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Clinical Characteristics, Support System, and Personality Differences of Cannabis and Stimulant Users in South Korea

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Objective To compare the clinical characteristics, support system, and personality traits of cannabis and stimulant users in South Korea.

Methods This study was based on electronic medical records. Among a total of 152 subjects who suspected of drug use and who underwent six types of urine-based drug screening tests at the National Center for Mental Health, 104 people who underwent both an interview with a psychiatrist and a psychological test were selected and classified according to the type of substance used. Psychological and personality characteristics were examined through the National Center for Mental Health psychological test battery for addiction. The differences in characteristics between cannabis (n=60) and stimulant (n=18) users were analyzed by an independent t-test for parametric data and chi-square test or Fisher's exact test for nonparametric data, and analysis of covariance for psychological tests.

Results The average age of cannabis users was lower than that of stimulant users and they were more often single. Substance cravings were higher in stimulant users, who more often had a psychiatric history than cannabis users. Moreover, stimulant users had higher clinical scale scores for depression and anxiety. Among the Minnesota Multiphasic Personality Inventory-II clinical scale scores, there was a significant difference in social introversion scores between groups.

Conclusion We found differences in demographic, psychological, and personality characteristics between cannabis and stimulant users in South Korea. Considering the recent increase in illegal drug use in South Korea, further follow-up and policy research on drug users are needed.

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Keywords Cannabis; Methamphetamine; Clinical characteristic; Personality; Psychosocial support systems.

INTRODUCTION

The number of illegal drug users worldwide increased from 226 to 275 million between 2010 and 2019; of those, around 36 million experience substance use disorder. The legalization of cannabis, in Canada and several U.S. states, has reduced awareness of the dangers of cannabis, becoming the most abused drug.[1] In South Korea, the total number of drug offenders reached a 10-year high of 18,050 in 2020. The number of stimulant users increased 21.8% and that of cannabis offenders increased 22.1% between 2019 and 2020. Additionally, the Internet and SNS have allowed the general public to easily purchase illegal drugs, increasing their use.[2] Particularly, for methamphetamine, cannabis, both methamphetamine and cannabis, and sedative, anxiolytics, and methamphetamine in that order.[3]

Illegal drug use can cause not only social problems but also individual physical and mental problems. For example, methamphetamine, a representative stimulant, causes euphoria, poor judgment, and abnormal behavior; long-term use can lead to psychosis, mood disorders, anxiety, and attention-deficit hyperactivity disorder.[4] As for cannabis, it can cause acute symptoms such as euphoria, relaxation, and dissociation but also lead to mood disorders, psychosis, and anxiety.[5] Long-term use of these substances, in particular, results in repetitive behaviors, including tolerance and withdrawal, diagnosed as substance use disorders and requiring treatment.[6] The complex interaction between biological factors such as heredity and epigenetics, parental substance use, an unstable parenting environment, or social factors such as poor interpersonal relationships, personal temperament and character, etc., can lead to substance abuse and use disorders.[7]

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Among them, the effect of individual temperament and personality on substance use behavior has been demonstrated. In a study using the temperament and character inventory, a high novelty seeking (NS) tendency was associated with substance use, and high NS and harm avoidance (HA) scores in adolescents were related earlier substance use.[8,9] For women, there was a proportional relationship between the level of substance craving, the NS score, and impulsive tendencies.[10] Moreover, methamphetamine abusers had higher NS and HA scores than cannabis abusers.[11] And differences in the Minnesota Multiphasic Personality Inventory-II (MMPI-2) profile characteristics were identified between alcohol and methamphetamine abusers.[12]

In recent years, there has been a notable increase in the prevalence of illegal drug use in South Korea, with a particularly high incidence of stimulant and cannabis usage. However, there is a scarcity of studies directly comparing the specific characteristics associated with these substances in recent years within the South Korean population. Therefore, we conducted an investigation aiming to compare the demographic, social support system, and psychological characteristics individuals using stimulants and cannabis who visited the National Center for Mental Health.

