




# Recidivism of Individuals Who Completed Schedule I Drugs Deferred Prosecution Treatment: A Population-Based Follow-Up Study from 2008 to 2020 in Taiwan

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## Abstract

Deferred Prosecution with Condition to Complete the Addiction Treatment (DPCCAT) is a judicial diversion program in Taiwan that shifts people who use drugs away from the label *drug offender* and toward the label *patient*. However, little is known about the effectiveness of completing a DPCCAT program on people who use drugs. Using a nationwide population-based retrospective panel data from 2008 to 2020, recidivism is defined as a person was caught urine positive and charged by a prosecutor after their completion of DPCCAT. After controlled gender, age, and region, comparisons of recidivism rates and time to relapse between Schedule I drug use only, Schedule I & II drug use, and heterogeneous group were examined. Of 24,248 participants with DPCCAT, 11,141 (46%) completed the one-year treatment program. Of completers, the five-year recidivism rates are significantly lower for the Schedule I drug use only (26%) than Schedule I & II drugs use (52%) and heterogeneous group (47%). Results from Cox regression indicated that the duration of recidivate to drug use is significantly longer for the Schedule I drug only than the other two groups after controlling for demographics. The main findings support that completion of a DPCCAT program only reduces the risk of recidivism for people who use Schedule I drug only and is less effective for polydrug users and heterogeneous group. We suggest that characteristics of people who use drugs and other criminal offenses should be taken into consideration for triage when DPCCAT is offered.

**Keywords** Deferred Prosecution with Condition to Complete the Addiction Treatment (DPCCAT) · Judicial diversion · Recidivism · Schedule I drug · Survival analysis

## Introduction

Misuse and abuse of opioids pose great harm to physical, psychological, and social well-being (Nutt et al., 2007). Heroin is listed as a Schedule I controlled drug in many countries worldwide, including Taiwan. Although the 1961 Single Convention on Narcotic Drugs (an

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international treaty) specifies control of heroin production and trafficking, heroin continues to be widely abused in many countries. In 2016, 26 million people worldwide were affected by heroin or opioid use disorder and an average of 353 per 100,000 people were affected by opioid dependence (Degenhardt et al., 2018). In addition to the substantial number of deaths by heroin overdose (Hedegaard et al., 2020; McLean, 2003; Taylor et al., 2021), heroin use is also correlated with predatory and property crimes (Demaret et al., 2015; Hayhurst et al., 2017; Ku, 2016; Marel et al., 2013; van der Zanden et al., 2007; Wang et al., 2020), and the rates of hepatitis C and human immunodeficiency virus infections (HIV) and suicide are significantly higher among people with opiate use disorder than among the general public (Chang et al., 2017; Degenhardt et al., 2017; Gicquelais et al., 2020; Goldman-Mellor et al., 2020; Lee et al., 2013a, 2013b). Control of heroin distribution and use and reduction of the harms associated with opioid use are major challenges in drafting public health and criminal justice policies.

### **Drug Policies in the United States, East Asia, and Taiwan**

In the United States, drug policies treat people who use heroin as criminal offenders. Because individuals turn to heroin for a variety of reasons, special drug courts are established to assist users of heroin (or other illicit drugs) in receiving the appropriate addiction treatment or community support in the United States (Mikolajewski et al., 2021; Wenzel et al., 2001). In drug courts, defendants who complete the court ordered program required by the judge do not face criminal prosecution (Longshore et al., 2001). If judicial policies on drug use are represented by a spectrum from penalization to decriminalization, US drug courts would be approximately center-left on the spectrum (Jesseman & Payer, 2018).

In many Asian countries (e.g., Japan, Thailand, the Philippines, Malaysia, and Indonesia), opioid use (including heroin use) among adults is legally defined as a criminal act, and people who use opioids are jailed or placed in rehabilitation facilities for compulsory detoxification (Koto et al., 2020; Li, 2012; Lunze et al., 2018). Some Asian countries have facilities that provide medical treatment for drug use, providing people who use drugs with the opportunity to remain in the community and receive treatment. For example, Malaysia allows people who have used heroin to enter voluntary drug treatment to receive outpatient maintenance treatment after discharge from 1 to 3 months of inpatient methadone treatment. One study found that patients received voluntary drug treatment centers had an 84% lower risk of opioid relapse compared with people admitted to compulsory drug detention centers. (Wegman et al., 2017). In Indonesia, heroin use is a crime, but users can participate in medical and social recovery programs (Sarasvita et al., 2012). In a related study, some positive results were presented about the community-based drug dependence treatment services provided in 17 rehabilitation facilities in 12 Indonesian cities. Patients were found to have better quality of life, fewer experiences of legal and health problems, and lower Addiction Severity Index scores after completing the treatment program (Suryadarma & Putri, 2018). In Japan, for drug users who meet the statutory requirements, courts may suspend some or all of the penalties and offer protection and observation during the suspension period. People who use drugs and comply with statutory requirements receive assistance for housing, medical treatment, employment, and life adjustment (Koto et al., 2020; Watson, 2018). Regarding heroin treatment, heroin use is uncommon in Japan. Therefore, opioid agonist therapy is not offered in most medical facilities, resulting in limited effectiveness of drug treatment in the community in terms

of impact on the heroin-dependent population (Koto et al., 2020). A study examined the outcomes of buprenorphine substitution therapy for heroin-dependent patients who voluntarily sought treatment at a Japanese psychiatric hospital and found that buprenorphine maintenance therapy significantly reduced withdrawal symptoms during detoxification and improved treatment completion rates. Therefore, the study urges the Japanese government to consider integrating buprenorphine maintenance therapy and existing community-based treatment (Nagano et al., 2020).

