

Mental Health Problems in Recently Incarcerated Male Adult Drug Users in Taiwan: Patterns, Rates, and Implications for Treatment

Te-Jen Lai^{1,2} · Mei-Hsin Su³ · Tony Szu-Hsien Lee⁴ · Hao-Jan Yang^{5,6}

Published online: 6 May 2016
© Springer Science+Business Media New York 2016

Abstract This study aimed to explore the extent of association between the classes and patterns (single vs. multiple) of drug use and the psychiatric disorders among recently incarcerated male drug users to help formulate drug policies for correctional facilities and provide adequate treatment for incarcerated drug users. Data were recruited from 414 male first-time incarcerated illicit drug users in one detention center in Taiwan. Their lifetime historical profiles of illicit drug use were then assessed and their associations with current psychiatric disorders were compared with 257 community controls. Heroin and meth/amphetamine were the most commonly used drugs among single and combined users. Heroin users were more likely to exhibit major depression and social phobia; meth/amphetamine users showed more psychotic disorder and antisocial personality disorder than community controls. Multiple drug users were associated with two-thirds of the psychiatric disorders. This study suggests that heroin and meth/amphetamine users require specific treatments, which may effectively address associated psychopathologic conditions. Interventions for mental disorders for some detainees are also recommended.

Tony Szu-Hsien Lee and Hao-Jan Yang contributed equally to this work.

✉ Hao-Jan Yang
hjyang@csmu.edu.tw

¹ Institute of Medicine, Chung Shan Medical University, Taichung, Taiwan

² Department of Psychiatry, Chung Shan Medical University Hospital, Taichung, Taiwan

³ Institute of Epidemiology and Preventive Medicine, National Taiwan University, Taipei, Taiwan

⁴ Department of Health Promotion and Health Education, National Taiwan Normal University, Taipei, Taiwan

⁵ Department of Public Health, Chung Shan Medical University, Taichung, Taiwan

⁶ Department of Family and Community Medicine, Chung Shan Medical University Hospital, No.110, Sec.1, Jianguo N. Rd, Taichung 40201, Taiwan

Keywords Heroin · Meth/amphetamine · Polydrug use · Mental disorders · Co-occurrence

Illicit drug use is a critical, worldwide problem. Many countries report relatively high lifetime prevalence rates of any illicit drug use problems (Compton et al. 2007; United Nations Office on Drugs and Crime [UNODC], 2015). In Taiwan, approximately 1.2 % of the 12- to 64-year-old population have tried at least one illicit drug during their lifetime. The five most commonly used drugs are meth/amphetamine (49 %), ecstasy (35 %), ketamine (22 %), cannabis (21 %), and heroin (10 %) (Kuo et al. 2007). Nevertheless, drug users who seek treatment or are coerced into a detoxification program do not have the same drug use profile as the general population. According to the Taiwan Food and Drug Administration (TFDA, 2009), heroin is the most commonly (52.7 %–93.8 %) reported drug among psychiatric hospitals or clinics from 2000 to 2008, followed by amphetamines (18.7 %–50.6 %) and benzodiazepines (2.0 %–11.0 %).

The close link between substance use and mental illness has been repeatedly demonstrated (Compton et al. 2007). Moreover, some studies have shown evidence of a specific connection between illicit drug use and psychopathology. For example, anxiety disorders are stronger in users of heroin than in those of cocaine, stimulants, or hallucinogens (Sareen et al. 2006). Heroin users have also shown much higher co-occurrences with major depressive disorder and antisocial personality disorder (Brooner et al. 1997; Callaly et al. 2001). As for the use/abuse of meth/amphetamine, it has long been acknowledged that it causes psychotic symptoms (Connell 1958). Lifetime use of amphetamine in patients with psychotic disorders is markedly higher (160 %) than that in the general population (Ringen et al. 2008). In addition, amphetamine users are more likely to exhibit major depressive disorder and anxiety disorders than other illicit drug users (Keyes et al. 2008; Lieb et al. 2002). Therefore, it seems that there are specific connections between the use of specific illicit drugs and the categories of psychiatric disorders, i.e., heroin with anxiety and depressive disorders and meth/amphetamine with psychotic disorders. Because individuals with co-occurring conditions are less likely to adhere to treatment (Santucci 2012), have their illness worsen over time (Sher et al. 2008), and have undiagnosed and untreated symptoms (Chan et al. 2008), it is necessary to understand the patterns and rates of co-occurrence to further develop intervention strategies. This is especially true for those incarcerated in correctional settings where detainees are medically underserved (Ditton 1999). As a result, many return to their communities with unsolved substance and mental problems, jeopardizing everyone's well-being.

For incarcerated heroin and meth/amphetamine users with mental disorders, anxiety symptoms are not only the cause for some individuals to use heroin for self-medication (Sareen et al. 2006) but also the consequence of heroin withdrawal when users are incarcerated. As such, treating illicit drug use alone to simultaneously alleviate the symptoms of non-substance mental disorders may work if the non-substance mental disorders are directly triggered by the use of illicit drugs (Raimo and Schuckit 1998). However, additional treatments addressing non-substance mental disorders and other factors are necessary if manifestations of mental disorders indirectly increase self-medication (Cerdeira et al. 2008) or if the two problems both share common causes (Santucci 2012).