METHODS

Research subjects and procedures

This study utilized electronic medical records to identify patients who visited the National Center for Mental Health between January 1, 2020 and December 31, 2021. Individuals suspected of drug use and who underwent six types of urine-based drug screening tests were extracted from the records. A total of 152 subjects were identified, and among them, those with documented substance use history by a psychiatrist and no acute intoxication symptoms during the interview were selected. Furthermore, study subjects were chosen from those who had undergone a battery of psychological tests conducted by trained clinical psychologists. All selected subjects were referred to the National Center for Mental Health for psychiatric evaluation and treatment of their drug use by the Prosecutor's Office. The subjects underwent a clinical interview with a psychiatrist for assessment and treatment purposes, along with an internal laboratory urine test to determine recent drug use, followed by psychological testing conducted within a few days. According to medical records by a psychiatrist, patients were classified according to drug: stimulants, cannabis, hallucinogens, opioids, sedatives, hypnotics, or anxiolytics, and mixed users (≥2) (Figure 1). Demographic characteristics such as sex, age, occupation, marital status, alcohol, and smoking history were extracted from the medical records, and the period of substance use, psychiatric history, and support system from medical records. The social support system was assessed by reviewing the specific information documented in the medical records created by a psychiatrist. During clinical interview, structured questions were utilized by a psychiatrist to evaluate the subjects' level of support system and documented it as nonemotional support, emotional support, or isolated. Based on these records, the subjects were categorized into three groups. All research methods were approved by the Institutional Review Board of the National Center for Mental Health (IRB No. 116271-2022-01).

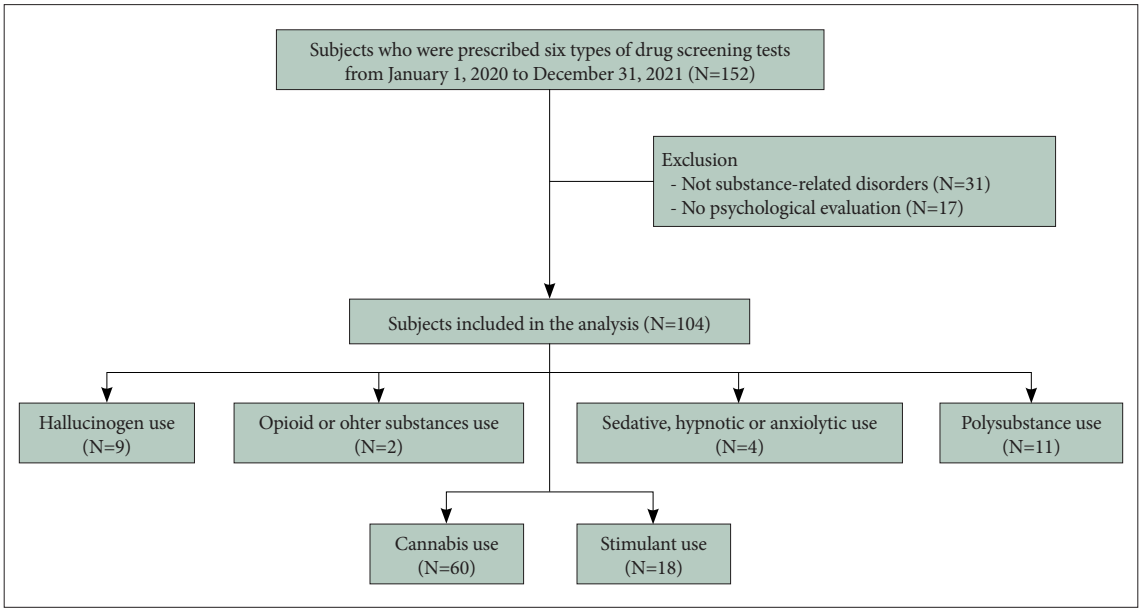

Figure 1. Flow chart of included subjects.

Measurement tools

The subjects participated in a psychological tests specifically designed for individuals with substance use disorders at the center. The battery included assessments such as Korean Wechsler Adult Intelligence Scale IV (K-WAIS-IV), MMPI-2, the Hamilton Depression Rating Scale (HDRS), and Korean-Beck Depression Inventory-II (K-BDI-II), among others. These tests were initially conducted as part of the standard treatment protocol for addicted patients. In this study, the results of these tests were utilized to directly compare the psychological characteristics between cannabis and stimulant users.

K-WAIS-IV

K-WAIS-IV was used to assess various aspects of intellectual ability. K-WAIS-IV is a Korean translation of WAIS-IV; through direct interviews with a clinical psychologist, four index scores (verbal comprehension, perceptual reasoning, working memory, and processing speed), including a full scale intelligence quotient (FSIQ) are calculated. To evaluate each score, 10 core subtests and five supplementary tests were performed. The FSIQ provides the relative intellectual ability of the subject compared to their peers while the four index scores serve to characterize more detailed intellectual functioning.[13]

MMPI-2

MMPI-2 was used to evaluate individual personality traits. It consists of a total of 567 questions; each dealing with psychiatric, psychological, neurological, and physical symptoms. Items represent validity, clinical, personality pathology, content, and supplementary scales, respectively. It consists of 9 validity scales, 10 clinical scales, 5 personality pathology scales, 15 content scales, and 15 supplementary scales. Calculated as a standardized score (T score), a T score ≥65 indicates as clinical range. However, when interpreting, rather than simply quantitatively confirming the profile, it should be reviewed in the overall context by considering the rise and fall of other scales.