Similar to the aforementioned Asian countries, Article 2 of Taiwan's Narcotics Hazard Prevention Act (2022) divides drugs into four categories and criminalizes the use of Schedule I and II drugs (i.e., Category 1 and 2 drugs). According to national statistics, heroin was the most commonly reported form of drug abuse in 2020, and it comprised more than 90 percent of Schedule I drug use among the top 13 reported drugs (Ministry of Health and Welfare, 2021). In order to implement addiction treatment that addresses needs for people who use drugs, Taiwan's criminal legislation and judiciary have begun to regard defendants in cases involving Schedule I and II drugs as *patient offenders*, that is, defendants who are simultaneously patients and criminal suspects. In addition to prison sentences, patient offenders are asked either to participate in institutional rehabilitation, mandatory treatment in a correctional facility, treatment in a hospital, or to participate in a community intervention (Li & Feng, 2017). For treatment in a hospital or for community interventions, Deferred Prosecution with Condition to Complete the Addiction Treatment (DPCCAT) may be provided in accordance with Article 253-2 of the Code of Criminal Procedure (The Code of Criminal Procedure, 2022).

Deferred prosecution is a judicial diversion program. Its goal is to prevent offenders from engaging in further criminal behavior due to prosecution or being incarcerated. Although Taiwan's legal system initiated the DPCCAT option in 2002, prosecutors have not prioritized it among the penalties they request for defendants in drug use cases. Due to the rapid increase in the number of injection drug users infected with HIV, Taiwan's Ministry of Health and Welfare launched condom distribution and syringe exchange programs in 2006 to provide injection drug users with clean needles and health consultations. In February 2006, the Ministry approved methadone for addiction treatment and began offering training for health care providers. For defendants in cases involving only minor crimes who display little potential for further criminal activity, prosecutors may issue a disposition of deferred prosecution. People who use drugs and receive deferred prosecution may live in the community and continue their education or job, and if they do not reoffend during their deferment period and they pay damages and perform other rehabilitation tasks (e.g., completing addiction treatment), they may avoid a court trial entirely. Addiction treatment under DPCCAT in Taiwan lasts for one year, and it is implemented by medical institutions based on the expertise of their personnel (including professionals in the fields of pharmacotherapy, psychotherapy, and rehabilitation therapy). DPCCAT also entails the implementation of regular drug tests (Standards for Implementation and Defining Completion of Addiction Treatment, 2021). At present, people who use heroin are the primary target of DPCCAT for medical pharmacotherapy, which involves the use of opioid agonists (e.g., methadone). Based on data released by the Taiwan Ministry of Justice, 2.8 percent of people charged with criminal drug use in 2008 participated in the DPCCAT program. This number gradually increased to the peak of 9.3 percent in 2011 and subsequently decreased. In 2016, Taiwan's Ministry of Justice set a goal of DPCCAT for people charged with illicit drug use to 20 percent, which resulted in an increase to 17.1 percent in 2020.

## The Essential Role of Policy Assessment

Various governments have proposed different criminal policies to solve problems or address harms relating to drug use. When introducing a new criminal policy, in addition to predicting policy effects through the lens of existing systems and overseas research, monitoring and evaluation of the policy's success after the policy is implemented are paramount. If a new criminal policy does not produce the expected results, it should be reviewed to identify problems in its design or the implementation process. If the assessment method has scientific rigor, the policy should be adjusted in accordance with research conclusions (Hughes, 2007; MacKenzie, 2000). In this study, response variable is recidivism which is defined as a person was caught urine positive and charged by a prosecutor after their completion of DPCCAT.

Understanding recidivism is crucial to the implementation of drug policies aimed at lowering the number of heroin users. Mitchell et al. (2012) conducted a meta-analysis of 154 studies on the effectiveness of drug courts. They concluded that participation in drug courts reduced drug recidivism from 50 to 38 percent on average, and it reduced drug-related criminal recidivism from 50 to approximately 37 percent. These reductions lasted for at least three years. Wegman et al. (2017) compared 89 opioid users in compulsory drug detention centers with 95 inpatients in voluntary drug treatment centers in Malaysia and reported that after being released from compulsory drug detention centers, many opioid users began using opioids again within a month. In contrast, patients who participated voluntarily in drug treatment were able to go for approximately one year before relapsing. This comparison suggests that recidivism occurs at a higher rate among individuals in compulsory drug detention centers.

## Lack of Scientific Evidence on the Effectiveness of Completing DPCCAT

In the 20 years since the introduction of DPCCAT in Taiwan, there is only one study in which recidivism among drug users who received DPCCAT was examined. Wang and Wang (2017) found that for the 18,017 Schedule I drug users who received DPCCAT, the recidivism rate after two years was 54.5 percent, and the recidivism rate for Schedule II drug users was 34.1 percent. However, although Wang and Wang (2017) studied recidivism among DPCCAT participants, they did not distinguish whether the participants had completed treatment. As such, their results only indicate recidivism among those who agreed to participate in DPCCAT and not among those who completed the program. Moreover, users of multiple types of drugs and drug users who engaged in heterogeneous criminal offenses were not included in their comparisons.

Clinical studies in Taiwan have reported that the mixed use of multiple drugs is not uncommon (Chen et al., 2021; Lee et al., 2021) and that Taiwan's judicial records indicate that people who use drugs often concurrently commit other crimes (Ministry of Justice, 2020). Past research has indicated that the effects of drug treatment differs between users of a single drug and users of polydrug (Chen et al., 2019; Hassan & Le Foll, 2019; Wang et al., 2020). Recidivism rates also differ between individuals who only use drugs, and those who also commit other crimes at the same time (Jaffe et al., 2012; Mitchell et al., 2012). For this reason, we differentiated between users of Schedule I drug use, users of polydrug (Schedule I & II drug use), and users who also engaged in other criminal

behaviors (i.e., heterogeneous group) as our targeted groups. The research objectives are as follows: (1) to estimate percentage of Schedule I drug users who completed DPCCAT and (2) to examine rates and duration of the recidivism within five years among three groups (users of Schedule I drug, users of Schedule I and II drugs, and users of Schedule I drug and other criminal offense (all of whom have completed their DPCCAT)).

