

Sex differences in the characteristics of stimulant offenders with a history of substance use disorder treatment

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Abstract

We analyzed the results of a nationwide questionnaire administered to 699 stimulant offenders and examined sex differences in the association between various psychosocial problems and treatment history for substance use disorder. Based on their attributes, we predominantly evaluated the treatment and support provided to women with substance use disorder. The rates of childhood (before the age of 18) traumatic experiences (physical, psychological, and sexual abuse and neglect) and lifetime intimate partner violence were significantly higher in women than in men. The history of treatment for substance use disorder was also significantly higher in women than in men, at 15.8% for men and 42.4% for women [$\chi^2(1)=41.223$, $p<0.001$]. Logistic regression analysis was performed using the treatment history of substance use disorder as the dependent variable. The results showed that treatment history was significantly associated with the total drug abuse screening test-20 score and suicidal ideation in men and with survivors of child abuse and eating disorders in women. A comprehensive assessment is required for several issues, such as child abuse, domestic violence, trauma symptoms, eating disorders, and drug problems. Moreover, an integrated treatment for substance use disorder, trauma, and eating disorders is required for female stimulant offenders.

KEYWORDS

inmates, methamphetamine, sex differences, substance use, treatment needs

1 | INTRODUCTION

The global incidence of substance abuse has been increasing gradually in the last few decades. According to the 2011 United Nations Office of Drugs and Crime, stimulants were the second most commonly used illicit drugs after marijuana worldwide.¹ In Japan, the Ministry of Justice has designed a recidivism prevention plan to support drug offenders to bring down the high recidivism rate.

Providing extensive support to them, especially female drug offenders arrested for violating the Stimulants Control Act who account for approximately 30% of all females sentenced to imprisonment, is an urgent issue. It is also important to provide them with appropriate and continuous support after their release from prison.^{2,3} With the intention of preventing recidivism, the Ministry of Justice has implemented the provision of effective guidance in consideration of offenders' risk of recidivism. The Ministry of Health, Labor and

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Welfare supports medical institutions specialized in substance use disorder (SUD) for the treatment of patients with drug dependency.³ The number of medical institutions specializing in dependency in Japan is inadequate, and considering that there is also a problem of uneven regional distribution of such institutions, we believe that it is important to endeavor to increase the number of such medical institutions. Besides such augmentation, it is important to enhance the quality of treatment, such as providing comprehensive treatment tailored to an individual's attributes, to improve the support provided to drug offenders with drug dependency after their release from prison.

In Japan, most drug offenders are arrested for stimulant use. Previous studies partly revealed sex differences in terms of stimulant users and characteristics of female stimulant users. In 2005, Kamoshita et al.⁴ conducted a survey involving 1000 sentenced people who were arrested for violating the Stimulants Control Act and put into Japanese prisons and juvenile prisons (not including medical prisons).

According to their results, in terms of having experienced abuse, such as that stemming from cohabiting with guardians during the period up to 18 years of age, women had a significantly higher rate of experiencing either physical abuse, psychological abuse, or sexual abuse than men. Women also had a significantly higher rate of having experienced domestic violence, overeating, and self-harm compared to men.

In terms of treatment history for drug dependency, approximately 90% of the users meet the diagnostic criteria for "substance dependence" as defined by the Diagnostic and Statistical Manual of Mental Disorders IV.^{4,5} Nevertheless, those who previously underwent a treatment program for substance use comprised only 26.0% of all the subjects. Regarding the medical institutions where substance use offenders received treatment, correctional institutions were the most common (47.2%), followed by outpatient (36.9%) and inpatient clinics (34.1%). However, no study has evaluated variables that affect the history of participation in treatment programs.

Webster et al.⁶ examined sex differences in the motivation for drug treatment in 327 men and 173 women who had been referred to drug courts and recognized their importance. They found that women had higher levels of motivation for treatment than men. Furthermore, motivation was associated with the severity of mental health problems.

