

ACUTE ADVERSE REACTIONS TO PSYCHOACTIVE DRUGS, DRUG USAGE, AND PSYCHOPATHOLOGY¹

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A field survey method was used to examine the relationship between psychopathology and acute adverse reactions to psychoactive drugs. A paper-and-pencil measure of acute adverse reactions was discussed. Acute adverse reactions were hypothesized to covary positively with regression, schizophrenia, and drug usage, and to covary negatively with adjustment and paranoia. These hypotheses were supported. Usage of LSD and mescaline was hypothesized to covary positively with regression and covary negatively with adjustment; these hypotheses were supported. A hypothesis that schizophrenia would positively covary with LSD and mescaline usage was not confirmed. Regression was also found to be related to marijuana usage. A recursive linear model is developed in an attempt to integrate and explain these results.

Users of psychoactive drugs report wide variations in experienced effects. Some users have reported pleasant or psychologically profound experiences (e.g., McGlothlin, 1962; Sherwood, Stolaroff, & Harman, 1962), while others have reported adverse, sometimes terrifying experiences (e.g., Smith & Mehl, 1970; Ungerleider, Fischer, Fuller, & Forgy, 1968). As in any kind of behavior, these reactions are probably influenced by some complex function of individual differences, expectancies, situational influences, and exogenously or endogenously introduced chemical changes in the body. Although these reactions have been of concern to clinicians and researchers for some time (the literature on adverse reactions to marijuana has been reviewed by Greenspoon, 1971, and Goode, 1970, and adverse reactions to LSD by McWilliams and Tuttle, 1973), there has been a surprisingly

meager amount of cumulative research into this problem. A major reason for this state of affairs has been the lack of shared meaning about what constitutes an adverse reaction. Many studies fail to distinguish between acute and chronic reactions, consider all psychoactive drug reactions or any counternormative behaviors to be adverse reactions, or use subjective or otherwise ill-defined definitions.

This study was concerned with acute adverse reactions to marijuana, LSD, and mescaline. Acute adverse reactions as reported by users in a pilot study were described as involving feelings of losing control, disintegration, or of being caught in highly unpleasant repetitive cycles, often accompanied by terrifying affect and intense fears of insanity or death. Acute adverse reactions as used in this research exclude counternormative behavior, reactions related to the drug experience that do not precipitate an acute anxiety state in the user, and chronic or long-term reactions.

The development of an instrument to measure acute adverse reactions and an examination of the relationships between this instrument, usage, adjustment, regression, schizophrenia, and paranoia will be reported in this paper.

Most of the accumulated knowledge about adverse reactions comes from clinical observations of users who come to medical centers because of adverse reactions. Although the selective nature of the samples, lack of con-

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trol groups or lack of precise definitions in many studies suggest that these results be interpreted with caution, these clinical observations afford a useful beginning in theorizing about what aspects of psychopathological behaviors may relate to the development of these reactions. A number of authors have observed that adverse reactions to psychoactive drugs are more common among more poorly adjusted users (Cohen, 1960; Glickman & Blumenfield, 1967; Smith & Mehl, 1970), among users with rigid or brittle defensive structures (Cohen, 1960), or among those with more poorly organized personalities (Smith & Mehl, 1970).

Conceptualizing acute adverse reactions as an overwhelming of psychological defenses suggests that it would be useful to examine the vulnerability of this structure by exploring both the general strength of an individual's defenses as well as relations between particular defenses and acute adverse reactions. Some varieties of psychopathological functioning such as a tendency toward regressive, immature response to stressful situations may predispose the user toward acute adverse reactions. Users already straining their defenses to account for a tendency toward bizarre or unorganized thoughts, as reflected for example in the schizophrenia subscale of the MMPI, may be more vulnerable to acute adverse reactions. Paranoids are likely to be skilled in the use of intellectualization and projection, sophisticated defenses that may be more effective in avoiding experiential cues associated with the development of anxiety. It is hypothesized in this study that regression and schizophrenia would be positively associated and that adjustment and paranoia would be negatively associated with acute adverse reactions to marijuana, LSD, and mescaline.