Clinical depression, anxiety, and impulsiveness scales

Self-report and clinician rating scales were used to evaluate depression, anxiety, impulsivity, and related symptoms. The K-BDI-II, Korean-Beck Anxiety Inventory (K-BAI), and Korean version of Barratt Impulsiveness Scale-11-Revised (K-BIS-11-R) were used as self-report scales and the HDRS and Hamilton Anxiety Rating Scale (HARS) were used as clinician rating scales. The K-BDI-II and K-BAI evaluate the severity of depression and anxiety symptoms, respectively, and have a total of 21 questions, each consisting of a 4-point Likert scale. A higher score indicates more severe symptoms.[14,15] The K-BIS-11-R consists of 30 items to evaluate three factors: attentional impulsiveness, motor impulsiveness, and non-planning impulsiveness. Each item is composed of a 4-point Likert scale and higher scores indicate higher impulsiveness.[16] HDRS is a tool designed for clinicians to evaluate the severity of depressive symptoms. We used the widely used 17-item version. HARS is a tool for clinicians to divide anxiety symptoms into mental and physical symptoms. Both scales use a total score, with higher scores indicating more severe symptoms.[17,18]

Data analysis

After selecting the suitable subjects for analysis, we used descriptive statistics for the demographic information. The chi-square test and independent t-test were used to confirm differences in demographic characteristics and support system between groups. The Bonferroni method was used as post hoc test when required. The number of uninformed subjects for each characteristic is indicated in the Supplementary Table 1 (in the online-only Data Supplement). To compare differences in intelligence level, clinical symptoms, and MMPI-2 results between stimulant and cannabis users, an independent t-test or Mann−Whitney U test was used. Significant differences in age, sex, marital status, and psychiatric history were observed through a simple average comparison between the two groups. These variables were treated as covariates, and an analysis of covariance (ANCOVA) was conducted. This analysis aimed to determine if there were any differences in intelligence level, clinical symptoms, and MMPI-2 results between the two groups, even after controlling for the aforementioned covariates. The resulting F values for these comparisons are presented in the accompanying tables. PASW statistics 18 (SPSS Inc., Chicago, IL, USA) was used for all statistical analyses; the significance level was defined as $p<0.05$.

RESULTS

Demographic and clinical characteristics

A total of 104 substance users were selected, their mean age was 30.9 (standard deviation=8.3) years; 60 (57.7%) took cannabis and 18 (17.3%) stimulants, 15 (14.4%) other substances, and 11 (10.6%) were using ≥2 substances. Cannabis users were the most common (Figure 1). The mean age of cannabis users (29.5±7.2 years) was lower than that of stimulant users (35.8±11.6 years; $p=0.041$). In terms of sex, more females were taking stimulants than cannabis (9 [50.0%] vs. 5 [8.3%]) ($\chi^2=16.323$, $p<0.001$). In terms of marital status, the proportion of unmarried cannabis users was higher than that of stimulant users (48 [80.0%] vs. 12 [66.7%]) ($\chi^2=7.179$, $p<0.015$). At the time of the interview with the psychiatrist, stimulant users reported significantly higher substance craving than