## Method

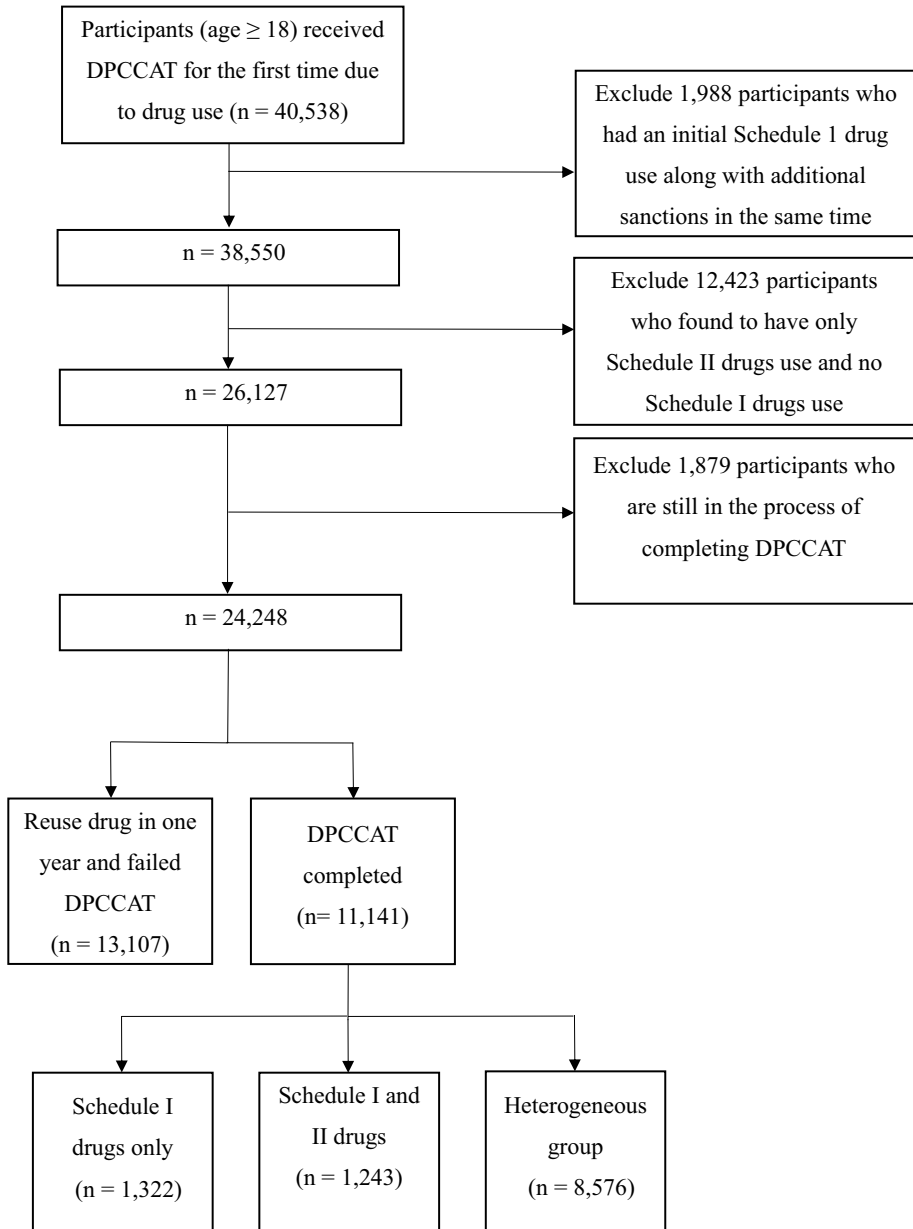
The Human Research Ethics Committee of Taiwan's National Cheng Kung University (NCKU HREC-E-109-465-2) reviewed and approved the study's protocol. The judiciary database used in this study is managed and maintained by the Taiwan Ministry of Justice. Personal and identifiable details are removed before entering their case records into the criminal policy and crime research database. The records of a participant who committed crimes at different times are linked with a randomized personal identification number so that anonymity is maintained.

In this nationwide population-based retrospective panel study, inclusion criteria included at least 18 years old and use of Schedule I drugs, and enrolled in the DPCCAT. Exclusion criteria were ages under 18 and individuals without the DPCCAT. We applied the following cleaning procedures to identify three groups of Schedule I drug users: (1) users of Schedule I only drugs (heroin, morphine, opium, cocaine, and their derivatives), (2) users of Schedule I and II drugs (cannabis, amphetamines, pethidine, pentazocine, and their derivatives such as ecstasy), and (3) Schedule I drug users who also engaged in other criminal behaviors. The exported dataset contained 8,719,561 criminal records dating from January 2008 to July 2020. We extracted a total of 291,232 cases of drug use with deferred prosecution. To prevent inflation of the number of persons involved, we merged data for the same person involving multiple concurrent drug use offenses (e.g., violations of two legal provisions due to the concurrent use of drugs), resulting in 220,600 individuals with records of drug offenses. We combined cases in which an individual's crimes overlapped in time and obtained 169,978 cases in which each person's criminal activity time frame was segmented without overlap. Thereafter, we isolated cases in which the participants received deferred prosecution for the first time due to drug use; under these conditions, we obtained the records of 40,538 persons who used drugs.