Drug usage rates must be considered as an important intervening variable in theorizing about causal relationships between acute adverse reactions and psychopathology. Each psychoactive drug experience exposes the user to another opportunity for an acute adverse reaction; consequently, more frequent users may have a higher probability of experiencing acute adverse reactions. A correlation between a measure of psychopathology and acute ad-

verse reactions could theoretically be a reflection of higher usage rates rather than any direct effect between pathological functioning and acute adverse reactions.

Two indices of drug usage were used in this paper, the rate of marijuana usage and the rate of combined LSD/mescaline usage. LSD and mescaline were combined because a significant portion of what passes for mescaline on the illegal drug market may often have LSD as its major psychoactive component.

A number of studies have examined the relation between psychopathology and drug usage. There is some consensus in these studies in associating a number of kinds of psychopathological behaviors with LSD usage but not with marijuana usage. Reviews of this literature can be found in Braucht, Brakarsh, Follingstad, and Berry (1973) and Sadava (1970). In this study, adjustment, schizophrenia, and regression were each hypothesized to be related to the rate of LSD/mescaline usage but not to the rate of marijuana usage. Paranoia was not hypothesized to be related to either kind of drug usage.

A more explicit statement of these hypotheses and some assumptions about causal direction are shown in Figure 1. Each circle represents one of the variables that has been discussed, adjustment (X_1), regression (X_2), schizophrenia (X_3), true paranoia (X_4), the rate of marijuana usage (X_5), the rate of LSD/mescaline usage (X_6), acute adverse reactions to marijuana (X_7), and acute reactions to LSD/mescaline (X_8). Lines connecting circles represent hypothetical relationships. Results for these hypotheses can be read from a simple correlation matrix. In addition to the hypotheses stated earlier, schizophrenia, regression, and adjustment were also hypothesized to covary positively since schizophrenia and regression should share a common component of maladjustment.

In this paper, arrows were deleted in reporting results when the respective regression coefficient of the beta for that arrow did not have an F test significant at at least the .05 level. Consequently, the coefficient for each remaining arrow can be interpreted as the net direct effect that one variable had on another, partialing out the effects of the

variables represented by the remaining straight arrows.

In order to complete the diagram, regression (X_2) and schizophrenia (X_3) were hypothesized to be related, but no assumptions about causality were made.

The approach described here approximates the method of linear path analysis (Duncan, 1966; Land, 1969).

Path modeling employs the concept of residual variables, represented in Figure 1 as R_w , R_x , R_y , and R_z . Residual variables represent the effects of unobserved exogenous variables and can be estimated simply as one minus the square of the multiple correlation coefficient of the remaining arrows on a particular circle:

$$P_z = \sqrt{1 - R^2}.$$

(Interested readers are referred to Land, 1969, pages 18–20, for a more comprehensive discussion of residual variables.)

METHOD

The data were collected using a self-administered questionnaire. An earlier pilot study of 581 Cornell students found that only a small percentage, approximately 10%, of students reported ever having used LSD. In order to study acute adverse reactions to LSD, it was necessary to contact a larger sample of subjects with drug usage experience. A snowballing sampling technique was used. Modified forms of this technique have been used in studies of marijuana users (Goode, 1970) and student activists (Block, Haan, & Smith, 1969), and the advantages and disadvantages of this sampling technique have been argued by these authors. Because of the sample size problem, only males were used as subjects. A comparative analysis using females is planned. Drug users were contacted and asked to refer the researcher to other potential subjects. To assure anonymity and to minimize any legal risks for subjects, each subject was asked to suggest the names of other people interested in psychoactive drug use (rather than the names of drug users) and to drop off the anonymous questionnaires at various designated drop-off points so that the completed responses could not be identified. Approximately 600 people were contacted in this manner over a six-month period during the spring and summer of 1972. Five hundred and thirty completed responses were collected, 483 of these were from males.

