

Sample sizes ranged from 24 to 242 participants. The majority of the samples were between the ages of 50 and 60. Samples in the various studies primarily reported on African American and white respondents. Hser and colleagues (Hser, 2007; Hser, et al., 2004; Hser, et al., 2001; Hser, Huang, et al., 2007) reported on a large number of Hispanic respondents, and Firoz and Carlson (2004) was the only study to report findings on an older adult sample of Asians (N=17). All studies, with the exception of three qualitative studies (Conner & Rosen, 2008; Hamilton & Grella, 2009; Smith & Rosen, 2009), had samples that were predominantly male. The study conducted by Hser and colleagues was entirely male, due to the low number of women committed to the compulsory treatment program from which the study sample was derived. Hamilton and Grella (2009) intentionally created a sample of individuals that was 50% male and 50% female to examine gender differences.

3.2 Qualitative Studies: Challenges Faced by the Aging Heroin User

Five qualitative studies examined challenges related to aging. Semi-structured interviews and focus groups were conducted with both methadone maintenance clients and active injectors. Each study explored societal barriers that older heroin addicts and methadone clients experienced and examined age-appropriate methods for the successful engagement of older heroin users in substance abuse treatment. Two qualitative studies (Anderson & Levy, 2003; Levy & Anderson, 2005) reported on the nature of drug careers of life-long heroin injectors and found that aging often changes the social relationships and roles of older heroin injectors, both within the drug culture and in mainstream society. Physical decline is a primary contingency that diminishes the older user's ability to participate in roles within the drug culture and has the potential to change and even reduce drug use.

Marginalization is a recurrent theme among older heroin users. Anderson and Levy (2003) described older users as being pushed to the margins of the drug culture, their status diminished and their participation within the drug culture largely invisible. Older heroin users lamented the changes that have occurred in the heroin using community. Thus, the "Old School" mores of social concealment and mutual protection among heroin users, functioning within a cottage industry of drug selling and procurement, has been replaced by the complexities of "New School" drug trafficking. In this new system, violence and inequity between the buyer and seller are exacerbated by age. Older heroin users experience loneliness and victimization within this new culture. Since older heroin users prefer to age in a culture that is familiar to them, these changes pose significant challenges for effective drug treatment interventions.

A second set of qualitative studies (Conner & Rosen, 2008; Smith & Rosen, 2009) examined the societal challenges faced by older adults (N=24) enrolled in a methadone maintenance program. Connor and Rosen (2008) found that older methadone clients experienced stigma associated with drug addiction, old age, psychotropic medication use, depression, being a methadone maintenance client, poverty, race, and HIV status, with drug addiction and advanced age being the most common areas of stigma. These stigmas served as barriers to treatment and retention for substance abuse and mental health treatment.

Using the same study sample, Smith and Rosen (2009) explored the barriers to accessing and maintaining social supports among older methadone maintenance clients. Mistrust emerged as a primary barrier and was associated with aging, difficulties related to personal relationships, and past traumatic experiences, such as the death of a loved one and physical and emotional abuse. Each of these factors led to an election to self isolate and a loss of social relationships, a key element of successful substance abuse treatment and maintenance of abstinence. The authors suggest that traditional substance abuse treatment interventions may not address the absence of social support or provide methods to enhance the older individual's social network.

The final qualitative study used focus groups to examine gender differences among older adults who have a history of heroin dependence (Hamilton & Grella, 2009). The authors found that female focus group participants spoke more about the impact of their heroin use on their families, while men expressed disbelief in surviving to older age. Heroin users in methadone maintenance treatment reported that treatment allowed them to regain connections to loved ones. The restoration of family ties was seen as a primary motivation to seek methadone maintenance treatment.

3.3 Estimated Prevalence of Mental Health Disorders

Measuring mental health disorders was a focus of six studies, including one qualitative and five quantitative studies (Table 2). All of the studies utilized established screening tools. Overall, two of the studies reported rates of a current mental health disorders at 24.4% and 57.1% (Firoz & Carlson, 2004; Rosen, et al., 2008). The prevalence of depression reported by studies ranged from 7.3% to 32.9% (Conner & Rosen, 2008; M.R. Lofwall, et al., 2005; Rosen, et al., 2008). Two other studies examined depression utilizing instruments with standardized cutoff scores, and reported depression rates in their older adult cohorts that were significantly higher than national norms (Hser, Huang, et al., 2007; Rajaratnam, et al., 2009).

