

Demographic Characteristics and Frequency of Use among Current Users of Classic Hallucinogens

Jennifer A. Lyke* and Julia Kuti

School of Social and Behavioral Sciences, Stockton University, Galloway, New Jersey 08205, USA

Abstract: Little is known about the demographic characteristics of classic hallucinogen users and few investigations address the frequency of their use. This study used five years of data from The National Survey on Drug Use and Health, an annual, nationally representative, cross-sectional survey, conducted by the Substance Abuse and Mental Health Services Administration of the United States government, to examine age, gender, marital status, race/ethnicity, income, education, employment status and health status and among low, medium, and high frequency users of classic hallucinogens ($N = 1323$). Results indicated classic hallucinogen users were most likely to be White males between 18 and 25 years old, who had never been married, had some college, were employed full-time, had a family income less than \$20,000 per year, and were in very good health. High frequency hallucinogen users were more likely to be males in the "Other" racial/ethnic category who were less well educated, and less healthy, but they did not differ from other users in age, marital status, family income, or employment. Limitations and suggestions for future research are discussed.

Keywords: Hallucinogen, demographic, frequency, NSDUH.

The National Survey on Drug Use and Health (NSDUH) is an annual, nationally representative, cross-sectional survey, conducted by the Substance Abuse and Mental Health Services Administration (SAMSHA) to gather data on drug use and health in the United States population. One section of the survey asks respondents about hallucinogen use, including LSD, phencyclidine (PCP), mescaline, peyote, MDMA (Ecstasy), psilocybin, and a host of other drugs offered as possibilities to participants, including DMT, salvia divinorum, and ayahuasca. Participants are asked whether they have ever used any of these drugs and, if so, about the frequency of their use within the past year.

The NSDUH, however, conflates several distinct drugs into the category of hallucinogens. Of those listed above, PCP and MDMA appear to have unique chemical structures, physiological effects, and use patterns compared to the classic hallucinogens (LSD, mescaline, peyote, and psilocybin). The classic hallucinogens, however, appear to form a more coherent category. Not only do they all act as agonists on serotonin 5-HT₂ and 5-HT_{2A} brain receptors [1-3], but they produce cross-tolerance with each other and the subjective effects are difficult for users to distinguish [4]. Thus, investigations focused on understanding correlates of hallucinogen use have frequently isolated classic hallucinogens from other drugs that are sometimes considered hallucinogenic [5, 6].

DEMOGRAPHICS

Little is known about the demographic characteristics of classic hallucinogen users. Research into hallucinogen use was largely curtailed when the U.S. Congress enacted the Controlled Substances Act in 1970. Many economic, social, and political factors have fluctuated in the intervening decades, so early research may not accurately describe current hallucinogen users. For example, in the 1990's Chilcoat and Schutz found that hallucinogen use often begins in late adolescence and is most prevalent among Whites with high family income [7], but more recently, Wu *et al.* [8] found that Asian-Americans, Native Hawaiians/Pacific Islanders, and mixed-race individuals have higher odds of hallucinogen use compared to Whites. Some recent research has also focused on hallucinogen use in dance clubs [9], whereas many early investigations focused on hallucinogen use on college campuses [10].

Frequency of Use

Very few investigations address the frequency of hallucinogen use. Given that hallucinogens rapidly produce tolerance in animals and humans [4], frequency of hallucinogen use is likely to be low, but almost no attention has been paid to the frequency or quantity of hallucinogen use in the general population. One early study by Chunko [11] sampled 2,500 high school and college students who used LSD and found that 75.5% of current users reported using LSD from three to five times per month and 16.4% reported using it two or more times per week. However, there have been no similar studies in the last several decades. In

*Address correspondence to this author at the School of Social and Behavioral Sciences, Stockton University, Galloway, New Jersey 08205, USA; Tel: (609) 626-6839; Fax: (609) 748-5559; E-mail: Jennifer.Lyke@stockton.edu

addition, poly-substance abuse and drug mixing complicate matters since these practices may be more common than single drug use, including among users of hallucinogens [12].

