

Personality Characteristics of Adolescents with Hallucinogen, Methamphetamine, and Cannabis Dependence: A Comparative Study

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ABSTRACT. A comparison of personality factors on scales of the Minnesota Multiphasic Personality Inventory-Adolescent (MMPI-A) was conducted with a sample of adolescents referred to a residential substance abuse treatment program. A total of sixty adolescents identified with hallucinogen ($n = 20$), cannabis ($n = 20$), or methamphetamine ($n = 20$) as their drug of choice participated in the study. All adolescents met criteria for hallucinogen, cannabis, or methamphetamine dependence in accordance with their assigned groups. Adolescents were matched by age and gender. Primary analysis revealed significant differences between hallucinogen and cannabis groups on the Hypochondriasis (Hs), Schizophrenia (Sc), and Adolescent-Bizarre Mentation (A-biz) scales. Post hoc analyses on remaining Clinical, Content, and Validity scales revealed significant differences between hallucinogen and cannabis groups on the Infrequency (F) scale. Scores on all scales of the methamphetamine group were not significantly different from scale scores on the cannabis or hallucinogen groups. Although sample sizes were small,

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this is one of the first studies to utilize personality assessment in order to differentiate personality characteristics of adolescents who report hallucinogen (i.e., psilocybin mushroom), cannabis, or methamphetamine as drug of choice. [Article copies available for a fee from The Haworth Document Delivery Service: 1-800-HAWORTH. E-mail address: <docdelivery@haworthpress.com> Website: <<http://www.HaworthPress.com>> © 2005 by The Haworth Press, Inc. All rights reserved.]

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INTRODUCTION

Adolescents may turn to licit or illicit drugs for a variety of reasons including lack of parental support, social support, and peer pressure (Dielman, Campanelli, Shope, & Blanchart, 1987). Drug use among adolescents may serve as an alternative to coping with personal problems; and drugs serve a number of purposes for different adolescents (Thorne & DeBlassie, 1985). Indeed, there is evidence that substance use among adolescents is on the increase for certain drugs. For example, methamphetamine use in the Midwest has continued to increase.

With the increased demand for substance abuse treatment, improved assessment practices are also needed. This problem has been recognized for at least the past decade (see Winters, 1990). The Minnesota Multiphasic Personality Inventory (MMPI; Hathaway & McKinley, 1983) has been widely used in the psychological assessment of adolescents for the past several decades (Johnson, Archer, Scheaffer, & Miller, 1992). In 1992, the Minnesota Multiphasic Personality Inventory-Adolescent (MMPI-A; Butcher, Williams et al., 1992) was developed and normed specifically for adolescents. This instrument was developed for assessment of a variety of psychiatric diagnoses, as well as evaluation of personality factors associated with substance use.

The classification of drugs known as hallucinogens has become synonymous with the 1960s. Nationally known hallucinogen advocates such as Timothy Leary, who brought these substances into public awareness during that decade, endorsed experimentation. During the 1970s, the use of hallucinogens declined significantly as cocaine became the drug of choice (Hunt, 1997). Results of the *Monitoring the Future Survey* (Johnston, O'Malley, & Bachman, 2003) revealed that the lifetime prevalence of use for twelfth graders was 12%. Until about

2001, hallucinogen prevalence was attributed primarily to the use of LSD (8.4%). However, larger proportions of high school seniors are now reporting use of hallucinogens other than LSD.