Ten different anxiety disorders were examined in four of the studies. Only two of the studies (M.R. Lofwall, et al., 2005; Rosen, et al., 2008) screened for more than four anxiety disorders. In a sample of 140 older adult methadone clients, Rosen and colleagues (2008) found rates of anxiety disorders ranging from 13.6% to 29.7%. The most common anxiety disorders were general anxiety disorder (29.7%), post-traumatic stress disorder (27.8%), and specific phobia (26.4%). Lofwall et al. (2005) found no significant differences in current rates of anxiety disorders among younger methadone maintenance clients (aged 25–34 years) versus older clients (aged 50–66 years), with the exception of higher rates of panic disorder in the younger group. Rajaratnam and colleagues (2009) found that anxiety symptoms (i.e. restlessness, nervousness, tension, etc.) were higher for clients 55–64 years of age compared to clients 65 years or older, although the difference did not reach statistical significance. Hser et al. (2007) compared anxiety symptoms for heroin addicts who had abstained from heroin use for the past five years versus those who had not abstained and found anxiety symptoms to be significantly higher in users.

3.4 Estimated Prevalence of Physical Health Problems

Six out of 14 articles focused on some aspect of physical health concerns of an aging addicted population (Table 3). Four of the articles relied on self-reports of health problems while the other two articles reviewed medical charts. Three of the articles utilized a version of the Short Form-36 (SF-36) to assess various domains of physical health with one concluding that “overall health functioning was worse than the population norms for their own age group and older age cohorts” (Rosen, et al., 2008). Two articles reported overall

prevalence rates for chronic medical conditions and identified rates of 46.3% and 89.1% respectively (Hser, et al., 2004; Rajaratnam, et al., 2009).

Three of the studies focused on the burden of Hepatitis C and documented prevalence rates between 24.4% and 94.2% (Hser, et al., 2004; M.R. Lofwall, et al., 2005; Rosen, et al., 2008). Five of the studies examined rates of human immunodeficiency virus (HIV) and acquired immune deficiency syndrome (AIDS). The two studies that relied on medical chart reviews found a relatively low prevalence rate of HIV/AIDS (Firoz & Carlson, 2004; Hser, et al., 2004). However, the self-report studies found rates of HIV/AIDS that ranged between 14.6% and 29.2% (Anderson & Levy, 2003; M.R. Lofwall, et al., 2005; Rajaratnam, et al., 2009). Hypertension and elevated blood pressure rates ranged from 11.0% to 58.3% with three of the studies reporting rates above 40% (Firoz & Carlson, 2004; Hser, et al., 2004; M.R. Lofwall, et al., 2005; Rosen, et al., 2008).

Two of the studies asked respondents about problems with arthritis and reported rates of 29.3% and 54.3% respectively (M.R. Lofwall, et al., 2005; Rosen, et al., 2008). Prevalence of heart conditions differed across studies, with Lofwall and colleagues (2005) reporting a rate of 17.9% and Rosen and colleagues (2008) reporting a rate of 53.7% among opioid maintenance clients. Diabetes and abnormal blood glucose levels ranged from 7.0% to 18.6% (Firoz & Carlson, 2004; Hser, et al., 2004; Rajaratnam, et al., 2009; Rosen, et al., 2008).

3.5 Reports of Legal/Illegal Drug and Alcohol Use

Nine of the 14 articles reported findings on drug and alcohol use among their older adult heroin addict samples utilizing a variety of self-reports and urinalysis results. Drug use remained high across many of the samples, with three of the studies reporting prevalence of any drug use according to urinalysis ranging from 30.1% (in the past three months) to 61.9% (in the past 12 months; Firoz & Carlson, 2004; Rosen, 2004; Rosen, et al., 2008). Over half of the sample (55.0%) self-reported any drug use in the past twelve months in a qualitative study (Hamilton & Grella, 2009).

Rates of specific types of drug use were examined across the nine articles. The most common type of drugs examined were heroin (six articles) and cocaine/crack (five articles). Urinalysis results of heroin/opioid use ranged from 3.7% to 27.0% (Hser, et al., 2004; M.R. Lofwall, et al., 2005; Rajaratnam, et al., 2009; Rosen, 2004). Rates of self-reported heroin/opioid use were higher and ranged from 32.6% to 87.5% (Anderson & Levy, 2003; Hser, et al., 2001; Rajaratnam, et al., 2009). The one study that presented both urinalysis and self-reports for heroin/opioid use had relatively comparable rates of 32.6% for self-report and 27.0% for urinalysis (Rajaratnam, et al., 2009). Cocaine/crack use for self-reports ranged from 13.0% to 42.5% (Anderson & Levy, 2003; Hser, et al., 2001; M.R. Lofwall, et al., 2005; Rajaratnam, et al., 2009) while urinalysis reports for cocaine/crack use ranged from 7.8% to 35.1% (Hser, et al., 2004; M.R. Lofwall, et al., 2005; Rajaratnam, et al., 2009). In the one study that presented both urinalysis and self-reports of cocaine/crack use the rates for urinalysis were higher than self-report (35.1% versus 13.0%; Rajaratnam, et al., 2009).