The DSM-5 [13] focuses on functional impairment due to use to discriminate presence or absence of Other Hallucinogen Use Disorder, and drug use frequency is not currently one of the criteria. Furthermore, the status of classic hallucinogens as uniquely non-harmful and non-addictive has recently become a hotly debated issue. Nutt *et al.* [14, 15] have suggested that classic hallucinogens have a limited dependence potential and are among the least harmful of misused drugs. Results indicating that adolescent onset of hallucinogen use is not associated with symptoms of dependence, as it is with other classes of drugs [16], support this position. Likewise, hallucinogens are not known to cause compulsive use or harm to the brain or other body organs [4], and Rhesus monkeys self-administer hallucinogens sporadically, indicating they are only weakly reinforcing or have mixed reinforcing and aversive effects [17].

Other researchers, however, have argued that higher quantity and frequency of consumption is associated with symptoms of dependence in hallucinogens as they are with other drug classes [18, 19]. For example, age of first hallucinogen use may be related to the likelihood of developing dependence, although investigators disagree. Stone *et al.* [20] have found that early use increases the risk of hallucinogen dependence, whereas Chen, Storr and Anthony [16] found that early hallucinogen use is not associated with dependence as it is for most other drugs.

In summary, few studies to date have investigated frequency of hallucinogen use in conjunction with other characteristics of users. Accordingly, the goal of this exploratory study was to examine the demographics characteristics and reported frequency of use of classic hallucinogen users in the NSDUH data.

METHOD

Five years of NSDUH data (2009-2013) were pooled for these analyses [21-25]. Participants in the current study were respondents with valid data on variables related to current classic hallucinogen use and relevant demographic variables. NSDUH interviewers met with individuals twelve years old and older in their homes to collect the data. Participants listened to prerecorded survey questions on headphones and provided responses on computers.

More detailed information on NSDUH methodology is available at <https://nsduhweb.rti.org/respweb/homepage.cfm>. The NSDUH survey was approved by the Institutional Review Board of the Research Triangle Institute and the current study was approved by the Institutional Review Board of Stockton University.

Data Analysis

Participants who had only ever used classic hallucinogens (LSD, peyote, mescaline, or psilocybin) were coded into a category indicating lifetime classic hallucinogen use. The NSDUH survey asks participants about their frequency of hallucinogen use during the past year, but it does not ask participants to identify which particular hallucinogen or combination of hallucinogens they used. Thus, in order to restrict results to those referring only to classic hallucinogen use, participants who had ever used PCP or Ecstasy were eliminated from the analyses.

The NSDUH survey also asks participants if they have ever used other hallucinogens besides those already mentioned and includes a list of over one hundred possibilities, including drugs such as DMT, ayahuasca, ketamine, salvia divinorum, and others. Participants who affirmed that they had used other hallucinogens were also eliminated from further analyses in order to isolate cases reporting only frequency of classic hallucinogen use.

Once participants who had ever used other hallucinogens besides LSD, peyote, mescaline or psilocybin were eliminated, they were then categorized according to their reported frequency of use of hallucinogens during the last year (HALYRTOT). Cases with valid data for frequency of use during the last twelve months were then coded into groups according to frequency of use: low (one to two times), medium (three to 23 times), or high (more than 23 times). Participants who had not used hallucinogens in the last year were eliminated from further analyses.

Chi square tests were then used to assess the relative frequencies of the low, medium, and high frequency hallucinogen users with respect to the demographic variables of age, gender, marital status, race/ethnicity, income, education, employment status and health status. Post hoc *z* tests were performed with Bonferroni adjustments for *p* values to identify significant differences ($p < .05$) in use frequency within variable categories. Analyses were conducted using unweighted data due to the potential for distortion of

results by using relatively small sample to estimate population frequencies.