Currently, clinical detoxification programs for inmates have mainly focused on reducing physical withdrawal symptoms rather than treating drug-dependent problems or co-occurring mental illnesses. Lack of drug-specific professionals, therapies, and psychiatric services represent unmet treatment needs for drug dependency and mental illness among incarcerated

drug users (Stewart 2009). This study thus aims to delineate the unmet needs for drug-specific treatments and mental disorder therapies by examining patterns and rates of co-occurrence between illicit drug use and mental disorders among incarcerated male adults in Taiwan.

Method

Study Design, Settings, Participants, and Procedure

A structured questionnaire was administered among recently incarcerated illicit drug users from April 1 to December 31, 2005 at the Taiwan Taichung Detention Center (TTDC), which is the largest detention center in central Taiwan. Male adults aged 18 years or older were deemed as eligible to represent the sub-population with the most drug users in Taiwan. To investigate the associations between illicit drug use and the occurrence of psychiatric disorders, only first-time and recent offenders were included. Long-term detainees and violators of the anti-drug law, who were not drug users themselves, such as illegal drug makers or drug sellers, were excluded from the analyses.

A census approach of sampling was undertaken for illicit drug users in TTDC. The recruitment was conducted once a month to make sure that newly and recently incarcerated drug users could be contacted. After giving verbal consent, detainees completed a structured and diagnostic interview at the TTDC for psychiatric assessment. The TTDC dictated the fieldwork timetable to accommodate interviewers. To encourage participants to provide real information of illicit drug use and psychiatric symptoms, face-to-face interviews were performed with no collection of personal identifiers or other demographic data, except for age, educational level, and residential area. In addition, the interviews were arranged separately to avoid possible interruption or manipulation from other inmates or TTDC officials. A total of 414 inmates were enrolled, which represented 36.54 % of the newly incarcerated drug users in the TTDC in 2005. The sample profile was not significantly different from the rest of the overall incarcerated reception population ($n = 719$) in mean age ($t = 1.13$, $p = 0.26$), educational level ($\chi^2 = 4.78$, $d.f. = 3$, $p = 0.19$), and residential area ($\chi^2 = 7.66$, $d.f. = 28$, $p = 0.96$).

The first-time drug offenders who lived in Taichung City were escorted to the TTDC after a positive urine test. Therefore, the probability proportional to size (PPS) strategy was used to randomly select male adults as a control sample from Taichung City. In brief, Taichung City was divided into 29 regions according to administrative divisions. As male adults aged 18+ living in Taichung City amounted to 913,268 in 2005, approximately 1 in 2000 of the population was randomly selected with a probability proportional to the number in each region. Random-digit dialing and direct household visitation were used to contact 456 male citizens. Two hundred fifty-seven gave verbal content and were enrolled as community controls, yielding a response rate of 56.3 %. No personal identifiers were collected except for age, educational level, and residential area. The Institutional Review Board of Chung Shan Medical University Hospital approved the study protocol.

Measures

We used the Mini-International Neuropsychiatric Interview (MINI) (Sheehan et al. 1998) to assess illicit drug use/abuse problems and psychiatric disorders based on the DSM-IV criteria.

The MINI is a structured interview instrument comprised of 15 Axis I and 1 Axis II diagnostic categories. It not only assesses a variety of psychiatric disorders, but also performs in a relatively short time (Otsubo et al. 2005), making it a proper diagnostic instrument in the use of large-scale epidemiological studies. The Chinese version of the MINI was originally translated and established by a professional team from the Taiwanese Society of Psychiatry. It is reliable when used in Taiwanese adult samples (Chiang et al. 2007). In the present study, the intraclass correlation coefficients for all diagnoses ranged from 0.82 to 0.95, indicating good inter-rater reliabilities among interviewers.

To identify the lifetime patterns (single vs. multiple) of drugs used, diagnoses of the use/abuse of illicit drugs in the “non-alcohol psychoactive substance use disorders” section of the MINI were evaluated. Current diagnoses of illicit drug use/abuse may only reflect specific drug use rather than regular use patterns. Detainees who reported using one class of drug were categorized as “any single drug users”. Those who reported trying any combination of two or more drugs were treated as “polydrug users”. For evaluating the classes of drugs, we did not distinguish between the subclasses (e.g., amphetamine or methamphetamine) of drugs or the methods (e.g., snorting or injecting) because such information was unavailable in the instrument. Therefore, the term “meth/amphetamine” refers to any subclass of amphetamine-type drugs in this study.

Current diagnoses of the remaining 15 psychiatric categories in the MINI were assessed in all participants at the time of recruitment. Since the present study aimed to investigate concurrent or prolonged psychiatric symptoms to provide evidence-based data for future policies and intervention, it is reasonable to evaluate the current diagnoses of psychiatric disorders that may be influenced by using illicit drugs.