Yatsugi et al.⁷ conducted a study involving 154 sentenced women who were imprisoned for violating the Stimulants Control Act. Participants imprisoned for the second time were found to be more likely to consider drug treatment as important compared with those imprisoned only once (odds ratio [OR] = 3.2). Participants with multiple sequelae and those with serious depressive symptoms are also more likely to regard the treatment as important compared with those without such symptoms (OR = 6.1 and 2.5, respectively). Few studies have evaluated variables that affect the treatment experience of drug offenders and sentenced people with SUD in actual settings.

The present study aimed to obtain new findings related to several factors that are affected by the treatment history for SUD of drug use offenders. Furthermore, we examined sex differences in the association between various psychosocial problems and treatment history for SUD in stimulant offenders. In the Discussion, we will focus our examination on how women should receive treatment for dependency in the future in Japan based on the historical background that treatment for dependency has primarily been provided for men to date. We expect that the present study will help to improve support and to create effective measures to prevent second offenses for female criminal offenders of stimulants, who account for 32.5% of all female prisoners (ranked second after theft) (2022 White Paper on Crime, P 54).

2 | METHODS

2.1 | Subjects

We included 806 newly sentenced people (542 men and 264 women) who were arrested for violating the Stimulants Control Act and subsequently imprisoned in Japan during the survey period. Of these, 699 people (462 men and 237 women) provided consent to participate in the survey (response rate: 86.7%). Individuals that did not provide consent were excluded from this study.

2.2 | Experiment

This was a collaborative study conducted by the Research and Training Institute at the Ministry of Justice and the National Center of Neurology and Psychiatry. The Research and Training Institute conducted a special investigation titled "Research on drug offenders." The National Center of Neurology and Psychiatry was permitted to use the database of the special investigation for performing secondary analysis after excluding personal information.

In our special survey, penal institution personnel distributed questionnaires to the subjects. The subjects were instructed to complete the questionnaire in a room or classroom at the penal institution. A clear statement and guarantee were provided to the subjects that their responses and decision to respond would not affect their evaluation in the prison and that cooperation in the survey was voluntary and not mandatory. The survey was conducted from July 2017 to August 2017 for men and from July 2017 to November 2017 for women.

2.3 | Survey questionnaire

The secondary analysis of this special survey included the following factors: age at the time of the survey, the number of times the subjects were imprisoned, score for the drug abuse screening test



(DAST)-20 (used for drug problem severity assessment), 10 variables related to psychosocial problems, such as traumatic experiences (physical, emotional, and sexual abuse; neglect; domestic violence (DV); overeating; bulimia nervosa; suicidal ideation; self-harm; and diagnosis of a mental disorder other than drug dependence), and history of treatment received at medical institutions specialized in treating SUD.

Age at the time of the survey was divided into four categories (the 20s, 30s, 40s, and ≥ 50 s), which matched the age categorization used in a previous study.⁷ The number of imprisonments was divided into three categories (1, 2, and ≥ 3 times).

DAST-20, a self-administered questionnaire, consists of 20 questions and is used globally because it takes approximately 5 min to complete.⁸ The score ranges from 0 to 20 points, and the reliability and validity of its Japanese version have been established.⁹ The respondents were asked about their drug use during the previous 12 months in the original version; however, our subjects were unlikely to have used substances after they were arrested. Hence, the phrase “during the previous 12 months” was modified to “during the 12 months before arrest.” Furthermore, the past tense was used in each question.

To evaluate child abuse experiences, 5 out of the 12 items to measure childhood trauma were used. A binary variable was created to assess whether the subjects experienced physical abuse inflicted by family members. Specifically, if the subjects answered “one to several times” or “repeatedly” to the item “Physical abuse involving hitting and kicking (e.g., punching, throwing objects at you, and injuring you by forceful hitting),” they were categorized as “applicable” (i.e., survivors of physical abuse), and those who answered “no” were categorized as “not applicable.”

The same evaluation procedure (a binary variable) was used for the items of emotional and sexual abuse, e.g., “Psychological violence involving a history of verbal interaction with family members resulting in emotional harm (such as being insulted, disparaged, and threatened)” and “Experiences of sexual violence inflicted by family members (such as sexually touching your body, making you forcefully touch others' genitals, and forced sex).”