Alcohol use was measured across five of the studies. One study reported an alcohol use rate of 2.4% in the past four months (M.R. Lofwall, et al., 2005). The other four studies that relied on self-reports during the interview reported a range of alcohol use from 17.6% to 34.0% (Hamilton & Grella, 2009; Hser, et al., 2004; Hser, et al., 2001; Rajaratnam, et al., 2009). Smoking tobacco was reported in three of the studies with a range of 57.4% to 87.1% (Hser, et al., 2004; Hser, et al., 2001; Rosen, et al., 2008).

Abuse of benzodiazepines, barbiturates, and amphetamines were reported in three of the studies. Benzodiazepine usage was the most common; Rajaratnam and colleagues (2009) presented self-report rates for the past month of 21.7% and urinalysis rates for the past month of 35.1%. Barbiturate and amphetamine use ranged from 2.7% to 11.6%, according to both urinalysis and self-report data (Hser, et al., 2004; Hser, et al., 2001; Rajaratnam, et al., 2009).

4. Discussion

An initial theory of substance abusers as they aged was that they “matured out” of their addiction problem (Winick, 1962). Other studies have characterized heroin addiction as a lifelong illness (Goldstein & Herrera, 1995), and have applied the life course perspective as a conceptual framework for characterizing drug use, comorbid conditions and treatment approaches (Hser, Longshore, & Anglin, 2007). Our review supports complementary research that older adult heroin users may not decrease their drug use as they age (Korper, 2002). Illegal drug use was a persistent and prevailing issue in many of the samples reviewed. Additionally, while most of the studies used samples culled from methadone maintenance treatment programs, heroin use was still prevalent across samples.

4.1 Treatment Implications

Several large scale longitudinal studies have tracked the treatment and health outcomes of individuals seeking substance abuse treatment (Hubbard, Craddock, & Anderson, 2003; Korper, 2002; Ross, et al., 2005), yet findings from these studies have not included an exclusive or significant sample of older adults, nor have a significant number of participants reached older adulthood. The domains of mental health, physical health, and continued drug use covered in this review present empirical evidence of syndemic behavior or interactions across domains for this population of older adults. Care approaches utilized in chronic illness management have been cited as a model for drug dependence treatment (Hser, Longshore, et al., 2007), and may be especially appropriate for older adult heroin users given the prevalence of comorbid health issues that warrant continuous maintenance (Higgs & Maher, 2010).

Our review supports the need for practitioners within substance abuse settings to be sensitive to the physical limitations of older adult clients. Reduced mobility and stamina along with cognitive impairments associated with aging and decades of substance abuse will require adaptations within the treatment setting. For example, the pace of treatment interventions, print material that can be read by individuals with sight impairment, and transportation problems are some of the issues that will need to be addressed in substance abuse treatment facilities serving older adults.

Substance abuse treatment has been shown to be more effective for older adults than for younger adults (Crome, Sidhu, & Crome, 2009). A recent study of older heroin addicts (ages 40+) enrolled in methadone maintenance treatment found that individuals who remained in treatment showed a statistically significant reduction in drug use as well as psychiatric and legal problems compared to drop-outs (Fareed, Casarella, Amar, Vayalapalli, & Drexler, 2009). Funding services that are more accessible, tailored to the needs of older adults and decrease the stigma of substance abuse may lead to even better treatment outcomes (Crome, et al., 2009).

4.2 Limitations of Studies

Methodological issues and measurement variability make it difficult to provide a consistent clinical profile across the reviewed studies. The tools used to determine mental health

diagnoses or detect symptoms varied considerably. For example, the Structured Clinical Interview for DSM-IV diagnoses for depression (M.R. Lofwall, et al., 2005) produced prevalence rates less than half the level of Composite International Diagnostic Interview measurements (Rosen, et al., 2008). Prevalence rates for many of the other mental health disorders, physical health problems, and illegal drug use differed substantially across studies, suggesting that the use of a similar battery across a national study of heroin users might better establish the prevalence of mental health disorders. These differences precluded formal meta-analysis.