RESULTS

The data set contained a total of 244,385 cases, of which 32,983 (13.5%) reported ever having used any hallucinogen. Of those, 22,128 (67.1%) had ever used PCP, Ecstasy, or another hallucinogen besides LSD, peyote, mescaline or psilocybin, while 10,855 (32.9%) had only ever used classic hallucinogens. Of those participants who had only ever used classic hallucinogens, 9,322 (85.9%) had not used within the past year, leaving 1,323 classic hallucinogen users who reported use within the last year.

The frequency of use during the last year (HALYRTOT) for this sample ranged from one to 260 days. When they were broken into groups based on frequency of use, 893 (67.5%) had used one or two times, 319 (24.1%) had used three to 23 times, and 111 (8.4%) had used more than 23 times during the past twelve months.

Age

Participants' ages were collapsed into three categories to preserve the integrity of the chi square analysis. Three hundred sixty (27.2%) participants were 12-17 years old, 859 (64.9%) were 18-25, and 104 (7.9%) were 26 or older. A chi square analysis indicated that frequency of hallucinogen use was not significantly associated with age, $X^2(4, N = 1323) = 7.14, p > .05$, (see Figure 1).

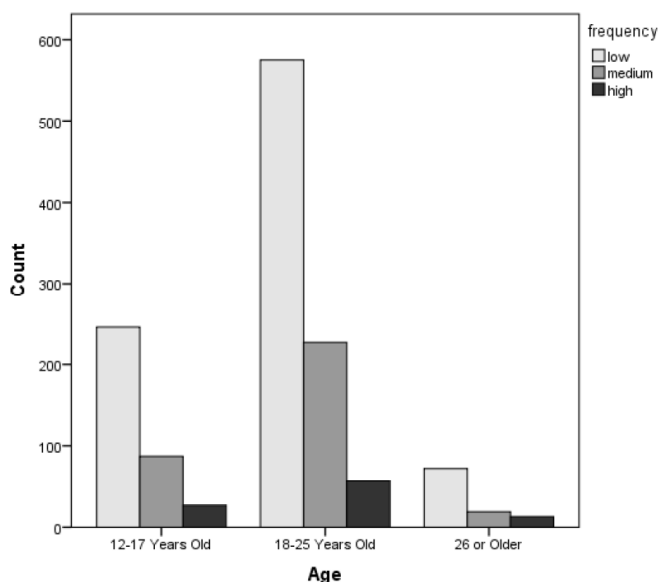


Figure 1: Ages of low, medium, and high frequency hallucinogen users ($N = 1323$).

Gender

Eight hundred ninety-eight (67.9%) of participants were male, and 425 (32.1%) were female. A chi square analysis indicated that frequency of hallucinogen use was significantly associated with gender, $X^2(2, N = 1323) = 6.83, p < .05$. Compared to expected counts, males were significantly more likely to use with high frequency than medium or low frequency and significantly more likely to use with medium frequency than low frequency. Females were significantly more likely to use with low frequency than medium frequency and significantly more likely to use with medium frequency than high frequency (see Figure 2).

With respect to their proportions within the frequency of use categories, males were significantly more likely than females to use with high frequency, (79.4% vs. 20.6% respectively; $X^2(1, N = 97) = 5.653, p < .05$), although observed proportions of gender did not differ within the low or medium frequency of use categories.

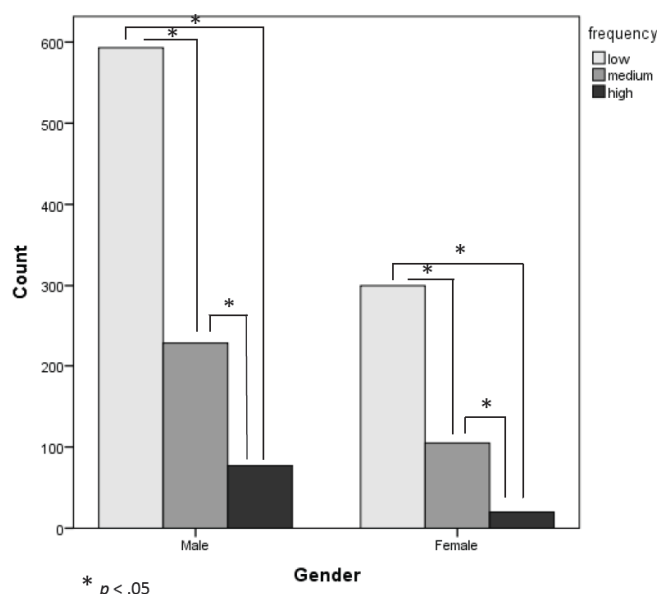


Figure 2: Gender of low, medium, and high frequency hallucinogen users ($N = 1323$).

