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Ayahuasca and Public Health: Health Status, Psychosocial Well-Being, Lifestyle, and Coping Strategies in a Large Sample of Ritual Ayahuasca Users

Genís Ona, M.Sc.^{a,b}, Maja Kohek, M.Sc.^{a,b}, Tomàs Massaguer, B.Sc.^a, Alfred Gomariz, B.Sc.^a, Daniel F. Jiménez, M.Sc.^a, Rafael G. Dos Santos, Ph.D. ^{a,c}, Jaime E. C. Hallak, Ph.D.^{c,d}, Miguel Ángel Alcázar-Córcoles, Ph.D.^e, and José Carlos Bouso, Ph.D.^a

^aInternational Center for Ethnobotanical Education, Research, and Services (ICEERS), Barcelona, Spain; ^bDepartment of Anthropology, Philosophy and Social Work, Universitat Rovira i Virgili, Tarragona, Spain; ^cDepartment of Neuroscience and Behavior, Ribeirão Preto Medical School, University of São Paulo, São Paulo, Brazil; ^dNational Institute for Translational Medicine (INCT-TM), CNPq, Ribeirão Preto (SP), Brazil; ^eDepartamento de Psicología Biológica y de la Salud, Facultad de Psicología, Universidad Autónoma de Madrid, Madrid, Spain

ABSTRACT

Assessing the health status of ayahuasca users has been challenging due to the limitations involved in randomized clinical trials and psychometric approaches. The main objective of this study is the implementation of an approach based on public health indicators. We developed a self-administered questionnaire that was administered to long-term ayahuasca users around Spain. The questionnaire was administered face-to-face to participants ($n = 380$) in places where ayahuasca ceremonies were occurring. Public health indicators were compared with Spanish normative data, and intergroup analyses were conducted. Long-term ayahuasca use was associated with higher positive perception of health or with a healthy lifestyle, among other outcomes. Fifty-six percent of the sample reported reducing their use of prescription drugs due to ayahuasca use. Participants who used ayahuasca more than 100 times scored higher in personal values measures. The main conclusion of this study is that a respectful and controlled use of hallucinogenic/psychedelic drugs taken in communitarian settings can be incorporated into modern society with benefits for public health. This new approach, based on the use of health indicators that were not used in previous ayahuasca studies, offers relevant information about the impact of long-term exposure to ayahuasca on public health.

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Ayahuasca; hallucinogens; lifestyle; psychedelics; psychological well-being; public health

Ayahuasca is the Quechua term for the decoction of the Amazonian vine *Banisteriopsis caapi* (Shultes 1967). It is used in traditional contexts as a medicine, for spiritual purposes, and in communitarian ceremonies to strengthen social bonds (Andritzky 1989). *B. caapi* contains inhibitors of the monoamine oxidase (MAOI compounds), such as harmine, harmaline, and tetrahydroharmine, which prevent the endogenous breakdown of compounds from the plants that are added to ayahuasca, thereby enhancing their biological effects (McKenna, Towers, and Abbott 1984).

The most common presentation of ayahuasca is the combination of *B. caapi* with *P. viridis*, or with the vine *Diplopterys cabrerana*, which contains the hallucinogenic compound N,N-Dimethyltryptamine (DMT). The expansion of ayahuasca from the jungle into urban Brazil (Grob et al. 1996; Labate 2004; Luna 2011; McKenna 2004) and then internationally (Sánchez and Bouso 2015) has led to its being used in multiple eclectic and syncretic ways throughout the world.

The international expansion of the use of ayahuasca is occurring in a context wherein serotonergic psychedelic research and therapy are gaining new recognition in the field of biomedicine, a phenomenon that several authors refer to as a “psychedelic renaissance” (Kotler 2010; Sessa 2018; Tupper and Labate 2014). Psilocybin, lysergic acid diethylamide (LSD), ibogaine, and MDMA (3,4-Methylenedioxyamphetamine) are being studied for the treatment of addictions, major depression, cluster headache, obsessive-compulsive disorder, post-traumatic stress disorder (PTSD), anxiety and depression associated with life-threatening diseases, and social anxiety among individuals with autism (Danforth et al. 2018; dos Santos et al. 2018; dos Santos, Bouso, and Hallak 2016; Mithoefer, Grob, and Brewerton 2016).