Psychiatric Interview and Diagnosis

The face-to-face interview was conducted by 11 interviewers who held a BS or PhD in Public Health-related fields. Before starting, all interviewers completed a one-week workshop and a two-week training course to learn how to use the MINI. Each of them passed a test by correctly interviewing three or more patients or individuals randomly assigned by the first author. Two of the following researchers made diagnoses for study participants within three weeks after the initial interview: one senior psychiatrist, one psychiatric epidemiologist, and two senior interviewers. The two diagnostic evaluators for each participant were blind to each other’s results. When doubts or inconsistencies arose regarding the assignment of a diagnosis to a particular participant, a case discussion was held with one or two of the other evaluators until the decision reached consensus.

Data Analysis

Demographic variables were compared between recruited and non-recruited detainees by employing the independent *t*-test on mean age and the Wald χ^2 statistic, with Fisher’s exact test if necessary, on educational level and residential area. To give an overview of the preliminary distributions, pattern and class frequencies and the proportions of illicit drug use for recently incarcerated drug users and for community controls were depicted. Statuses of psychiatric disorders were compared between recently incarcerated drug users and community controls using the adjusted odds ratios (AORs) and 95 % confidence intervals (CIs) to examine the association between drug use and psychopathology. The AORs were derived from

multivariable logistic regression models in which each psychiatric disorder was regressed on drug use status (recently drug users vs. community controls), controlling for age, educational level, and residential area. An AOR with 95 % CI away from the unity indicated a significant difference in the distribution of some psychiatric disorder between recently incarcerated drug users and community controls. To identify whether some class of illicit drug was specifically linked to psychiatric diagnoses, single drug users were compared with community controls by calculating the AORs and their 95 % CIs from multivariable logistic regression models. Detainees were categorized as single and multiple drug users to examine whether the prevalence rates of psychiatric disorders were significantly different from community controls for the two groups of users. Two-tailed tests were employed and a significant level of 0.05 was set throughout the study. All analyses were performed with SAS version 9.1.

Results

Patterns and Classes of Illicit Drugs Used

Table 1 shows the frequencies and proportions for the patterns and classes of illicit drugs used among the recently incarcerated drug users and community controls. Nearly two-thirds (61.2 %) of recently incarcerated drug users reported using one class of drug and over one-third (38.8 %) tried two or more. The most common drug among single users was heroin (49.6 %), followed by meth/amphetamine (35.8 %) and ecstasy (8.5 %). Very few tried cannabis (1.2 %) or any other illicit drug (4.9 %). For polydrug users, the most prevalent combination was heroin and meth/amphetamine (48.7 %). One-tenth (10.9 %) of polydrug

Table 1 Patterns and classes of illicit drug used among recently incarcerated drug users ^a and community controls

Patterns and classes of illicit drug use	Recently incarcerated drug users <i>n</i> = 402 ^b			Community controls <i>n</i> = 257		
	<i>n</i>	%	% ^c within sub-pattern	<i>n</i>	%	% ^c within sub-pattern
Single drug use	246	61.2	—	2	.8	—
Heroin	122	30.3	49.6	0	0	0
Meth/amphetamine	88	21.9	35.8	0	0	0
Ecstasy	21	5.2	8.5	0	0	0
Cannabis	3	.7	1.2	1	.4	50.0
Other illicit drugs	12	3.0	4.9	1	.4	50.0
Multiple drug use	156	38.8	—	2	.8	—
Heroin + Meth/amphetamine	76	18.9	48.7	1	.4	50.0
Heroin + any other one non-meth/amphetamine illicit drug	17	4.2	10.9	0	0	0
Meth/amphetamine + any other one non-heroin illicit drug	14	3.5	9.0	0	0	0
Other combinations (including 3 or more drugs)	49	12.2	31.4	1	.4	50.0

^a All participants were recruited within one month after their being incarcerated

^b There were 12 drug users who did not provide information about the class of drugs used

^c A proportion of specific class of drug use within such pattern (single or multiple) of drug use

users combined heroin with any other one non-meth/amphetamine class. A similar proportion (9.0 %) existed for meth/amphetamine combined with any other one non-heroin class of drug. There were 37 polydrug users who experienced three or more classes of drugs. Among community controls, four of the 257 male adults tried illicit drugs, among which two used a single drug and two used multiple drugs.

Psychiatric Disorders between recently Incarcerated Drug Users and Community Controls

Drug users had higher results than community controls on all prevalence estimates of psychiatric disorders except panic disorder, which showed an equivalent rate (3.1 %) between the two groups (Table 2). Alcohol abuse/dependence (29.5 %), major depressive episode (18.4 %), suicide ideation/attempt (13.5 %), psychotic disorder (13.3 %), and manic/hypomanic disorder (12.8 %) were common among recently incarcerated drug users. These disorders were also the five most prevalent diagnoses among community controls, albeit the prevalence rates were much lower. Eating and anxiety disorders (except for generalized anxiety disorder) showed very low prevalence rates among drug users. Compared with community controls, drug users were significantly associated with major depressive episodes (AOR = 3.2, 95 % CI = 1.8–5.7), dysthymic disorder (AOR = 3.9, 95 % CI = 1.3–13.4), social phobia (AOR = 9.6, 95 % CI = 1.3–196), obsessive-compulsive disorder (AOR = 10.3, 95 % CI = 1.4–209), alcohol abuse/dependence (AOR = 3.9, 95 % CI = 2.4–6.3), psychotic disorder (AOR = 2.0, 95 % CI = 1.1–3.7), and antisocial personality disorder (AOR = 8.2, 95 % CI = 1.9–50.5).