Marital Status

Participants were collapsed into two categories to preserve the integrity of the analysis. Eighty-five participants (6.7%) were married, separated or divorced, 1190 (93.3%) had never been married. A chi square analysis indicated that frequency of hallucinogen use was not significantly associated with marital status, $X^2(2, N = 1275) = 4.87, p > .05$, (see Figure 3).

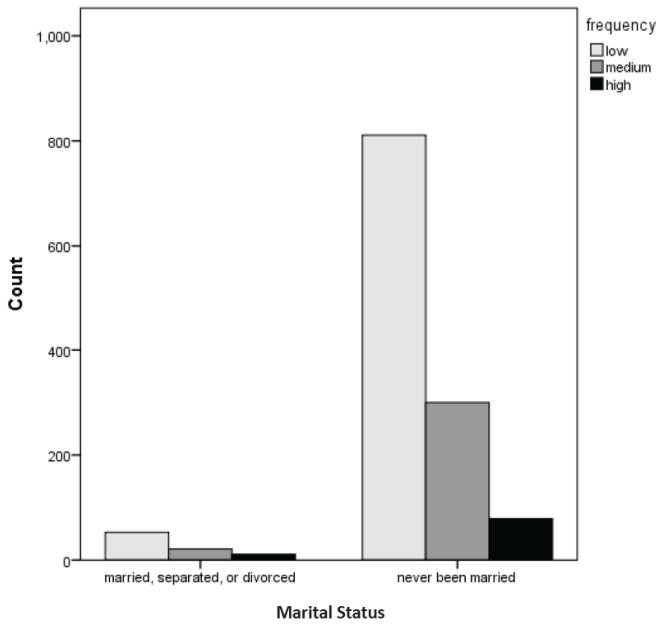
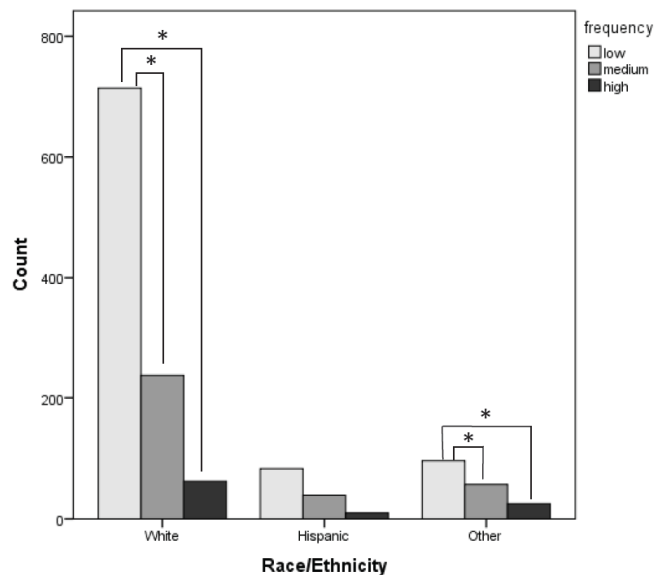


Figure 3: Marital status of low, medium, and high frequency hallucinogen users (N = 1275).

Race/Ethnicity

Participants' race/ethnicity was collapsed into three categories to preserve the integrity of the chi square analysis. There were 1013 White participants (76.7%), 132 Hispanic participants (10.0%), and 178 participants in the Other category (13.5%; including Black/African American, Native American/Alaskan Native, Native Hawaiian/Pacific Islander, and mixed race). Results of the chi square indicated that frequency of hallucinogen use was significantly associated with race/ethnicity, X^2



* p < .05

Figure 4: Race/ethnicity of low, medium, and high frequency hallucinogen users (N = 1323).