At the same time, contemporary psychedelic research is occurring in a particular moment when biomedicine is being questioned as the main source of evidence for public health decisions (Jones and Wilsdon 2018). In the field of psychopharmacology (focusing on psychiatric and

neurological drugs), some authors suggest that it is in a state of crisis (Fibiger 2012; Insel et al. 2013), while others claim that psychedelic drugs may offer a solution for overcoming such a crisis (Mithoefer, Grob, and Brewerton 2016; Ona and Bouso 2019).

Alongside evidence from clinical trials, some study populations that use data from national epidemiologic surveys also conclude that psychedelics can offer beneficial outcomes with regards to mental health (Hendricks et al. 2015; Johansen and Krebs 2015; Krebs and Johansen 2013). Additionally, studies comparing ritualistic peyote (a mescaline-containing cacti) users (Halpern et al. 2005) and ritualistic ayahuasca users (Barbosa et al. 2016; Bouso et al. 2012, 2015; Fábregas et al. 2010; Grob et al. 1996) with non-users have indicated that the former performed better regarding some neuropsychological and psychopathological variables, including showing less use of alcohol and illegal drugs and reporting remission from anxiety and mood disorders. Although psychedelics can also trigger psychopathological crises (dos Santos, Bouso, and Hallak 2017), their occurrence seems to be limited and preventable when doing proper screenings (Johnson, Richards, and Griffiths 2008).

Despite the growing interest in biomedicine regarding psychedelics as potential tools for the treatment of mental conditions, there are no studies based on public health indicators that assess the potential benefits of psychedelics when they are used in communitarian contexts. With the globalization of some traditional medicines like ayahuasca and peyote, a growing number of people from outside of the traditional territories are attending ceremonies with the purpose of generally improving their health, curing specific medical and/or psychopathological conditions, or simply for personal growth (Franquesa et al. 2018; Horák, Hasíková, and Verter 2018; Malcolm and Lee 2018; Prat et al. 2012). Contemporary use of ayahuasca is generally in the context of a social setting (Apud and Romaní 2017; MacRae 1998; Talin and Sanabria 2017), thus strengthening social bonds (Andritzky 1989; Cavnar 2014; Kavenská and Simonová 2015; Prat et al. 2012), an aspect that is particularly important for the maintenance of a positive mental health status (Berkman 1995; Ozbay et al. 2007; Wang et al. 2018). Thus, it is now possible to assess in the real world, from a public health perspective, the consequences of the integration of psychedelics into society.

In this article, we present the results of a face-to-face assessment of health and psychosocial well-being, lifestyle, and coping strategies among a large sample of Spanish ritualistic ayahuasca users, using public-health-based indicators.

Methods

Participants

This study involved a sample of long-term ritualistic ayahuasca users in Spain. The inclusion criterion was to have used ayahuasca in a ritual communitarian context for more than six months before the assessment. The exclusion criteria were if the individual was under 18 years old (the age of legal adulthood in Spain) and if there was a clinical suspicion that a potential participant had a neurocognitive disorder.