Table 2 Psychiatric disorders among recently incarcerated drug users ($n = 414$) and community controls ($n = 257$)

Psychiatric disorders	Recently incarcerated drug users n (%)		Community controls n (%)		AOR (95 % CI)	
Major depressive episode	76	(18.4)	17	(6.6)	3.2	(1.8–5.7)
Dysthymic disorder	24	(5.8)	4	(1.6)	3.9	(1.3–13.4)
Manic/hypomanic disorder	53	(12.8)	22	(8.6)	1.6	(0.9–2.7)
Suicide ideation/attempt	56	(13.5)	26	(10.1)	1.4	(0.8–2.4)
Generalized anxiety disorder	32	(7.7)	10	(3.9)	2.1	(1.0–4.6)
Panic disorder	13	(3.1)	8	(3.1)	1.0	(0.4–2.7)
Agoraphobia	23	(5.6)	6	(2.3)	2.5	(0.9–6.8)
Social phobia	15	(3.6)	1	(.4)	9.6	(1.3–196)
Obsessive-compulsive disorder	16	(3.9)	1	(.4)	10.3	(1.4–209)
Posttraumatic stress disorder	5	(1.2)	1	(.4)	3.1	(0.4–71.2)
Alcohol abuse/dependence	122	(29.5)	25	(9.7)	3.9	(2.4–6.3)
Psychotic disorder	55	(13.3)	18	(7.0)	2.0	(1.1–3.7)
Anorexia nervosa	1	(.2)	0	(0)	—	—
Bulimia nervosa	3	(.7)	1	(.4)	1.9	(0.2–46.9)
Antisocial personality disorder	25	(6.0)	2	(.8)	8.2	(1.9–50.5)

AOR = adjusted odds ratio controlling for age, educational level, and residential area; CI = confidence interval; A bold values of AOR represents significant difference from the null hypothesis of AOR = 1 according to its corresponding 95 % CI

Psychiatry Disorders among Single Class Drug Users

Among recently incarcerated single drug users, heroin and meth/amphetamine were the two most common drugs; relatively few tried ecstasy ($n = 21$), cannabis ($n = 3$), and other illicit drugs ($n = 12$). Thus, only three classes of drugs used were categorized—heroin, meth/amphetamine, and other drugs—to explore their association with psychiatric disorders (Table 3). Alcohol abuse/dependence was the most prevalent diagnosis across all three groups. Major depressive episodes, suicide ideation/attempts, manic/hypomanic disorders, and psychotic disorders were common for all user classes. No significant associations existed between the use of other drugs and psychopathologies compared to community controls. The results remained insignificant when only ecstasy users were included in the analyses. Associations of alcohol abuse/dependence with heroin use (AOR = 2.2, 95 % CI = 1.2–4.0) and meth/amphetamine use (AOR = 3.5, 95 % CI = 1.9–6.5) were both significant. Heroin users were more likely to be associated with major depressive episodes (AOR = 2.1, 95 % CI = 1.1–4.4) and social phobia (AOR = 10.9, 95 % CI = 1.3–94.7). Meth/amphetamine users were prone to psychotic disorder (AOR = 2.5, 95 % CI = 1.2–5.3) and antisocial personality disorder (AOR = 7.7, 95 % CI = 1.5–40.3).

Psychiatric Disorders among Single and Poly Illicit Drug Users

Prevalence rates for single drug users were substantially lower than polydrug users for all psychiatric disorders, except for panic disorders (Table 4). The five most common psychiatric diagnoses for both groups were consistent and each counted for at least 10 % of users; they were alcohol abuse/dependence, major depressive episodes, suicide ideation/attempt, manic/hypomanic, and psychotic disorders. Compared to community controls, single drug users were significantly associated with only three psychiatric disorders: major depressive episode (AOR = 2.0, 95 % CI = 1.1–3.8), alcohol abuse/dependence (AOR = 2.9, 95 % CI = 1.8–4.9), and antisocial personality disorder (AOR = 6.5, 95 % CI = 1.4–29.5). Polydrug users showed substantial associations with two-thirds (10/15) of the psychiatric disorders, except for suicide ideation/attempt, panic disorder, posttraumatic stress disorder, and eating disorders.