As expected, this sampling technique resulted in a population with more drug experience than the student sample used in the pilot study. Approximately 92% of these subjects had used marijuana (versus 61% in the pilot study); approximately 55% had used marijuana more than one hundred

times. Fifty-two percent had used LSD (versus 10% in the pilot study), and 55% had used mescaline (versus 17% in the first study).

Age was distributed in this sample with a mean of 21.4 and a standard deviation of 2.9. Ninety-five percent of the subjects were white; approximately 65% reported being students. Most subjects lived in the community surrounding the university, although 20% lived in college dormitories.

Measures

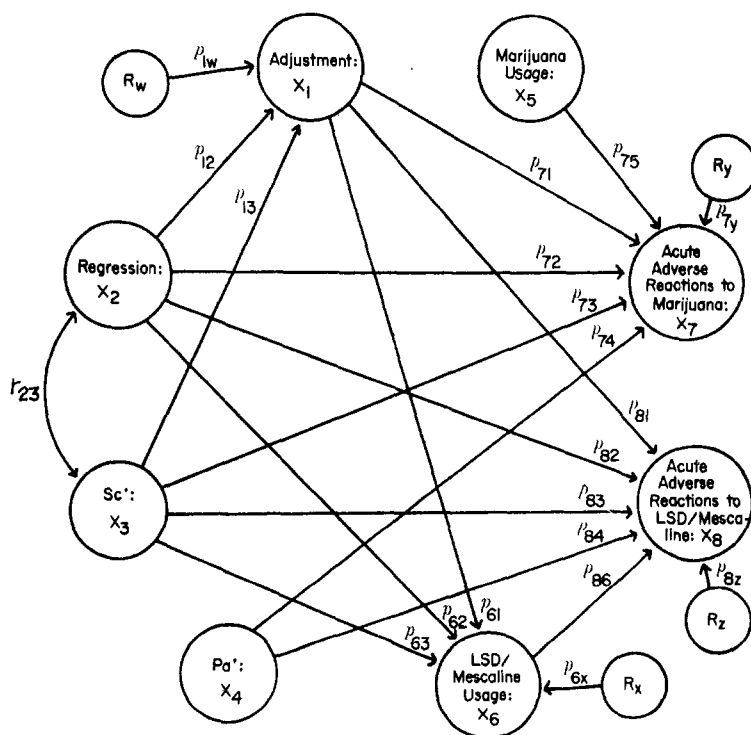
Based on the pilot study and interviews with drug users who had experienced adverse reactions, 23 items^a concerned with acute adverse reactions were included in the questionnaire. Items reflected recurring terrible thoughts or feelings, fear of losing control, insanity or death, despair, suicidal thoughts, and strong negative affect.

A factor analysis, correlations of each item with

^a All of the following items were used for acute adverse reactions to marijuana and repeated for LSD/mescaline:

- (1) I was worried because I didn't know how other people were reacting to me.
- (2) I felt frustrated because I wasn't able to say what I wanted to.
- (3) I felt as if I were being persecuted.
- (4) I felt everyone was making fun of me and laughing at me.
- (5) I felt panicky because of changes in my sense of time.
- (6) I was worried something within me showed that I did not want seen.*
- (7) I was afraid of losing control.
- (8) I was disgusted by some sexual ideas that came to mind.*
- (9) I was frightened by feelings of disintegration or falling apart.
- (10) I kept thinking terrible thoughts.*
- (11) The same unpleasant things kept happening over and over, and there was nothing I could do about it.
- (12) I felt life was no longer worth living.*
- (13) I felt something dreadful was about to happen.
- (14) I was worried that someone was spying into my mind.*
- (15) I felt people were influencing my thoughts against my will.*
- (16) I felt helpless and totally out of control.
- (17) I saw myself as I really am and didn't like what I saw.*
- (18) I had frightening or terrifying hallucinations.
- (19) I was afraid I was going to die.*
- (20) I had a feeling of complete despair.*
- (21) I felt like committing suicide.*
- (22) I was afraid of going permanently insane.*
- (23) I felt on the fringes of sheer horror.