A binary variable was also created to assess whether the subjects experienced neglect. Specifically, the subjects were asked the following questions: “Did your family members neglect your basic needs, such as food, washing clothes, and bathing?” (i.e., failing to seek appropriate and timely medical care and providing insufficient meals) and “Did you feel that the affection that you got from your family members was insufficient? (e.g., they did not take care of you and withheld affection from you).” If the subjects answered “yes” to either of the questions, they were categorized as “applicable” (i.e., survivors of neglect), and those who answered “no” were categorized as “not applicable.”

To evaluate whether the subjects experienced overeating or bulimia nervosa or inflicted self-harm, three binary questions with yes/no options were included: “Did you experience eating large amounts of food (overeating) with a loss of control over the eating?”; “Did you frequently force yourself to vomit after eating to keep yourself from gaining weight?”; and “Did you deliberately harm yourself using sharp objects, such as knives (wrist cutting)?” If the subjects

answered “yes” (wrist cutting ≤ 9 times)” or “yes” (wrist cutting ≥ 10 times), they were classified as “applicable,” and those who answered “no” were categorized as “not applicable.”

To assess whether the subjects were victims of DV or experienced suicidal ideation, two binary questions with yes/no options were included: “Did your partner inflict physical DV on you?” and “Have you ever seriously considered committing suicide in your life?”

A binary variable was created to examine whether the subjects had a history of receiving treatment at hospitals specialized in treating SUD. The subjects who responded “I received treatment at a specialized hospital/clinic” were categorized as those “with a history of treatment.” The subjects who responded “I did not know of such hospitals/clinics” or “I knew of such hospitals/clinics but did not receive treatment” were categorized as those “without a history of treatment.”

2.4 | Analyses

Welch's *t*-test was used for comparing groups of subjects in terms of age at the time of the survey, the total DAST-20 score, and duration of stimulant use. Pearson's Chi-square or Fisher's exact test was used to compare groups in terms of the proportion of subjects with each variable (i.e., age groups at the time of the survey, total DAST-20 scores, and psychosocial problems). To evaluate the association between treatment histories at hospitals specialized for treating SUD, drug dependence severity, and psychosocial problems, binomial logistic regression analysis was performed.

Using treatment history at hospitals specialized for treating SUD as the dependent variable, logistic regression analysis according to sex was performed. However, the number of men “with a history of treatment” was limited; thus, the number of independent variables was decreased using the following procedure: First, a new binary variable associated with neglect was created. The subjects who experienced one of the following episodes (physical, emotional, and sexual abuse and neglect) were categorized as “applicable” (i.e., survivors of child abuse), and those who did not were categorized as “not applicable.” Additionally, a new binary variable related to eating disorders was created. The subjects who experienced overeating or bulimia nervosa were categorized as “applicable,” and those who did not were categorized as “not applicable.”

Subsequently, binomial logistic regression analysis was performed using treatment history at hospitals specialized for treating SUD as the dependent variable and age groups at the time of the survey, total DAST-20 score, neglect experience, DV experience, eating disorders, and suicidal ideation as the independent variables. Initially, univariate analysis was performed, followed by multivariate analysis in which the relationship among independent variables was adjusted using the forced input method. We confirmed that all variance inflation factors were ≤ 10 in multicollinearity. The Hosmer–Lemeshow test yielded *p*-values of 0.661 and 0.638 in men and women, respectively, confirming the fit of the model. Since two questions of DAST-20, an independent variable, were related to dependent variables (e.g., “Did you receive treatment for substance use?”), a similar analysis was performed after

excluding the two questions. The results confirmed that the total DAST-20 score tended to be similar; therefore, the results for all 20 items of the DAST-20 have been provided in the present article. The level of statistical significance was set at 5%, and statistical analyses were conducted using SPSS Statistics 24.0.