Discussion

We found that heroin and meth/amphetamine were the most commonly used illicit drugs in convicted Taiwanese male adults, indicating possible directions and a substantial need for providing more specific and effective intervention programs for inmates in detention centers. Heroin and meth/amphetamine are difficult to detect in public health surveillance systems in Taiwan, such as the emergency departments of hospitals (Chen et al. 2006). Thus, delivering regular medical care for newly incarcerated heroin and meth/amphetamine users within detention centers could effectively reduce risk of future drug use; this is due to recent use of heroin, amphetamine, and cocaine among prisoners being associated with the persistent use of these drugs during subsequent imprisonment (Strang et al. 2006) and reduced heroin use being associated with a less frequent use of other illicit drugs in the follow-up (Darke et al. 2006).

Results of highly co-occurring substance (i.e., alcohol abuse/dependence) and non-substance psychiatric disorders among incarcerated drug users in this study are consistent with those of an earlier study conducted in methadone maintenance treatment (MMT) clinics

Table 3 Psychiatric disorders among recently incarcerated drug users with single class drug used

Psychiatric disorders	Heroin (n = 122)			Meth/amphetamine (n = 88)			Other drugs (n = 36)		
	n	%	AOR (95 % CI)	n	%	AOR (95 % CI)	n	%	AOR (95 % CI)
Major depressive episode	16	13.1	2.1 (1.1–4.4)	9	10.2	1.6 (0.7–3.8)	4	11.1	1.7 (0.4–5.8)
Dysthymic disorder	5	4.1	2.7 (0.7–10.3)	2	2.3	1.5 (0.3–8.2)	1	2.8	1.8 (0.1–18.7)
Manic/hypomanic disorder	14	11.5	1.4 (0.7–2.8)	9	10.2	1.2 (0.5–2.8)	3	8.3	1.0 (0.2–3.5)
Suicide ideation/attempt	11	9.0	0.8 (0.4–1.8)	10	11.4	1.1 (0.5–2.5)	5	13.9	1.4 (0.4–4.2)
Generalized anxiety disorder	8	6.6	1.7 (0.7–4.5)	6	6.8	1.8 (0.6–5.1)	2	5.6	1.5 (0.2–7.2)
Panic disorder	5	4.1	1.3 (0.4–4.2)	1	1.1	0.4 (0.0–2.9)	1	2.8	0.9 (0.1–7.0)
Agoraphobia	5	4.1	1.8 (0.5–6.0)	2	2.3	1.0 (0.2–4.9)	2	5.6	2.5 (0.2–14.4)
Social phobia	5	4.1	10.9 (1.3–94.7)	2	2.3	6.0 (0.5–66.5)	1	2.8	7.3 (0.1–57.6)
Obsessive-compulsive disorder	4	3.3	8.7 (1.0–78.5)	2	2.3	6.0 (0.5–66.5)	2	5.6	15.1 (0.8–89.1)
Posttraumatic stress disorder	1	.8	2.1 (0.1–34.1)	0	0	—	1	2.8	7.3 (0.1–57.6)
Alcohol abuse/dependence	23	18.9	2.2 (1.2–4.0)	24	27.3	3.5 (1.9–6.5)	6	16.7	1.9 (0.6–5.1)
Psychotic disorder	9	7.4	1.1 (0.5–2.4)	14	15.9	2.5 (1.2–5.3)	4	11.1	1.7 (0.4–5.5)
Anorexia nervosa	0	0	—	0	0	—	0	0	—
Bulimia nervosa	1	.8	2.1 (0.1–34.1)	0	0	—	0	0	—
Antisocial personality disorder	5	4.1	5.4 (0.1–28.5)	5	5.7	7.7 (1.5–40.3)	2	5.6	7.5 (0.5–80.5)

AOR = adjusted odds ratio controlling for age, educational level, and residential area; CI = confidence interval; A bold values of AOR represents significant difference from the null hypothesis of AOR = 1 according to its corresponding 95 % CI compared to community controls

Table 4 Psychiatric disorders among single and polydrug users

Psychiatric disorders	Any single drug users (<i>n</i> = 246)				Polydrug users (<i>n</i> = 156)			
	<i>n</i>	%	AOR	(95 % CI)	<i>n</i>	%	AOR	(95 % CI)
Major depressive episode	31	12.6	2.0	(1.1–3.8)	43	27.6	5.3	(2.9–9.7)
Dysthymic disorder	9	3.7	2.4	(0.7–7.9)	15	9.6	6.7	(2.3–20.1)
Manic/hypomanic disorder	26	10.6	1.3	(0.7–2.3)	25	16.0	2.0	(1.1–3.7)
Suicide ideation/attempt	28	11.4	1.1	(0.6–2.0)	25	16.0	1.7	(0.9–3.0)
Generalized anxiety disorder	16	6.5	1.7	(0.8–3.9)	15	9.6	2.6	(1.2–5.9)
Panic disorder	8	3.3	1.0	(0.4–2.8)	4	2.6	0.8	(0.3–2.5)
Agoraphobia	9	3.7	1.6	(0.6–4.5)	11	7.1	3.2	(1.2–8.5)
Social phobia	7	2.8	7.5	(0.9–61.4)	5	3.2	8.5	(1.2–60.8)
Obsessive-compulsive disorder	7	2.8	7.5	(0.9–61.4)	8	5.2	13.8	(1.9–99.2)
Posttraumatic stress disorder	2	.8	2.1	(0.2–23.3)	2	1.3	3.3	(0.5–23.8)
Alcohol abuse/dependence	59	24.0	2.9	(1.8–4.9)	61	39.1	6.0	(3.5–10.0)
Psychotic disorder	28	11.4	1.7	(0.9–3.2)	24	15.4	2.4	(1.2–4.5)
Anorexia nervosa	0	0	—	—	0	0	—	—
Bulimia nervosa	1	.4	1.0	(0.1–16.8)	1	.6	1.6	(0.1–130.1)
Antisocial personality disorder	12	4.9	6.5	(1.4–29.5)	13	8.3	11.6	(2.7–49.6)