Measures

A questionnaire was developed especially for this study. We selected items from several psychometric questionnaires and from indicators used in health surveys. The final questionnaire included indicators assessing eight different dimensions. The General Health dimension included measures of self-perceived health status, body mass index (BMI), presence of chronic disease, physical limitation, sleep problems, levels of cholesterol and blood pressure, medical/psychology visits, and use of prescription drugs. The Lifestyle dimension measured physical activity, mode of transport to work, and diet. The Positive Mental Health measure included activities like yoga/meditation, feeling loved by others, vital goals, autonomy, and perception of happiness. Adjustment was measured using items from the Bell Adjustment Inventory (BAI; Bell 1962). Coping strategies were measured using items from the Coping Strategies Inventory (CSI; Tobin, Holroyd, and Reynolds 1984) and the Coping Orientation to Problems Experienced (COPE; Carver, Scheier, and Weintraub 1989). Cultural activities included frequency of participation in activities like exhibitions, museum visits, or artistic workshops, and reading habits. Social support was measured using number of close family members and friends, the presence of someone with whom to go to the doctor, the presence of people who express affection to the participant, the possibility to share feelings of joy or sadness with a friend, and someone with whom to share private fears and worries. Last, the Personal values dimension used the Engaged Living Scale (ELS; Trompetter et al. 2013). The ELS has two subscales (Valued Living, measuring the recognition and knowledge of personal values and the capacity to undertake actions congruent with these values; and Life Fulfilment, which measures one's sense of fulfilment in life as a consequence of recognizing and living in accordance with personal values), and gives a total score, which suggests the degree to which an individual

Table 1. Dimensions conforming the administered questionnaire, indicators in each dimension, and sources used.

Dimensions	Indicators	Source
General health	Self-perceived health	ENSE (2017)
	Body mass index	SEEDO (2018)
	Chronic diseases	INEBase (2014)
	Physical limitation	INEBase (2014)
	Sleep problems	SEN (2016)
	Cholesterol/blood pressure	ENSE (2017)
	Medical visits	INEBase (2014)
	Mental health visits	-
	Use of prescription drugs	ESCAV 2018
	Lifestyle	Physical activity
Mode of transport to work		CONAMA (2016)
Positive mental health	Diet	5alDia project
	Yoga/meditation	AOMM (2014)
Adjustment	Feel loved by others	Lluch (2000)
	Vital goals	Lluch (2000)
	Autonomy	Lluch (2000)
	Perception of happiness	GNSB 2018
Coping strategies	Items from questionnaires	Bell (1962)
	Items from questionnaires	Tobin, Holroyd, and Reynolds (1984); Carver, Scheier, and Weintraub (1989)
Cultural activities	Frequency of participation in cultural activities	-
Social support	Reading habit	Eurostat (2016)
	Number of close family members and friends	Sherbourne and Stewart 1991
	Presence of a close person with whom to go to the doctor	Statistics Canada 2018
	Presence of people who express affection to him/her	Statistics Canada 2018
	A friend with whom to share feelings of joy or sadness	Zimet et al. 1988
	Someone with whom to share private fears and worries	MOS-SSS
Personal values	Complete questionnaire	Trompetter et al. (2013)

is involved in engaged living, understood as a concept of the Acceptance and Commitment Therapy (ACT) model. We also administered the General Health Questionnaire (GHQ-12) (Goldberg 1972) to obtain an independent measure of general mental health. A description of the item selection can be found in Table 1, and the questionnaire is available on request.

Procedure

During a six-month period, we visited various locations in the Spanish territory where ayahuasca ceremonies took place. Because one ICEERS (International Centre for Ethnobotanical Education, Research, and Services) project is focused on engaging ayahuasca leaders, we asked to

collaborate with them in order to conduct this study. We visited two different settings where we found religious (Santo Daime communities) and neo-shamanic groups. Both kinds of groups use ayahuasca as part of a ceremony. Individuals take ayahuasca in the evening, in a group setting, indoors and with caregivers present, following a previously structured session, in order to ensure that participants are taken care of and to help them to contain the experience. The duration of the ceremonies varies from six to 12 hours. Participants who planned to attend these ceremonies were invited to participate in the study. The questionnaires were completed before the ceremony started. Those who were eligible to participate in the study and agreed to do so signed an informed-consent form and then completed the questionnaires face-to-face with a trained psychologist or an anthropologist. Study procedures were approved by the Research Ethics Committee of the Universidad Autónoma de Madrid (Autonomous University of Madrid), Spain.