Items with an asterisk were taken from the Ditman, Whittlesey, and Moss card sort (Ditman, Tietz, Prince, Forgy, & Moss, 1968) of items descriptive of the LSD experience.



Regression Equations:

$$X_8 = p_{81}X_1 + p_{82}X_2 + p_{83}X_3 + p_{84}X_4^2 + p_{86}X_6 + \alpha \quad (1)$$

$$X_7 = p_{71}X_1 + p_{72}X_2 + p_{73}X_3 + p_{74}X_4^2 + p_{75}X_5 + \alpha \quad (2)$$

$$X_6 = p_{61}X_1 + p_{62}X_2 + p_{63}X_3 + \alpha \quad (3)$$

$$X_1 = p_{12}X_2 + p_{13}X_3 + \alpha \quad (4)$$

FIGURE 1. Hypothesized relationships between acute adverse reactions to LSD/mescaline and to marijuana, LSD/mescaline and marijuana usage, adjustment, regression, pure schizophrenia (Sc') and pure paranoia (Pa') squared. (Straight arrows represent assumptions about causal direction. Curved arrows represent a correlation with no assumptions about causal direction. The absence of an arrow represents no hypothesized relationship. Each straight arrow corresponds to a regression term in Lines 1-4.)

the total scores minus that item, and split-half reliability coefficients suggested that the acute adverse reaction measures for marijuana and for LSD/mescaline were measuring a unidimensional concept.

Scale scores were calculated by assigning each subject 0 if he had never experienced a particular adverse effect, 1 for experiencing it momentarily, 2 for experiencing it once, 3 for 2-3 times, 4 for 4-10 times, and 5 if he had had that experience more than 10 times. These scores were added for the 23 items, yielding a possible range of scores from 0 to 115. For marijuana, these scores were distributed with a mean of 14.6 and a standard deviation of 17.3. For LSD/mescaline, these scores were distributed with a mean of 24.5 and a standard deviation of 20.9. A comparison of these distributions

suggests that acute adverse reactions to LSD/mescaline are considerably more intense (and/or frequent) than acute adverse reactions to marijuana, a finding consistent with the more powerful psychoactive effects of LSD and mescaline.

Drug usage measures of both current usage rates and historical cumulative usage of marijuana, LSD, and mescaline were included in the questionnaire. Response categories for current usage ranged from never to more than once per day, and historical cumulative usage included eight categories ranging from never to more than 100 times. Results using the current and the historical measures were essentially equivalent. Historical usage was reported in this paper because it more closely approximates an interval scale and was more theoretically congruent

TABLE 1

CORRELATION MATRIX FOR ACUTE ADVERSE REACTIONS TO LSD/MESCALINE AND TO MARIJUANA, LSD/MESCALINE AND MARIJUANA USAGE, ADJUSTMENT, REGRESSION, PURE SCHIZOPHRENIA, AND PURE PARANOIA SQUARED

Variable	1	2	3	4	5	6	7
1. X_1 Adjustment							
2. X_2 Regression	-.41***						
3. X_3 Pure Schizophrenia squared	-.49***	.44***					
4. X_4 Pure Paranoia squared	-.02	.06	.02				
5. X_5 Marijuana usage	.02	.13**	.02	.07			
6. X_6 LSD/mescaline usage	.05	.17***	.06	.01	.53***		
7. X_7 Acute adverse reactions to marijuana	-.42***	.41***	.45***	-.09*	.20***	.14**	
8. X_8 Acute adverse reactions to LSD/mescaline	-.45***	.40***	.44***	-.06	.19**	.28***	.56***

Note. For correlations including X_1 - X_6 , $N = 483$; for correlations including X_7 , $N = 380$; for correlations including X_8 , $N = 235$. Levels of significance were based on a two-tailed test.

* $p < .05$.
 ** $p < .01$.
 *** $p < .001$.

with the measures of acute adverse reactions which themselves were historical, cumulative measures.