Table 1. Demographic characteristics and psychiatric history of subjects

Characteristic	Total (N=104)	Stimulant (N=18)	Cannabis (N=60)	t or χ^2	p
Age (yr)	30.9±8.3	35.8±11.6	29.5±7.2	2.177	0.041
Sex				16.323	0.001
Female	26 (25.0)	9 (50.0)	5 (8.3)		
Male	78 (75.0)	9 (50.0)	55 (91.7)		
Marital status				7.179	0.015
Unmarried	81 (77.9)	12 (66.7)	48 (80.0)		
Married	13 (12.5)	6 (33.3)	4 (6.7)		
Education				0.874	>0.999
Primary school	2 (1.9)	0 (0.0)	1 (1.7)		
Middle school	3 (2.9)	0 (0.0)	2 (3.3)		
High school	38 (36.5)	6 (33.3)	21 (35.0)		
>College	54 (51.9)	11 (61.1)	32 (53.3)		
Job				3.792	0.117
Unemployed	24 (23.1)	4 (22.2)	11 (18.3)		
Employed	57 (54.8)	13 (72.2)	30 (50.0)		
Student	17 (16.3)	1 (5.6)	15 (25.0)		
Religion				0.333	0.774
No	65 (62.5)	11 (61.1)	37 (61.7)		
Yes	30 (28.8)	7 (38.9)	17 (28.3)		
Purchasing route				1.684	0.277
Directly from someone	56 (53.8)	12 (66.7)	27 (45.0)		
Internet	43 (41.3)	6 (33.3)	28 (46.7)		
Alcohol, yes	79 (76.0)	12 (66.7)	47 (78.3)	1.023	0.354
Smoking, yes	83 (79.8)	13 (72.2)	53 (88.3)	2.761	0.134
Duration				2.996	0.098
<12 mo	84 (80.8)	12 (66.7)	51 (85.0)		
≥12 mo	20 (19.2)	6 (33.3)	9 (15.0)		
Craving				8.809	0.008
No	93 (89.4)	12 (66.7)	56 (93.3)		
Yes	11 (10.6)	6 (33.3)	4 (6.7)		
Stressor before using				2.607	0.106
No	37 (35.6)	4 (22.2)	26 (43.3)		
Yes	67 (64.4)	14 (77.8)	34 (56.7)		
Psychiatric history				3.902	0.048
No	59 (56.7)	7 (38.9)	39 (65.0)		
Yes	45 (43.3)	11 (61.1)	21 (35.0)		
Schizophrenia spectrum and other psychotic disorders	2 (4.4)	2 (18.2)	0 (0.0)		
Bipolar and depressive disorders	20 (44.4)	3 (27.3)	7 (33.3)		
Anxiety disorders	2 (4.4)	0 (0.0)	1 (4.8)		
Neurodevelopmental disorders	6 (13.3)	0 (0.0)	5 (23.8)		
Others	1 (2.2)	0 (0.0)	1 (4.8)		
Comorbid	11 (24.4)	4 (36.4)	6 (28.6)		
Unknown	3 (6.7)	2 (18.2)	1 (4.8)		

Table 1. Demographic characteristics and psychiatric history of subjects (continued)

Characteristic	Total (N=104)	Stimulant (N=18)	Cannabis (N=60)	t or χ^2	p
Current psychiatric problems				0.686	0.408
No	48 (46.2)	7 (38.9)	30 (50.0)		
Yes	56 (53.8)	11 (61.1)	30 (50.0)		
Social support status				1.955	0.397
Non-emotional conversation	43 (41.3)	7 (38.9)	25 (41.7)		
Emotional conversation	50 (48.1)	8 (44.4)	31 (51.7)		
Completely isolated	6 (5.8)	2 (11.1)	2 (3.3)		

Values are presented as mean±standard deviation or number (%).

Table 2. K-WAIS-IV results in users of stimulants and cannabis

Scale	Stimulants (N=18)	Cannabis (N=60)	Total (N=78)	t	p (t-test)	F value				
						Covariate				Model
						Age	Sex†	Marital status†	Psychiatry history	
FSIQ	97.9±16.1	99.1±11.6	98.8±12.6	0.37	0.71	2.13	1.41	0.37	0.63	0.09
VCI	100.3±11.9	100.5±9.9	100.5±10.3	0.09	0.93	4.47*	1.71	0.27	0.76	0.22
PRI	98.0±15.3	101.9±14.1	101.1±14.4	1.01	0.31	0.01	1.12	0.06	0.33	0.12
WMI	98.7±12.2	102.3±13.9	101.5±13.5	1.02	0.31	0.69	1.16	0.08	0.05	0.14
PSI	99.7±19.9	95.5±13.8	96.4±15.4	-1.04	0.30	3.80	0.00	0.38	0.23	0.07
GAI	98.9±14.9	101.0±11.7	100.5±12.4	0.63	0.53	0.82	2.17	0.46	0.92	0.21
CPI	98.2±18.0	97.5±13.4	97.6±14.5	-0.20	0.84	2.94	0.34	0.04	0.24	0.00

Values are presented as mean±standard deviation. *p<0.05; †sex (female); marital status (unmarried). K-WAIS-IV, Korean Wechsler Adult Intelligence Scale IV; FSIQ, full scale intelligence quotient; VCI, verbal comprehension index scale; PRI, perceptual reasoning index scale; WMI, working memory index scale; PSI, processing speed index scale; GAI, general ability index; CPI, cognitive proficiency index

cannabis users (χ^2= 8.809, p=0.008). More stimulant users 11 (61.1%) had a psychiatric history than cannabis users 21 (35.0%). The most common past diagnoses were mood disorders (44.4%) and ≥2 comorbidities (24.4%), followed by neurodevelopmental disorders (13.3%), and schizophrenia spectrum and other psychotic disorders, anxiety disorders (4.4%). All of neurodevelopmental disorders were ADHD. There was no significant difference between groups regarding the support system (Table 1).

Results of the K-WAIS-IV, clinical scales, and MMPI-2

In the K-WAIS-IV test, there was no significant difference between groups in the FSIQ or any other partial index. Furthermore, even after adjusting for covariates including age, sex, marital status, and psychiatry history, the consistent findings persisted (Table 2).

