SHORT RESEARCH ARTICLE

Over 30 million psychedelic users in the United States [v1; ref status: indexed, http://f1000r.es/w8]

Teri S Krebs, Pål-Ørjan Johansen

Department of Neuroscience, Faculty of Medicine, Norwegian University of Science and Technology, Trondheim, Norway

v1 **First Published:** 28 Mar 2013, **2**:98 (doi: 10.12688/f1000research.2-98.v1)
Latest Published: 28 Mar 2013, **2**:98 (doi: 10.12688/f1000research.2-98.v1)

Abstract

We estimated lifetime prevalence of psychedelic use (lysergic acid diethylamide (LSD), psilocybin (magic mushrooms), mescaline, and peyote) by age category using data from a 2010 US population survey of 57,873 individuals aged 12 years and older. There were approximately 32 million lifetime psychedelic users in the US in 2010; including 17% of people aged 21 to 64 years (22% of males and 12% of females). Rate of lifetime psychedelic use was greatest among people aged 30 to 34 (total 20%, including 26% of males and 15% of females).

Article Status Summary

Referee Responses

Referees	1	2
v1 published 28 Mar 2013	✓ report	✓ report

1 **Wayne Hall**, University of Queensland Australia

2 **Dave Nichols**, Purdue University USA

Latest Comments

No Comments Yet

Corresponding author: Teri S Krebs (krebs@ntnu.no)

How to cite this article: Krebs TS, Johansen PØ (2013) Over 30 million psychedelic users in the United States [v1; ref status: indexed, http://f1000r.es/w8] *F1000Research* 2013, **2**:98 (doi: 10.12688/f1000research.2-98.v1)

Grant information: Both authors were supported by the Research Council of Norway, grant number 185924.
The funders had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript.

Competing Interests: No competing interests were disclosed.

First Published: 28 Mar 2013, **2**:98 (doi: 10.12688/f1000research.2-98.v1)
First Indexed: 17 Apr 2013, **2**:98 (doi: 10.12688/f1000research.2-98.v1)

Introduction

The classical serotonergic psychedelics, LSD (lysergic acid diethylamide), psilocybin ("magic mushrooms"), and mescaline (peyote and other cacti), have their main mechanism of action at the serotonin 2A receptor (5-HT_{2A}), produce similar, often indistinguishable subjective effects, and elicit cross-tolerance[1,2]. The mechanisms of action, subjective effects, and risk profile of the classical serotonergic psychedelics distinguishes them from other drugs sometimes also labeled "hallucinogens", such as entactogens, like methylenedioxymethamphetamine (MDMA; ecstasy) that act primarily at serotonin transporters, or dissociative anesthetics, like phencyclidine (PCP) or ketamine that act primarily at NMDA glutamate receptors[1].

Prevalence data on psychedelic use in the US is often reported for LSD alone (ignoring psilocybin and mescaline), or for psychedelics grouped together with PCP (popular in the 1970s), MDMA (popular since the 1990s), and/or other "hallucinogens" (some older estimates of hallucinogen use even included cannabis, amphetamine, and cocaine as hallucinogenic drugs), or for use among teenagers but not adults. Here, we present estimated lifetime prevalence of psychedelic use by age category using data from a large US population survey.

Methods

We examined the estimated lifetime use of psychedelics by age based on 2010 data of the National Survey on Drug Use and Health (NSDUH). Results are presented for males and females separately. We counted participants as having any lifetime psychedelic use if they reported ever using LSD, psilocybin, mescaline, or peyote. The use of mescaline and peyote were combined into one category because mescaline is the active substance of the peyote cactus, but peyote use was also examined separately. Current age was only available as a categorical variable. This study was exempt from review by our Regional Committee for Medical Research Ethics because all data are available in the public domain without any identification of personal information.

