



Relationship between substance use and personality traits: pilot study through *cluster* analysis of MMPI profiles of adolescent and young adult patients¹ (2020)

Sandra Berivi, Antonio Grassi, Gaia La Spina, Marco Lauriola, Daniela Pozzi, Carla Russello

Key Words: adolescence – young adult – MMPI– personality – substances use disorder – addiction – cannabinoids – THC

Citation: Berivi S., Grassi A., La Spina G.,Lauriola M., Pozzi D., Russello C. (2020).

Relationship between substance use and personality traits: pilot study through cluster analysis of MMPI profiles of adolescent and young adult patients².

doi.medra.org: 10.48237/LIJ_038

lijedizioniretlis03072018

Copyright:©LIRPA-International Journal

Funding: None

Competing interests: None

Corresponding author

Department of Primary Care ASL RM3 Italy Telephone: +393204189441

berivisandra@libero.it

Abstract: Recent data provided by the European Monitoring Center for Drugs and Drug Addiction and the ESPAD@Italia study indicated that the consumption of illegal substances in the young population is constantly increasing. According to scientific evidence, it is well known that early substance use tends to interfere with adolescent brain development and maturation processes. It was also proven that psychopathological personality traits are highly correlated to concomitant psychiatric disorders in subjects who abuse psychotropic substances. Within this framework, our pilot research was done, analyzing MMPI-2 and MMPI-A profiles in patients from a specific outpatient clinic of the Sistema Sanitario Nazionale (SSN; in English: National Health System) for adolescents and young adults from 13 to 22 years of age. Our study aims to investigate the personality traits and their relationship with substance use and the diagnosis of substance use disorder. Using cluster analysis on our sample, we were able to cluster the subjects based on their shared personality traits, separating them into three different groups. Data analysis was performed using the IBM SPSS 25 statistical software. The results showed that substance use and psychopathological traits the impairment of personality function. The more severe the

¹ Patients referred to a specific outpatient clinic of the Sistema Sanitario Nazionale (SSN; in English: National Health System) for adolescents and young adults from 13 to 22 years of age.

² Berivi Sandra., Grassi Antonio., La Spina Gaia., Lauriola Marco., Pozzi Daniela., Russello Carla. Sapienza University of Rome, Faculty of Psychology



substance use, the more severe the psychopathological symptoms. Unlike theories that support the post-morbid personality function, the results obtained by our study would support the presence of a premorbid one, in which the substance is introduced within a pre-existing psychopathological picture, consequently leading to substance addiction. In light of these results, we reiterate that for a population at such high risk, interventions must be done early to ensure a normal personality development, promote a healthier lifestyle and avoid physical and mental damages in the future.

Introduction

In recent years, despite the reported stable consumption of narcotic substances, new sources of information have confirmed that this phenomenon is becoming more widespread and worrisome, especially in children and adolescents. Giovanni Serpelloni (2011) agreed to this observation, adding that substance use nowadays has also acquired very drastically different features compared to the past. This change, according to the author, has been brought about by several factors, like the socially and culturally different drug markets across the world, the emergence of new drugs, the diverse methods of substance consumption, as well as multiple drug use. The latest data from the ESPAD[®]Italia (European School Survey Project on Alcohol and other Drugs[®]Italia) study, presented in the 2019 Parliament annual report (Data from 2018) on drug addiction in Italy, showed that 33.6% of students (about 870,000 young adults) have used at least one illegal psychoactive substance during their life ($M = 37.3\%$; $F = 29.6\%$), while 25.6% ($M = 29.2\%$; $F = 21.8\%$) reported having used it in the past year (660,000 students). Among these subjects, the majority, corresponding to 89.4%, took only one illegal substance. The remaining 10.6%, on the other hand, can be defined as “multi-users”, having consumed two (5.8%) or at least three substances (4.8%). Additionally, 400,000 (equal to 15.5%) reported having used illegal psychoactive substances during the month when the study was conducted ($M = 18.5\%$; $F = 12.3\%$). More than 97,000 students (3.8%) used substances frequently ($M = 5.8\%$; $F = 1.7\%$): they reported having used cannabis 20 or more times and/or 10 or more times with other illegal substances (cocaine, stimulants, hallucinogens and heroin) in the past 30 days. About 30,000 students (1.2% of the studied population) reported having taken one or more substances without knowing what they were. About 64.7% of these unaware students repeated the experience for at most five times while around 25% repeated for 20 or more times. Around 78.1% of those who used substances without knowing what they were, was also unaware of their negative effects. Cannabis remains the most widely used illegal substance. The New Psychoactive Substances (NPS) have recently become the second most commonly used substance, followed by synthetic cannabinoids, cocaine, stimulants, hallucinogens and heroin. The use of psychoactive drugs is proven to be more prevalent within males. The gender ratio is around 1.5 for almost all substances, except for cocaine and hallucinogens, for which the prevalence in males is double of that in females. The European Monitoring Center for Drugs and Drug Addiction (EMCDDA 2019) also estimated that 19.1 million (16%) of young adults (15-34 years old) used drugs in 2019. Within these subjects, males (20%) are as twice as females (11%). Cannabis was the most widely used illicit substance in all age groups. In individuals from 15-45 years old, cannabis use was also observed to be most common, which accounts for 18% (10.1 million) having consumed it in the past year and 9.3% (5.2 million) in the past month.



Despite evidence of growing substance use, only a few countries have sufficient survey data to statistically analyze the long-term trends in cannabis use among young adults (15-34 years old) in the last year. Within these countries, the decreasing trend previously observed in Spain and the United Kingdom (including England and Wales) has stabilized according to recent data, though the United Kingdom has experienced an increase of cannabis consumption to 12.3% in the last year. Also since 2000, an upward trend in the prevalence of cannabis use among young adults has been observed in some countries. Ireland and Finland stand out, where the prevalence was demonstrated to be close to the European Union (EU) average of 14.4%. So do Bulgaria and Romania, albeit having lower prevalence. In France, recent surveys have shown that the prevalence has been stable at a high 22%. In Denmark, a 2017 survey recorded a decrease to 15.4% from an estimate of 17.6% in 2013.

If this increase in drug use amongst young people is indeed true, it is crucial to then look at the addiction onset, in order to detect and intervene in time. In fact, in the youth population, the first experimental substance use is becoming even earlier. Young users are also becoming increasingly nonchalant towards the risks and the consequences of drug use, hence more likely to underestimate them. Furthermore, early substance use interferes strongly with the adolescent brain development and maturation processes. This effect is even more detrimental for this age group in which numerous neuropsychic functions are being consolidated (mechanisms for learning, memorization, motivation, coordination and gratification) as well as various important aspects of personality are being developed and refined (self-esteem, self-efficacy, problem analysis, decision making, etc.) (Serpelloni 2011). Addiction is therefore a dynamic process, involving not only the activity of the drugs on the brain, but also the synergy of various genetic, biological, environmental, psychological, cultural and economic determinants. Addiction can also develop on a base of biological fragility that is heavily influenced by genetic and temperamental traits. The genetic component has been proven to play a role in addiction by studies done on twins separated from parents since birth. These studies confirmed that children of parents who are drug abusers are likely to become abusers themselves, ranging from 39% for hallucinogen to 72% for cocaine users (Goldmann et al. 2005). To measure the role that the temperamental component plays on the development of addiction, it is indeed crucial to study the correlation between psychopathology and substance use. In fact, the investigation of the main personality traits associated with the tendency towards drug addiction and behavioral addiction has been carried out extensively within the research community (Morrow & Flagel 2016). Numerous scientific evidence supports a high correlation between psychopathological personality traits and concomitant psychiatric disorders in subjects who abuse psychotropic substances in general (Shedler & Block 1990, Greene et al. 1993, Allen et al. 1998, McGue et al. 1999, Gerra & Frati 2000, Liraud & Verdoux 2000, Gerra et al. 2000, Gerra et al. 2001, Biondi & Dimauro 2001, Feske et al. 2006, Mercenaro & Pirastu 2007, De Persis et al. 2009, Grant et al. 2009, Martinotti et al. 2010, Di Blasi et al. 2010, Swendsen et al. 2010, Lin et al. 2011, Maremmanni et al. 2012).

Within this framework, our pilot study was done, using the analysis of MMPI-2 and MMPI-A profiles in patients from a specific outpatient clinic of the Sistema Sanitario Nazionale (SSN; in English: National Health System) for adolescents and young adults from 13 to 22 years of age. We aspire to investigate the potential correlation between substance use and any psychopathological personality traits.



Methodology and Instruments

The specific outpatient clinic provides a standardized method for both the assessment and treatment for the subjects. The service guarantees a prompt reception of requests from every subject and their family. Access to the service is direct, without the need to book an appointment in advance (through CUP; in English: Appointment Booking Center), so as to protect patient privacy. The subjects follow an outpatient path, consisting of intake, reception, assessment, multidisciplinary assessment, personalized therapeutic plan, multidisciplinary treatment, conclusion, monitoring and further verification. The appointment schedule for patient assessment (including psychological evaluation, psychiatric evaluation, medical check-ups and urine analysis) is agreed by the patient. These are done in order to provide a clearly outlined course of action that would be carried out within the outpatient clinic.