3 | RESULTS

3.1 | Sex differences in age at the time of the survey, the number of imprisonments, and psychosocial problems

Table 1 presents the sex differences in age at the time of the survey, the number of imprisonments, and psychosocial problems, such as the severity of drug problems and being a survivor of neglect. The

mean age at the time of the survey was 44.5 years (SD=10.7) for men and 41.7 years (SD=9.1) for women. The mean age at the time of the survey was significantly lower in women than in men ($t=3.626, p<0.001$). The mean age at the time of first using a stimulant was 22.9 years (SD=6.9) for men and 22.4 years (SD=7.9) for women. No significant difference was observed between men and women in terms of the mean age at first stimulant use ($t=-0.817, p=0.414$); however, the mean DAST-20 score was 9.3 points (SD=3.9) for men and 10.3 points (SD=4.4) for women, indicating that the mean total DAST-20 score was significantly higher in women than in men ($t=-3.028, p=0.003$).

The rates of experiencing child abuse (physical, emotional, and sexual abuse and neglect) and DV inflicted by a partner were significantly higher in women than in men. Furthermore, 55.8% and 35.3% of women experienced these episodes two or more and three or more times, respectively.

TABLE 1 Sex differences in age at the time of the survey, the number of imprisonments, and psychosocial problems.

Sex	Men	Women	Total	p-Value
	(n=462)	(n=237)	(n=699)	
	Proportion (%)	Proportion (%)	Proportion (%)	
Age groups				
20–29 years	33 (7.1)	22 (9.3)	55 (7.9)	0.059
30–39 years	117 (25.3)	75 (31.6)	85 (12.2)	
40–49 years	189 (40.9)	96 (40.5)	107 (15.3)	
≥50 years	123 (26.6)	44 (18.6)	140 (64.7)	
No. of imprisonments				
1 time	99 (21.4)	82 (34.6)	181 (25.9)	<0.001***
2 times	105 (22.7)	62 (26.2)	167 (23.9)	
≥3 times	258 (55.8)	93 (39.2)	351 (50.2)	
DAST-20				
0–5 points	94 (21.3)	37 (17.4)	131 (20.0)	0.002**
6–10 points	165 (37.3)	67 (31.5)	232 (35.4)	
11–15 points	162 (36.7)	82 (38.5)	244 (37.3)	
16–20 points	21 (4.8)	27 (12.7)	48 (7.3)	
Physical abuse	124 (27.9)	91 (39.1)	215 (31.8)	0.003**
Emotional abuse	106 (23.9)	111 (47.4)	217 (32.1)	<0.001***
Sexual abuse	1 (0.2)	15 (6.4)	16 (2.4)	<0.001***
Neglect	69 (15.5)	65 (28.3)	141 (20.9)	<0.001***
Domestic violence	15 (3.5)	167 (72.6)	182 (27.5)	<0.001***
Overeating	88 (19.7)	98 (42.2)	186 (27.4)	<0.001***
Bulimia nervosa	8 (1.8)	45 (19.4)	53 (7.8)	<0.001***
Suicidal ideation	91 (21.0)	106 (46.3)	197 (29.8)	<0.001***
Self-harm	35 (8.1)	94 (41.2)	129 (19.6)	<0.001***
Diagnosis of mental disorder other than drug dependence	38 (8.6)	92 (40.2)	130 (19.4)	<0.001***

Note: Pearson's Chi-square test or Fisher's exact test.

* $p<0.05$; ** $p<0.01$; *** $p<0.001$.



3.2 | Association of treatment history at specialized hospitals with age at the time of the survey and psychosocial problems

After 217 people with missing data for any of the variables were excluded, subsequent analyses were performed on the data from 482 people. Table 2 presents data regarding the association of treatment history at hospitals specialized in treating SUD with age at the time of the survey, the number of times the subjects were imprisoned, and psychosocial problems, such as the severity of drug problems and being a survivor of neglect. The number of women with a history of treatment for SUD was significantly higher (42.4%) than that of men (15.8%) [$\chi^2(1) = 41.223, p < 0.001$].

In terms of treatment history, variables that showed a significant sex difference were DAST-20, suicidal ideation, and self-harm in men and physical and emotional abuse and overeating in women.