Data source

The annual NSDUH survey provides estimates of substance use and mental health indicators from a randomly-selected sample representative of the US civilian non-institutionalized population aged 12 and older. The Substance Abuse and Mental Health Services Administration (SAMHSA) of the US Department of Health and Human Services is responsible for the NSDUH study design and methods of assessment. Trained interviewers met the randomly-selected participants in their homes, and participants listened to recorded questions via headphones and then entered their answers directly into a computer, providing a highly confidential and standardized setting. The response rate was approximately 78%. In addition, approximately 10% of participants were excluded from the public use data file, either because of excessive missing data on drug use or because they were excluded at random in order to increase anonymity. The total number of respondents in the public use file was 57,873. Detailed information on the sampling and data collection methods, including interview instructions and questionnaires, confidentiality and informed consent are available on the SAMHSA website (http://oas.samhsa.gov/nsduh.htm).

Data analysis

Estimates were calculated using the online Survey Documentation Analysis from the Inter-university Consortium for Political and Social Research (http://dx.doi.org/10.3886/ICPSR32722.v3). Calculations of estimated population percentages and extrapolated total numbers of psychedelic users in the US took into account the weights provided with the NSDUH public use data file. Variance estimates took into account the complex sample design of the NSDUH survey using Taylor series linearization. Respondents with missing data on psychedelic use (less than 1% of the respondents) were assumed to have no use.

Results

An estimated 32 million (95% confidence interval (CI): 30 to 33 million) US residents in 2010 reported lifetime use of LSD (23 million, 95% CI: 22 to 25 million), psilocybin (21 million, 95% CI: 20 to 22 million), mescaline (11 million, 95% CI: 10 to 12 million), or peyote (6 million, 95% CI: 5 to 7 million).

Figure 1 shows the rate of lifetime psychedelic use in the US in 2010 by age category and gender. Lifetime rate of psychedelic use among people aged 50 to 64 years (the "baby boomer" generation) was similar to the rate among people aged 21 to 49 years. Among people aged 21 to 64 years, 17%, (95% CI: 15% to 18%) reported ever using LSD, psilocybin, or mescaline, including 22% (95% CI: 21% to 23%) of males and 12% (11% to 13%) of females. Prevalence of psychedelic use was low among people aged 65 and older (total 1.3%, 95% CI: 0.8% to 2.1%). Rate of lifetime psychedelic use was greatest among people aged 30 to 34 years (total 20%, 95% CI: 18% to 22%), with 26% (95% CI: 23% to 29%) of males and 15% (95% CI: 13% to 17%) of females.

Discussion

Psychedelics continue to be widely used in the US. Common reasons given for using psychedelics include curiosity, mystical experiences, and introspection[3]. Rates of lifetime psychedelic use are greater in males than in females. Overall rates of lifetime psychedelic use are roughly the same among the "baby boomers" and younger adults. However, psilocybin was more common among younger adults, while LSD and mescaline or peyote were more common among older adults. Use of psilocybin mushrooms has increased since the 1970s in the US and worldwide, likely due to dissemination of simple home cultivation techniques, instructions on finding wild mushrooms, and information about effects and methods of psilocybin mushroom use[4]. This was a retrospective cross-sectional study. Self-reports of drug use behaviors could be influenced by memory errors and under-reporting; however, a