Statistical analyses

Descriptive statistics were used to present the data. Data for the most relevant health indicators were compared with Spanish normative data from various health surveys published between 2014 and 2018. Data from the psychometric questionnaires were compared with normative Spanish data. The multivariate General Linear Model (GLM) was performed with the number of times that ayahuasca was used, type of ceremony (Santo Daime vs Neoshamanic groups), and gender as factors, in order to determine differences between groups. The corresponding size effect (Cohen's *d*) was also calculated. A linear regression model (stepwise method) was performed to find which variables can better predict the mental health status of the sample, measured by GHQ-12. A *p* value of <.05 was considered statistically significant for both analyses. Bonferroni multiple comparisons correction was applied. IBM® SPSS version 21.0 software package was used. An online calculator of effect size was used (<https://www.uccs.edu/lbecker/>).

Results

A total of 380 (47% women) long-term ayahuasca users completed the questionnaire (32.5% were Santo Daime members), with a mean age of 44 years old (SD = 10). See Table 2 for sociodemographic information.

Concerning the use of ayahuasca, the largest number of respondents reported having taken ayahuasca between one and 10 times in their lifetime (34.2%), followed by more than 100 times (29.7%). In the

Table 2. Sociodemographic information and use of ayahuasca and other drugs.

	<i>n</i> (%) or Mean (SD)
Age	44 (10)
<34	58 (15.3%)
35–44	154 (40.6%)
45–54	93 (24.5%)
55–64	61 (16.1%)
65+	13 (3.4%)
Gender	
Women	179 (47%)
Men	201 (53%)
Education	
Primary education	4 (3.3%)
Secondary school	19 (15.7%)
High school	27 (22.3%)
University graduate	39 (32.2%)
Postgraduate studies	27 (22.3%)
Ph.D.	5 (4.1%)
Jobs	
Trade jobs	90 (24%)
Health sector	81 (21.7%)
Administrative	46 (12.3%)
Artist	35 (9.4%)
Teaching	31 (8.3%)
Others	88 (23.1%)
Area	
Urban	233 (62.3%)
Rural	140 (37.4%)
Number of inhabitants	
0–5,000	112 (31.4%)
5,000–25,000	47 (13.2%)
25,000–50,000	18 (5%)
50,000–100,000	20 (5.6%)
100,000–500,000	34 (9.5%)
500,000–1,000,000	13 (3.6%)
1,000,000–2,000,000	39 (11%)
>2,000,000	74 (20.7%)
Type of housing	
Flat	209 (55.6%)
Particular house	152 (40.4%)
Sharing housing with	
Partner	93 (26%)
Family/children	124 (34.8%)
Friends	65 (18.3%)
Living alone	74 (20.8%)
Financial difficulties in last six months	92 (24.3%)

*SD = Standard deviation.

previous six months before completing the questionnaire, 38% of the participants reported having used ayahuasca between one and two times, while 9.3% used ayahuasca more than 20 times. The mean was between three and five times. Sixty-seven percent of the sample reported that their use of ayahuasca influenced their life “very positively”; 30.7% reported that its use influenced them “positively”; and 1.7% reported that “it has not had an influence.” No participants answered that it had influenced them “negatively” or “very negatively.”

About half of the sample (49.7%) used drugs other than ayahuasca in the previous six months (Table 3). The most common drug used was cannabis (31%), followed by MDMA (“ecstasy”; 11%), psilocybin mushrooms (7.1%), and San Pedro cactus (7.1%).