Schizophrenia and paranoia were measured by pure Schizophrenia (Welsh, 1952) and pure Paranoia (Welsh, 1952) subscales of the Minnesota Multiphasic Personality Inventory (MMPI; Dahlstrom & Welsh, 1960). Pure schizophrenia (Sc') was distributed with a mean of 6.02 and a standard deviation of 3.23. Pure paranoia (Pa') was distributed with a mean of 4.42 and a standard deviation of 1.56. Cross-tabulations indicated that very high as well as very low scorers on the Pa' scale were low in acute adverse reactions. This result was interpreted as indicating that some paranoids, perhaps being suspicious of the purposes of the experimenter, may have systematically biased their responses toward low scores on the Pa' items. Consequently, the term representing Pa' was squared in the regression and correlation analysis and included along with the linear term. There were no significant relations using the linear term, and consequently only the coefficients for Pa' squared were reported in this analysis.

Regression was measured using items from a measure developed by Haan (1963, 1965). Haan defined regression as a defensive ego mechanism in which the

S resorts to evasive, wistful, ingratiating, age-inappropriate behavior to avoid responsibility, aggression, and generally unpleasant demands from others and self and to allow concomitant indulgence [Haan, 1963, p. 5].

This measure is one of a series of measures of defensive and coping mechanisms developed by Haan. It was validated using clinical assessments of regression.

A measure of adjustment applicable to this population was constructed using 19 items that had been found useful in discriminating clients at the University of Wisconsin Counseling Center from controls

(Scheff, 1964). These items were concerned with inability to get along with others, to concentrate or form friendships, problems with the opposite sex, homesickness and confusion about future goals.

Procedure

A correlation matrix using Pearson correlations was computed for the eight variables in the study. Stepwise multiple regressions were run based on the four multiple regression equations shown in Figure 1. Regressions were rerun to include only terms with F ratios statistically significant at better than the .05 level, and the beta weights were used as the path coefficients corresponding to each straight arrow in the results diagram.

All correlations and regressions had an N of 483 with the exception of those in which acute adverse reactions were included. Correlations and regressions using acute adverse reactions to marijuana included only those subjects who had used marijuana, $N = 380$. Correlations and regressions using acute adverse reactions to LSD/mescaline included only those subjects who had used either LSD or mescaline, $N = 235$.

RESULTS

A correlation matrix of the eight variables considered in this analysis appears in Table 1. Acute adverse reactions to LSD/mescaline (X_8) were significantly correlated with adjustment ($r = -.45$, $p < .001$), regression ($r = .40$, $p < .001$) and with Sc' ($r = .44$, $p < .001$). A similar pattern was found for acute adverse reactions to marijuana, which was also significantly correlated with adjustment ($r = -.42$, $p < .001$), regression ($r = .41$, $p < .001$) and Sc' ($r = .45$, $p < .001$),