The results of the t-test did not reveal a statistically significant difference between the two groups in terms of HDRS and HARS scores. However, a statistically significant difference was observed in K-BDI-II and K-BAI (p<0.01). Nevertheless, when employing ANCOVA, the statistical significance of K-BAI was no longer evident, while significant differences were identified in HDRS, HARS, and K-BDI-II scores. Among the clinician-rated scales, stimulant users had an average HDRS score of 6.22±6.35, while cannabis users had an average score of 2.72±2.7 (F value 6.61, p<0.05). In terms of HARS, stimulant users had an average score of 6.94±8.2, whereas cannabis users had an average score of 2.7±3.3 (F value 4.93, p<0.05). Regarding self-report scales, stimulant users scored an average of 18.4±13.6 on the K-BDI-II, whereas cannabis users scored an average of 9.6±9.4 (F value 4.26, p<0.05) (Table 3).

On the validity scale of the MMPI-2, both groups showed valid values for MMPI interpretation, and no significant difference between groups (Table 4). Among the clinical scale scores, stimulant users showed relatively elevated psychopathic deviate (Pd) and paranoia (Pa), indicating a profile consistent with the 46/64 code type. And cannabis users showed relatively elevated Pd. Following the t-test analysis, statistically significant differences were observed in Pa (p<0.02) and social introversion (Si, p<0.04). However, after conducting the ANCOVA analysis, only Si exhibited statistically significant differences, while the significance of Pa was no longer evident.

Table 3. Results of clinical scales in depression, anxiety, and impulsiveness

Scale	Stimulants (N=18)	Cannabis (N=60)	Total (N=78)	U or t	p (t-test)	F value				
						Covariate				Model
						Age	Sex†	Marital status†	Psychiatry history	
HDRS	6.2±6.4	2.7±2.7	3.5±4.1	383	0.06	3.89	3.78	0.14	1.57	6.61*
K-BDI-II	18.4±13.6	9.6±9.4	11.7±11.1	316	0.01	1.26	6.09*	1.98	4.5*	4.26*
HARS	6.9±8.2	2.7±3.3	3.7±5.2	399	0.09	1.77	1.46	0.02	1.67	4.93*
K-BAI	9.7±11.0	4.4±8.2	5.6±9.1	335	0.01	1.24	0.12	0.43	9.4*	2.29
K-BIS-11-R										
Total	67.7±19.9	60.6±11.8	62.3±14.2	1.44	0.17	0.74	2.94	1.95	0.44	1.62
Attentional impulsiveness	16.5±5.0	15.6±4.5	15.8±4.6	0.70	0.49	0.24	1.03	2.64	5.7*	0.02
Motor impulsiveness	23.1±8.5	20.0±4.4	20.7±5.7	1.50	0.15	0.32	5.38*	3.13	0.38	1.38
Non-planning impulsiveness	28.1±7.3	25.7±4.5	26.2±5.3	1.32	0.20	0.93	0.42	1.08	0.31	2.60

Values are presented as mean±standard deviation. *p<0.05; †sex (female); marital status (unmarried). HDRS, Hamilton Depression Rating Scale; K-BDI-II, Korean-Beck Depression Inventory-II; HARS, Hamilton Anxiety Rating Scale; K-BAI, Korean-Beck Anxiety Inventory; K-BIS-11-R, Korean version of Barratt Impulsiveness Scale-11-Revised

Both groups showed relatively decreased Si and there was a significant difference between groups (F value 5.53, p<0.05), with the mean score being 48.1±13.4 for stimulant users and 41.6±10.4 for cannabis users.

DISCUSSION

This study employed a cross-sectional design utilizing the medical records of subjects who underwent screening tests related to the use of six types of drugs. The objective of this study was to identify individual clinical characteristics among individuals who use substances. In particular, we compared the differences in clinical characteristics between stimulant and cannabis users. The present results showed that the average age of cannabis users was lower than that of stimulant users. In addition, significantly more females used stimulants and more cannabis users were unmarried. Stimulant users had a significantly higher craving level at the time of the test and more often a psychiatric history. In addition, stimulant users scored significantly higher on clinical scales of depression and anxiety. Among the MMPI-2 clinical scale scores, both groups showed relatively decreased Si and there was a significant difference between groups.