General health

The majority of the sample (96.6%) reported a positive perception of their health status (“good,” “very good,” or “excellent” health status). Mean BMI was 22.6 (SD = 4.1), fulfilling normality criteria (established as being between 18.5 and 25 in Spain; SEEDO 2018). The proportions of ayahuasca users reporting chronic disease and physical limitations, broken out by age group, are shown in Table 4, along with comparable information for the general population. Regarding cholesterol and blood pressure levels, 7.4% of our sample were told by a health professional that they presented a high cholesterol or blood pressure level. These scores for our ayahuasca sample are considerably better than those for the general Spanish population, where 18%–20% of the population are affected by high cholesterol or blood pressure (ENSE 2017). Regarding medical visits, 47.5% of the sample did not visit a doctor during the previous six months, and 47% of the sample visited a doctor between one and three times in the previous six months (data not shown). Regarding visits to a psychologist or psychiatrist, 81% of the sample did not visit any in the previous six months, while 10% visited between one and three times. Among ayahuasca users, 53.5% and 57.3% of the sample reported reducing their use of medical and mental health services, respectively. Regarding the use of prescription drugs, 57.2% of the sample reported not having used any drugs during the previous six months, 39.6% of the sample reported using fewer than five drugs, and the remaining 3.2% reported using more than five drugs. Among ayahuasca users, 56% of the sample reported a reduction in their use of prescription drugs.

Lifestyle

Almost half of the sample (45.4%) reported not being as physically active as they wished. The most frequent mode of transportation to work was one’s own vehicle (36%), followed by walking (32.8%), bicycling (14%), and public transport (12.8%). About one-third of the sample (31.2%) reported sleep problems during the previous weeks. The majority of the sample (88.4%) reported paying attention to their diet and trying to increase their consumption of healthy foods while reducing their intake of sugars, fats, and/or alcohol. Seventy-three percent of the sample were consuming between one and three servings of fruits daily, and 20% were consuming between four and six daily servings. Sixty percent of the sample were consuming between one and three servings of vegetables daily, and 30% were consuming between four and six daily servings (see Table 4).

Table 3. Other drugs used (in the last six months), compared with other drugs used by general population (in the last 12 months).

	Ayahuasca users				Total	General population				
	18–34 years (n = 58)	35–44 years (n = 154)	45–54 years (n = 93)	55–64 years (n = 61)		18–34 years	35–44 years	45–54 years	55–64 years	Total
Alcohol	7 (12%)	14 (9%)	3 (3.2%)	2 (3.3%)	26 (6.8%)	79.8%	77.8%	79%	72.3%	77.6%
Cannabis	23 (39.7%)	58 (37.7%)	23 (24.7%)	17 (28%)	127 (33.3%)	20%	9%	4.7%	2%	9.5%
Cocaine	2 (3.4%)	14 (9%)	6 (6.5%)	1 (1.6%)	23 (6%)	3.3%	2.5%	1.3%	0.4%	2%
MDMA	6 (10.3%)	21 (13.6%)	10 (10.8%)	4 (6.6%)	43 (11.3%)	1%	0.4%	0.2%	0.1%	0.6%
Psilocybe mushrooms	6 (10.3%)	10 (6.5%)	6 (6.5%)	3 (5%)	27 (7.1%)	0.4%	0.4%	0%	0%	0.4%
Ketamine	2 (3.4%)	5 (3.2%)	0%	0%	7 (1.8%)	0.2%	0.2%	0%	0%	0.1%
Speed	1 (1.7%)	3 (2%)	2 (2.2%)	1 (1.6%)	7 (1.8%)	1%	0.5%	0.2%	0%	0.5%
Hallucinogens	6 (10.3%)	24 (15.6%)	11 (11.8%)	8 (13%)	50 (14%)	0.8%	0.7%	0.1%	0.1%	0.6%

Positive mental health

A large proportion of the sample (86.3%) were engaged in activities like meditation or yoga. Almost all of the participants (98.2%) reported having someone who loved them. Almost all of the participants (97%) reported having vital goals to fulfill or to fight for. The majority of the participants (92.6%) reported having personal autonomy. Regarding perception of happiness, 43.7% reported being “quite happy,” 39.2% reported being “very happy,” and 7.5% reported being “immensely happy.”