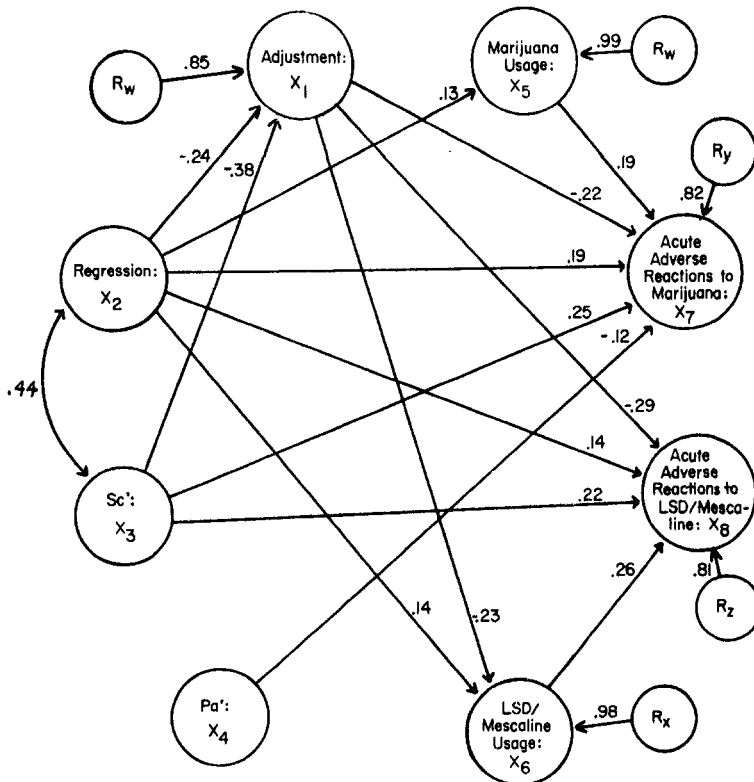


FIGURE 2. Relationships between acute adverse reactions to LSD/mescaline and to marijuana, LSD/mescaline, and marijuana usage, adjustment, regression, pure schizophrenia (Sc') and pure paranoia (Pa') squared. (Straight arrows represent assumptions about causal direction. Curved arrows represent a correlation with no assumptions about causal direction. The absence of an arrow represents no hypothesized relationship.)

supporting the hypotheses. There was no significant correlation between either Pa' and either kind of acute adverse reaction or with Pa' squared failing to support the hypotheses that subjects high in Pa' would be less likely to experience acute adverse reactions.

As predicted, acute adverse reactions to LSD/mescaline were significantly associated with LSD/mescaline usage ($r = .28, p < .001$), and acute adverse reactions to marijuana were significantly associated with marijuana usage ($r = .20, p < .001$). There were also smaller but significant relationships between adverse reactions to LSD/mescaline and the rate of marijuana usage ($r = .19, p < .001$) and between adverse reactions to marijuana and the rate of LSD/mescaline usage ($r = .14, p < .01$). These associations probably reflect shared variance that each of

these pairs of variables have in common with other variables included in this analysis (e.g., regression) as well as variables not included in this study. Similarly, there was also a strong relationship between the two kinds of acute adverse reactions ($r = .56, p < .001$). A portion of this is due to common variance with adjustment, regression, and Sc' .

There was a small, but statistically significant correlation between LSD/mescaline usage and regression ($r = .17, p < .001$), supporting that hypothesis. There was no significant association between either adjustment or Sc' and LSD/mescaline usage, however, failing to support these hypotheses. Consistent with predictions, there was no significant correlation between either LSD/mescaline or marijuana usage rates and Pa' (not shown in Table 1), Pa' nor any association found be-

tween marijuana usage and either adjustment or Sc' . Contrary to expectations, there was a small but significant association between marijuana usage rates and regression ($r = .13$, $p < .01$).

Marijuana and LSD/mescaline drug usage rates were strongly related ($r = .53$, $p < .001$). This association may be due to variables exogenous to this system such as age, values and the normative aspects of the sociocultural matrix in which these subjects are embedded. As expected, there were no relationships between Pa' (not shown) or Pa' squared and the other three kinds of psychopathology.

As hypothesized, there was a significant association between adjustment and regression ($r = .41$, $p < .001$) and between adjustment and Sc' ($r = -.49$, $p < .001$) which may reflect a common component of maladjustment in each of these two kinds of psychopathology. There was also an association between regression and Sc' ($r = .44$, $p < .001$). This strong association may reflect commonly shared variance between these two concepts, both because schizophrenia is one of the most regressed modes of psychopathology and because of the commonly shared variance with adjustment.

The diagram in Figure 2 indicates that each of the four kinds of psychopathology directly affected acute adverse reactions to marijuana, partialing out the effects of usage rate and the remaining three psychopathologies. Acute adverse reactions to marijuana were directly effected by Sc' ($p_{73} = .25$, $F = 21.5$, $df = 1/379$, $p < .001$), adjustment ($p_{71} = -.22$, $F = 16.8$, $df = 1/379$, $p < .001$), and by regression ($p_{72} = .19$, $F = 13.6$, $df = 1/379$, $p < .001$). Pa' was also significantly associated with acute adverse reactions to marijuana ($p_{74} = .12$, $F = 7.4$, $df = 1/337$, $p < .01$). Subjects who scored farther from the mean on Pa' were less likely to have adverse reactions, supporting the hypothesis, and consistent with the interpretation that the more sophisticated paranoid defenses may be useful in avoiding acute adverse reactions. This relation was not apparent using simple correlations. The appearance of this small relation could have been due to the effects of

other variables in the regression acting as suppressor variables.