The finding indicating a younger age among cannabis users compared to stimulant users can be linked to the gateway hypothesis, which originated in the United States.[19] In particular, all of 11 mixed users in this study used cannabis concurrently, indicating that cannabis exposed at a younger age can act as a gateway drug, increasing the risk of mixed use, which indicates the need for appropriate intervention. Given the limited sample size of mixed users, special attention should be given to the implications for young individuals who use cannabis. It was confirmed that stimulant users had more psychiatric history. Despite the difficulty of knowing whether the psychiatric history is a direct effect of the substance used or a problem prior to substance use, previous studies have shown that a psychiatric history is a risk factor for substance use disorder.[20] Also at the time of the interview, more stimulant users than cannabis users reported cravings, although there was no statistical significance for duration of substance use. Thus, stimulant users have a high possibility of exacerbation to a substance use disorder than cannabis users. Social support systems affect the degree of substance use, in particular, there is a relationship between poor social support systems and substance misuse.[21] In this study, we could not observe any effect of the support system on the type of substance used.

One of the objects of this study was to examine whether there were differences in intelligence levels between the two groups. However, no significant differences were found between the two groups, and the intelligence levels were within the average range. Based on previous research indicating that long-term or dose-dependent use of cannabis or stimulants impairs executive function,[22] we hypothesized that cannabis or stimulant users might have lower scores on the cognitive proficiency index. But this was not observed in our study. Previous research has demonstrated that cognitive function can be restored following the cessation of drug use.[23] In our study, the participants were referred to the prosecution, and

Table 4. MMPI-2 results in users of stimulants and cannabis

MMPI-2	Stimulants (N=18)	Cannabis (N=60)	p (t-test)	F value				
				Covariate				Model
				Age	Sex†	Marital status†	Psychiatry history	
Validity scales								
VRIN	44.9±8.4	43.9±8.1	0.65	0.39	7.74*	0.02	4.45*	0.03
TRIN	56.7±5.3	56.0±4.3	0.59	3.91	0.13	1.56	0.19	0.01
F	47.2±10.6	44.4±9.0	0.26	0.96	0.12	1.45	5.19*	1.44
F(B)	49.3±13.1	44.2±8.4	0.16	1.86	0.11	0.72	3.87	2.96
F(P)	45.3±7.0	44.0±7.2	0.33	2.41	2.13	0.24	0.66	1.54
FBS	17.2±6.6	15.0±4.0	0.20	0.05	1.65	0.00	0.73	0.27
L	48.2±10.6	50.3±10.0	0.44	0.06	0.24	2.34	8.19*	0.17
K	51.3±10.6	55.1±12.0	0.22	0.05	0.00	1.88	6.97*	0.65
S	52.0±11.2	55.7±13.1	0.28	0.06	1.04	1.50	7.44*	0.03
Clinical scales								
Hs	48.5±10.4	47.8±7.5	0.74	0.03	2.26	0.01	1.28	0.68
D	51.3±11.4	47.0±9.0	0.09	0.00	4.86*	2.32	0.34	0.68
Hy	51.1±9.0	49.4±9.6	0.51	1.30	0.79	0.97	2.09	0.14
Pd	55.5±12.5	51.7±11.0	0.22	1.04	0.78	1.43	0.92	0.21
Mf	48.0±10.2	49.0±8.0	0.70	0.04	5.90*	0.00	0.12	0.70
Pa	56.4±12.7	49.1±10.6	0.02	0.21	0.65	1.81	3.35	1.83
Pt	50.6±12.7	47.1±9.6	0.22	0.88	1.35	1.35	4.96*	0.50
Sc	48.0±11.4	45.6±9.8	0.38	0.86	0.18	1.70	8.15*	0.36
Ma	46.8±8.2	48.7±10.4	0.41	0.25	0.14	0.36	12.24*	1.69
Si	48.1±13.4	41.6±10.4	0.04	3.57	0.29	2.20	2.97	5.53*

Values are presented as mean±standard deviation. *p<0.05; †sex (female); marital status (unmarried). MMPI-2, Minnesota Multiphasic Personality Inventory-II; VRIN, variable response inconsistency; TRIN, true response inconsistency; F, infrequency; F(B), back F; F(P), infrequency-psychopathology; FBS, symptom validity; L, lie; K, correction; S, superlative self-presentation; Hs, hypochondriasis; D, depression; Hy, Hysteria; Pd, Psychopathic deviate; Mf, masculinity/femininity; Pa, paranoia; Pt, psychasthenia; Sc, schizophrenia; Ma, hypomania; Si, social introversion

a significant proportion of them had a duration of drug use of less than one year. It is plausible to consider that these individuals abstained from drug use during the testing period, which may have influenced the observed findings. However, it is important to consider the research findings that suggest no relationship between substance use and IQ when interpreting these results.[24]

Stimulant use has been associated with psychiatric symptoms such as depression, anxiety,[25] and in cannabis users, there have been conflicting findings about the effects of cannabis on depression and anxiety,[26,27] which is in line with our results. In our study, stimulant users exhibited more distress related to depression and anxiety compared to cannabis users. And no clinically significant depression and anxiety were observed among cannabis users. This finding remains after controlling for the psychiatric history. However, it notes that only K-BDI-II reached clinically significant score. It is plausible that the psychiatric history of stimulant users may have influenced the K-BDI-II scores. Although the frequency of use could not be perfectly reliable, and establishing a causal relationship was not feasible, it appeared that stimulant users experienced clinically significant depressive symptoms and higher subjective levels of depression compared to cannabis users.