To assess whether a subject has a diagnosis of substance use disorder or not, with reference with the Diagnostic and Statistical Manual of mental disorders – 5 (DSM-5) criteria, a protocol consisting of various diagnostic methods was designed. These methods include: a medical check-up, two psychological interviews, a psychiatric interview, the administration of a psychodiagnostic test panel³ and urine analysis; all done using on-site methods with “Legal Value of First Level”, to avoid result falsification. The theoretical basis of this protocol is the proven coexistence of addiction with various psychiatric disorders. The assessment for each individual subject is done by both a psychologist and a psychiatrist, who make their own diagnosis which is then compared and agreed upon definitively, during team meeting. The diagnosis is then documented on a special format that also tracks the course of action carried out during the assessment. In this way, it is possible to maintain the accuracy of the final diagnosis, since it’s made from the agreement of both the psychologist and the psychiatrist. The following tests were administered to our sample: Minnesota Multiphasic Personality Inventory-2 (Butcher & Williams 2000) and Minnesota Multiphasic Personality Inventory - A (Butcher et al. 1992). To limit the scope of our study, only a few scales of the two versions of MMPI (MMPI-2 and MMPI-A) were taken into consideration. Statistical analysis was conducted only on the scales common to both versions or the 3 validity scales (Lie - L, Frequency - F and Correction - K), the 9 clinical scales (Hypochondria - Hs; Depression - D; Hysteria - Hy ; Psychopathic deviate - Pd; Paranoia - Pa; Psychasthenia - Pt; Schizophrenia - Sc; Hypomania - Ma; Social Introversion - Si.), the related subscales of Harris and Lingoes, and finally the 11 content scales (Anxiety - ANX; Obsessiveness - OBS; Depression - DEP; Health concerns - HEA; Bizarre Mentation - BIZ; Anger - ANG; Cynicism - CYN; Negative self-esteem - LSE; Social discomfort - SOD; Family problems - FAM; Negative treatment indicators - TRT). The two MMPI versions have standard T scores ($M = 50$ $Ds = 10$). Scores $T > 65$ (corresponding to the 92nd percentile uniformly for the 8 clinical scales, except for scales 5 and 0 and the content scales) in all scales and scores $T < 40$ in some scales (Pa, Es, Re, GM, GF) indicate the presence of clinical disorders, while values between 60 and 65 reveal the presence of problematic traits (Butcher & Williams 2000).

³ The diagnostic tools administered are: MAC (Motivazione al cambiamento. Rollnick et al. 1992), CAST (Cannabis Abuse Screening Test. Legleye et al. 2007), STAXI-2 (State-Trait Anger Expression Inventory – 2. Spielberger 1979), BDHI (Buss Durkee Hostility Inventory. Buss & Durkee 1957), SCID II (Structured Clinical Interview for DSM-IV Axis II Disorders. First et al. 1994), MMPI-2 (Minnesota Multiphasic Personality Inventory-2. Butcher & Williams 2000) e MMPI – A (Minnesota Multiphasic Personality Inventory-Adolescent. Butcher et al. 1992), RTSHIA (Risk-Taking and Self-Harm Inventory for Adolescents. Vrouva et al. 2010).

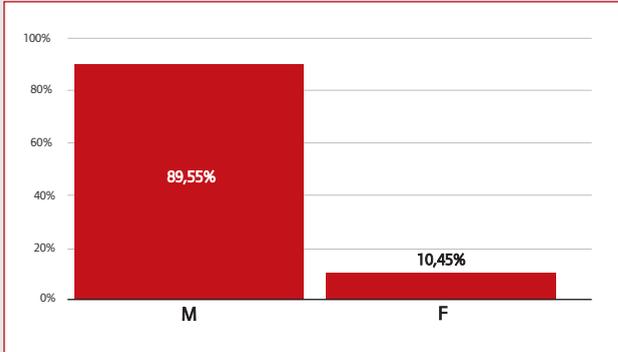


Figure 1 - Gender of the subjects

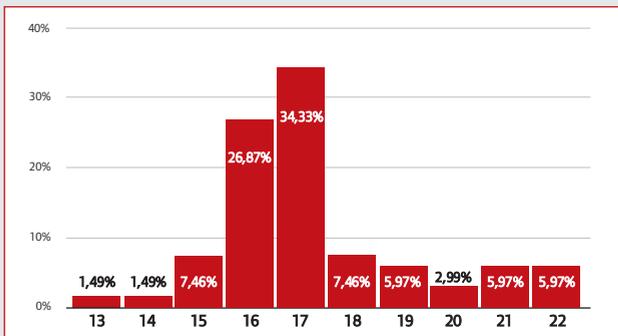


Figure 2 - Frequency analysis of the age at access to the service

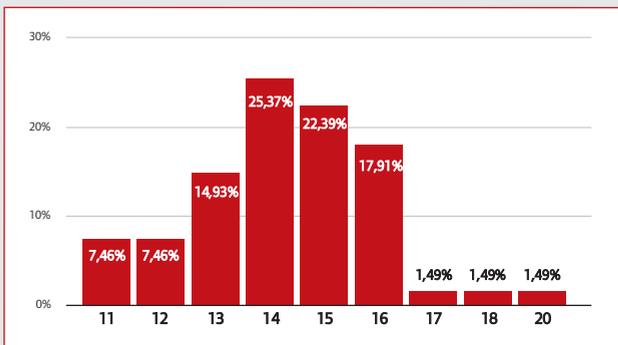


Figure 3 - Frequency analysis of the age at the first substance use.

The study was conducted using data from the specific outpatient clinic. Our target subjects consist of teenagers and young adults, who showed initial signs of substance addiction and behavioral addiction, such as gambling disorder, Internet addiction and online gaming addiction, compulsive shopping, etc. A total of 67 subjects from 13 to 22 years of age were enrolled in this study for the period from the “Delibera di Istituzione” until December 2018, lasting for 18 months. We excluded subjects that belong to the counselling service ($N = 13$) (except for those taken over by our service after counselling), those with incomplete data ($N = 14$) and drop-outs ($N = 7$). 89.6% ($N = 60$) of the subjects are males, while 10.4% ($N = 7$) are females⁴ (see Figure 1).

For our sample, the age at access to the service was on average 17 years ($M = 17.30$), ranging from a minimum of 13 years to a maximum of 22 years (see Figure 2).

The age at which the first substance use occurred was on average 14 years ($M = 14.25$), ranging from a minimum of 11 years to a maximum of 20 years (see Figure 3).

It has been observed that on average three years elapsed from the first substance intake to entering the service.

⁴ For further information, please peruse Berivi S. et al (2019).



Regarding the education level of the subjects, 3.0% ($N = 2$) had elementary school qualification, 89.6% ($N = 60$) had secondary school qualification, and 7.5% ($N = 5$) had a high school diploma (see Figure 4).

The type of cohabitation of the subjects was analyzed, revealing that 56.06% ($N = 37$) lived with the entire family consisting of a mother and a father, 27.27% ($N = 18$) lived only with the mother, 10.61% ($N = 7$) only with the father and finally 6.06% ($N = 4$) follow other cohabitation types, for example with a grandfather (see Figure 5).

Patients differed in how they first came to our service: 28.4% ($N = 19$) accessed the service voluntarily (self-sending), one person was sent by Consulente Tecnico di Ufficio (CTU; in English: court-appointed expert), 25.4% ($N = 17$) were sent by the Centro per la Giustizia Minorile (CGM; in English: Center for Juvenile Justice), 3.0% ($N = 2$) from counselling service, 38.8% ($N = 26$) from the Ufficio Servizio Sociale per i Minorenni (USSM; in English: Social Service Office for Minors), one patient came from the Dipartimento di Salute Mentale (DSM; in English: Mental Health Department) and one from the service of Childhood Mental Health Protection and Rehabilitation (TSMREE) (see Figure 6).