All of the studies reviewed in this article involved convenience samples, primarily in methadone maintenance clinics or substance abuse treatment facilities, in major urban areas. Significant populations missing from this review are individuals currently not in substance abuse treatment or living in more rural areas. The small samples (mean N=101; range 24–242) were insufficient for analyzing differences by race/ethnicity and/or gender. In addition, while all English language publications were reviewed, there were no articles from outside the United States that fit the criteria for this review. An emerging literature in Europe has begun to document the aging substance abusing population across Europe (Beynon, McVeigh, & Roe, 2007; European Monitoring Centre for Drugs and Drug Addiction, 2008; Vogt, 2009).

4.3 Directions for Future Research

Additional research is needed with larger samples of older adult heroin addicts both within treatment and not currently in treatment. While methadone maintenance programs offer a primary route of entry for services, it is possible that both the mental and physical health systems may see an increased number of older adults with substance abuse disorders. Validated instruments for the assessment of substance use in older adults, as well as tools for the evaluation of physical and mental health disorders of older adult addicts, are needed.

The increased burden of physical health problems for a relatively young older adult cohort was pronounced throughout the various studies and points to a significant public health concern. Three of the studies utilized versions of the SF-36, a multi-purpose short-form health survey (Ware, 1993) that allowed for comparison to national norms by age. However, there was a lack of consistency regarding which specific health conditions were examined, and no coherent justification for why certain chronic health conditions were chosen. The most common health conditions examined across the studies, hepatitis C and HIV/AIDS are non-geriatric health conditions. Hser and colleagues (2004) provided a more comprehensive listing of health conditions but arthritis, heart conditions, lung disease and gastrointestinal problems were all excluded and do warrant examination as they are all prevalent chronic health concerns in late life. Some conditions occurring in late life that may also be associated and exacerbated by heroin use include thyroid conditions, diabetes, arthritis, and osteoporosis warrant further investigation as limited access to care may hinder screening and treatment for these conditions (Beynon, Roe, Duffy, & Pickering, 2009; Higgs & Maher, 2010).

4.4. Conclusions

The high rates of co-occurring disorders indicate the need for substance abuse treatment facilities to address the challenges of geriatric mental health needs. For example, five of the studies documented high rates of depression. The etiology, identification, treatment, and response to treatment of depressive disorders differ among older adults. The specialized course of treatment for late-life depression will need to be addressed for substance abuse treatment facilities that are treating an increased number of older adults.

This review suggests that the development of appropriate interventions and treatment for older adult heroin users will be contingent on empirical research that adequately describes mental and physical health problems. Dual diagnosis in older adults is associated with increased service utilization, yet data on effective treatment options are limited and primarily focus on alcohol use and depression (Bartels, 2006; Schultz, Arndt, & Liesveld, 2003). As practitioners interact with an increasing number of older adult substance abusers they will be in search of cost-effective treatment options for addressing co-occurring mental and physical health disorders.

In the next decade, demographic trends demonstrate an increase in the projected utilization of the baby-boom generation of heroin addicts on the service delivery system. The articles reviewed in this study demonstrate that the needs of this population will be significant, but that in order to adequately prepare for these changes it will take a coordinated effort from funders, researchers, and practitioners. The public health cost of not acknowledging, identifying, and treating these increased risks is substantial and places older adult substance abusers at an increased risk and susceptibility for additional burdens as they age.

Research Highlights

- Research on heroin use and methadone treatment among older adults is scant
- Older heroin users experience significant marginalization that impacts treatment
- High levels of physical and psychological/psychiatric comorbidities are reported
- Intervention and treatment development is contingent upon further research

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Table 1

Description of U.S. based studies of heroin use and aging

Source	Study Dates	Location	Data Collection	N	Mean Age (Range or SD)	Race/Ethnicity ^a				
						White	AA	Hispanic	Asian	Other
Anderson & Levy, 2003; Levy & Anderson, 2005	NR	Chicago	Semi-structured interview	40	NR (50–68)	NR	38	NR	NR	NR
Connor & Rosen, 2008; Smith & Rosen, 2009	2005	Midwestern city	Semi-structured interview	24	58.4 (52–68)	10	14	0	0	0
Firoz & Carlson, 2004	1995–2000	Midwestern city	Structured interview, medical chart review	54	62.4 (55–82)	17	14	NR	17	6
Hamilton & Grella, 2009	NR	Los Angeles	Focus groups	38	NR (50–61+)	11	21	3	NR	3
Hser et al., 2001; Hser, 2007	1962–1997	Los Angeles	Longitudinal structured interview, medical chart review	242	57.4 (4.0)	89	17	136	0	0
Hser et al., 2004	1996–1997	Los Angeles	Longitudinal structured interview, medical chart review	108	58.4 (3.8)	38	8	62	0	0
Hser et al., 2007	1962–1997	Los Angeles	Longitudinal structured interview, medical chart review	239	57.0 (4.3)	NR	NR	NR	NR	NR
Lofwall et al., 2005	NR	Baltimore	Structured interview, medical chart review	41	53.9 (50–66)	14	NR	NR	NR	NR
Rajaratnam et al., 2009	NR	New York City	Structured interview, medical chart review	46	NR (55–65+)	8	27	9	0	2
Rosen, 2004	2002	Midwestern city	Structured interview	143	NR (50–60+)	64	79	0	0	0
Rosen et al., 2008	NR	Midwestern city	Structured interview	140	53.9 (4.01)	67	73	0	0	0