A small number of studies were conducted in the 1960s with respect to adult personality profiles on the MMPI and hallucinogen use. For example, Keeler (1965) examined participants' responses on the MMPI before and during psilocybin reaction. Significant changes were noted on the scales associated with Schizophrenia (Sc) and Hypochondriasis (Hs). Another study published by the same first author (Keeler & Doehne, 1965) revealed differences between two administrations of the MMPI before and during psilocybin reaction on two different occasions during a two-week period. On the first occasion, the Hypochondriasis (Hs) and Schizophrenia (Sc) scales were elevated. On the second occasion, the Defensiveness (K), Hypochondriasis (Hs), Depression (D), Hysteria (Hy), and Psychopathic Deviate (Pd) scales were elevated. Wackwitz, Pelfrey, and Stenmark (1974), used the Lie (L) scale as part of their study examining differences in personality characteristics between three groups of women (i.e., heavy, moderate, and no hallucinogen use). According to Carrol and Zuckerman (1977), significant positive correlations were found between adults who used hallucinogens and the Infrequency (F), Hypochondriasis (Hs), Depression (D), Hysteria (Hy), and Psychasthenia (Pt), Schizophrenia (Sc), and Social Introversion (Si) scales. This study also found positive relationships between stimulant use and the Hypochondriasis (Hs), Hysteria (Hy), Paranoia (Pa), Schizophrenia (Sc), and Hypomania (Ma) scales.

Cannabis use by adolescents has long been identified as a significant social problem. Marijuana is the most widely used drug among adolescents (Johnston, O'Malley, & Bachman, 2003). A large proportion of high school seniors (48%) reported cannabis use in their lifetime, and 22% reported use within the last month.

Research examining marijuana use and the personality profiles have almost solely used the MMPI, not the MMPI-A. No specific personality profile has been discovered in regards to the MMPI and marijuana dependent patients. For example, one study examined differences on clinical and validity scales between marijuana and cocaine users with no significant differences found on any scales of the MMPI. Their scores were also similar to alcohol dependent inpatients (Greene, Adyanthaya, Morse, & Davis, 1993). Previous studies have also explored the link between cannabis use and psychosis. Phillips (2002) explored the development of psychosis in a "high risk" population of individuals who exhibited subthreshold psychotic symptoms, or the

possession of first-degree relatives with a psychotic disorder. It was discovered that cannabis use did not directly influence the development of psychosis in the "high risk" population.

Although amphetamine use has been present for a number of years, the production and distribution of methamphetamine has been on the rise over the past decade. Nationally, the lifetime prevalence of methamphetamine use among Seniors was only 7%. However, this drug is especially popular in the Midwest, as access to chemicals needed to produce the drug is easily available. In fact, the use of methamphetamine in the Midwest has grown to epidemic proportions. Federal law enforcement indictments and convictions for methamphetamine-related crimes have reportedly risen to 66% in one Midwestern state (Nebraska) as compared to about 14% for the whole nation in 2001 (Hill, 2002).

Methamphetamine is a dopamine receptor stimulant; and it may produce psychotic symptoms including delusions, paranoia, and hallucinations (Brown, 1994). However, to the author's knowledge, no previous research has examined the relationship between the use of methamphetamine and adolescent profiles on the MMPI-A. Andrucci, Archer, and Pancoast (1989) examined differences between persons who used various substances (including amphetamines) and two scales (i.e., the MacAndrew Alcoholism and Sensation Seeking scales). Consistently higher scores were found with subjects on the Sensation Seeking scales.

To date, little research has been conducted with the MMPI-A and adolescents with substance abuse problems. Further, no known studies have been conducted to determine what personality factors might exist on the MMPI-A between adolescents who use hallucinogens (i.e., psilocybin mushrooms), stimulants (i.e., methamphetamine), and marijuana. For example, most studies that do exist regarding hallucinogens are devoted to the use of lysergic acid diethylamide (LSD), leaving drugs such as psilocybin mushrooms largely unaddressed. Based upon previous research with the MMPI and adults, the Hypochondriasis (Hs) and Schizophrenia (Sc) scales have been most consistently elevated with persons reported to use hallucinogens. The authors hypothesized that there would be significant differences on the Schizophrenia (Sc) and Hypochondriasis (Hs) scales, with scales being significantly higher for the hallucinogen group. This finding, if confirmed, would raise concern regarding more serious long-term psychopathology as the result of chronic use of psilocybin mushrooms. Individuals with elevations on the Schizophrenia (Sc) scale are not only characterized as experiencing psychotic or delusional experiences; but they are also described as withdrawn, confused, and experiencing feelings of alienation. High scores

on the Hypochondriasis (Hs) scale indicate preoccupations with health and illness; and adolescents might have chronic concerns related to health.