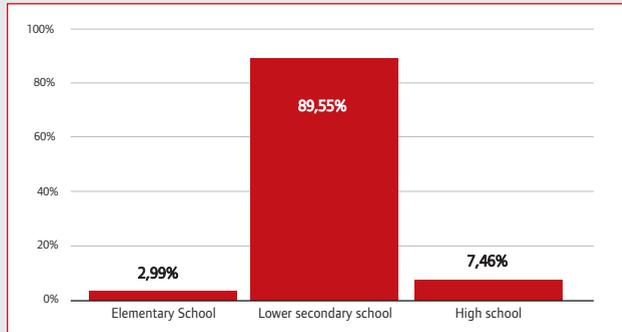


Figure 4 - Level of education of the sample

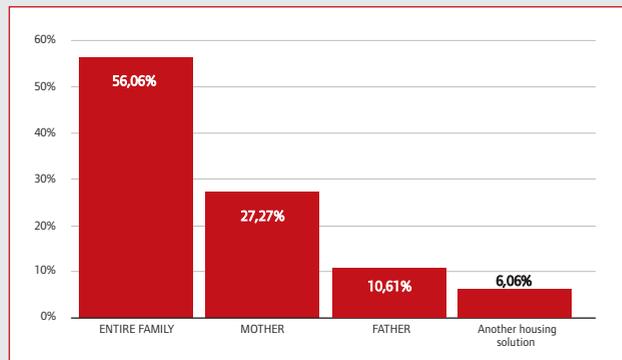


Figure 5 - Type of cohabitation

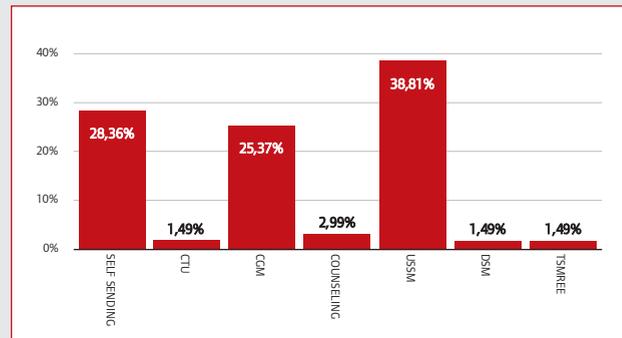


Figure 6 - Type of access to the service



ADDICTION

	Frequency	Percentage
Cocaine	1	1,5
Gambling Disorder, Cocaine	1	1,5
Internet	2	3,0
Gambling Disorder	1	1,5
OPI, THC, Ketamin	1	1,5
THC4	2	62,7
THC, MDMA, Cocaine	1	1,5
THC, Cocaine	13	19,4
THC, Cocaine, Heroin	2	3,0
THC, Ketamin, Cocaine	1	1,5
THC, Ketamin, MDMA Cocaine	1	1,5
THC, Crack	1	1,5
Total	67	100,0

Table 1 - Frequency analysis by type of addiction

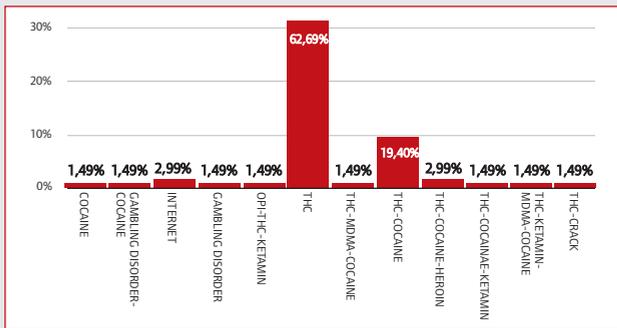


Figure 7 - Frequency analysis of presence of addiction diagnosis

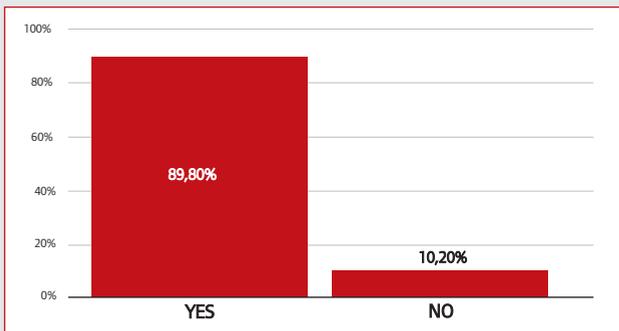


Figure 8 - Percentage of tobacco consumption

Regarding the substance type, 61.2% (N = 41) had a -9-Tetrahydrocannabinol (THC) addiction, 32.8% (N = 22) of patients were polyabusers, 4.5% (N = 3) instead had behavioral addiction (internet addiction or gaming/gambling addiction). Only one subject had cocaine addiction (see Figure 7 and Table 1 for details).

Patients were also asked if they smoked tobacco at that time and it was found that 89.80% (N = 44) of the subjects answered yes, while 10.20% (N = 5) answered no (see Figure 8).

An analysis was also carried out within the sample for any diagnosis of substance use and diagnosis of psychiatric disorders (A paragraph with details on the methodology



used to make the diagnoses can be found below). 20.9% (N = 14) of the cases had a mild substance use disorder, 31.3% (N = 21) moderate, 35.8% (N = 24) severe. 11.9% (N = 8) did not have any disorder associated with substance use (This group also includes a subject who used substances in the absence of any problematic substance use. See Figure 9).

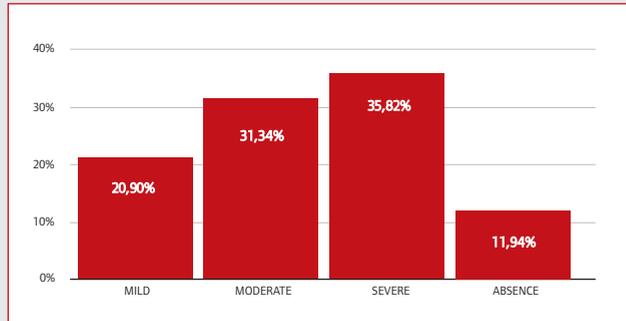


Figure 9 - Percentage of substance use disorder

Regarding the psychiatric diagnosis, 14.9% (N = 10) of the subjects had personality disorder, 3.0% (N = 2) of the subjects had bipolar disorder, 4.5% (N = 3) of the subjects had depressive disorder, 11.9% (N = 8) of the subjects had impulse control disorder, 25.4% (N = 17) of the subjects had attention deficit disorder and disruptive behavior disorder. In 40.3% (N = 27) of the cases, the subjects did not show any psychiatric disorder (see Figure 10).

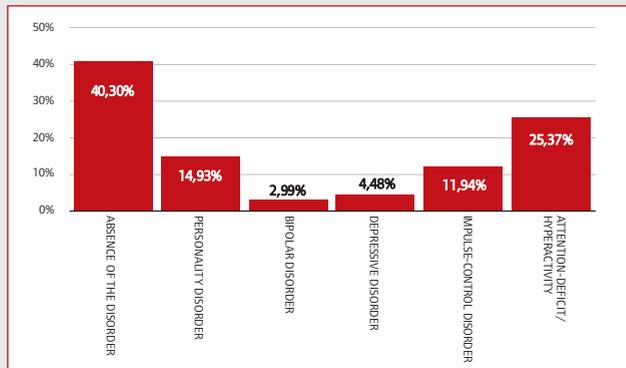


Figure 10 - Percentage of psychiatric disorders

Statistical Analysis

The T points on the MMPI 2 and A scales were considered. In a hierarchy cluster analysis, the score on the common scales predict in which cluster a subject is placed, making sure that only subjects with similar personality features are grouped into the same cluster. The algorithm of Average-Linkage was used to ascertain reliability of the cluster selection. Each group was hence homogenous and well differentiated from other groups. Furthermore, to interpret the clusters, a one-way ANOVA analysis was performed to observe whether the three groups were significantly different, using the scales examined. This makes it easier to interpret of the profile of each cluster, using the clinical scales, the related subscales and the MMPI content scales. Finally, the profile of the three clusters were then compared to study how subjects are distributed based on gender, type of addiction, degree of substance use addiction and type of psychiatric addiction.

Data analyses was performed using the IBM SPSS 25 statistical software.

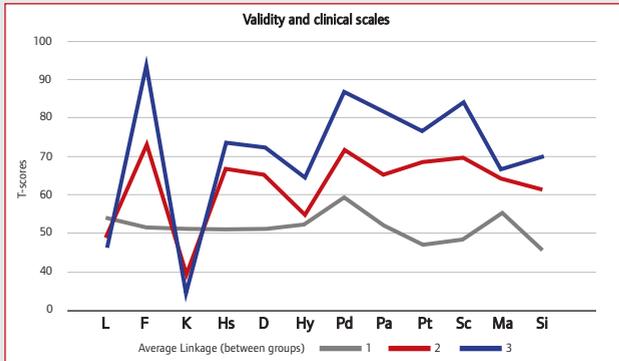


Figure 11 - Graphic profile of the three clusters based on validity and clinical scales

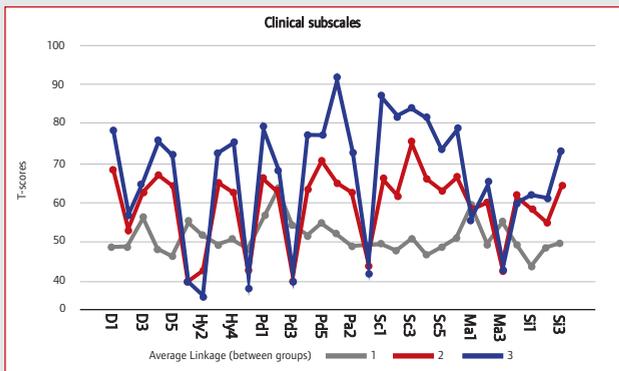


Figure 12 - Graphic profile of the three clusters based on clinical subscales

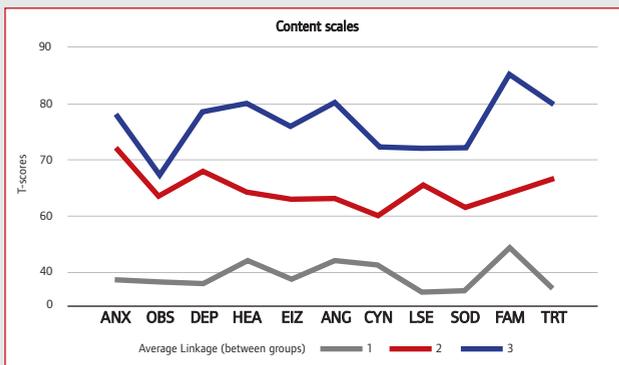


Figure 13 - Graphic profile of the three clusters based on content scales

Results

To determine an appropriate number of clusters, a hierarchy analysis was carried out, as mentioned previously, and the scree plot was examined. We came up accordingly with three clusters: two larger clusters of 50 and 12 cases respectively and a third cluster comprising a smaller number of 5 cases. To arrive at an accurate interpretation of the clusters, the patient profiles of each cluster were compared using the MMPI scales. The following figures show the profiles of the clusters based on the 3 validity scales, the 9 clinical scales, the related subscales and the 11 content scales (see Figure 11, 12, 13).