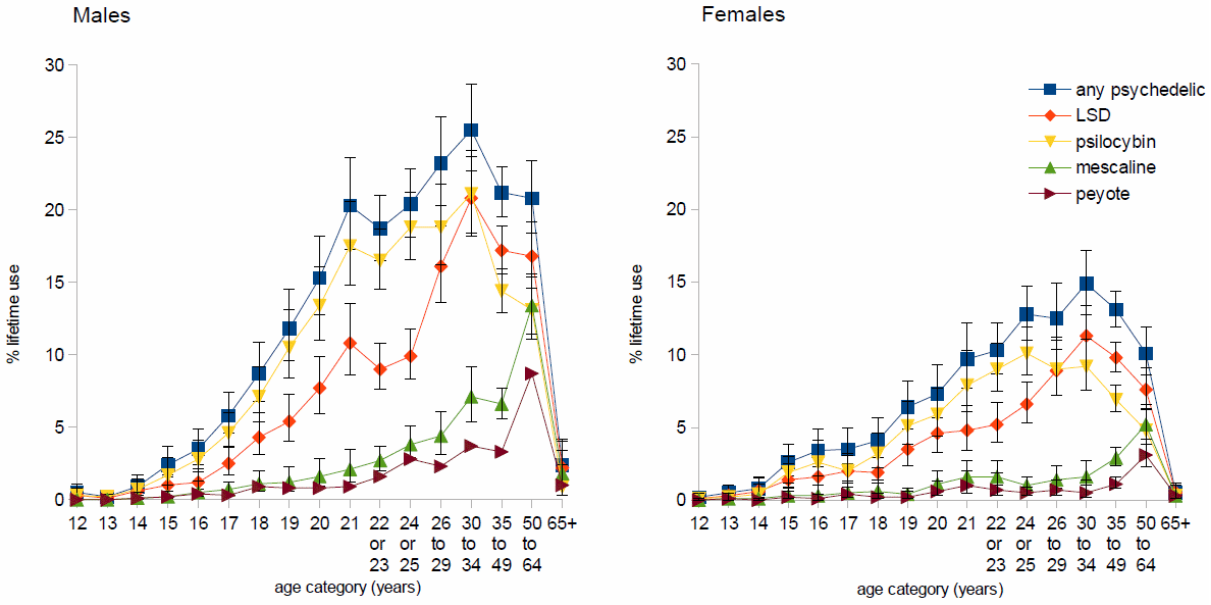

Figure 1. Lifetime psychedelic use by age and gender in the US in 2010. Error bars show 95% confidence intervals. Any psychedelic includes LSD, psilocybin, mescaline, and/or peyote. Mescaline includes both mescaline and peyote.

14-year longitudinal study reported good consistency over time in the reporting of lifetime LSD use[5].

Author contributions

TK conducted the data analysis. Both authors prepared and approved the manuscript for publication.

Competing interests

No competing interests were disclosed.

Grant information

Both authors were supported by the Research Council of Norway, grant number 185924.

The funders had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript.

Acknowledgments

The Substance Abuse and Mental Health Data Archive provided the data files from the National Survey on Drug Use and Health, which was sponsored by the Office of Applied Studies of the Substance Abuse and Mental Health Services Administration.

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PubMed Abstract

Current Referee Status:

Referee Responses for Version 1

Dave Nichols
Department of Physical chemistry and Molecular Pharmacology, Purdue University, West Lafayette, IN, USA

Approved: 17 April 2013

Referee Report: 17 April 2013
This report is short and well written. It reports on lifetime incidence of use of various psychedelics. Without knowing the frequency of use, however, these data do not indicate whether the use of psychedelics is increasing.

I have read this submission. I believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

Competing Interests: No competing interests were disclosed.

Wayne Hall
University of Queensland, St Lucia, Australia

Approved: 03 April 2013

Referee Report: 03 April 2013
The paper is concise and well written and I have no major criticisms of the content of the article. The authors have appropriately analysed the best available data on the question that they address namely, what is the estimated life time use of various psychedelic drugs among US adults. They report analyses of a large representative US household survey data on lifetime experience with various psychedelic drugs. My issue is more with what the paper does not say.

What's missing from the paper is any indication of why the authors' question is worth posing:

1. Why do lifetime rates of psychedelic drug use among US adults matter?

2. Why did they only report lifetime use? Lifetime or ever use can overstate rates of use in the population. I would bet that most psychedelic use is very limited e.g. once or twice during late adolescence and early adulthood. This isn't clear from the lifetime data presented. Some data on frequency of use would make it clearer if most psychedelic use is in fact limited and experimental rather than more persistent as occurs with cannabis and MDMA.

3. Were any data collected on adverse events or experiences? If so, this could be briefly reported.

4. It would be useful to provide a bit more data on the characteristic of psychedelic drug users other than

their age and sex. How are they characterised by SES, education, geographic areas of residence and experience with other illicit drugs e.g. cannabis, MDMA and stimulants?

5. What if anything follows from the findings? Should we be concerned about this use or should we regard psychedelic drug use as being of much lower public health concern than the use of other illicit drugs such as cannabis, amphetamine type stimulants, cocaine and opioids?

I have read this submission. I believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

Competing Interests: No competing interests were disclosed.