Only 402 participants were included in the table because 12 did not provide specific drug information

(Lee et al. 2011), which revealed that detention center services have unmet needs in the treatment of mental health problems. Because dependence on hard drugs, mental health problems, and a variety of social factors are associated with the perceived treatment need among recent drug users in prison, drug treatment provision should coordinate with other services to tackle these interconnected problems (Stewart 2009). As such, we suggest that detention centers should include psychiatry or psychology specialists to cooperate with physicians in providing regular and integrated services for detainees' drug problems and mental distress. This may be practicable and effective since evidence from non-judiciary systems has highlighted that psychotherapeutic treatment is a promising approach for co-occurring depression and substance use disorders (Brown et al. 2006; Hesse 2009).

It is worth noting that the use of a specific class of drugs appears to be associated with some specific psychiatric disorders. In this study, we found that the use of heroin alone was significantly associated with current diagnoses of major depression and social phobia and meth/amphetamine use was more significantly associated with psychotic and antisocial personality disorders. Despite the difficulty in establishing a temporal sequence between drug use and psychopathology based on our case-control study design, the high prevalence of mental disorders among incarcerated drug users and the specific associations between psychopathology and drug use in the present study demonstrated that an effective treatment for a specific drug class in detention centers may benefit incarcerated drug users both in terms of their drug problems and in relation to their mental disorders.

In treating heroin dependence, the MMT has been successfully established in prisons throughout the world (WHO, UNODC, and UNAIDS 2004). Such programs are relatively simple to operate and are effective in reducing heroin use (Gossop et al. 2002). Our findings suggest that implementing MMT for heroin users within correctional facilities may produce

additional advantages by remitting accompanied major depression and social phobia, particularly when a part of the co-occurring major depression or social phobia symptoms results in heroin withdrawal. Upon incarceration, heroin users experience abrupt withdrawals and the trauma of imprisonment (especially for newly incarcerated individuals). Such severe physical and psychological stressors can cause or exacerbate depressive symptoms and/or lead to self-exclusion. Symptoms associated with withdrawals may also increase suicide risk in opioid-dependent individuals (U.S. Department of Health and Human Services [USDHHS] 2005), explaining the high prevalence of suicide ideation/attempt among heroin users in this study. Thus, adequate treatment for heroin dependence, such as MMT in detention centers or other correctional facilities, may reduce heroin-dependent problems and related mental disorders.

An MMT-alone strategy may not be suitable for all situations, especially for detainees who self-medicate with heroin to alleviate severe mood or anxiety disorders. Social phobia and many other anxiety disorders have an earlier age of onset than drug use (Sareen et al. 2006). Due to heroin's similar pharmacological effects to those of cocaine and stimulants as antidepressants used to treat both major depression and social phobia (Sareen and Stein 2000), some individuals with major depression or social phobia may use heroin to decrease their psychiatric symptoms. In these cases, implementing MMT may not provide additional support for primary psychiatric disorders. Additional intervention programs that treat mood or anxiety disorders, such as cognitive-behavioral therapy (CBT), are relatively important because remission or recovery from the primary psychiatry disorders may help prevent the subsequent use/abuse of heroin.

Medication that effectively treats meth/amphetamine dependence does not exist. One common treatment for meth/amphetamine users is antipsychotic medication, which mainly decreases psychotic symptoms. However, the effect of antipsychotic prescriptions may be restricted for co-occurring conditions because some meth/amphetamine users are less liable to psychosis (Chen et al. 2005). More recently, psychological interventions, such as CBT or contingency management for meth/amphetamine use, have been effective in achieving drug abstinence (Lee and Rawson 2008). These psychological intervention programs are applicable for drug users in correctional or rehab settings because many of them are new meth/amphetamine users with milder symptoms and less co-occurrence.

Significant associations with a variety of psychiatric disorders among multiple drug users in this study imply that the mechanisms for co-occurrence between illicit drug use and mental disorders may be too complicated to develop individual treatment for each situation. Limited resources render individual case management impracticable. Fortunately, our findings have shown that heroin and meth/amphetamine combined is the most prevalent type among multiple drug use. Appropriate approaches focusing on heroin and meth/amphetamine-combined users and integrating pharmacotherapy, psychotherapy, and occupational therapy for each drug user could benefit polydrug users in detention centers with drug-dependent and co-occurring non-substance mental problems.