For all three clusters, an ANOVA analysis was conducted using the scores of the selected MMPI scales. The comparison of the average values (see Table 2) shows that in all three clusters, we observed significant differences in almost all scales, except for the L scale and the subscales D2, Pd2, Ma1 (see Table 2).



	CLUSTER 1 M (DS)	CLUSTER 2 M (DS)	CLUSTER 3 M (DS)	F	Sig.
L	53.82 (11.85)	49.08 (7.86)	46.20 (5.72)	1.770	.179
F	51.54 (9.04)	73.00 (8.91)	<i>93.40</i> (10.95)	65.886	.000
K	51.20 (8.81)	39.58 (6.22)	35.00 (4.36)	16.410	.000
Hs	51.02 (7.84)	<i>66.67</i> (7.94)	<i>73.80</i> (6.94)	34.299	.000
D	51.12 (7.40)	<i>65.17</i> (8.35)	<i>72.20</i> (5.68)	30.996	.000
Hy	52.30 (9.80)	54.67 (10.50)	<i>64.40</i> (8.65)	3.508	.036
Pd	59.26 (12.84)	<i>71.58</i> (10.00)	86.80 (4.82)	15.171	.000
Pa	51.96 (9.01)	<i>65.50</i> (7.57)	<i>81.40</i> (9.18)	33.036	.000
Pt	47.02 (7.42)	<i>68.50</i> (6.99)	<i>76.60</i> (4.98)	71.619	.000
Sc	48.58 (7.88)	<i>69.42</i> (6.57)	<i>83.80</i> (10.52)	70.320	.000
Ma	55.34 (12.40)	<i>64.50</i> (10.91)	<i>66.60</i> (5.64)	4.385	.016
Si	45.86 (7.64)	<i>61.50</i> (5.89)	<i>69.80</i> (6.30)	41.376	.000
ANX	48.86 (8.93)	<i>72.08</i> (10.26)	<i>78.00</i> (2.45)	50.511	.000
OBS	48.54 (9.29)	<i>63.75</i> (7.09)	<i>67.40</i> (9.61)	21.195	.000
DEP	48.22 (6.122)	<i>67.75</i> (7.00)	<i>78.40</i> (5.32)	88.950	.000
HEA	52.18 (8.40)	<i>64.50</i> (7.31)	<i>79.80</i> (7.40)	33.127	.000
BIZ	49.08 (7.79)	<i>63.25</i> (6.82)	<i>76.00</i> (10.65)	37.787	.000
ANG	52.08 (10.91)	<i>63.08</i> (6.69)	<i>80.20</i> (5.59)	21.308	.000
CYN	51.36 (10.83)	<i>60.17</i> (10.62)	<i>72.40</i> (9.02)	10.857	.000
LSE	46.66 (9.08)	<i>65.50</i> (8.51)	<i>72.00</i> (13.10)	32.523	.000
SOD	46.96 (7.64)	<i>61.67</i> (10.23)	<i>72.20</i> (10.43)	31.769	.000
FAM	54.44 (10.65)	<i>64.50</i> (9.18)	<i>85.00</i> (7.55)	22.711	.000
TRT	47.20 (9.68)	<i>66.58</i> (10.01)	<i>80.00</i> (8.63)	40.275	.000
D1	48.64 (8.11)	<i>68.75</i> (8.55)	<i>78.40</i> (7.09)	53.016	.000
D2	49.00 (10.05)	53.50 (10.19)	57.40 (7.70)	2.318	.107
D3	55.96 (9.28)	<i>62.42</i> (7.42)	<i>64.80</i> (13.97)	3.823	.027
D4	47.98 (8.76)	<i>66.92</i> (8.23)	<i>75.20</i> (7.73)	40.993	.000
D5	46.36 (8.22)	<i>64.17</i> (7.67)	<i>72.20</i> (4.60)	42.641	.000
Hy1	55.00 (7.66)	39.75 (8.67)	40.00 (11.27)	22.232	.000
Hy2	51.28 (8.74)	42.58 (6.82)	36.40 (5.32)	11.859	.000
Hy3	49.44 (8.69)	<i>64.50</i> (9.43)	<i>72.80</i> (3.83)	27.909	.000
Hy4	50.26 (9.11)	<i>62.25</i> (10.24)	<i>75.00</i> (2.92)	22.647	.000
Hy5	48.52 (8.80)	42.33 (8.28)	38.60 (6.91)	4.881	.011
Pd1	55.56 (10.97)	<i>66.17</i> (11.90)	<i>78.80</i> (11.67)	12.665	.000
Pd2	<i>63.06</i> (11.06)	<i>62.25</i> (10.06)	<i>67.80</i> (4.32)	.523	.595
Pd3	54.48 (8.16)	40.25 (8.08)	41.00 (9.41)	18.396	.000
Pd4	51.68 (9.22)	<i>63.42</i> (8.08)	<i>77.20</i> (4.03)	24.811	.000
Pd5	54.62 (10.11)	<i>70.33</i> (7.15)	<i>77.20</i> (3.77)	23.632	.000
Pa1	51.78 (9.43)	<i>65.00</i> (10.71)	91.00 (7.52)	43.294	.000
Pa2	49.26 (9.78)	<i>62.67</i> (10.28)	<i>72.80</i> (10.47)	19.197	.000
Pa3	49.34 (8.16)	43.25 (7.16)	41.80 (5.26)	4.438	.016
Sc1	49.38 (9.34)	<i>65.92</i> (8.78)	<i>86.40</i> (9.97)	46.054	.000
Sc2	48.06 (6.64)	<i>62.00</i> (16.25)	<i>81.60</i> (11.37)	36.011	.000
Sc3	50.48 (8.64)	<i>74.92</i> (12.82)	<i>83.60</i> (5.51)	54.443	.000
Sc4	46.78 (7.76)	<i>66.00</i> (14.08)	<i>81.20</i> (4.87)	48.616	.000
Sc5	48.68 (9.42)	<i>63.08</i> (7.57)	<i>73.20</i> (3.63)	26.650	.000
Sc6	50.82 (8.15)	<i>66.42</i> (10.49)	<i>78.40</i> (12.44)	32.376	.000
Ma1	58.84 (8.81)	58.25 (9.19)	56.20 (11.65)	.200	.820
Ma2	49.50 (11.05)	59.75 (7.18)	<i>64.00</i> (11.90)	7.837	.001
Ma3	54.80 (8.69)	43.92 (7.37)	45.40 (5.90)	10.053	.000
Ma4	49.30 (10.27)	<i>61.33</i> (8.75)	59.80 (6.14)	8.879	.000
Si1	44.02 (7.84)	58.75 (9.62)	<i>61.80</i> (6.38)	23.912	.000
Si2	48.44 (9.47)	55.17 (10.09)	<i>61.20</i> (6.22)	5.903	.004
Si3	49.68 (10.52)	<i>64.25</i> (7.76)	<i>72.80</i> (5.98)	20.366	.000

Table 2 - Comparison of Average scores and Standard Deviations of the three clusters.

Note: For T points, numbers in italics are more than 60; in bold are indicative of significant difference



In **Cluster 1** ($N = 50$) there are **46** (92.0%) males and 4 (8.0%) females, making it the biggest group out of the three. The average scores of the MMPI profiles were analysed.

The validity scales L ($M = 53.82$; $DS = 11.85$), F ($M = 51.54$; $DS = 9.04$) and K ($M = 51.20$; $DS = 8.81$) demonstrate the validity and the interpretability of the collected data. The average scores on the clinical scales are normal, except for the Pt, Sc and Si scales. On the clinical subscales, high scores on the Pd2 and Ma1 scales are found, even if the base value is normal.

The content scales do not show any particular issues; all scores are within the range or below threshold.

In **Cluster 2** ($N = 12$) there are **11** (91.7%) males and 1 (8.3%) female.

Analysis of the MMPI profiles shows that the average scores on the validity scales L ($M = 49.08$; $DS = 7.86$), F ($M = 73.00$; $DS = 8.91$) and K ($M = 39.58$; $DS = 6.22$) correspond to the Configuration L and $K < 50$, $F > 65$ (Configuration 1 according to Abbate & Roma 2014).

Regarding the average scores on the clinical scales, high scores that are significantly above the norm are observed in almost all scales, with the exception of the Hy, Ma and Si scales. Scores higher than the statistical norm are also noted on the subscales D1, D5, Pd1, Pd5, Sc1, Sc3 and Sc6. Regarding the content scales, high scores are observed on the ANX, DEP, TRT, LSE scales. A high score is shown on the FAM scale as well, despite still being below the normal threshold.