Men with a history of treatment were more likely to receive a total DAST-20 score of ≥ 11 points than men without a history of treatment. Additionally, more men with a history of treatment experienced suicidal ideation and self-harm. The mean total DAST-20 score of men with a history of treatment was significantly higher than that of men without a history of treatment ($t = -3.882, p < 0.001$). Among men with a history of treatment, 52.0% (26/50) had experienced at least one incident of physical abuse, emotional abuse, or neglect.

Women with a history of treatment were more likely to experience physical and emotional abuse and overeating than women without a history of treatment. Among women with a history of treatment, 71.4% (50/70) had experienced at least one incident of physical abuse, emotional abuse, or neglect.

3.3 | Logistic regression analysis using treatment history at specialized hospitals as the dependent variable

Table 3 shows the results of logistic regression analysis according to sex using treatment history at hospitals specialized in treating SUD as the dependent variable. According to univariate analysis, treatment history for SUD was significantly associated with a total DAST-20 score, neglect, suicidal ideation, and self-harm in men. However, a significant association between neglect and self-harm was not observed in multivariate analysis. Subjects with a DAST-20 total score of 11–15 points were 6.5 times more likely to have a history of treatment for SUD than those with a DAST-20 total score of ≤ 5 points (i.e., baseline). Additionally, subjects with a DAST-20 total score of 11–15 points were 2.2 times more likely to experience suicidal ideation than those without a DAST-20 total score of 11–15 points.

According to univariate and multivariate analyses, treatment history for SUD was significantly associated with eating disorders and neglect in women. Women who were survivors of neglect and had eating disorders were 4.1 times more likely to have a treatment history.

4 | DISCUSSION

4.1 | Treatment of drug dependency in the future and assessment thereof for criminal offenders of stimulants taking into consideration sex differences

The present study showed sex differences in treatment history for SUD and its related factors in stimulant offenders. The severity of drug problems and suicidal ideation was associated with treatment history in men. While a mutual relationship was observed among child abuse, suicidal ideation, and self-harm, as a result of our multivariate analysis, we found that among these variables, suicidal ideation alone had a significant effect on prior experience of treatment for SUD. Assuming that severe depressive mood is an underlying factor that precipitates suicidal ideation, aggravation of SUD and the appearance of suicidal ideation accompanied with increased depressive mood might serve as motivation to receive treatment for SUD for male criminal abusers of stimulants.

In Japan, the Serigaya Methamphetamine Relapse Prevention Program (SMARPP), which includes group therapies based on cognitive behavioral therapies, is used widely today in addiction treatment.¹⁰ The SMARPP was developed based on the Matrix Model,¹¹ a treatment program for outpatients with SUD, and a clinical study has previously demonstrated its efficacy.¹² The SMARPP has been widely used across Japan for the past 10 years. This enables homogeneous treatment of SUD in Japan.

Serigaya Methamphetamine Relapse Prevention Program, which is based on relapse prevention, can be considered an intervention that is suited to male stimulant abusers who require treatment need focused on reducing the drug problem. However, attention should be paid to the presence of suicidal ideation, which is another related factor. According to the results of the present study, the rate of individuals with suicidal ideation among men with a history of treatment for drug dependency was high at 40%. The delicate topic of suicidal ideation is expected to be difficult to talk about in group therapy settings, such as the SMARPP program, and therefore, due care is needed so that the existence of suicidal ideation is not overlooked by physicians in consultations.

By contrast, female subjects showed different results. The severity of SUD was higher in women than in men, although the mean age of women at the time of the survey was lower than that of men. This result is consistent with the results of a previous study showing that several drug problems become severe more rapidly in women than in men¹³ and that there is a remarkably higher proportion of women with a treatment history for SUD than men. However, in women, a history of such treatment was significantly associated with neglect experiences and eating disorders rather than the severity of drug dependency. Many previous studies have shown that survivors of child neglect tend to subsequently experience mental disorders, such as substance use and eating disorders.^{14–16} Furthermore, several previous studies have indicated an association between substance use and eating disorders.^{17,18} The present study demonstrates that

TABLE 2 Association of treatment history at specialized hospitals with age at the time of the survey, the number of imprisonments, and psychosocial problems.