We examined the set of 40,538 participants by type of drug offense. We identified 1,988 drug users who had an initial Schedule I drug offense along with additional sanctions in the same time frame, which may have then caused them to be disqualified from deferred prosecution, so we eliminated this subset. A total of 12,423 participants had only used Schedule II drugs and were removed from the analysis. In addition, at the end of July 2020, 1,879 joined the DPCCAT less than one year. Namely, they are still in the process of completing DPCCAT, and hence, they were excluded from the analysis.

According to Taiwan's laws on the implementation of drug addiction treatments and standards for certifying the completion of treatment, treatment must last for a year. If a participant uses drugs again or engages in other criminal behavior during this treatment period, the prosecutor may revoke the deferred prosecution and cancel the treatment program. Therefore, if a participant had any record of drug use or prosecution during their one-year treatment program, we regarded them as having failed to complete

treatment. Under this definition, 13,107 people reused drug and did not complete their one-year treatment. A total of 11,141 individuals participated in DPCCAT and completed the treatment program. Among these, 1,322 people only used Schedule I drugs, 1,243 people used Schedule I and Schedule II drugs, and 8,576 people both used drugs and engaged in other criminal behaviors (see Fig. 1).



**Fig. 1** Flow diagram for the inclusion of participants

## Statistical Analyses

The SPSS version 27 was used to perform all the statistical analyses in this study. Chi-squared analyses were run to compare categorical variables of groups (see Table 1 and Table 2). We conducted survival analyses to assess the risk of recidivism among the three groups (i.e., users of Schedule I drugs, users of Schedule I and II drugs, and heterogeneous group). The terminal event in this study was defined as a recidivism in which an individual was tested positive for illicit drug use and charged by a prosecutor. Covariates used were gender (male or female), age (18–29, 30–39, and 40 upward), and region of treatment (northern, central, southern, and eastern). A log-rank test was performed to compare differences in survival curves among three groups with varying hierarchies. The censored observations refer to the nonrecidivism event; i.e., when a person completed DPCCAT, he/she was not charged for any crime within the 5-year follow-up period. To obtain the adjusted risk of recidivism coefficients, Cox regression was used to estimate the proportional hazard (PH) and 95% confidence interval to assess

**Table 1** Demographics and recidivism rates of participants by the completion of Deferred Prosecution with Condition to Complete the Addiction Treatment (DPCCAT) in Taiwan

Characteristics	Total ( <i>n</i> = 24,248)		DPCCAT incomplete ( <i>n</i> = 13,107)		DPCCAT completed ( <i>n</i> = 11,141)		$\chi^2$ <i>p</i>
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	
Gender							0.418
Male	21,034	86.7	11,391	86.9	9,643	86.6	
Female	3,214	13.3	1,716	13.1	1,498	13.4	
Age <sup>a</sup>							< .001
18–29	4,821	19.9	2,778	21.2	2,043	18.3	
30–39	9,165	37.8	5,036	38.4	4,129	37.1	
40 up	10,253	42.3	5,287	40.4	4,966	44.6	
Region							< .001
North	12,252	50.5	6,313	48.2	5,939	53.3	
Central	6,189	25.5	3,529	26.9	2,660	23.9	
South	5,594	23.1	3,137	23.9	2,457	22.1	
East	213	0.9	128	1.0	85	0.8	
Recidivism in 2 years							< .001
None	6,597	27.2	785	6.0	5,812	52.2	
≤ 2 years	15,505	63.9	12,187	93.0	3,318	29.8	
> 2 years	2,146	8.9	135	1.0	2,011	18.1	
Recidivism in 5 years							< .001
None	6,597	27.2	785	6.0	5,812	52.2	
≤ 5 years	17,059	70.4	12,293	93.8	4,766	42.8	
> 5 years	592	2.4	29	0.2	563	5.1	
Recidivism of any crime in 5 years							< .001
None	4,463	18.4	–	–	4,463	40.1	
≤ 5 years	19,075	78.7	13,107	100	5,968	53.6	
> 5 years	710	2.9	–	–	710	6.4	

<sup>a</sup>9 values missing. The Bonferroni test was used to adjust for the significance of multiple comparisons.

**Table 2** A comparison of the demographics of participants who completed the DPCCAT between three groups

Characteristics	Total ( <i>n</i> = 11,141)		Schedule I drug		Schedule I & II drugs		Heterogeneous		$\chi^2$ <i>p</i>
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	
Gender									< .001
Male	9,643	86.6	1,155	87.4	957	77.0	7,531	87.8	
Female	1,498	13.4	167	12.6	286	23.0	1,045	12.2	
Age <sup>a</sup>									< .001
18–29	2,043	18.3	74	5.6	85	6.8	1,884	22.0	
30–39	4,129	37.1	381	28.8	467	37.6	3,281	38.3	
40 up	4,966	44.6	867	65.6	691	55.6	3,408	39.8	
Region									< .001
North	5,939	53.3	433	32.8	533	42.9	4,973	58.0	
Central	2,660	23.9	422	31.9	413	33.2	1,825	21.3	
South	2,457	22.1	460	34.8	290	23.3	1,707	19.9	
East	85	0.8	7	0.5	7	0.6	71	0.8	

<sup>a</sup>3 values missing. The Bonferroni test was used to adjust for the significance of multiple comparisons

the potential influence of hybrid factors on the risk of recidivism after controlling for gender, age, and region.

## Results

Most participants who used Schedule I drugs from 2008 to 2020 were men (86.7%), over 40 years old (42.3%), and living in northern Taiwan (50.5%). About 46 percent completed their DPCCAT. The median follow-up was 3,706 days (range from 1 to 3,706 days). The incidence rate of recidivism in 5 years of the DPCCAT completers was 8.05 per 100 person-days (95% CI, 0.078–0.083).