MMPI-2 results, there was no significant increase or decrease in the validity scale of each of the two groups. And there was no statistically significant difference between groups. Although there is a limitation in that the T score of the group average was used, the profile based on the average score seemed to have appropriate validity. In the clinical scales, no clinically significant level of score increase or decrease was confirmed in both groups. In the supplementary scales, especially the addiction potential scale and addiction acknowledgment scale, which are associated with addiction, no statistically significant difference was observed between stimulant users and canna-

bis users in these measures (Supplementary Table 2 in the online-only Data Supplement). However, it is important to interpret the profile in the context of the overall findings, rather than focusing solely on individual scores. Previous study has shown that stimulant users exhibit elevated Pd scores, indicating a tendency towards antisocial behavior. Consistent results were also obtained in this study.[28] In particular, a distinct profile characterized by the 46/64 code type was observed in stimulant users. This code type suggests high levels of hostility and deep distrust. Individuals with this profile tend to be sensitive to criticism and are more likely to engage in superficial relationships with others. Whether this is a direct effect of the substance used or a personality trait requires additional research but it can explain the higher scores of stimulant users in K-BDI-II. There was a significant difference in the Si (0) scores between groups, with lower scores for cannabis users. Both groups exhibited low average Si scores, indicating a dependency on interpersonal relationships and a tendency towards superficial connections. However, unlike stimulant users, it was challenging to identify a specific profile in cannabis users.

This study has several limitations. First, as a retrospective study, the evaluation criteria might have differed depending on the clinician present at the time of the interview. Second, there is a different number of stimulant and cannabis users. Particularly, the small stimulant use group can result in bias and low statistical power. Third, the frequency of substance use was not evaluated. Considering the psychiatric effects of frequency of substance use, future research should fully consider the duration and frequency of substance use. Fourth, there was no detailed classification of psychiatric problems at the time of interview. Considering the effect of mood or anxiety disorders on psychological tests, the underlying psychopathology at the time of interview might have influenced the outcome. Fifth, we did not use a detailed scale for the support system. Differences may exist in the actual environment because the classification was based on the subjective judgment of the subject during the clinical interview. Further research considering more objective aspects is needed in the future.

The strengths of this study are its location at a hospital where drug screening test was available and that the subjects were evaluated as requested by the prosecution, so although there was a geographical limitation in Seoul, bias in patient selection could be decreased.

In conclusion, we compared the demographic characteristics, clinical symptoms including mood, anxiety, and impulsivity, and personality characteristics between cannabis and stimulant users in South Korea. Cannabis users were younger and more were unmarried people. In contrast, stimulant users had higher levels of psychiatric history and substance craving, suggesting a higher risk of disorder exacerbation, and higher scores on clinical scales of depression and anxiety. In the MMPI-2, both groups showed low levels of Si, and stimulant users had 46/64 code type profile, indicating that they had high hostility and deep distrust and would more likely experience difficulties in social relationships. The present data might inform follow-up studies and policy studies on substance use disorders, particularly involving cannabis and stimulants.

Supplementary Materials

The online-only Data Supplement is available with this article at https://doi.org/10.30773/pi.2023.0029.

Availability of Data and Material

The datasets generated or analyzed during the study are not publicly available due to ethical restrictions for protecting participant's confidentiality but are available from the corresponding author on reasonable request with the approval of the Institutional Review Board of National Center for Mental Health.

Conflicts of Interest

The authors have no potential conflicts of interest to disclose.

Author Contributions

Conceptualization: Yangsik Kim. Investigation: Jiheon Jang. Writing—original draft: Jiheon Jang. Writing—review & editing: Yangsik Kim.