	Men		p-Value	Women		p-Value
	SUD treatment			SUD treatment		
	Experience (n = 50)	Inexperience (n = 267)		Experience (n = 70)	Inexperience (n = 95)	
	Proportion (%)	Proportion (%)	Proportion (%)	Proportion (%)		
Age groups						
20–29 years	2 (4.0)	26 (9.7)	0.563	7 (10.0)	13 (13.7)	0.639
30–39 years	14 (28.0)	69 (25.8)		23 (32.9)	30 (31.6)	
40–49 years	24 (48.0)	113 (42.3)		25 (35.7)	38 (40.0)	
≥50 years	10 (20.0)	59 (22.1)		14 (21.4)	14 (14.7)	
No. of imprisonments						
1 time	12 (24.0)	63 (23.6)	0.976	22 (31.4)	38 (40.0)	0.320
2 times	12 (24.0)	68 (25.5)		24 (34.3)	23 (24.2)	
≥3 times	26 (52.0)	136 (50.9)		24 (34.3)	34 (35.8)	
DAST-20						
0–5 point(s)	3 (6.0)	60 (22.5)	0.003**	9 (12.9)	18 (18.9)	0.314
6–10 points	15 (30.0)	105 (39.3)		19 (27.1)	34 (35.8)	
11–15 points	28 (56.0)	92 (34.5)		31 (44.3)	32 (33.7)	
16–20 points	4 (8.0)	10 (3.7)		11 (15.7)	11 (11.6)	
Physical abuse	17 (34.0)	72 (27.0)	0.310	34 (48.6)	24 (25.3)	0.002**
Psychological abuse	18 (36.0)	63 (23.6)	0.065	39 (55.7)	33 (34.7)	0.007**
Sexual abuse	0 (0.0)	0 (0.0)	–	4 (5.7)	4 (4.2)	0.723
Neglect	11 (22.0)	38 (14.2)	0.163	22 (31.4)	24 (25.3)	0.383
Domestic violence	3 (6.0)	8 (3.0)	0.389	50 (71.4)	64 (67.4)	0.577
Overeating	12 (24.0)	57 (21.3)	0.677	41 (58.6)	35 (36.8)	0.006**
Bulimia nervosa	1 (2.0)	5 (1.9)	1.000	16 (22.9)	17 (17.9)	0.431
Suicidal ideation	20 (40.0)	49 (18.4)	0.001**	35 (50.0)	41 (43.2)	0.384
Self-harm	9 (18.0)	20 (7.5)	0.018*	33 (47.1)	36 (37.9)	0.234

Note: Pearson's Chi-square test or Fisher's exact test.

* $p < 0.05$; ** $p < 0.01$.

child abuse, substance use, and eating disorders are closely associated with one another in a complex manner, and the frequency of treatment for SUD in the clinical setting was higher among female stimulant offenders who were survivors of child abuse and neglect or had eating disorders. These findings suggest that improvements in several problems related to a history of child abuse or eating disorders rather than drug-related issues are required to address the treatment needs of affected women. Meeting the treatment needs of female stimulant offenders exclusively through a uniform treatment program based on the SMARPP would be difficult.

The results of the present study suggest the importance of a comprehensive assessment of female stimulant offenders. Approximately 60% of these women had experienced two or more episodes of physical, psychological, and sexual abuse; neglect; and DV inflicted by a partner before their 18th birthday. Additionally, more than 70% of these women with a history of treatment for SUD

were survivors of child abuse or victims of DV inflicted by a partner. These results suggest that most female stimulant offenders who received treatment for SUD in clinical settings may have experienced some kind of traumatic incident. The present study failed to diagnose or screen for posttraumatic psychiatric disorders (PTSD); however, the proportion of subjects having experienced any of the PTSD symptoms is not likely to be low. PTSD symptoms mediate the relationship between experiences of child abuse and subsequent experiences of DV from a partner.¹⁹ Treatment of and recovery from SUD are difficult in survivors of child abuse and patients with PTSD, SUD, and eating disorders when more than one disorder is present.^{20,21} Thus, a comprehensive assessment of the relationships among histories of child abuse and DV, PTSD symptoms, eating disorders, and drug-related issues is required for female stimulant offenders.