Further, no research has examined the response patterns on the Content Scales and drug of choice. The authors hypothesized that the hallucinogen group would have a significantly higher Adolescent-Bizarre Mentation (A-biz) Content scale score than other groups. High scores on this particular scale are indicative of hallucinations or delusions. In addition, individuals may feel there is “something wrong with their minds” and report strange thoughts and experiences.

Since there is little research regarding chronic methamphetamine use and the MMPI-A, the author’s based the next hypothesis on the Clinical scales based upon long-term reported effects of methamphetamine. For methamphetamine users, the Paranoia (Pa) scale was hypothesized to be higher than the hallucinogen and marijuana groups.

Finally, exploratory analyses on all remaining Validity, Clinical, Content, and Supplementary scales would be conducted to look for differences between groups. This study is one of the first to explore differences of the three groups on scales other than just Clinical and Validity scales.

METHODS

Participants

Data were collected from a sample of 449 consecutive admissions to an adolescent residential treatment program for substance abuse. Of these admissions, 20 MMPI-A protocols (18 males and 2 females) were identified for adolescents with hallucinogens (specifically, psilocybin mushrooms) as the drug of choice. The participants were matched by age and gender with 20 adolescents who were diagnosed with methamphetamine dependence, and 20 adolescents with cannabis dependence. Demographic characteristics of the sample are found in Table 1.

The mean age was 15.8 years, and 90% of the sample were male adolescents. The sample consisted of 93.3% Caucasians, 3.7% Native Americans, 1.7% African Americans, and 1.7% Hispanics.

Procedure

Demographic data were gathered from each adolescent’s medical record. All Minnesota Multiphasic Personality Inventories-Adolescent

TABLE 1. Demographic Characteristics of the Sample

	Drug		
	Hallucinogen (n = 20)	Methamphetamine (n = 20)	Cannabis (n = 20)
Gender			
Male	18	18	18
Female	02	02	02
Age			
14	02	02	02
15	07	07	07
16	04	04	04
17	07	07	07
Ethnicity			
Caucasian	19	17	20
Black	01	0	0
Hispanic	0	01	0
Native American	0	02	0

(MMPI-A) were scored using the NCS computer scoring system, and information from these results was obtained from the NCS database. Since the study accessed archival data, approval to access patient files was obtained from the treatment facility and a University Human Subjects Institutional Review Board.

Data Analyses

Statistical analyses were conducted with the Statistical Package for the Social Sciences Version 11.5 (SPSS, 2002). In accordance with hypotheses, a series of one-way analysis of variance (ANOVA) was conducted to assess differences between groups on the Hypochondriasis (Hs), Schizophrenia (Sc), Adolescent-Bizarre Mentation (A-biz), and Paranoia (Pa) scales. The Benjamini and Hochberg (Benjamini & Hochberg, 1995) method was chosen to adjust for the dilemma of multiple comparisons. A modification of the Bonferroni procedure, this adjustment takes into account the presence of Type II error. While the

Bonferroni limits the presence of Type I error, statistical power is substantially compromised when the number of comparisons is large and/or the sample size is small (Williams, Jones, & Tukey, 1999; Millis, 2003). The Benjamini and Hochberg method is a sequentially rejective approach that focuses on the False Discovery Rate (i.e., the proportion of erroneous rejections to the total number of rejections).

After completion of primary analyses, exploratory analysis was conducted on the remaining Validity, Clinical, Content, and Supplementary scales. Benjamini and Hochberg comparisons were again utilized to adjust for the False Discovery Rate.