(4, N = 1323) = 25.18, p < .001. Compared to expected counts, Whites were significantly more likely to use hallucinogens with low frequency than with medium or high frequency, and participants in the Other category were significantly more likely to use hallucinogens with medium or high frequency than with low frequency (see Figure 4).

With respect to their proportions within the frequency of use categories, race/ethnicity was significantly associated with high frequency use (X^2 (2, N = 97) = 13.647, p < .01), with Other participants most likely to use with high frequency. Race/ethnicity was also significantly associated with low frequency use (X^2 (2, N = 893) = 119.698, p < .001), with Whites most likely to use with low frequency. There were no significant differences in race/ethnicity within the medium frequency of use category.

Income

Four hundred thirty-five participants (32.9%) had a yearly family income of \$20,000 or less, 390 (29.5%) earned \$20,000 - \$49,999, 162 (12.2%) earned \$50,000 - \$74,999, and 336 (25.4%) earned more than \$75,000 per year. A chi square analysis indicated that frequency of hallucinogen use was not significantly associated with family income, X^2 (6, N = 1323) = 6.44, p > .05, (see Figure 5).

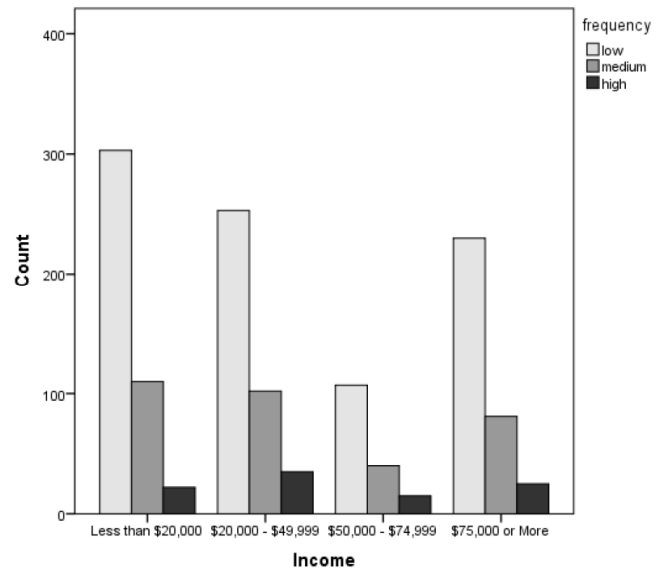


Figure 5: Income of low, medium, and high frequency hallucinogen users (N = 1323).

Education

One hundred thirty-three (10.1%) participants had less than a high school education, 308 (23.3%) were

high school graduates, 382 (28.9%) had some college, 140 (10.6%) were college graduates, and 360 (27.2%) were 12 to 17 years old. A chi square analysis indicated that frequency of hallucinogen use was significantly associated with education, $\chi^2 (8, N = 1323) = 38.08, p < .001$. Compared to expected counts, participants with less than a high school education were significantly less likely to use hallucinogens with low frequency than either medium or high frequency, and college graduates were significantly more likely to use hallucinogens with low frequency than medium or high frequency (see Figure 6).

With respect to their proportions within the frequency of use categories, education was significantly associated with high frequency use ($\chi^2 (4, N = 97) = 16.47, p < .01$), with participants with less than a high school education proportionately most likely to use with high frequency, and college graduates proportionately least likely to use with high frequency. There were no significant differences in education within the medium or low frequency of use categories.