Adjustment

Based on all of the items that we selected for the estimate of adjustment, the maximum level of adjustment was a score of five. Among the respondents, 9.4% scored five, 33.3% scored four, and 52% scored three. The mean obtained was 3.4 (SD = 0.7). Only 5.3% of respondents scored one or two, which can be interpreted as poor general adjustment.

Coping strategies

Based on all of the items that we selected to assess ways of coping, the score that best reflected the adoption of appropriate coping strategies was 14. The mean obtained was 9.3 (SD = 1.8). Among the sample, 1.1% scored five or less, and 45% scored 10 or more.

Cultural activities

Between 38% and 42.5% of the sample reported being engaged in cultural activities. Regarding reading habits, 86.2% of the sample read one or more books in the previous six months.

Social support

Among the sample, 39.4% reported having four to six close friends or family members, 24% reported having one to three, and 22% reported having 10 or more.

Only 2% of the sample reported not having any close friends or family members. The majority of the sample (96.3%) had someone to go to the doctor with them. The majority of the sample (97%) had someone who expressed affection to them. The majority of the sample (96.8%) also had someone with whom to share their feelings of joy or sadness. Furthermore, 96.6% of the sample had someone with whom to share their private fears and worries.

Personal values

Scores of the first scale of the questionnaire (Valued Living) range from 11 to 55. The mean obtained in our sample was 42.6 (SD = 4.6). Scores of the second scale (Life Fulfillment) range from 6 to 30, and the mean obtained was 24.4 (SD = 3). Total scores range from 16 to 80. The mean obtained in our sample was 67 (SD = 10). Among the sample, 14% scored 60 or less, while 30% scored above 70.

General health questionnaire-12 (GHQ-12)

The mean GHQ-12 score was 1.3 (SD = 2.3). The majority of the sample (82.7%) scored three or less (see Table 4).

Multivariate general linear model (GLM)

Chi-square testing showed that groups of the first factor (number of times ayahuasca was used) were not matched by age [$\chi^2(100) = 171, p < .001$] but matched by gender [$\chi^2(2) = .77, p = .67$]. Groups of the second factor (type of ceremony) were not matched by age [$\chi^2(50) = 75, p = .01$] but were matched by gender [$\chi^2(1) = .55, p = .45$]. Third factor (gender) groups were not matched by age [$\chi^2(50) = 70, p = .03$].

The multivariate GLM was used to identify potential differences between groups. Using ayahuasca a greater number of times was associated with being older [$F(2) = 28.6, p < .001$], with an enhanced sense of Valued Living [$F(2) = 4, p = .01; d = .50$] and Engaged Living

Table 4. Comparison of indicators between ayahuasca users and general population.

Health indicators	Ayahuasca users			General population		
	Positive perception of health	BMI	Cholesterol/Blood pressure	Positive perception of health ^a	BMI ^b	Cholesterol/Blood pressure ^a
	96.6%	22.6	7.4%	74%	18–25	18–20%
	Physical limitation			Physical limitation ^c		
18–34 years	8.6%		8.6%	42.4%		17%
35–44 years	9.1%		8.4%	47.5%		15%
45–54 years	16.1%		10.8%	60.1%		21%
55–64 years	29.5%		6.6%	75.8%		31%
+65 years	7.7%		15.4%	84.3%		40%
Total	14%		9%	60%		25.6%
Lifestyle indicators	Mode of transport		Daily fruits (DP)	Mode of transport ^d		Daily fruits (>1 daily) ^f
	Own vehicle (36%)		1–3 (73%)	Own vehicle (61.5%)		43%
	Sleep problems		Daily vegetables (DP)	Sleep problems ^e		Daily vegetables (>1 daily) ^f
	31.2%		1–3 (60%)	20–48%		22%
	Good MH		Poor MH	Good MH ^g		Poor MH ^g
	82.7%		17.3%	85.3%		14.7%
	80%		20%	75.4%		24.6%
	81.4%		18.5%	80.6%		19.4%
GHQ-12	Men			Men		
	82.7%			85.3%		
	Woman			75.4%		
	80%			80.6%		
	Total			80.6%		
	81.4%			80.6%		

BMI = body mass index; DP = daily portions; GHQ = general mental health; MH = mental health. ^aENSE (2017); ^bSEEDO (2018); ^cINEBase (2014); ^dCONAMA (2016); ^eSEN (2016); ^fSaldía; ^gRocha et al. 2011.