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Supplementary Table 1. Demographic and clinical characteristics of subjects

Characteristic	Total (N=104)	Stimulant (N=18)	Cannabis (N=60)
Age (yr)	30.9±8.3	35.8±11.6	29.5±7.2
Sex			
Female	26 (25.0)	9 (50.0)	5 (8.3)
Male	78 (75.0)	9 (50.0)	55 (91.7)
Marital status			
Unmarried	81 (77.9)	12 (66.7)	48 (80.0)
Married	13 (12.5)	6 (33.3)	4 (6.7)
Unknown*	10 (9.6)	-	8 (13.3)
Education			
Primary school	2 (1.9)	0 (0.0)	1 (1.7)
Middle school	3 (2.9)	0 (0.0)	2 (3.3)
High school	38 (36.5)	6 (33.3)	21 (35.0)
>College	54 (51.9)	11 (61.1)	32 (53.3)
Unknown*	7 (6.8)	1 (5.6)	4 (6.7)
Job			
Unemployed	24 (23.1)	4 (22.2)	11 (18.3)
Employed	57 (54.8)	13 (72.2)	30 (50.0)
Student	17 (16.3)	1 (5.6)	15 (25.0)
Unknown*	6 (5.8)	-	4 (6.7)
Religion			
No	65 (62.5)	11 (61.1)	37 (61.7)
Yes	30 (28.8)	7 (38.9)	17 (28.3)
Unknown*	9 (8.7)	-	6 (10.0)
Purchasing route			
Directly from someone	56 (53.8)	12 (66.7)	27 (45.0)
Internet	43 (41.3)	6 (33.3)	28 (46.7)
Unknown*	5 (4.8)	-	5 (8.3)
Alcohol, yes	79 (75.9)	12 (66.7)	47 (78.3)
Smoking, yes	83 (79.8)	13 (72.2)	53 (88.3)
Duration			
<12 mo	84 (80.8)	12 (66.7)	51 (85.0)
≤12 mo	20 (19.2)	6 (33.3)	9 (15.0)
Craving			
No	93 (89.4)	12 (66.7)	56 (93.3)
Yes	11 (10.6)	6 (33.3)	4 (6.7)
Stressor before using			
No	37 (35.6)	4 (22.2)	26 (43.3)
Yes	67 (64.4)	14 (77.8)	34 (56.7)
Past psychiatric history			
No	59 (56.7)	7 (38.9)	39 (65.0)
Yes	45 (43.3)	11 (61.1)	21 (35.0)
Schizophrenia spectrum and other psychotic disorders	2 (4.4)	2 (18.2)	0 (0.0)
Bipolar and depressive disorders	20 (44.4)	3 (27.3)	7 (33.3)
Anxiety disorders	2 (4.4)	0 (0.0)	1 (4.8)
Neurodevelopmental disorders	6 (13.3)	0 (0.0)	5 (23.8)
Others	1 (2.2)	0 (0.0)	1 (4.8)
Comorbid	11 (24.4)	4 (36.4)	6 (28.6)
Unknown	3 (6.7)	2 (18.2)	1 (4.8)
Current psychiatric problems			
No	48 (46.2)	7 (38.9)	30 (50.0)
Yes	56 (53.8)	11 (61.1)	30 (50.0)
Social support status			
Non-emotional conversation	43 (41.3)	7 (38.9)	25 (41.7)
Emotional conversation	50 (48.1)	8 (44.4)	31 (51.7)
Completely isolated	6 (5.8)	2 (11.1)	2 (3.3)
Unknown*	5 (4.8)	1 (5.6)	2 (3.3)

Values are presented as mean±standard deviation or number (%). *included the number of uninformed subjects for each characteristic.

Supplementary Table 2. Differences of MMPI-2 supplementary scales between stimulants and cannabis users

MMPI-2 supplementary scales	Stimulants (N=18)	Cannabis (N=60)	F*
A	49.0±14.7	43.9±11.9	0.84
R	51.2±9.6	49.7±8.9	0.23
Es	51.8±12.1	55.8±10.6	0.07
Do	49.2±11.6	52.0±9.5	0.53
Re	48.3±14.2	51.0±11.5	0.03
Mt	50.8±16.4	44.0±13.7	1.25
PK	53.3±16.7	45.3±13.8	1.31
MDS	51.1±14.8	45.7±11.2	0.79
Ho	46.8±8.3	45.8±12.2	0.05
O-H	55.6±6.6	51.4±12.0	1.17
MAC-R	55.3±10.9	54.4±10.3	0.17
AAS	51.4±14.1	49.3±11.7	0.83
APS	55.2±13.5	53.2±9.9	0.12
GM	50.7±14.6	59.3±9.6	0.83
GF	51.9±9.6	48.6±8.9	0.32

Values are presented as mean±standard deviation. *covariates: age, sex, marital status, and past psychiatry history. A, Anxiety; R, Repression; Es, Ego-Strength; Do, Dominance; Re, Social Responsibility; Mt, College Maladjustment; PK, Post-traumatic Stress disorder; MDS, Marital Distress Scale; Ho, Hostility; O-H, Overcontrolled Hostility; MAC-R, MacAndrew Alcoholism Scale; AAS, Addiction Acknowledgment Scale; APS, Addiction Potential Scale; GM, Gender role-Masculine; GF, Gender role-Feminine