As shown in Table 1, the chi-squared analyses indicated the presence of significant differences between those who completed their treatment and those who did not in terms of age ( $\chi^2 = 53.24$ ,  $p < .001$ ), and region ( $\chi^2 = 65.81$ ,  $p < .001$ ), but there was no statistically significant difference based on gender. The chi-squared analyses also revealed significant differences in the distribution of relapses for drug use within two years ( $\chi^2 = 10,453$ ,  $p < 0.001$ ) and within five years ( $\chi^2 = 7,524$ ,  $p < 0.001$ ) depending on whether or not participants completed their DPCCAT. The five-year recidivism rate for drug use among participants who completed their DPCCAT was 42.8 percent. If completion of DPCCAT is not considered, the five-year recidivism rate for drug use is 70.4 percent. Among these relapses, 63.9 percent and 70.4 percent occurred within two and five years, respectively. As shown in Table 2, gender, age, and region were significantly different between three groups. Thus, we controlled for gender, age and region in the subsequent Cox regression analyses in order to compare differences in recidivism rates among the three groups.



## Rates of Five-Year Recidivism and Cumulative Survival after Program Completion

We assessed the recidivism rate for Schedule I only drug users (use of heroin, opium, cocaine, and their derivatives), Schedule I and II drug users (people who used Schedule I and Schedule II drugs which included cannabis, amphetamines, pethidine, pentazocine, and their derivatives such as ecstasy), and Schedule I drug users who also engaged in other criminal behaviors (crimes against a person and/or against property) according to the group's exposure risk and cumulative survival rate (see Table 3). During the five-year tracking period, among the 1,322 Schedule I drug users who completed their DPCCAT, the number who did not reuse Schedule I drugs decreased over time. The cumulative survival rate indicated that 348 users of Schedule I drugs relapsed within five years of completing their DPCCAT; their five-year cumulative survival rate was 74 percent, yielding a recidivism risk of 26 percent.

Among the 1,243 users of Schedule I and II drugs who completed their DPCCAT, the number of recidivism increased with time throughout the five-year tracking period. The cumulative survival rates indicated that 649 users of Schedule I and II drugs recharged by prosecutors within five years of completing their DPCCAT treatments; their five-year cumulative survival rate was 48 percent, indicating a recidivism risk of 52 percent.

Among the heterogeneous group of 8,576 participants who completed their DPCCAT, the number of recidivism increased with time during the five-year tracking period. The cumulative survival rates indicated that 4,012 participants reused drugs within five years of completing their DPCCAT; their five-year cumulative survival rate was 53 percent, indicating a recidivism risk of 47 percent (see Table 3).

## Differences in Recidivism Across Groups

The Kaplan-Meier (KM) method was used to assess differences in recidivism among the three groups of offenders by performing log-rank tests to examine the survival time results for individual cases. The analysis indicated that for the three groups, the average survival time was 7.72 years for users of Schedule I drugs only, 5.34 years for users of Schedule I and II drugs, and 5.8 years for heterogeneous offenders. Each group's survival curve was tested by conducting a log-rank test, and the results revealed significant differences among the three groups ( $\chi^2 = 210.17, p < .001$ ). Users of only Schedule I drugs had a significantly

**Table 3** Days of not reusing drugs after completing one-year DPCCAT for the three groups in 5 years

Time days ( <i>t</i> )	Schedule I drug			Schedule I & II drugs			Heterogeneous		
	NEI	NTE	CPS	NEI	NTE	CPS	NEI	NTE	CPS
0	1,322	0	1.0	1,243	0	1.0	8,576	0	1.0
365	1,114	208	.84	871	372	.70	5,832	2,735	.68
730	1,065	49	.81	760	111	.61	5,254	578	.61
1,095	1,021	44	.77	692	68	.56	4,946	308	.58
1,460	993	28	.75	638	54	.51	4,735	211	.55
1,825	974	19	.74	594	44	.48	4,564	171	.53

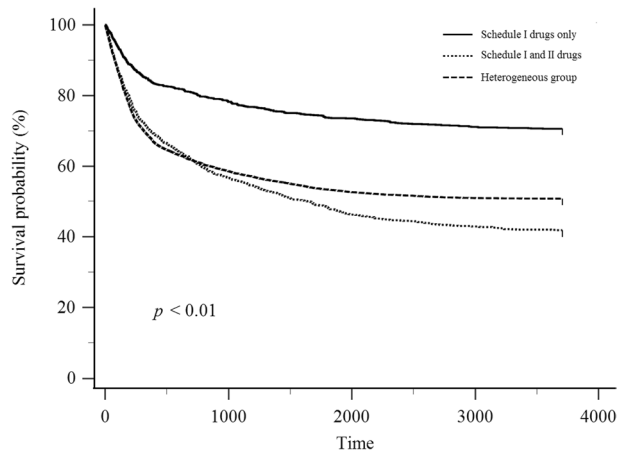
NEI Number Entering Interval, NTE Number of Terminal Events, CPS Cumulative Proportion Surviving at End of Interval

**Table 4** Survival estimates of recidivism in 5 years for the three groups using the Kaplan-Meier approach.

Offending type	Estimate	S.E.	95% Confidence Interval		$\chi^2$	<i>p</i>
			Lower bound	Upper bound		
Schedule I drug	2,819.67	39.59	2,742.08	2,897.25	210.17	< .001
Schedule I & II drugs	1,949.47	45.41	1,860.48	2,038.47		
Heterogeneous group	2,115.96	18.04	2,080.61	2,151.32		
Overall	2,180.94	15.67	2,150.22	2,211.66		

The KM method uses days as the unit of measurement

**Fig. 2** Survival curves for the three different groups of participants using the Kaplan-Meier approach



higher survival curve than did users of Schedule I and II drugs and heterogeneous offenders (see Table 4 and Fig. 2).