Our results have potential methodological and sample limitations. First, despite our efforts to restrict participants to newly incarcerated drug users and identify their psychiatric statuses according to the current diagnoses, the findings could not indicate a causal relationship between illicit drug use and psychopathology because both data were collected cross-sectionally and both problems relapsed frequently. Second, despite our efforts to select representative samples from the TTDC and the community in the present study, the sampling procedure may inevitably have exhibited selection bias according to the high attrition rate for incarcerated drug users and the low use of illicit drugs among the control group, as drug users

are more likely to suffer from psychiatric disorders. Third, these findings only include a sample of male adults and may not be generalized for female groups.

In summary, two major classes of illicit drugs, in terms of heroin and meth/amphetamine, coupled with their specific co-occurring mental disorders, are common among recently incarcerated drug users. These findings suggest the need for enhanced drug and psychiatry treatment services in detention centers. Interventions being tailored to the specific profile and co-occurrence patterns of illicit drugs used for detainees are required.

Compliance with Ethical Standards All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2000 (5).

Role of Funding Sources Both NBCD and NSC had no roles in the study design, collection, analysis or interpretation of the data, preparation of the manuscript, or the decision to submit the paper for publication.

Contributors The authors would like to thank the detainees and staffs of TTDC who took part in the survey. We would also like to acknowledge Dr. Chuan-Yu Chen for her critical suggestions of the manuscript and the Taiwanese Society of Psychiatry for permitting our use of the Chinese version of the MINI.

Informed Consent Informed consent was obtained from all patients for being included in the study.

Conflict of Interest Te-Jen Lai, Mei-Hsin Su, Tony Szu-Hsien Lee and Hao-Jan Yang declare that they have no conflicts of interests.

Funding This study was partly funded by the former National Bureau of Controlled Drugs, Department of Health (DOH94-NNB-1013) and the former National Science Council (NSC94–2815-C-040-010-B), Taipei, Taiwan.

References

- Brooner, R. K., Ing, V. L., Kidorf, M., Schmidt, C. W., & Bigelow, G. E. (1997). Psychiatric and substance use comorbidity among treatment-seeking opioid abusers. *Archives of General Psychiatry*, *54*, 71–80.
- Brown, S. A., Glasner-Edwards, S. V., Tate, S. R., McQuaid, J. R., Chalekian, J., & Granholm, E. (2006). Integrated cognitive behavioral therapy versus twelve-step facilitation therapy for substance-dependent adults with depressive disorders. *Journal of Psychoactive Drugs*, *38*, 449–460.
- Callaly, T., Trauer, T., Munro, L., & Whelan, G. (2001). Prevalence of psychiatric disorder in a methadone maintenance population. *Australian and New Zealand Journal of Psychiatry*, *35*, 601–605.
- Cerda, M., Sagdeo, A., & Galea, S. (2008). Comorbid forms of psychopathology: key patterns and future research directions. *Epidemiologic Reviews*, *30*, 155–177.
- Chan, Y. F., Dennis, M. L., & Funk, R. R. (2008). Prevalence and comorbidity of major internalizing and externalizing problems among adolescents and adults presenting to substance abuse treatment. *Journal of Substance Abuse Treatment*, *34*, 14–24.
- Chen, C.-K., Lin, S.-K., Sham, P., Ball, D., Loh, E.-W., & Murray, R. M. (2005). Morbid risk for psychiatric disorder among the relatives of methamphetamine users with and without psychosis. *American Journal of Medical Genetics Part B (Neuropsychiatric Genetics)*, *136B*, 87–91.
- Chen, W. J., Fang, C.-C., Shyu, R.-S., & Lin, K.-C. (2006). Underreporting of illicit drug use by patients at emergency departments as revealed by two-tiered urinalysis. *Addictive Behaviors*, *31*, 2304–2308.
- Chiang, S.-C., Chen, C.-Y., Chang, Y.-Y., Sun, H.-J., & Chen, W. J. (2007). Prevalence of heroin and methamphetamine male users in the northern Taiwan, 1999–2002: capture-recapture estimates. *BMC Public Health*, *7*, 292.
- Compton, W. M., Thomas, Y. F., Stinson, F. S., & Grant, B. F. (2007). Prevalence, correlates, disability, and comorbidity of DSM-IV drug abuse and dependence in the United States: results