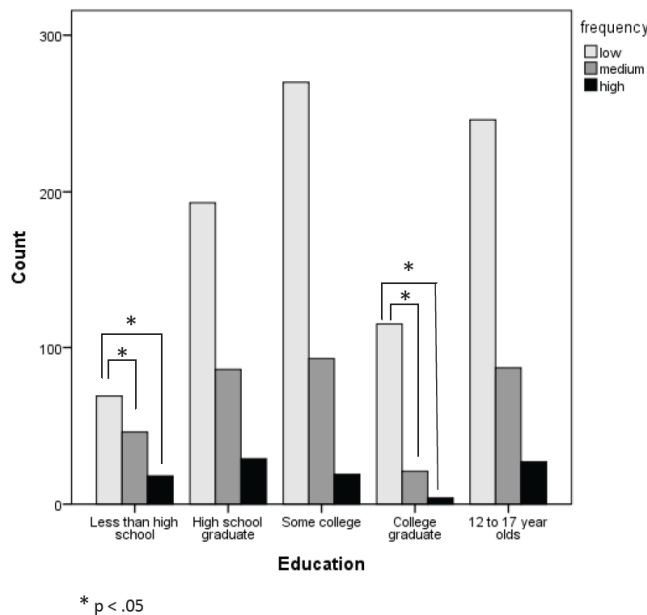


Figure 6: Education of low, medium, and high frequency hallucinogen users (N = 1323).

Employment

Participants aged 12 to 17 were eliminated from this analysis. Of the remaining participants, 360 (37.4%) were employed full time, 278 (28.9%) were employed part time, 135 (14.0%) were unemployed, and 190 (19.7%) were not included in the labor force. A chi square analysis indicated that frequency of hallucinogen use was not significantly associated with

employment status, $\chi^2 (6, N = 963) = 10.11, p > .05$, (see Figure 7).

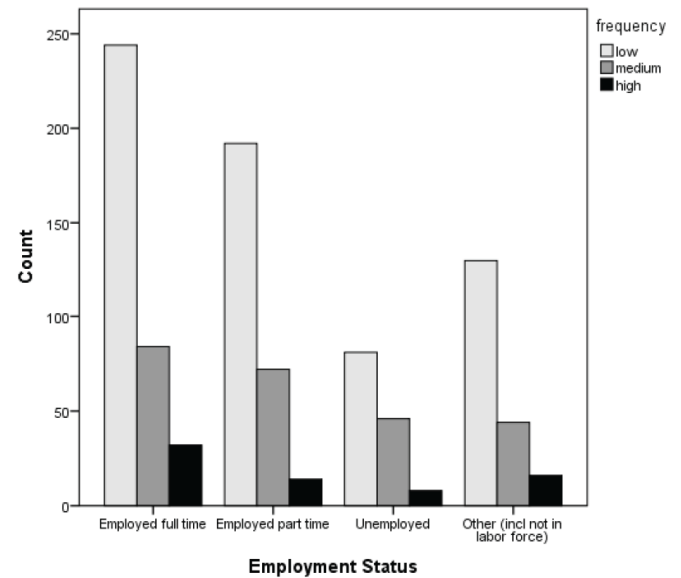


Figure 7: Employment status of low, medium, and high frequency hallucinogen users (N = 963).

Health

Three hundred twenty-one participants (24.3%) reported being in excellent health, 611 (46.2%) reported very good health, 315 (23.8%) reported good health, and 76 (5.7%) reported fair or poor health. A chi square analysis indicated that frequency of hallucinogen use was significantly associated with health status, $\chi^2 (6, N = 1323) = 27.73, p < .001$.