Next, we performed Cox proportional hazards regressions to control for the influence of demographic variables on the survival model and to assess the recidivism risk for users of Schedule I drugs only ( $n = 1,322$ ), users of Schedule I and II drugs ( $n = 1,243$ ), and heterogeneous group ( $n = 8576$ ). Because the data were extracted from a large, real-world data set and the risk of drug recidivism often changes over time, nonproportional hazards were not relevant to the present study (Stensrud, 2020), even though the sample distributions of the three groups in this study do not meet the Cox proportionality assumption. Hence, deviations from proportional hazards were negligible.

A subgroup analysis was conducted to assess the association of Schedule I drugs, Schedule I & II and heterogeneous with recidivism in Cox regression by gender, age, and region (see Tables 6, 7 and 8). The results of the Cox regression by subgroup showed that the risk of recidivism was significantly higher in the Schedule I & II drugs and Heterogeneous groups than in the Schedule I drugs group for both gender and age, with the exception of participants in the eastern region, where there was no significant difference among the three groups. The differential effects of characteristics suggest that they may bias the main effect observed, and therefore, they were included as controlled variables.

After gender, age, region, and treatment groups were incorporated into the model, the results from the Cox proportional hazards regression indicated that there is no significant

**Table 5** Using Cox proportional hazards model to examine associations of recidivism for the three groups of participants

	df	p	HR	95% CI		df	p	Adjusted HR	95% CI	
				Lower	Upper				Lower	Upper
Schedule I drug <sup>a</sup>	2	<.01				2	<.01			
Schedule I & II drugs	1	<.01	2.36	2.089	2.673	1	<.01	2.3	2.04	2.61
Heterogeneous	1	<.01	1.99	1.795	2.209	1	<.01	1.92	1.725	2.13
Gender <sup>b</sup>						1	.81	1.01	.93	1.09
Age										
18–29 <sup>a</sup>						2	<.01			
30–39						1	.26	1.04	.97	1.13
40 up						1	<.01	.79	.73	.86
Region										
North <sup>a</sup>						3	<.01			
Central						1	<.01	1.21	1.13	1.29
South						1	.43	.97	.91	1.04
East						1	<.01	.53	.35	.79
Omnibus $\chi^2$		<.001					<.001			

<sup>a</sup>Reference group<sup>b</sup>The reference group was male**Table 6** A subgroup analysis by gender with recidivism in Cox regression

Gender	Offending type	df	p	HR	95% CI	
					Lower	Upper
Male	Schedule I drug <sup>a</sup>	2				
	Schedule I & II drugs	1	<.001	2.284	1.999	2.609
	Heterogeneous	1	<.001	1.884	1.689	2.102
Female	Schedule I drug <sup>a</sup>	2				
	Schedule I & II drugs	1	<.001	3.247	2.262	4.662
	Heterogeneous	1	<.001	3.032	2.163	4.249

<sup>a</sup>Reference group

difference by gender, but recidivism risks were significant among age and region groups. The risk of recidivism was lowest among participants aged 40 or older (adjusted hazard ratio [HR] = 0.79, 95% confidence interval [CI] = 0.73–0.86). It was 21 percent lower than the risk of recidivism in the age 18 to 29 group. Compared with participants in Northern Taiwan, participants who completed DPCCAT in Eastern Taiwan (including the offshore islands) had the lowest rate of recidivism among drug users (HR = 0.53, 95% CI = 0.35–0.79); specifically, Eastern Taiwan had a 47.7 percent lower rate of recidivism relative to Northern Taiwan. Central Taiwan exhibited the highest rate of recidivism among participants who completed their DPCCAT (HR = 1.21, 95% CI = 1.13–1.29); specifically, it was 20.9 percent higher than that of Northern Taiwan. After controlling for gender, age, and region, relative to users of only Schedule I drugs, the risk of recidivism was 2.3 times higher among users of Schedule I and II drugs (adjusted HR = 2.3, 95% CI =

**Table 7** A subgroup analysis by age with recidivism in Cox regression

Age	Offending type	df	<i>p</i>	<i>HR</i>	95% CI	
					Lower	Upper
18–29	Schedule I drug <sup>a</sup>	2				
	Schedule I & II drugs	1	< .001	3.588	2.146	5.999
	Heterogeneous	1	< .001	2.376	1.509	3.741
30–39	Schedule I drug <sup>a</sup>	2				
	Schedule I & II drugs	1	< .001	2.576	2.098	3.162
	Heterogeneous	1	< .001	1.946	1.626	2.328
40 up	Schedule I drug <sup>a</sup>	2				
	Schedule I & II drugs	1	< .001	2.025	1.717	2.388
	Heterogeneous	1	< .001	1.807	1.578	2.070

<sup>a</sup>Reference group**Table 8** A subgroup analysis by region with recidivism in Cox regression

Region	Offending type	df	<i>p</i>	<i>HR</i>	95% CI	
					Lower	Lower
North	Schedule I drug a	2	< .001			
	Schedule I & II drugs	1	< .001	2.930	2.348	3.655
	Heterogeneous	1	< .001	2.394	1.969	2.911
Central	Schedule I drug a	2	< .001			
	Schedule I & II drugs	1	< .001	2.444	1.972	3.031
	Heterogeneous	1	< .001	2.413	2.004	2.906
South	Schedule I drug a	2	< .001			
	Schedule I & II drugs	1	< .001	1.883	1.510	2.348
	Heterogeneous	1	< .001	1.483	1.249	1.761
East	Schedule I drug a	2	.303			
	Schedule I & II drugs	1	.396	2.086	.382	11.389
	Heterogeneous	1	.873	.888	.206	3.826

<sup>a</sup>Reference group

2.04–2.61) and 1.9 times higher among heterogeneous group (adjusted *HR* = 1.92, 95% CI= 1.73–2.13) (see Table 5).