In **Cluster 3** ($N = 5$) there are **3** (60%) males and 2 (40%) females – the cluster with the smallest number of subjects.

The analysis of the MMPI profiles (2 and A) shows that the average scores on the validity scales L ($M = 46.20$; $DS = 5.72$), F ($M = 93.40$; $DS = 10.95$), K ($M = 35.00$; $DS = 4.36$) correspond, like in cluster 2, to Configuration L and $K < 50$, $F > 65$, but with a significantly high score on the F scale. Regarding the average scores on the clinical scales, very high scores are observed, reaching 92nd percentile on almost all scales, except for the Hy scale. The subscales demonstrating high scores are D1, D3, D4, D5, Hy3, Pd1, Pd2, Pd4, Pd5, Pa1, Pa2, Sc1, Sc2, Sc3, Sc4, Sc6, Si3.

For the content scales, T scores > 65 are revealed on the ANX, OBS, HEA, ANG, CYN, LSE, SOD, FAM and TRT scales.

The second type of results (see Table 3) shows the differences of the three clusters in terms of the type of substance, the severity of the substance use disorder and the type of psychiatric diagnosis.

Regarding the type of substance, the subjects belonging to **Cluster 1** have a prevalence of THC addiction in 70% ($N = 35$), poly-abuse in 26% ($N = 13$) and behavioral addiction in 4% ($N = 2$).

The subjects of this cluster are characterized by moderate substance use disorder in 32% ($N = 16$), severe in 32% ($N = 16$), mild in 24% ($N = 12$). Only in 12% ($N = 6$) the diagnosis of addiction is absent. Regarding the psychiatric diagnosis, it is observed that 52% ($N = 26$) of the cases have no diagnosis, 24% ($N = 12$) of the cases have attention deficit disorder and disruptive behavior disorder, 12% ($N = 6$) have personality disorder, 6% ($N = 3$) of the subjects have impulse control disorder, 4% ($N = 2$) have bipolar disorder and 2% ($N = 1$) has depressive disorder.

The subjects that make up **Cluster 2** are polyabusers in 50% ($N = 6$) of the cases, while 33.3% ($N = 4$) of the subjects have THC addiction, finally 8.3% ($N = 1$) has cocaine addiction and 8.3% ($N = 1$) has behavioral addiction. The subjects of this cluster mainly have the diagnosis of severe substance use disorder in 41.7% ($N = 5$) of cases, followed by moderate disorder in 33.3% ($N = 4$) and mild disorder in 16.7% ($N = 2$) of the cases. The diagnosis of substance use disorder is absent only in 8.3% ($N = 1$) of the cases. As far as psychiatric diagnoses are concerned, the highest percentages are of impulse



control disorder and attention deficit and disruptive behavior disorder in 33.3% ($N = 4$) of subjects, while 16% ($N = 2$) of the subjects have personality disorder and 8.3% ($N = 1$) has depressive disorder. In **Cluster 3**, regarding the substance type, 60% ($N = 3$) of cases have THC addiction, 40.0% ($N = 2$) are polyabusers. 60% ($N = 3$) of subjects received the diagnosis of severe substance use disorder, while 20% ($N = 1$) has moderate disorder. Finally, 20% ($N = 1$) does not have substance use disorder. Regarding the psychiatric disorders, personality disorder is found in 40% ($N = 2$) of the subjects, depressive disorder in 20.0% ($N = 1$), attention deficit and disruptive behavior disorder in 20.0% ($N = 1$) and finally impulse control disorder in 20.0% ($N = 1$). See Table 3 for detailed description of the three clusters.

Variable	Category	CLUSTER 1		CLUSTER 2		CLUSTER 3	
		N	%	N	%	N	%
Gender	M	46	92.0%	11	91.7%	3	60.0%
	F	4	8.0%	1	8.3%	2	40.0%
Substance of Addiction	THC	35	70.0%	4	33.3%	2	40.0%
	Polyabuse	13	26.0%	6	50.0%	3	60.0%
	Behavioral Addiction	2	4.0%	1	8.3%	0	0%
	Others	0	0%	1	8.3%	0	0%
Substance Use Disorder	MILD	12	24.0%	2	16.7%	0	0%
	MODERATE	16	32.0%	4	33.3%	1	20.0%
	SEVERE	16	32.0%	5	41.7%	3	60.0%
	ABSENT	6	12.0%	1	8.3%	1	20.0%
Psychiatric Disorder	Absent	26	52.0%	1	8.3%	0	0%
	Personality disorder	6	12.0%	2	16.7%	2	40.0%
	Bipolar disorder	2	4.0%	0	0%	0	0%
	Depressive disorder	1	2.0%	1	8.3%	1	20.0%
	Impulse control disorder	3	6.0%	4	33.3%	1	20.0%
	Attention deficit and disruptive behavior disorder	12	24.0%	4	33.3%	1	20.0%

Table 3 - Description of the three clusters

Discussion

The aim of this study is to investigate the personality traits of patients referred to the specific outpatient clinic and the correlation between these personality traits and substance use and substance use disorder.

Using cluster analysis, it was possible to identify three different personality profiles within our sample. The subjects were then "naturally" divided into three main groups; those within each cluster somewhat share similar personality traits. The three clusters are described as follows.



Cluster 1

The subjects of Cluster 1 answered the questions honestly, without trying to act like someone else better. We found that mood disorder within this cluster is absent and their ability to self-assess appears intact. There is no particular impairment of personality function, but there are difficulties in following planned activities.

The subjects appear disobedient and show resistance to adhere to strict behavioral instructions. This personality trait is compatible with the examined age group, which is the adolescent phase. However, these subjects apparently have decent self-esteem and self-confidence. They appear well-adapted and well-integrated, possessing good interpersonal skills and a decent capability to process their emotions in both their personal and interpersonal life. They also seem to be decent at forming relationships.

The critical feature that we found in this cluster is the aversion towards authority and the tendency towards amorality. These result in almost law breaching activities, outright antisocial behaviors and problems in school settings, such as failing and dropouts. In addition, we observe within the cluster an inability to conform to social norms and an attitude that is oppositional and resentful towards their primary caretakers. Therefore the subjects appear unable to tolerate restrictions and are resentful towards the authority. This rebellious pattern of behavior is usually mislabeled as “adolescent reaction of adaptation”. Instead, it signals the need to investigate the personality structure of a teenager who is in conflict with one’s social environment (Kernberg 1987).

As demonstrated earlier on, this cluster is characterized by a high number of moderate and severe THC addicts, followed by a smaller but still significant subgroup of polyabusers, and lastly the smallest subgroup with behavioral addiction. As confirmed by the EMCDDA (2019), cannabis is the most commonly used illicit substance by all age groups. It was estimated that 91.2 million adults in the European Union (15-64 years old), representing 27.4% of this age group, have tried cannabis during their life. In specific, it was also shown that 17.5 million young adults (15-34 years), equal to 14.4% of this age group, have used cannabis during the past year (of which 10.1 million between 15 and 24 year olds, representing 18% of those who have used cannabis during the past year, while 9.3% accounting for 5.2 million, in the past one month). The diagnosis of addiction is present in the majority of cases. This is thus not reassuring data.

In most subjects in Cluster 1, we do not find psychiatric disorders, except for a small number of the following disorders: attention deficit disorder and disruptive behavior disorder, personality disorder, impulse control disorder, bipolar disorder and depressive disorder.

An important finding revealed by studying Cluster 1’s average profile is that the subjects are clinically treatable.

Finally, in Cluster 1 the majority of cases did not receive a diagnosis of psychiatric disorders, but were diagnosed with moderate substance use disorder, mainly THC. Therefore, we can hypothesize that the onset of substance use corresponds to the rebellious behavioral tendency in subjects of this age group, who have yet to fully develop their personality. Timely intervention for such a susceptible age group can prevent the problem from becoming chronic. Even if the subject’s personality is sufficiently functional, the moderate substance use disorder (4-5 symptoms), if left untreated, can worsen their personality function. Correspondingly, Daumann et al. (2004) highlighted in their study that regular use of cannabis was found to be a crucial factor for the development and maintenance of psychopathological symptoms in ecstasy users.



In addition, researchers from the University of Vermont, United States (Orr et al. 2019) did a study to observe the difference in the Gray Matter Volume (GMV) brought about by the use of extremely low levels of cannabis in adolescence, using neuroimaging analysis technique of voxel-based morphometry (VBM). The difference in GMV was measure by analyzing a sample group consisting of 46 14-year-olds of both sexes who used cannabis only once or twice and a THC-naïve control group. The result showed a marked difference in GMV between the sample and the control, implying that even a short exposure to cannabis in adolescence can have an effect on brain structures, particularly for structures in charge of emotional processing and memory. Such effects, consequently, could predispose individuals to emotional and cognitive deficits even in the long term. This study provides an important opportunity for scientific reflection, since not only the legal status of cannabis is changing in many jurisdictions, but also young people's perception towards the risk of cannabis use has drastically diminished in recent years. Finally, this scientific evidence would dispel the common belief that sporadic cannabis use in youth has no consequence. It is now established that the endogenous cannabinoid system plays a significant role in brain development, influencing the action of several neurotransmitters and promoting neurogenesis (Belue et al. 1995, Harkany et al. 2008, Rodriguez et al. 1993). With cannabis use, this endogenous system is being suppressed by the exogenous one, eliciting negative effects on the brain development in general.