- from the National Epidemiologic Survey on alcohol and related conditions. *Archives of General Psychiatry*, 64, 566–576.
- Connell, P. H. (1958). *Amphetamine psychosis*. London: Chapman and Hall Ltd.
- Darke, S., Williamson, A., Ross, J., & Teesson, M. (2006). Reductions in heroin use are not associated with increases in other drug use: 2-year findings from the Australian treatment outcome study. *Drug and Alcohol Dependence*, 84, 201–205.
- Ditton, P. M. (1999). *Mental health treatment of inmates and probationers*. In Washington: U.S. Office of Justice Programs, Bureau of Justice Statistics: Department of Justice.
- Gossop, M., Marsden, J., Stewart, D., & Treacy, S. (2002). Change and stability of change after therapy of drug misuse: 2-year outcomes from the National Therapy Outcome Research Study (UK). *Addictive Behaviors*, 27, 155–166.
- Hesse, M. (2009). Integrated psychological treatment for substance use and co-morbid anxiety or depression vs. treatment for substance use alone. A systematic review of the published literature. *BMC Psychiatry*, 9, 6.
- Keyes, K. M., Martins, S. S., Hasin, D. S., Keyes, K. M., Martins, S. S., & Hasin, D. S. (2008). Past 12-month and lifetime comorbidity and poly-drug use of ecstasy users among young adults in the United States: results from the National Epidemiologic Survey on alcohol and related conditions. *Drug and Alcohol Dependence*, 97, 139–149.
- Kuo, K. N., Hsiao, M.-L., & Chien, C.-S. (2007). 2005 National Health Interview and drug abuse survey final report. No. 2 drug abuse survey. Miaoli County: National Health Research Institutes. (in Chinese)
- Lee, N. K., & Rawson, R. A. (2008). A systematic review of cognitive and behavioral therapies for methamphetamine dependence. *Drug and Alcohol Review*, 27, 309–317.
- Lee, T. S., Shen, H. C., Wu, W. H., Huang, C. W., Yen, M. Y., Wang, B. E., et al. (2011). Clinical characteristics and risk behavior as a function of HIV status among heroin users enrolled in methadone treatment in northern Taiwan. *Substance Abuse Treatment, Prevention, and Policy*, 6, 6.
- Lieb, R., Schuetz, C. G., Pfister, H., von Sydow, K., & Wittchen, H. (2002). Mental disorders in ecstasy users: a prospective-longitudinal investigation. *Drug and Alcohol Dependence*, 68, 195–207.
- Otsubo, T., Tanaka, K., Koda, R., Shinoda, J., Sano, N., Tanaka, S., et al. (2005). Reliability and validity of Japanese version of the mini-international neuropsychiatric interview. *Psychiatry and Clinical Neurosciences*, 59, 517–526.
- Raimo, E. B., & Schuckit, M. A. (1998). Alcohol dependence and mood disorders. *Addictive Behaviors*, 23, 933–946.
- Ringen, P. A., Melle, I., Birkenaes, A. B., Engh, J. A., Faerden, A., Jonsdottir, H., et al. (2008). Illicit drug use in patients with psychotic disorders compared with that in the general population: a cross-sectional study. *Acta Psychiatrica Scandinavica*, 117, 133–138.
- Santucci, K. (2012). Psychiatric disease and drug abuse. *Current Opinion in Pediatrics*, 24, 233–237.
- Sareen, J., & Stein, M. (2000). A review of the epidemiology and approaches to the treatment of social anxiety disorder. *Drugs*, 59, 497–509.
- Sareen, J., Chartier, M., Paulus, M. P., & Stein, M. B. (2006). Illicit drug use and anxiety disorders: findings from two community surveys. *Psychiatry Research*, 142, 11–17.
- Sheehan, D. V., Lecrubier, Y., Sheehan, K. H., Amorim, P., Janavs, J., Weiller, E., et al. (1998). Mini-international neuropsychiatric interview (M.I.N.I.): the development and validation of a structured diagnostic psychiatric interview for DSM-IV and ICD-10. *Journal of Clinical Psychiatry*, 59(suppl 20), 22–23.
- Sher, L., Stanley, B. H., Harkavy-Friedman, J. M., Carballo, J. J., Arendt, M., Brent, D. A., et al. (2008). Depressed patients with co-occurring alcohol use disorders: a unique patient population. *Journal of Clinical Psychiatry*, 69, 907–915.
- Stewart, D. (2009). Drug use and perceived treatment need among newly sentenced prisoners in England and Wales. *Addiction*, 104, 243–247.
- Strang, J., Gossop, M., Heuston, J., Green, J., Whiteley, C., & Maden, A. (2006). Persistence of drug use during imprisonment: relationship of drug type, recency of use and severity of dependence to heroin, cocaine and amphetamine in prison. *Addiction*, 101, 1125–1132.
- Taiwan Food and Drug Administration. (2009). Statistical distribution table of indiscriminate use from the reporting system in Taiwan psychiatric hospitals pharmaceuticals bulletin in. Taipei: TFDA, Ministry of Health and Welfare. (in Chinese)
- United Nations Office on Drugs and Crime. (2015). World drug report 2015. United Nations publication, Sales No. E.15.XI.6.

- U.S. Department of Health and Human Services (USDHHS). (2005). Medication-assisted treatment for opioid addiction in opioid treatment programs. In *Treatment improvement protocol (TIP) series 43. Substance Abuse and Mental Health Services Administration/Center for Substance Abuse Treatment, DHHS publication no. (SMA) 054048*. MD: Rockville.
- World Health Organization (WHO), United Nations Office on Drugs and Crime (UNODC), & Joint United Nations Programme on HIV/AIDS (UNAIDS). (2004). Substitution maintenance therapy in the management of opioid dependence and HIV/AIDS prevention: Position paper. Retrieved 16th March 2010 from http://www.who.int/substance_abuse/publications/en/PositionPaper_English.pdf