## Discussion

DPCCAT is a major drug policy reform in Taiwan, and it represents a turning point in Taiwan's judiciary system from penalization to community medicalization for the problem of drug use. Of 24,248, Schedule I drug users with DPCCAT between January 2008 and July 2020 in Taiwan, 11,141 (46%) completed the one-year treatment program. Of completers, the recidivism rates are significantly lower for those who used Schedule I drug only than multiple types of drug use and heterogeneous group. The duration of recidivism is significant longer for the Schedule one drug only than the other two groups after controlling for demographics. Similar to Lee et al.'s (2013a, 2013b) findings, we found that during the

tracking period, drug users who only used Schedule I drugs and never used drugs of other categories only comprised five percent of the overall DPCCAT population and that this group shrank with each year. Several studies have suggested that harm reduction programs have encouraged heroin users to voluntarily seek methadone maintenance treatment and reduced their demand for heroin, leading to a decrease in HIV infection in Taiwan (Feng et al., 2016; Lyu et al., 2012).

The finding that 63.9 percent and 70.4 percent of Schedule I DPCCAT participants reused drugs within two and five years respectively is similar to Wang and Wang's (2017) report of a 63.8 percent recidivism rate for Schedule I drug users during the follow-up period over two years. In contrast, when DPCCAT completion is considered, 52.2 percent did not recidivate during their 5-year follow-up period. As such, we can reasonably infer that DPCCAT completion effectively delays or reduces recidivism.

The drug recidivism rate within five years of DPCCAT completion was approximately 42.8 percent, which indicates that DPCCAT may offer a more effective alternative for reducing drug recidivism relative to imprisonment or mandatory treatment in a closed institution. For instance, a study in Taiwan indicated that between 2001 and 2009, Schedule I drugs users exhibited a 73 to 80 percent chance of reoffending (involving any crime) within five years of their release from prison, and a 70 to 72 percent chance of drug recidivism within five years of their release from prison (Chung, 2018). A study that surveyed 794 drug users in a mandatory rehabilitation facility in Taiwan (166 heroin users and 628 amphetamine users) reported that 67.9 percent of participants relapsed within five years of completing their rehabilitation (Chiang et al., 2006). A more recent study argued that adult drug users have a 44 to 46 percent chance of having a drug relapse within five years of voluntary rehabilitation and a 47 to 60 percent chance of drug relapse within five years of completing mandatory treatment (Chung, 2018). The high recidivism rate among drug users after release from prison or constrained facilities reflects the limited benefits of imprisonment in dealing with the problems associated with drug addiction.

The United States government introduced antidrug policies in 1971 and declared a war on drugs in 1993. Imprisonment was regarded as an effective penalty for combating the spread of drugs. Consequently, the population of drug users in prisons remains high (Deng & Wang, 2014). Although Taiwan's government attempted to provide drug users with the opportunity to receive treatment in prison in earlier years, the literature suggests that the lack of support or adjustment programs that help drug users reintegrate into society and stay away from delinquent peers have rendered these treatments ineffectual (Vaughn et al., 2003). A similar problem affects rehabilitation and mandatory treatment programs that are conducted in prisons. Mandatory institutional treatment means that people who use drugs are not self-motivated and cannot meet their needs pertaining to sustained social connections and familial support (Chiang et al., 2006). Furthermore, closed institutions lack effective programs that help people who use drugs re-assimilate in society (Deng et al., 2001), which increases the difficulty of realizing medical-oriented policies.

The DPCCAT approach offers community treatment and stabilizes a drug user's employment, academic, and family functions by offering not going to prisons. It provides treatment-friendly conditions that are difficult to obtain through prisons and mandatory rehabilitation programs, thereby allowing it to reduce the risk of recidivism effectively. However, the completion of DPCCAT must be considered to understand its potential. When it is not considered, the five-year drug recidivism rate among all DPCCAT participants can surpass the recidivism rates associated with mandatory rehabilitation. When treatment programs fail to have people who use drugs remained in treatment, their benefits for controlling drug relapses are limited, regardless of the comprehensiveness of program planning.

Relative to the other two groups, users of only Schedule I drugs exhibited higher survival rates, a longer survival time, and lower recidivism rates after completing their DPCCAT treatments. This finding is consistent with the drug court principles advocated by studies on addiction treatment (Prendergast et al., 2013). Marlowe et al. (2011) proposed the risk triage indicators include criminal history and criminal behavior and that there also need to be triage indicators that emphasize medical factors such as substance dependence or addiction, severity of mental disease, and chronic substance abuse. According to our results, because the heterogeneous group engages in both drug use and other criminal behavior, programs that only comprise addiction treatment are unlikely to address needs beyond drug dependence. Consequently, recidivism cannot be effectively reduced. Similar to drug courts, the purpose of DPCCAT is to promote treatment and recovery in the interest of reducing the likelihood of recidivism. Especially, high-risk groups should be accessed to proper treatment programs and other resources, such as medical assisted treatments, behavioral relapse prevention programs, housing as well as group and individual cognitive behavioral treatment accompanied with supervision rather than receiving stricter supervision and/or attending single-treatment programs (Bahr et al., 2012.; Gutierrez & Bourgon, 2012). Furthermore, the results of this study indicated that the risk of recidivism was 2.3 times higher among Schedule I and II drug users than Schedule I drug users. It appears that polydrug use is an indicator of the severity of drug use (Prendergast et al., 2013) it may be closely correlated with drug recidivism, low treatment efficacy, and high imprisonment rates (Eastwood et al., 2017; Smith et al., 2020).