Cluster 2

The average scores on the validity scales correspond to configuration 1, which is typical in psychiatric clinical settings (Abbate & Roma 2014). This configuration, according to Alex B. Caldwell (1997) is found in 12.15% of psychiatric patients and according to Butcher et al. (1998) in 5.31% of normal subjects. Our data showed that our Cluster 2 subjects recognize and acknowledge their personal and emotional difficulties; they are willing to ask for help, since they have little confidence in solving them on their own. They are not concerned about being socially acceptable and are not afraid of being judged by the test results. They present with serious emotional disorders, a lack of ability to control their behaviors or emotional reactions due to their poor defenses. The subjects also present with impulsive traits, often unnoticed due to underestimation of circumstances, and also associated with an imprecise and inadequate perception of reality.

The interpersonal capability is apparently deficient. In fact, subjects can be aggressive, susceptible, immature and incapable of self-mockery in interpersonal relationships. We reported the presence of strong family conflicts and the tendency towards self-alienation amongst the subjects. This was derived from the significant increase on the scale Pd - Psychopathic deviate. According to John R. Graham (2006), this scale represents a tool to measure rebelliousness: those who get a high score on this scale tend to rebel through acting-out, due to their anti-social or criminal tendency. In this cluster, the high scores are explained by the presence of marked family conflict and the emotional and cognitive difficulties, which are typical of patients with substance use disorder. This is different from the interpretation of the scores Pd > T 65; Pd2 and Pd3 > T 65, which are typical of antisocial or misanthropic conduct. As Butcher and Williams (2007) have demonstrated, high scores on the Pd scale are most frequent also in the MMPI-A clinical sample. Many behavioral dysfunctions are associated with high scores on this scale, for example, poor school attendance and performance, dropouts, problems towards authority and emotional issues. Furthermore, the average profile of



Cluster 2 is characterized by a certain degree of social withdrawal. The subjects prefer solitude and complete independence in dealing with their own experiences and problems. However, such autonomy often translates into complete disregard for people and social happenings. Loss of cognitive ego control and bizarre sensory experiences may be present. There is a significant degree of anxiety and obsession over their own state of health. The subjects can feel dissatisfied, unhappy and can express and seek for affection incessantly, while being indirectly aggressive. A high score on the hypochondria scale in association with a high score on the schizophrenia scale allows us to hypothesize the presence of distorted somatic perceptions due to substance use. Additionally, we also observed a depressive symptomatology characterized by unhappiness, a sense of distrust, brooding and rumination, and feelings of worthlessness and guilt. Finally, the subjects demonstrated negative attitudes towards doctors and psychological treatments, making compliance difficult.

Regarding the substance type, the majority of Cluster 2 subjects are polyabusers and a smaller number of cases are THC addicts. They are mostly diagnosed with severe substance use disorder, and in descending order, with moderate and mild disorder. While the most common psychiatric diagnoses are impulse control disorder and attention deficit disorder and disruptive behavior disorder, we found a smaller number of subjects with personality disorder and depressive disorder as well.

The most significant finding of this cluster is the degree of personality function impairment. The average profile of Cluster 2 has a tendency towards borderline personality, characterized by impulsiveness together with poor ego defense since their ego is very weak. Regarding their social skills, the subjects form very few relationships but only for the sake of manipulating others, instead of seeking emotional closeness, since they tend to self-alienate. Furthermore, we observed within this cluster a great difficulty in coming into contact with their own emotional world and a weak ability to comprehend symbolic language.

In addition, Cluster 2 presents with comorbidity with severe substance use disorder, impulse control disorder and attention deficit disorder and disruptive behavior disorder. As shown in DSM-5 (2013), attention deficit disorder is associated with poor school performance as well as social rejection in the young population, and poor work performance in adults. In addition, a higher risk to develop conduct disorder in adolescence and antisocial personality disorder in adulthood has been noted, subsequently leading to more likelihood of developing a substance use disorder and incarceration.

The impulse control disorder found in Cluster 2 can be explained if it is correlated with the presence of strong family conflicts and the inability to adhere to social norms, according to the results of the recent research by Otten et al. (2019). In their study, they tested a cascade model, observing that early life stressful events and negative parent-child interactions at 2-5 years of age are correlated and that they interfere with the development of inhibitory control in children at 7-8 years of age. A low level of inhibitory control could lead to the onset of behavioral problems at 9-10 years of age. Finally, it was observed that these behavioral problems in mid-late childhood are associated with substance use at the age of 14. The authors concluded that early stress, together with negative interactions with parents, can interfere and disrupt inhibitory control in children, causing a cascade of effects in early childhood, consequently giving rise to behavioral problems and an increased risk of early substance use in adolescence.

Finally, considering the age group of Cluster 2, the higher number of subjects with severe substance use disorder compared to that with psychiatric diagnoses of impulse control disorder and attention



deficit disorder and disruptive behavior disorder, allows us to hypothesize that substance use may subsequently worsen the psychopathological traits that are already present within a personality that is still in its developmental phase.

Cluster 3

The analysis of the MMPI average profile shows, similar to in Cluster 2, the values L and K <50, F> 65 on the three validity scales, but with a significant increase on the F scale. As previously mentioned, this particular configuration is frequent in psychiatric settings. Generally, this is an ideal configuration to start psychological treatments, provided F is not higher than T 90 or 100, or K is lower than T 35 (Abbate & Roma 2014). The validity scales can detect an underestimation or an overestimation of the prevalence of the pathology. In Cluster 3, the high score on F scale indicates the presence of severe psychiatric disorders, which means that the subjects are highly likely to engage in some extent of dysfunctional behaviors.

The subjects present with acting-out. They are very impulsive and have great difficulties adhering to the rules. They show an incapacity to realistically assess the consequences of their behaviors, to the point of committing to real antisocial behaviors. The related subscales report major family conflicts, problems with authority, social alienation and self-alienation. Similar to Cluster 2, studies on adolescents have shown that high scores on the Psychopathic Deviate scale indicate a high probability of alcohol or drug use (Archer et al. 1988, Butcher et al. 1992); and that the scenario could even worsen when high scores on the Pd scale are also associated with school and family issues and problems with the law (Butcher et al. 1992, Worbel & Lacher 1992).

The average profile of the Cluster 3 reveals the tendency of the subjects to isolate from others and withdraw to themselves. There is a clear preference for daydreaming rather than acting. The subjects particularly indulge in their internal issues, without feeling the need to face and work on them. We also found within this cluster social alienation, emotional alienation, loss of control of the cognitive and emotional self and bizarre sensory experiences. In addition, we noted the presence of a possible delusion-like ideation, in which the projection and interpretation of reality play a leading role. At a behavioral level, persecutory ideation can develop. The high score on the Paranoia scale is generally associated with an unfavourable prognosis for psychotherapeutic treatments, since the subjects tend to avoid facing and working on their emotional problems (Abbate & Roma 2014). We observe a certain level of severe anxiety that is temporarily relieved by committing to avoidance behaviors that are repetitive, anancastic and compulsive in nature. Furthermore, the presence of somatization of anxiety is highlighted; their concerns about one's health tend to acquire worrisome features. The subjects tend to complain, to unnecessarily go for medical visits and tests. Their daily social life is often limited. Their mood is depressed, asthenic and distrustful. There are also subjective depression, physical dysfunctions, mental slowing and brooding and rumination. From the average profile of Cluster 3, we can confirm a serious psychopathological picture characterized by behavioral problems affecting all areas: family, school and social settings. There is a tendency towards borderline personality characterized by marked impulsiveness, intolerance towards rules and restrictions, with a significant aversion towards figures of authority. The impulse control is seriously impaired. Under great stress, antisocial acting-out behaviors may occur due to weak ego defenses. Anxiety is not mentalized but somatized. Their social ability is compromised; the subjects find it



considerably difficult to establish interpersonal relationships. The few social contacts that these subjects have are only for the sake of manipulating others; there is also a tendency towards social withdrawal. Their mood is dysphoric. A sense of superficiality and an underestimation of their emotional issues coexist with little willingness to ask for help. This may greatly compromise compliance in this cluster.

Also for most cases in this cluster, the diagnosis of severe substance use disorder appears to be the primary disorder, co-existing, in descending order, with personality disorder, depressive disorder, attention deficit disorder and disruptive behavior disorder, and finally impulse control disorder. We can also hypothesize that substance use came first, subsequently and possibly worsening the premorbid personality dysfunction.

In the scientific literature, the presence of psychiatric comorbidity in drug addiction is already been proven. In the United States, an epidemiological survey conducted on more than twenty thousand subjects revealed 57% of alcoholics and 53% of drug addicts have psychiatric comorbidities (Krausz 2001, Verheul 2001). Furthermore, the survey disclosed a worrisome finding that substance abusers have an approximately 20 times greater risk of committing suicide than the general population (Sadock & Sadock 2007). Various authors confirmed that there is a significant correlation between substance use (cannabis, cocaine, ecstasy) and suicidal ideation and suicide attempts in adolescence (Hatcher-Kay & King 2003).