RESULTS

The means and standard deviations of the MMPI-A scales used in the primary analysis for each group are presented in Table 2, as well as F ratios. The p value was assessed for significance by the Benjamini and Hochberg method with critical value set according to the number of ANOVAs ($i^* .05/k$, where i = the rank order of the p value used for comparison and k = the number of ANOVAs).

On the Hypochondriasis (Hs) scale, significant differences were found between groups, $F(2, 57) = 3.8500$, $p < .0375$. Significant differences were found between the Hallucinogen and Marijuana pair. There was no significant difference between other pairs.

As expected, significant differences were found between groups on the Schizophrenia (Sc) scale, $F(2, 57) = 4.3941$, $p < .0375$. As with the

TABLE 2. Results of Comparisons Between Mean MMPI-A Scales (T Scores) and Drug Dependence

Scale	Hallucinogens <i>M (SD)</i>	Methamphetamine <i>M (SD)</i>	Cannabis <i>M (SD)</i>	<i>F</i> Ratio	<i>p</i>
Hs	56.90 (13.09)	50.50 (10.14)	47.30 (9.91)	3.8500	.0270*
Pa	60.45 (13.32)	55.40 (15.30)	52.40 (10.37)	1.9127	.1570
Sc	61.25 (13.66)	55.10 (14.14)	48.95 (11.39)	4.3941	.0168*
A-biz	65.25 (16.16)	57.10 (16.36)	50.15 (14.97)	4.5519	.0147*

* $p < .0375$ (Benjamini and Hochberg method; Benjamini and Hochberg, 1995).

Hypochondriasis (Hs) group, posttest revealed differences between the Hallucinogen and Marijuana groups, but no significant differences between other groups.

On the Adolescent-Bizarre Mentation (A-biz) Content scale, significant differences were again found between groups, $F(2, 57) = 4.5519, p < .0375$. As with the other scales, posttest revealed significant differences between Hallucinogen and Marijuana groups. On the Paranoia (Pa) scale, no significant differences were found between groups, $F(2, 57) = 1.9127, p = .1570$.

Exploratory analyses were conducted on all remaining Validity, Clinical, and Content scales using a series of ANOVAs. The means, standard deviations, and F ratios of the Validity scales are presented in Table 3. On Validity Scales, The F scale was significantly different between groups, $F(2, 57) = 5.1816, p < .01$. Posttest revealed a significantly higher Infrequency (F) scale for the hallucinogen group than the marijuana group.

Results of the remaining Clinical scales of the MMPI-A are presented in Table 4. No significant differences were found between groups on any of the Clinical scales. The means and standard deviations of the Content scales for each group are presented in Table 5, as well as F ratios. Despite the use of Benjamini and Hochberg adjustments, no significant differences between groups were found.

Results of Post hoc analyses conducted on the Supplementary Scales are presented in Table 6. Post-hoc analyses on the Supplementary scales

TABLE 3. Post Hoc Analyses of Mean MMPI-A Validity Scales (T Scores) and Drug Dependence

Scale	Hallucinogens <i>M (SD)</i>	Methamphetamine <i>M (SD)</i>	Cannabis <i>M (SD)</i>	<i>F</i> Ratio	<i>p</i>
L	55.80 (12.16)	53.05 (10.62)	51.40 (8.82)	.8764	.4218
F	64.40 (13.66)	56.95 (12.25)	52.00 (10.70)	5.1816	.0086*
K	52.10 (10.06)	51.55 (9.46)	56.05 (11.79)	1.0967	.3409
VRIN	53.50 (12.69)	49.85 (6.66)	48.40 (9.45)	.4057	.2536
TRIN	58.75 (7.31)	56.40 (7.13)	58.50 (8.31)	.5762	.5652

* $p < .01$ (Benjamini and Hochberg method; Benjamini and Hochberg, 1995).