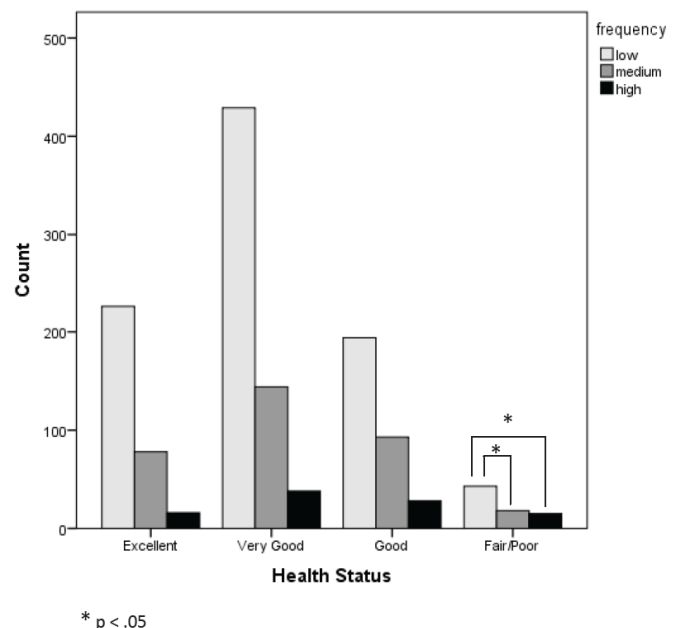


Figure 8: Health of low, medium, and high frequency hallucinogen users (N = 1323).

Compared to expected counts, those reporting fair or poor health were significantly more likely to be high or medium frequency users than low frequency users (see Figure 8).

With respect to their proportions within the frequency of use categories, health status was significantly associated with high frequency use ($\chi^2(3, N = 97) = 22.83, p < .001$), with participants in fair or poor health most likely to use with high frequency, and participants in excellent health least likely to use with high frequency. There were no significant differences in health status within the medium or low frequency of use categories.

DISCUSSION

These results provide a basis for generalizing about the demographic characteristics of classic hallucinogen users as well as drawing conclusions regarding the specific characteristics of those who use with varying frequency. In general, classic hallucinogen users were most likely to be White males between 18 and 25 years old, who had never been married, had some college, were employed full-time, had a family income less than \$20,000 per year, and were in very good health. This description is consistent with research by Chilcoat and Schutz [7] that found that the highest proportion of hallucinogen users are young adults, but it contradicts findings from the same researchers that hallucinogen users were likely to have high income families. Finally, the relatively young age of users may contribute to the high proportion of users reporting that they were in very good health.

Frequency of use did not vary significantly across age groups, but males were more likely to use with greater frequency than females, which may relate to risk-taking behavior generally. Marital status was also unrelated to frequency of use, but given the high proportion of users under 26 years old, it is not surprising that there were so few married, separated, or divorced participants in the sample. Family income also was not related to frequency of use, but users with less than a high school education were more likely to use hallucinogens more frequently and college graduates were more likely to use hallucinogens less frequently. Employment status was not associated with frequency of hallucinogen use, although the highest proportion of users were employed full time, which may imply that frequent hallucinogen use does not impair employment performance. However, high frequency users were more likely to report poor health than either low or medium frequency users.

In summary, high frequency hallucinogen users were more likely to be males in the "Other" racial/ethnic category who were less well educated, and less healthy, but they did not differ from other users in age, marital status, family income, or employment. Although the sample for this research was too small to effectively investigate each racial/ethnic category, the high rate of high frequency use among the "Other" racial/ethnic category, which included Native Americans, is perhaps consistent with the high prevalence of peyote use among Native Americans [26].

There are several limitations to this study, including the self-reported nature of the data. In particular, participants may have inaccurately recalled their frequency of hallucinogen use over the last year or inaccurately reported their health status due to the subjective nature of that evaluation. Another limitation is the cross-sectional nature of the NSDUH data, which prevents causal conclusions. Narrowing the sample to include users who have only ever used specific classic hallucinogens threatens the external validity of the findings since many classic hallucinogen users also use PCP, MDMA, and other hallucinogens as well. Another limitation of these findings is that the NSDUH data includes no information regarding the dose of hallucinogen taken by users, which may vary independent of use frequency.

Despite these limitations, these results point toward important areas for future investigation. For example, future research should attempt to assess the personality characteristics, patterns of use, and motivation of frequent hallucinogen users compared to those who use less frequently. Qualitative investigations could be particularly useful in this effort. Future research should also follow up on these findings to investigate the reasons why higher levels of education may correlate with lower frequency of hallucinogen use and attempt to identify the mediators and moderators that influence the relationship between high frequency of use and poor health status.

In general, it is hoped that this research may stimulate further work investigating the correlates of classic hallucinogen use and atypical patterns of use in order to promote a better understanding of the variety of people who use classic hallucinogens.

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