Next, we will discuss the future prospects for treatment methods that must be explored. The Substance Abuse and Mental Health

TABLE 3 Logistic regression analysis using treatment history at specialized hospitals for SUD as the dependent variable.

	COR	95% CI		p-Value	AOR	95% CI		p-Value
		Lower	Upper			Lower	Upper	
Men								
Age at the time of the survey								
20–29 years	1.00				1.00			
30–39 years	2.64	0.56	12.41	0.220	3.65	0.72	18.43	0.117
40–49 years	2.76	0.61	12.43	0.186	4.43	0.88	22.25	0.071
≥50 years	2.20	0.45	10.77	0.329	4.14	0.73	23.63	0.110
No. of imprisonments								
1 time	1.00				1.00			
2 times	0.93	0.39	0.21	0.863	0.56	0.21	1.46	0.233
≥3 times	1.00	0.48	2.12	0.992	0.49	0.20	1.22	0.126
DAST-20								
0–5 points	1.00				1.00			
6–10 points	2.86	0.80	10.27	0.108	2.82	0.76	10.42	0.121
11–15 points	6.09	1.77	20.91	0.004**	6.48	1.81	23.23	0.004**
16–20 points	8.00	1.55	41.23	0.013*	5.13	0.92	28.72	0.063
Child abuse	1.87	1.02	3.43	0.044*	1.56	0.77	3.16	0.215
Domestic violence	2.07	0.53	8.07	0.297	1.18	0.27	5.18	0.830
Eating disorders	1.24	0.62	2.48	0.546	0.92	0.43	1.96	0.831
Suicidal ideation	2.97	1.56	5.65	0.001**	2.15	1.03	4.58	0.046*
Self-harm	2.71	1.16	6.36	0.022*	1.51	0.56	4.06	0.411
Women								
Age at the time of the survey								
20–29 years	1.00				1.00			
30–39 years	1.42	0.49	4.14	0.516	1.57	0.47	5.28	0.467
40–49 years	1.22	0.43	3.49	0.708	1.51	0.44	5.22	0.517
≥50 years	1.99	0.62	6.43	0.250	4.11	0.97	17.35	0.055
No. of imprisonments								
1 time	1.00				1.00			
2 times	1.80	0.83	3.92	0.137	1.43	0.59	3.45	0.427
≥3 times	1.22	0.58	2.56	0.600	1.04	0.41	2.68	0.929
DAST-20								
0–5 points	1.00				1.00			
6–10 points	1.12	0.42	2.97	0.824	1.16	0.38	3.51	0.800
11–15 points	1.94	0.76	4.96	0.168	2.18	0.76	6.28	0.149
16–20 points	2.00	0.63	6.36	0.240	1.73	0.46	6.56	0.418
Child abuse	2.78	1.44	5.36	0.002**	4.11	1.84	9.17	0.001**
Domestic violence	1.21	0.62	2.37	0.577	0.65	0.28	1.48	0.301
Eating disorders	2.61	1.38	4.93	0.003**	4.05	1.86	8.84	<0.001***
Suicidal ideation	1.32	0.71	2.45	0.384	0.66	0.29	1.50	0.325
Self-harm	1.46	0.78	2.73	0.235	1.12	0.50	2.52	0.785

Abbreviations: AOR, adjusted odds ratio; COR, crude odds ratios.

* $p < 0.05$.; ** $p < 0.01$.; *** $p < 0.001$.

Services Administration recommends adopting a trauma-informed perspective as a principle for alleviating women's suffering caused by drug-related issues.²² Such principles are also important for

female stimulant offenders. Future treatment approaches should include an integrated treatment program for patients with SUD and PTSD symptoms (seeking safety²³ is a prime example) as well as for

patients with SUD and eating disorders. Extremely few programs attempt to monitor eating behavior problems and eating disorders simultaneously and in parallel in patients with SUD.²⁴ However, the results of studies that employed an integrated treatment program are gradually accumulating.²⁵ To improve the quality of treatment for female stimulant offenders in Japan, sensitivity to sex differences should be enhanced among medical professionals who treat patients with SUD, and integrated treatment programs for SUD involving trauma and eating disorders should be developed and popularized based on the trends and approaches observed in Western countries.