TABLE 4. Post Hoc Analyses of Mean MMPI-A Clinical Scales (T Scores) and Drug Dependence

Scale	Hallucinogens <i>M (SD)</i>	Methamphetamine <i>M (SD)</i>	Cannabis <i>M (SD)</i>	<i>F</i> Ratio	<i>p</i>
Hy	56.45 (11.00)	52.75 (10.11)	52.55 (9.64)	.7350	.4840
Pd	63.45 (12.92)	64.15 (13.85)	61.30 (12.03)	.2629	.7698
Mf	47.35 (12.18)	45.10 (8.84)	44.20 (9.88)	.4875	.6167
Pt	54.90 (10.81)	53.55 (14.26)	47.30 (12.11)	2.1128	.1303
Ma	63.60 (14.77)	60.00 (13.43)	54.15 (12.23)	2.4884	.0920
Si	48.50 (9.90)	48.15 (12.33)	43.25 (10.22)	1.4579	.2413

* $p < .008$ (Benjamini and Hochberg method; Benjamini and Hochberg, 1995).

TABLE 5. Post Hoc Analyses of Mean MMPI-A Content Scales (T Scores) and Adolescent Drug Dependence

Scale	Hallucinogens <i>M (SD)</i>	Methamphetamine <i>M (SD)</i>	Cannabis <i>M (SD)</i>	<i>F</i> Ratio	<i>p</i>
A-anx	55.60 (12.02)	54.25 (12.97)	51.10 (12.65)	.6768	.5123
A-obs	52.30 (10.78)	49.65 (9.77)	48.05 (9.50)	.9161	.4059
A-dep	56.10 (11.88)	54.80 (12.78)	49.10 (10.76)	1.9793	.1476
A-hea	56.95 (12.87)	49.90 (10.47)	48.15 (8.41)	3.7658	.0291
A-aln	54.35 (11.40)	52.20 (14.65)	46.50 (9.71)	2.2508	.1146
A-ang	52.85 (14.36)	51.55 (12.35)	51.35 (12.94)	.0757	.9272
A-cyn	49.90 (11.85)	54.80 (9.79)	49.95 (13.02)	1.1714	.3173
A-con	60.20 (13.49)	59.70 (15.07)	50.15 (11.20)	3.6026	.0336
A-lse	56.05 (11.49)	54.45 (15.97)	44.85 (10.45)	4.4376	.0162
A-las	54.85 (8.96)	51.75 (13.28)	51.80 (14.56)	.4035	.6699
A-sod	49.15 (12.11)	50.90 (14.73)	43.45 (7.55)	2.1649	.1241
A-fam	59.85 (12.63)	59.05 (15.68)	53.70 (13.45)	1.1442	.3257
A-sch	64.95 (11.58)	64.15 (13.35)	56.50 (10.57)	3.0799	.0537
A-trt	55.95 (16.06)	55.30 (18.97)	46.70 (12.72)	2.0518	.1379

* $p < .0036$ (Benjamini and Hochberg method; Benjamini and Hochberg, 1995).

TABLE 6. Post Hoc Analyses of Mean MMPI-A Supplementary Scales (T Scores) and Adolescent Drug Dependence

Scale	Hallucinogen <i>M (SD)</i>	Methamphetamine <i>M (SD)</i>	Cannabis <i>M (SD)</i>	<i>F</i> Ratio	<i>p</i>
A	52.45 (9.28)	51.40 (12.24)	47.30 (9.64)	1.3508	.2672
R	48.15 (12.89)	47.10 (9.94)	47.10 (9.84)	.0610	.9409
MAC-R	66.10 (10.36)	64.20 (12.57)	63.25 (9.01)	.3645	.6962
ACK	66.95 (9.04)	65.30 (11.55)	60.70 (9.13)	2.1080	.1308
PRO	67.50 (10.03)	65.80 (11.66)	62.70 (10.10)	1.0498	.3567
IMM	59.40 (9.83)	54.15 (12.25)	48.90 (11.88)	4.2639	.0188

* $p < .008$ (Benjamini and Hochberg method; Benjamini and Hochberg, 1995).

revealed no significant differences between groups on any of the Supplementary scales.