Usage rates of marijuana also directly affected acute adverse reactions to marijuana ($p_{75} = .19$, $F = 16.7$, $df = 1/379$, $p < .001$) independently of psychopathology.

The pattern for acute adverse reactions to LSD/mescaline was similar to that for marijuana. Acute adverse reactions to LSD/mescaline were directly affected by adjustment ($p_{81} = -.29$, $F = 20.2$, $df = 1/234$, $p < .001$), Sc' ($p_{83} = .22$, $F = 11.30$, $df = 1/234$, $p < .001$), and to a somewhat lesser extent to regression ($p_{82} = .44$, $F = 5.2$, $df = 1/234$, $p < .025$). There was no significant relationship between acute adverse reactions to LSD/mescaline and Pa' squared, failing to support that hypothesis. It may be that the ego defenses effective for paranoid functioning in avoiding acute adverse reactions to marijuana may not be as effective in avoiding the much more intense LSD/mescaline experience. The rate of LSD/mescaline usage also directly affected acute adverse reactions to these drugs ($p_{86} = .26$, $F = 22.7$, $df = 1/234$, $p < .001$) after partialing out the effects of psychopathology.

The five variables directly affecting acute adverse reactions to marijuana taken together accounted for approximately 33% of the variance. The four variables directly related to acute adverse reactions to LSD taken together accounted for approximately 35% of the variance. The portion of variance in each of the dependent variable measures accounted for by each of the independent variables independently of the other variables considered is estimated by the square of the various path coefficients found in Figure 2.

LSD/mescaline usage rates were both directly affected by adjustment ($p_{61} = -.23$, $F = 10.2$, $df = 1/482$, $p < .005$), and by regression ($p_{62} = .14$, $F = 4.1$, $df = 1/482$, $p < .05$), supporting those hypotheses. There was no direct effect of Sc' on the rate of LSD/mescaline usage when the effects of adjustment and regression were partialled out, failing to support that hypothesis. There was also a small, statistically significant relationship between regression and marijuana usage rates ($p_{52} = .13$, $F = 6.1$, $df = 1/482$, $p < .025$).

Adjustment was directly affected by both Sc' ($p_{13} = -.38$, $F = 75.9$, $df = 1/483$, $p < .001$) and regression ($p_{12} = -.24$, $F = 29.7$, $df = 1/482$, $p < .001$). These two variables accounted for 28% of the variance in adjustment for this sample.

DISCUSSION

Acute adverse reactions to both marijuana and LSD/mescaline correlated significantly with measures of adjustment, regression, schizophrenia, and the degree of drug usage. Adjustment, regression, Sc' , and usage each directly covaried with both measures of acute adverse reactions after partialing out shared covariance with each of the other independent variables. If the assumptions made about causal direction are accurate and no important intervening variables have been excluded, these direct effects can be interpreted as estimates of the direct causal effect that adjustment, regression, and Sc' have in influencing the development of acute adverse reactions.

In these data, adjustment, regression, and Sc' each made an independent contribution to the variance in acute adverse reactions to both marijuana and LSD/mescaline, independently of usage rates and of each other. Assuming that extreme scores on the Pa' subscale represent true paranoia, paranoia also directly affects acute adverse reactions to marijuana independently of the other independent variables. Increased paranoia was associated with decreased scores on the measure of acute adverse reactions to marijuana.

The finding that higher scores on paranoia were related to decreased scores on acute adverse reactions to marijuana (and just barely missed significance at the .05 level for acute adverse reactions to LSD/mescaline, $p_{84} = -.10$, $F = 3.34$, $df = 1/379$, $< .06$) while higher scores on Sc' and regression were likely to lead to increased rates of acute adverse reactions was consistent with an interpretation of acute adverse reactions as an overwhelming of psychological defenses. The more sophisticated defenses represented in paranoid functioning may be effective in preventing acute adverse reactions. These findings are consistent with the findings of Barr, Langs, Holt, Goldberger, and Klein (1972).