Note. AA: African American; NR: not reported; SD: standard deviation. All studies were convenience samples.

^aFrequency of study participants is reported for each race/ethnicity.

Table 2
Summary of mental health diagnoses of older heroin users and individuals in methadone maintenance treatment

	Conner & Rosen, 2008 (N=24) PHQ-9, past two weeks, %	Firoz & Carlson, 2004 (N=54) SCID, %	Hser et al., 2001; Hser, 2007 ^a ; Hser et al., 2007(N=242; 239) Hopkins Symptom Checklist, Mean (SD); CES-D, Mean (SD)	Lofwall et al., 2005 (N=41) SCID, %	Rajaratnam et al., 2009 ^b (N=46) BSI, Mean (SD)	Rosen et al., 2008 (N=140) CIDI, past 12 months, %
Major depression	16.7%				1.28 (0.93); 0.92 (1.22)	32.9%
Depression symptoms	41.7%		1.49 (0.52) ^c , 8.2 (8.6); 15.1 (12.6) ^d	7.3%		
Anxiety			1.30 (0.42) ^c		1.00 (0.80); 0.81 (0.81)	
Generalized anxiety disorder (GAD)						29.7%
Somatization disorder			1.48 (0.44) ^c		1.03 (0.84); 0.74 (0.45)	
Obsessive-compulsive disorder			1.59 (0.54) ^c		1.20 (0.85); 1.06 (0.67)	
Bipolar I				7.3%		
Dysthymia				7.3%		
Social phobia				4.9%		16.9%
Specific phobia				4.3%		26.4%
Schizophrenia				2.4%		
Panic disorder						13.6%
Post traumatic stress disorder						27.8%
Agoraphobia						13.6%
Current Mental Health Diagnosis		24.4%				57.1%

Note. SCID: Structured Clinical Interview for DSM-IV; SD: Standard deviation; ASI: Addiction Severity Index; CES-D: Center for Epidemiologic Studies Depression Scale; BSI: Brief Symptom Inventory; CIDI: Composite International Diagnostic Interview

^aThe first mean (SD) is for individuals abstaining from heroin for five years or more (N=104) while the second mean (SD) is for individuals with less than five years of abstinence from heroin use (N=138).

^bThe first mean (SD) are for study participants ages 55 and over; the second mean (SD) are for individuals ages 65 and over. These groups are not mutually exclusive.

^cMean (SD) are reported using the Hopkins Symptom Checklist.

^dMean (SD) are reported using the CES-D.

Table 3

Summary of medical conditions of older heroin users

	Anderson & Levy, 2003 (N=40)		Hser et al., 2004 (N=108)		Firoz and Carlson, 2004 (N=54)		Lofwall et al., 2005 (N=41)		Rajaratnam et al., 2009 (N=46)		Rosen et al., 2008 (N=140)	
	Self-report	Medical chart review	Medical chart review	Medical chart review	Medical chart review	Medical chart review	Self-report	Self-report	Self-report	Self-report	Self-report	Self-report
Hepatitis C		94.2%					24.4%				49.3%	
Hypertension/Elevated blood pressure		58.3%		11.0%			51.2%				44.9%	
Arthritis							29.3%				54.3%	
Heart condition							53.7%				17.9%	
Chronic lung disease											22.1%	
Gastrointestinal problems							26.8%				21.4%	
Cirrhosis				11.0%			7.0%				14.3%	
Diabetes/Abnormal blood glucose levels		18.6%		7.0%					11.1%		11.4%	
HIV Positive/AIDS	24.0%	1.8%		0.0%			14.6%		29.2%			
High cholesterol		22.4%										
Overweight/obesity		54.6%										
Syphilis		3.8%										
Tuberculosis		27.3%										
Asthma				4.0%			9.8%					
Any chronic medical condition				46.3%					89.1%			