DISCUSSION

Earlier studies have yielded significant differences between groups of substance abusers on MMPI profiles based on drug of choice. This article is the first to examine differences between adolescent profiles on the MMPI-A based on drug of choice, specifically between hallucinogen, methamphetamine, and marijuana groups.

Consistent with adult studies regarding hallucinogen use and the MMPI conducted in the 1960s, there were significant noticeable differences on the Schizophrenia (Sc) and Hypochondriasis (Hs) scales for those who used hallucinogens as compared to the marijuana group. These findings could present serious ramifications for adolescents who are chronic users of hallucinogens. On the MMPI-A, individuals with elevations on the Schizophrenia (Sc) scale are not only characterized as experiencing psychotic or delusional experiences; but they are also described as withdrawn, confused, and experiencing feelings of alienation. High scores on the Hypochondriasis (Hs) scale indicate preoccupations with health and illness; and adolescents might have chronic concerns related to health. In some cases, adolescents with elevation on this partic-

ular scale may actually be experiencing chronic medical problems. Unexpectedly, exploratory analysis revealed a significant difference between the Hallucinogen group and cannabis group on the Infrequency (F) scale. This finding could present serious concern, as marked elevations on this scale are consistent with adolescents exhibiting evidence of serious psychopathology.

This article is the first, to date, to examine the differences of the Content and Supplementary scales on the MMPI-A. As expected, a significantly higher scale score was found on the Adolescent-Bizarre Mentation (A-biz) scale for the Hallucinogen group as compared to the other groups.

No significant differences were found between the methamphetamine group and other groups. The sample sizes may have partially accounted for this finding. Another strong possibility for this finding might have been due to the relatively short length of time that the adolescents in the sample used methamphetamine. More prominent psychopathology might be manifested with extended chronic use of this particular drug.

There are several limitations to this particular investigation. Sample size was small, and the sample was limited by the dearth of adolescents who reported hallucinogens as the drug of choice. Despite the sample size, it is interesting to note that all 20 subjects reported the same hallucinogen (psilocybin mushrooms) as the preferred drug. Replication of these results will be important with larger sample sizes. Little research, to this point, has been conducted with individuals who demonstrate long-term use of methamphetamine. Long-term use of methamphetamine has been linked to serious side effects, including paranoia. Research on the MMPI-A will be important to determine if long-term use of methamphetamine might increase scores on the Paranoia (Pa) scale. Methamphetamine is a dopamine receptor stimulant, and as such, produces psychotic symptoms including delusions, paranoia, and hallucinations (Brown, 1994). While these symptoms might diminish with cessation of use, research is needed to determine the effect of methamphetamine use after a significant period of abstinence has been achieved. The recent rise in popularity and expanded population of use may make this research more possible in the very near future.

Methamphetamine use (more so than most other drugs) appears to be much more prevalent in the Midwest, which may account for less available research on this particular drug. This problem, combined with the dramatic increase in popularity of the drug over a relatively short period of time and the corresponding lack of extended use followed by ex-

tended recovery, decreases the opportunity to establish what effect methamphetamine use exerts over the human body. As a result, little is known about long-term effects of methamphetamine of personality profiles.

The number of female participants in the study was quite small, and the data set revealed a higher proportion of females reported marijuana and methamphetamine as the drug of choice. Nevertheless, significant differences were still found between the Hallucinogen and Marijuana groups.

The sample was taken from protocols of adolescents who completed the MMPI-A while in a residential treatment program. Therefore, generalizability of results might be limited. Adolescents who identified hallucinogens as their drug of choice were somewhat of a rarity in our sample, as about .04% of the cases we examined acknowledged hallucinogens as their preferred substance. Further research is necessary to examine the differences in personality profiles between adolescent substance users with larger sample sizes.

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