Our finding that users of both Schedule I and II drugs had the highest recidivism risks of the three study groups is similar to the findings of other studies that have shown polydrug use can increase the risk for heroin relapse and impair the outcomes of opioid agonist treatment (Sullivan et al., 2010). Chen et al. (2019) pointed out that polydrug use is one of the most important factors in predicting relapse to heroin addiction when patients enter a rehabilitation and treatment program. People who use cocaine or heroin as secondary drugs were less likely to complete drug treatment in addiction treatment programs (Brecht, Huang, Evans, & Hser, 2008). Wang et al. (2017) divided polydrug use into primary and secondary drug use and found that secondary drug use can reduce the effectiveness of drug treatment. Further research on how DPCCAT can more effectively address polydrug and associated comorbidities is warranted.

Finally, because drug policies identical to Taiwan's DPCCAT do not exist overseas, it is difficult to compare recidivism rates cross-nationally. The recidivism rate within five years of DPCCAT completion (42.8%) is comparable to the antirecidivism effects achieved by drug courts (38%; Mitchell et al., 2012) and some drug diversion program (Cotti & Haley, 2014) in the United States. The observed improvements in recidivism rates in Taiwan outperform those achieved by several Southeast Asian countries, such as Japan and Malaysia, through mandatory drug addiction policies (Koto et al., 2020; Wegman et al., 2017). These findings reflect the preliminary results achieved through the reform of Taiwan's drug policies to focus on drug use behaviors (specifically the incorporation of the international concept of community medical care and the improvements made to diversify treatment programs). However, we also found that groups with varying levels of criminal risk and medical needs vary substantially in terms of their rates of recidivism. Thus, our study findings about the Taiwan's DPCCAT may provide evidence for other countries who are transitioning their policies from penalization to the medicalization of drug use or who are working to integrate judiciary resources with community medical care to improve triage and treatment mechanisms.

We found that within the group that was prosecuted in Northern Taiwan, the proportion of DPCCAT participants who completed their treatment was significantly higher relative to other regions. Taiwan's northern region has more medical resources relative to other regions, particularly more medical institutions that can cooperate with district prosecutors' offices to conduct

DPCCAT treatments (Chiang et al., 2016; Kreng & Yang, 2011). Thus, the higher treatment completion rates in Northern Taiwan are not surprising. However, although Northern Taiwan exhibited higher rates of people who use drugs completing their treatment, Eastern Taiwan exhibited the lowest rate of drug recidivism after treatment. This result may be related to urban-rural differences. As of July 2021, Northern Taiwan comprises 45.6 percent of Taiwan's total population and has a population density of up to 1,455 people per square kilometer. Comparatively, Eastern Taiwan is sparsely populated and accounts for only 2.9 percent of Taiwan's population with a population density of 82 people per square kilometer. In line with its population count, Northern Taiwan has 8.8 police officers for every police officer in Eastern Taiwan, which is a considerable difference. Liu (2013) reported a correlation between regional distribution of crime and population density. Other studies have suggested that Eastern Taiwan has low arrest rates for drug-related crimes (Lee et al., 2013a, 2013b) and few recreational venues for using drugs (Chang, 2014). In other words, the low rates of recidivism in drug use in Eastern Taiwan may be due to the urban and rural differences in geographical and social characteristics (Huang et al., 2015). We found no significant gender difference in the completion of DPCCAT (male: 45.8% and female: 46.6%). This is consistent with prior studies that gender is not significantly correlated with early withdrawal or continuance rates of methadone treatments (Chao et al., 2020; Lin et al., 2013; Sarasvita et al., 2012). Our Cox regression results also did not indicate any difference in post-DPCCAT recidivism rates between men and women.

## Limitations

Although a national database with records of a long period of time was used, a few study limitations deserve attention. We examined data on deferred prosecution with mandated addiction treatment from 2008 onward—we did not include data on cases that might have received other drug treatments prior to 2008. The extent to which recidivism among DPCCAT participants was affected by other previous treatments could not be determined. Furthermore, only the judicial records of individual cases could be obtained during the study tracking period; DPCCAT participants who died during the tracking period were regarded as not having any record of relapsing during the tracking period. This could have resulted in a biased estimate relating to survival rates. A prior study indicated that the quality-adjusted life expectancy of heroin users who receive methadone therapy is approximately 17 to 18 years (Chang et al., 2019), which is substantially longer than the longest follow-up period (11 years) found in the present study. That is, we are confident that the deaths of individual participants have a negligible influence on our study outcomes. Finally, this study was not linked to corrective data and did not consider judicial records of deferred prosecutions that were revoked. In this regard, the present study could only exclude participants who did not complete their treatment.

## Conclusion

The present study revealed that the five-year recidivism rate among users of Schedule I drugs (e.g., opioids) after the completion of DPCCAT was somewhere between 26 and 52 percent, depending on whether the participants only used Schedule I drugs, used Schedule I drugs in conjunction with other drugs, or engaged in other heterogeneous crimes. Relative to users of only Schedule I drugs, users of both Schedule I and II drugs and heterogeneous group also had

an approximately twofold higher risk of recidivism and a shorter survival time. Overall, the results indicate that relative to conventional penalties, DPCCAT is effective in reducing relapse, particularly for the Schedule I drug users. That is, DPCCAT should be tailored to the specific characteristics of the drug users. To this end, governments should perform risk and need triages for drug users and focus on allocating corresponding treatment resources to groups that are more responsive to treatment.

**Author Contributions** YCK designed the study, analysis of data, and preparation of results; drafted the manuscript; and revised the manuscript. YCK and HPC devised the conceptual ideas and proof outline of the manuscript. YCK, CYH, and EC cleaned data and performed the statistical computations. HPC, FICH, YHC, and YCT drafted parts of the manuscript. TSHL initiates the conceptual framework and policy regulations; devised the conceptual framework, statistical analysis, and results; provides critical and intellectual directions; and revised the manuscript based on review comments. All authors contributed to the writing and approved the final manuscript.

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## Declarations

**Ethics Approval** This study has been approved by the Human Research Ethics Committee of National Cheng Kung University (NCKU HREC-E-109-465-2).

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