[F(2) = 3.6, $p = .02$; $d = .44$]. Regarding ceremony type, those who attended Santo Daime ceremonies visited mental health professionals less frequently than those who participated in Neo-shamanic groups [F(1) = 4.8, $p = .02$; $d = .66$]. There were no significant differences by gender.

Linear regression

A linear regression model was used to identify predictor variables for general mental health status (measured by the GHQ-12). Only Valued Living, Engaged Living, and Self-Perceived Health Status can be used as predictor variables [F(3) = 17.2, $p < .001$; $R^2 = .24$].

Discussion

The study results are described in terms of a series of indicators that assessed bio-psychosocial factors among a large sample of long-term ritualistic ayahuasca users. Previous studies that assessed the mental health status of psychedelic users analyzed data from national surveys (Hendricks et al. 2015; Johansen and Krebs 2015; Krebs and Johansen 2013) or from naturalistic studies comparing users with non-users (Barbosa et al. 2012, 2016; Bouso et al. 2012, 2015). This is the first study in which a large sample of psychedelic users has been assessed using indicators from a public health perspective.

Almost all of the participants described their experience with ayahuasca as “very positive” or “positive,” whereas no participants described it as “negative” or “very negative.” Regarding the use of other drugs, the prevalence of use in the previous six months was considerably higher than the Spanish general population, excepting alcohol, both for the total sample and when stratifying by age (OEDA 2017). These results are in disagreement with previous studies (Fábregas et al. 2010; Grob et al. 1996; Halpern et al. 2008), except regarding alcohol intake (Barbosa et al. 2018; Lawn et al. 2017). The reason for the disagreement may be that the earlier studies were conducted with samples of participants who belonged to ayahuasca religions, and the influence of religious doctrine may be a protective factor against the misuse of psychoactive drugs (Moscati and Mezuk 2014). In our sample, only 32.5% were members of an ayahuasca religion. These results are interesting because ayahuasca has been proposed as a treatment for drug dependence (Bouso and Riba 2014; Nunes et al. 2016). Since psychedelic experiences are context-dependent (Carhart-Harris et al. 2018; Hartogsohn 2016), the achievement of a positive outcome seems not to be an inherent property of the substance. Although in disagreement, our results do not

contradict those of earlier studies, since our participants seem to engage in the responsible use of other psychoactive drugs, as reflected in the better scores obtained by this study's participants on most of the assessed health indicators relative to the general population. Moreover, participants described using mostly cannabis and psychedelics, which are substances associated with less social and physical harm to the individual and to society when compared to other drugs such as alcohol, crack cocaine, and heroin (van Amsterdam et al. 2015).

Compared to the general Spanish population, our participants scored higher in terms of perceiving their health status positively (ENSE 2017), had BMIs within the normal range (SEEDO 2018), and had lower levels of cholesterol and hypertension (ENSE 2017), both for the general sample and when stratified by age. In addition, the prevalence of chronic diseases was lower among our sample, as compared to the general Spanish population. Our sample was mostly composed of people who live in the Catalonia territory (69.7%), and the prevalence of chronic disorders is also lower in the general Catalanian population (38%) than in the general Spanish population (60%). Our sample scored lower than the general Catalanian population in terms of chronic disease prevalence, both for the general sample and when stratified by age (OSG 2014). The prevalence of physical limitations was half that compared with the general sample and when stratified by age (INEBase 2014).