One of the most widely used tools that assess the personality profile in subjects with drug addiction is the Minnesota Multiphasic Personality Inventory-2 (Hathaway & McKinley 1942, Craig 1983). A review on several American empirical studies suggests that the typical MMPI profile of heroin addicts shows a high level of psychopathology, with particularly high scores on the F, D, Pd, Pt and Sc scales (Craig 1979a, 1979b, 1983; Shaffer et al. 1988).

Grassi et al. (2013) did a study on the interaction between substance use and psychopathological and/or behavioral characteristics. The study, belonging to the UOCI Addiction Service for 2nd level control with reference to DGR 332/09, was done by analyzing the MMPI-2 profiles of a sample of 62 workers with duties to third parties at risk, therefore was non-clinical. It unveiled substance use and substance addiction in 35% and 5% of subjects, respectively (Grassi et al. 2012). In particular, almost 50% of the sample possessed the personality traits that are conventionally associated with subjects who use and/or abuse substances (Grassi et al. 2013).

Jean Bergeret (1982) claimed that there is no specific personality structure of a drug addict and that there is no extensive psychic structure that characterizes the addictive behaviors. However, according to Bergeret, it is still possible to divide different personality profiles of addicts into subgroups, like drug addicts with a neurotic component, drug addicts with psychotic mental functioning and drug addicts with depressive personality. Bignamini et al. (2002) and Bignamini and Bombini (2003) claimed that it is not possible to recognize a premorbid personality that is typical of the drug addict, but affirmed that substance use can "transform" many initially different personality traits, into some common traits, defined as the "post-morbid personality" of the addict.

The data obtained in our study is not entirely in line with this statement. In particular, Cluster 1 is characterized by rebelliousness and outright aversion towards the rules and laws, but with a rather normal personality profile. Instead, for Cluster 2 and 3, although the substance use certainly worsens the existing symptoms and the loss of control within subjects, there is no time for a structural



consolidation, given their young age. Hence the hypothesis of the presence of a premorbid personality should be supported rather than a postmorbid one. We believe that further studies on the onset of the disorders in young people could over time clarify these issues.

Finally, we wish to emphasize that although Cluster 3 is characterized by a serious behavioral dysfunction and that the compliance assessment shows an unfavourable prognosis for psychological treatments, no drop-outs were observed. This finding allows us to hypothesize that the treatment for the patients as well as the diagnostic and therapeutic protocol were well carried out by the specific outpatient clinic (Berivi et al. 2019).

Conclusions

After having studied the three clusters, one of the most relevant findings is that there exists a high number of diagnoses of moderate and severe substance use disorder across the sample.

In Cluster 1, the majority of subjects did not receive any psychiatric diagnosis. The use of THC within this cluster can be explained by the antisocial behaviors that are shared and reinforced amongst their peers. In fact, in adolescence, participating in social circles that approve and adopt certain risk behaviors increases the chance of being involved in the same behavior (Bonino et al. 2003; Hindelang et al. 2001).

Unlike Cluster 1, the data obtained in Cluster 2 and 3 shows that substance use and psychopathological traits are directly proportional to the impairment of personality function. The more severe the substance use, the more severe the psychopathological symptoms. This data would support the theory that there exists a premorbid personality, in which the substance is introduced into a pre-existing psychopathological picture, consequently leading to substance addiction.

In light of these results, we reiterate that for subjects at such high risk, who unlikely seek psychiatric and psychological help⁵, interventions must be done early to ensure a normal personality development, promote a healthier lifestyle and avoid physical and mental damages in the future.

⁵ Berivi, S. et al (2019).



Bibliografia

- Abbate, L. & Roma, P. (2014). *MMPI-2: manuale per l'interpretazione e nuove prospettive di utilizzo*. Raffaello Cortina Editore.
- Allen, T. J., Moeller, F. G., Rhoades, H. M. & Cherek, D. R. (1998). *Impulsivity and history of drug dependence*. *Drug and alcohol dependence*, 50,2, 137-145.
- APA, American Psychiatric Association (2013). *Manuale diagnostico e statistico dei disturbi mentali*, Quinta edizione, DSM -5. Raffaello Cortina Editore.
- Archer, R. P., Gordon, R. A., Giannetti, R. A., & Singles, J. M. (1988). *MMPI scale clinical correlates for adolescent inpatients*. *Journal of Personality Assessment*, 52,4, 707-721.
- Belue, R. C., Howlett, A. C., Westlake, T. M., & Hutchings, D. E. (1995). *The ontogeny of cannabinoid receptors in the brain of postnatal and aging rats*. *Neurotoxicology and Teratology*, 17,1, 25-30.
- Bergeret, J. (1982). *Toxicomanie et personnalité*. Presse Universitaires de France, Parigi.
- Berivi S., Aliasi P., Balbi A., Boro C., Carabini P., Cherli M., Del Prete D., Iafrate E., Grassi A., La Spina G., Mancini T., Pavoni L., Piermaria C., Pozzi D., Russello C. (2019). *Un nuovo servizio per gli adolescenti e gli esordi di uso di sostanze e di dipendenze comportamentali – “Percorso Diagnostico Terapeutico Assistenziale – PDTA – Fragilità minori, giovani adulti e famiglie”*: risultati e prospettive. LIRPA journal, Roma: Ed. online www.lirpajournal.it
- Bignamini E. & Bombini R. (2003). *Considerazioni sul pensiero e sul linguaggio delle “tossicodipendenze”*, *Medicina delle Tossicodipendenze*, 11,38, 49-58.
- Bignamini, E., Cortese, M., Garau, S., & Sansebastiano, S. (2002). *Dipendenza da sostanze e patologia psichiatrica*. Bologna: Editeam.
- Biondi, F., & Dimauro, P. E. (2001). *La doppia diagnosi in una prospettiva istituzionale*. *Bollettino per le farmacodipendenze nell'alcolismo*, 24,4, 33-43.
- Bonino, S., Cattelino, E. & Ciairano, S. (2003). *Adolescenti e rischio: comportamenti, funzioni e fattori di protezione* (pp. 1-250). Firenze Italy: Giunti.
- Buss, A. H., & Durkee, A. (1957). *An inventory for assessing different kinds of hostility*. *Journal of consulting psychology*, 21,4, 343.
- Butcher, J. N. (1992). *MMPI-A Minnesota Multiphasic Personality Inventory-Adolescent: Manual for Administration and Scoring*. University of Minnesota Press.
- Butcher, J. N., Berah, E., Ellersten, B., Miach, P., Lim, J., Nezami, E., & Almagor, M. (1998). *Objective personality assessment: Computer-based MMPI-2 interpretation in international clinical settings*. *Comprehensive clinical psychology: Sociocultural and individual differences*, 277-312.



- Butcher, J. N., & Williams, C. (1992). *Fondamenti per l'interpretazione del MMPI-2 e del MMPI-A*. Firenze, Giunti O.S.
- Butcher, J. N., & Williams, C. L. (2000). *Essentials of MMPI-2 and MMPI-A interpretation*. Firenze, Giunti.
- Butcher, J. N., & Williams, C. L. (2007). *Fondamenti per l'interpretazione del MMPI-2 e del MMPI-A*. Firenze, Giunti O.S.
- Caldwell, A. B. (1997). *MMPI-2 data research file for clinical patients*. Unpublished raw data.
- Craig, R. J. (1979a). *Personality characteristics of heroin addicts: A review of the empirical literature with critique-Part I*. International Journal of the Addictions, 14,4, 513-532.
- (1979b). *Personality characteristics of heroin addicts: a review of the empirical literature with critique-part II*. International Journal of the Addictions, 14,5, 607-626.
- Craig, R. J. (1983). *Effects of opiate withdrawal on MMPI profile scores*. International journal of the addictions, 18,8, 1187-1193.
- Daumann, J., Hensen, G., Thimm, B., Rezk, M., Till, B., & Gouzoulis-Mayfrank, E. (2004). *Self-reported psychopathological symptoms in recreational ecstasy (MDMA) users are mainly associated with regular cannabis use: further evidence from a combined cross-sectional/longitudinal investigation*. Psychopharmacology, 173,3-4, 398-404.
- De Persis, S., De Filippis, S., Sciortino, S., Dario, C., & Sciarretta, A. (2009). *Disturbi psichiatrici gravi e Disturbi da Uso di Sostanze: problemi attuali*. Dipendenze Patologiche, 4,1, 7-10.
- Di Blasi M. & Cavani P., Pavia L. (2010). *Tossicodipendenza e carcere: un contributo di ricerca*, Rivista di Psicologia clinica 1, 136-144.
- EMCDDA, European Monitoring Centre for Drugs and Drug Addiction (2019). *Relazione Europea sulla droga 2019: tendenze e sviluppi*, Ufficio delle pubblicazioni dell'Unione europea, Lussemburgo.
- Feske, U., Tarter, R. E., Kirisci, L., & Pilkonis, P. A. (2006). *Borderline personality and substance use in women*. American Journal on Addictions, 15,2, 131-137.
- First, M. B., Gibbon, M., Spitzer, R. L., Benjamin, L. S. & Williams, J. B (1997). *Structured Clinical Interview for DSM-IV® Axis II Personality Disorders SCID-II*. American Psychiatric Pub.
- Gerra, G., & Frati, F. (2000). *La ricerca sui disturbi psichiatrici nei pazienti tossicodipendenti ed alcolisti*. Personalità/dipendenze, 6,1, 73-87.
- Gerra, G., Zaimovic, A., Ferri, M., Marzocchi, G. F., Timpano, M., Zambelli, U., Bergarani, M., Delsignore M., & Brambilla, F. (2000). *Neuroendocrine correlates of temperament traits in abstinent opiate addicts*. Journal of Substance Abuse, 11,4, 337-354.
- Gerra, G., Zaimovic, A., Raggi, M. A., Giusti, F., Delsignore, R., Bertacca, S., & Brambilla, F. (2001). *Aggressive responding of male heroin addicts under methadone treatment: psychometric and neuroendocrine correlates*. Drug and alcohol dependence, 65,1, 85-95.