These authors administered LSD in the laboratory to a sample of 30 male actors and found that subjects with more effective and rigid defenses were less likely to experience terrifying affect, fear of loss of control, and fear of insanity.

These measures of psychopathology and usage accounted for approximately 35% of the variance in acute adverse reactions, supporting the contention that individual differences, at least in psychopathology, account for a substantial percent of the variance in acute adverse reactions. It remains for future research to determine how much additional variance will be accounted for by personality, set, setting, and dosage level.

A secondary consideration in this study was the degree to which adjustment, regression, and Sc' influenced the usage of marijuana, LSD, or mescaline. In this sample of college-aged drug users, schizophrenia was not associated with increased LSD/mescaline usage as in the studies of Hensala, Epstein, and Blacker (1967) and Hekimian and Gershon (1968). Adjustment and regression were both related to LSD/mescaline usage, however, supporting those hypotheses. Regression was also found to be associated with increased marijuana usage, although this relationship was not predicted. The relationship between regression and both kinds of psychoactive drug usage suggests that people high in regression may use psychoactive drugs as a regressed way of handling personal problems. The finding that adjustment was negatively related to LSD/mescaline usage rates but not to marijuana usage is consistent with the hypothesis that more disturbed people may be attracted toward stronger drugs as suggested by McAree, Staffenhausen, and Zheutlin (1969).

Although these interpretations of the relationship between regression, adjustment, and drug usage may be valid, it should be noted that adjustment and regression taken together account for only a very small portion of the variance in LSD/mescaline usage, approximately 4%, and regression accounted for only a tiny percentage of the variance in marijuana usage, approximately 2%. The strength of these relationships indicates that psycho-

pathology as reflected in these measures was not a major factor in determining psychoactive drug usage or resulting from psychoactive drug usage.

These data were collected using a field survey method rather than administration of drugs in the laboratory, for ethical as well as practical reasons, such as sample size. A possible disadvantage in using a survey method is the reliance on retrospective data. A study focusing on this problem by Linton, Langs, and Paul (1964) suggests that not only may the disadvantages not be too serious but that there may actually be advantages in using retrospective drug experience data. Linton et al. administered LSD/25 orally to 30 subjects, gave the same questionnaire concerned with drug effects a number of times during the experience and retrospectively, and collected direct observational data. Retrospective reports agreed very well with reports collected during the drug experience ($r = .90$). Although some items appeared with decreased frequency during recall, some aspects of the drug experience were reported more accurately (both in terms of comparison with raters and in retrospective discussions) during the retrospective period. During recall, a number of items concerned with threat of losing control were reported for the first time by a number of subjects who reported that they were afraid that had they verbalized these fears during their drug experiences they would have precipitated an adverse reaction (Linton et al.,¹p. 422).

It was assumed in these analyses that drug usage and psychopathology directly affected adverse reactions as opposed to adverse reactions determining use and psychopathology. If there was (or was also) an effect of adverse reactions on use, these would tend to suppress even stronger relations than those found. Adverse reactions should be more likely to convince someone to use drugs less rather than increase drug usage. The assumption that psychopathology leads to usage and acute adverse reactions is consistent with the literature in this area. Concerning usage, Braucht et al. (1973) in a review of that literature stated:

The general consensus concerning mental illness and use appears to be that persons with predisposing

psychopathology often take drugs which aggravate that state. Use of drugs themselves is not seen as producing abnormality [p. 102].

It does not seem likely that an acute adverse reaction itself would have an appreciable influence on adjustment, as measured by the items included in this measure, paranoia, schizophrenia, or the extent to which regression is used as a characteristic response to stress.

The data in this study indicate acute adverse reactions to marijuana and to LSD and/or mescaline are related to psychopathology. The apparently inoculative effects that paranoia had in acute adverse reactions to marijuana suggest that it would be useful to examine in more depth how characteristic mechanisms of defense may relate to acute adverse reactions.

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