4.2 | Criminal justice system for female stimulant offenders

A previous study showed that more women than men imprisoned for drug use offenses reported experiencing depression, anxiety symptoms, suicidal ideation, and child abuse.²⁶ This trend was also observed in the present study. Since many female prison inmates concomitantly experience SUD, PTSD, and depression disorder, a different treatment approach than the ones used for men is required to address their distinct treatment needs.^{27,28} Penal institutions have also started trials of the seeking safety²³ approach mentioned above; however, many issues have been pointed out, such as the insufficient evidence pertaining to the therapeutic effects, and that significant resources are needed to put the approach into practice. Establishing a support system to address the complicated pathologies and treatment needs of women with drug problems who have been imprisoned is a major issue worldwide that will have to be addressed in future.²⁹ Female prison inmates who have had several traumatic experiences must be engaged in community-based treatment with access to social support after parole to address their treatment needs and to prevent them from experiencing further trauma.^{30,31} As proposed by Marotta,³² when considering treatment for female stimulant offenders after parole, organizations in the Japanese criminal justice system should encourage them to participate in community-based treatment, as per the comprehensive assessment mentioned above. Furthermore, while rehabilitation facilities have been put in place as temporary residences for women who have difficulty returning to their parents or partners for various reasons, a solution is needed for the shortcomings of the system whereby it is difficult to raise money to pay for medical expenses incurred by women residing in facilities in order to receive essential medical care.

4.3 | Limitations of the present study and scope for further studies

This was a cross-sectional study, and the temporal relationship between the onset of SUD treatment and that of several psychosocial problems, such as exposure to child abuse, was unclear. Many

previous studies have shown that several psychosocial problems occur prior to the initiation of drug use in female drug users³³; however, the relationship between the two is unclear. A major limitation is that we were unable to assess psychiatric symptoms, such as depression and PTSD, which are important for considering a treatment strategy for female stimulant offenders in penal institutions and after their release from prison. Nonetheless, the results of the present study are useful because they demonstrate notable characteristics of stimulant offenders with a history of SUD.

Future studies are required to evaluate psychiatric symptoms using several screening tools in female stimulant offenders and obtain information regarding their treatment/support needs with the aim of further understanding them and providing them with treatment and support they need.

AUTHOR CONTRIBUTIONS

Conceived and designed the analysis: Ayumi Kondo, Takuya Shimane, Masaru Takahashi, and Toshihiko Matsumoto. Data collection: Michiko Kobayashi, Marie Otomo, and Yoshiko Takeshita. Contributed data/analysis tools: Michiko Kobayashi, Marie Otomo, and Yoshiko Takeshita. Performed the analysis: Ayumi Kondo. Wrote the paper: Ayumi Kondo

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CONFLICT OF INTEREST STATEMENT

The authors declare that they have no conflict of interest.

DATA AVAILABILITY STATEMENT

This study is a secondary analysis of the original project of the Ministry of Justice, Japan. Due to the contract with the Ministry of Justice, Japan, the data set is not publicly available.

ETHICAL APPROVAL

Approval of the Research Protocol by an Institutional Reviewer Board: The special investigation conducted by the Research and Training Institute of the Ministry of Justice was performed according to the prespecified procedures evaluated by the Institute's monitoring board, which consisted of independent academic experts. The secondary analysis was performed using the data from the special investigation after obtaining approval from the institutional review board of the National Center of Neurology and Psychiatry (approval number: A2017-107).

Patient consent statement: Six hundred and ninety-nine people (462 men and 237 women) provided consent to participate in the survey (response rate: 86.7%). Individuals that did not provide consent were excluded from this study.

Registry and the Registration No. of the study/trial: N/A.

Animal Studies: N/A.

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