- Goldman, D., Oroszi, G., & Ducci, F. (2005). *The genetics of addictions: uncovering the genes*. *Nature Reviews Genetics*, 6,7, 521-415.
- Graham, J. R. (2006). *MMPI-2: Assessing personality and psychopathology* (pp. 46-48). New York: Oxford University Press.
- Grant, B. F., Goldstein, R. B., Chou, S. P., Huang, B., Stinson, F. S., Dawson, D. A., Saha T.D., Smith S.M., Pulay A.J., Pickering R.P., Ruan, W. J & Compton W. M. (2009). *Sociodemographic and psychopathologic predictors of first incidence of DSM-IV substance use, mood and anxiety disorders: results from the Wave 2 National Epidemiologic Survey on Alcohol and Related Conditions*. *Molecular psychiatry*, 14,11, 1051-66.
- Grassi A., Alberti F., Berivi S., Mereu C., Palummieri A., Scevola S., Spissu A. (2012). *Gli accertamenti WDT (Workplace Drug Testing): studio preliminare su un campione di lavoratori con mansioni a rischio terzi afferenti alla ASL RM D di Roma per gli accertamenti di 2° livello (DGR 332/09)*, *Dipendenze Patologiche* 3, 5-10.
- Grassi, A., Berivi, S., Palummieri, A., & Scevola, S. (2013). *Uso di sostanze psicotrope e tratti di personalità in un campione di lavoratori a rischio di terzi sottoposto agli accertamenti di 2° livello (DGR 332/09) studiato attraverso la somministrazione del MMPI-2*. *Psichiatria e Psicoterapia*, 32,3, 163-180.
- Greene, R. L., Adyanthaya, A. E., Morse, R. M., & Davis Jr, L. J. (1993). *Personality variables in cocaine- and marijuana-dependent patients*. *Journal of Personality Assessment*, 61,2, 224-230.
- Harkany, T., Keimpema, E., Barabás, K., & Mulder, J. (2008). *Endocannabinoid functions controlling neuronal specification during brain development*. *Molecular and cellular endocrinology*, 286,1-2, S84-S90.
- Hatcher-Kay, C., & King, C. A. (2003). *Depression and suicide*. *Pediatrics in Review*, 24,11, 363.
- Hathaway, S. R., & McKinley, J. C. (1942). *The Minnesota Multiphasic Personality Schedule*. University of Minnesota Press.
- Hindelang, R. L., Dwyer, W. O., & Leeming, F. C. (2001). *Adolescent risk-taking behavior: A review of the role of parental involvement*. *Current problems in pediatrics*, 31,3, 67-83.
- Kernberg, O. F. (1987). *Disturbi gravi della personalità*. Bollati Boringhieri.
- Krausz M. (2001). *“Comorbidità psichiatrica e decorso della dipendenza: il valore predittivo della diagnosi psichiatrica”* In Lucchini A. (2001). *La diagnosi dei disturbi da uso di sostanze*. Milano: F. Angeli.
- Legleye, S., Karila, L., Beck, F., & Reynaud, M. (2007). *Validation of the CAST, a general population Cannabis Abuse Screening Test*. *Journal of substance use*, 12,4, 233-242.
- Lin, W. C., Zhang, J., Leung, G. Y., & Clark, R. E. (2011). *Chronic physical conditions in older adults with mental illness and/or substance use disorders*. *Journal of the American Geriatrics Society*, 59,10, 1913-1921.



- Liraud, F., & Verdoux, H. (2000). *Which temperamental characteristics are associated with substance use in subjects with psychotic and mood disorders?* *Psychiatry Research*, 93,1, 63-72.
- Maremmani, A. G. I., Dell'Osso, L., Pacini, M., Popovic, D., Rovai, L., Torrens, M., Perugi G. & Maremmani, I. (2011). *Dual diagnosis and chronology of illness in treatment-seeking Italian patients dependent on heroin*. *Journal of Addictive Diseases*, 30,2, 123-135.
- Martinotti, G., Stavros HatzigiaKoumis, D., Janiri, L. (2010). *Alessitimia e dipendenze patologiche*. *Nóos* 16,3,191-209.
- McGue, M., Slutske, W., & Iacono, W. G. (1999). *Personality and substance use disorders: II. Alcoholism versus drug use disorders*. *Journal of Consulting and Clinical Psychology*, 67,3, 394.
- Mercenaro, S. & Pirastu, R. (2007). *Disturbo mentale e abuso di sostanze. Analisi delle caratteristiche demografiche e sociali di tabagisti, alcolisti, eroinodipendenti*. *Bollettino sulle dipendenze*, 30, 3, 49-54.
- Morrow, J. D., & Flagel, S. B. (2016). *"Neuroscience of resilience and vulnerability for addiction medicine: From genes to behavior"*. In *Progress in brain research* (Vol. 223, pp. 3-18). Elsevier, 2016.
- Orr, C., Spechler, P., Cao, Z., Albaugh, M., Chaarani, B., Mackey, S., D'Souza, D., Allgaier, N., Banaschewski, T., Bokde, A.L.W., Bromberg, U., Büchel, C., Quinlan, E.B., Conrod, P., Desrivières, S., Flor, H., Frouin, V., Gowland, P., Heinz, A., Ittermann, B., Martinot, J.L., Paillère, Martinot, M.L., Nees, F., Papadopoulos Orfanos, D., Paus, T., Poustka, L., Millenet, S., Fröhner, J.H., Radhakrishnan, R., Smolka, M.N., Walter, H., Whelan, R., Schumann, G., Potter, A. & Garavan, H. (2019). *Grey matter volume differences associated with extremely low levels of cannabis use in adolescence*. *Journal of Neuroscience*, 39,10, 1817-1827.
- Otten, R., Mun, C. J., Shaw, D. S., Wilson, M. N., & Dishion, T. J. (2019). *A developmental cascade model for early adolescent onset substance use: the role of early childhood stress*. *Addiction*, 114,2, 326-334.
- Presidenza del Consiglio dei Ministri. Dipartimento Politiche Antidroga 2019 (Dati 2018). *Relazione Annuale al Parlamento sul fenomeno delle tossicodipendenze in Italia*.
- Rodríguez de Fonseca F., Ramos J. A., Bonnín A., Fernández-Ruiz J. J. (1993). *Presence of cannabinoid binding sites in the brain from early postnatal ages*. *Neuroreport*. 4,2, 135-138.
- Rollnick, S., Heather, N., Gold, R., & Hall, W. (1992). *Development of a short 'readiness to change' questionnaire for use in brief, opportunistic interventions among excessive drinkers*. *British journal of addiction*, 87,5, 743-754.
- Sadock, B.J., Sadock, V. A. (2007). *Kaplan & Sadock – Synopsis of psychiatry*. Wolters Kluwer, New York.
- Serpelloni, G. (2011). *Diagnosi e intervento precoce dell'uso di sostanze nei minori mediante counseling motivazionale, drug test e supporto educativo alla famiglia: metodi e rationale*. Dipartimento Politiche Antidroga.



- Shaffer, J. W., Nurco, D. N., Hanlon, T. E., Kinlock, T. W., Duszynski, K. R., & Stephenson, P. (1988). *MMPI 168 profiles of male narcotic addicts by ethnic group and city*. *Journal of clinical psychology*, 44,2, 292-298.
- Shedler, J., & Block, J. (1990). *Adolescent drug use and psychological health: A longitudinal inquiry*. *American psychologist*, 45,5, 612.
- Spielberger, C. D. (1979). *State-Trait Anger Expression Inventory – 2*. Firenze. Giunti O.S.
- Swendsen, J., Conway, K. P., Degenhardt, L., Glantz, M., Jin, R., Merikangas, K. R., Sampson N. & Kessler, R. C. (2010). *Mental disorders as risk factors for substance use, abuse and dependence: results from the 10 year follow up of the National Comorbidity Survey*. *Addiction*, 105,6, 1117-1128.
- Verheul, R. (2001). *Co-morbidity of personality disorders in individuals with substance use disorders*. *European Psychiatry*, 16,5, 274-282.
- Vrouva, I., Fonagy, P., Fearon, P. R., & Roussov, T. (2010). *The risk-taking and self-harm inventory for adolescents: Development and psychometric evaluation*. *Psychological assessment*, 22,4, 852.
- Wrobel, N. H., & Lacher, D. (1992). *Refining adolescent MMPI interpretations: Moderating effects of gender in prediction of descriptions from parents*. *Psychological Assessment*, 4,3, 375.