More than the half of the sample reported reducing their use of medical and/or mental health services due to ayahuasca use. Reportedly, 52.5% of our sample visited a doctor in the previous six months, while 86.8% of the general Spanish population visited a doctor in the previous 12 months (ENSE 2017). Furthermore, 56% of the sample reported reducing their use of prescription drugs due to ayahuasca use. Some authors claim that there is a crisis in psychopharmacology because the mechanistic models of molecules do not satisfactorily explain the causes of diseases and, thus, there are no optimal treatments for most mental disorders (Hyman 2012). With the renaissance occurring in psychedelic therapy, where substances like MDMA, psilocybin, and ayahuasca are showing promise for the treatment of disorders like PTSD and major depression (dos Santos et al. 2018; Nichols, Johnson, and Nichols 2017), some authors are proposing that psychedelics may be the "cure" to this crisis (Mithoefer, Grob, and Brewerton 2016). Our results can be interpreted as preliminary evidence that psychedelics offer promise for the treatment of mental health problems.

Regarding lifestyle indicators, our sample used their own vehicle as a mode of transportation less than the general Spanish population (CONAMA 2016), and

their daily intake of fruits and vegetables was considerably higher (Saldía 2018).

In this study, participants also completed the GHQ-12, an instrument widely used to determine a person's risk of having a diagnosable psychiatric disorder (Goldberg 1972). The results in our study were similar to the Spanish normative data (Rocha et al. 2011). Most participants (82.7%) scored below the cut-off point for having a diagnosable psychiatric disorder. The prevalence of a degree of mental disturbance is very similar between ayahuasca users and the general population (18.5% and 19.4%, respectively). However, Good Mental Health (a score below 3) for the women in our sample was more than five points better than for the Spanish general population (Rocha et al. 2011). These results regarding mental health are in agreement with previous studies that assessed the mental health status of ayahuasca users, where there were no differences found to exist between users and non-users (Barbosa et al. 2016; Bouso et al. 2012, 2015) or between users and the general population (Halpern et al. 2008).

More than 85% of our participants engaged in activities that we categorized as having a positive effect on mental health, like yoga (which is practiced regularly by 12% of the general Spanish population (AOMM 2014)) or meditation. Our participants were also relatively interested in cultural activities, and their book-reading habits (86.2%) are above the mean for the general Spanish population (which is 65.8%; CONECTA 2018). Furthermore, positive self-perceptions of happiness were reported by over 90% of respondents, which is similar to the general Spanish population (CIS 2017). Regarding social support, only 2% of the sample reported not having any close friends or family members, while 97% reported having someone who expressed affection to them. The perception of having strong social bonds is an indicator of positive mental health (Berkman 1995; Ozbay et al. 2007; Wang et al. 2018).

Finally, we selected specific items from several validated rating scales to assess adjustment, coping and personal values. Regarding adjustment, only 5.3% of the sample obtained scores indicating poor general adjustment. Regarding coping strategies, only 1.1% showed poor coping strategies. Furthermore, regarding personal values, there is no Spanish normative data with which to make a comparison, but high scores were obtained for the three scales. We were interested in collecting this kind of data, since personal values can guide one's goals and actions, and could thus be related to some of the other analyzed variables. Under the ACT model (a "third wave" cognitive behavior therapy), it is assumed that personal values play a vital role in the interpretation of thoughts and experiences, acting like

a modulating variable that changes potential relationships with them (Trompeter et al. 2013). Similar studies used this approach in ayahuasca users (Franquesa et al. 2018) and when analyzing practices like sweat-lodge ceremonies or the use of other psychedelic drugs like peyote in Navajo communities (Sabucedo 2017), finding that psychedelic practices performed in ritualistic communitarian contexts share some of the assumptions or concepts of the ACT model, such as the process of acceptance and commitment to the “true ways” of a community. Therefore, these rituals can clarify values and promote commitment to community.

Multivariate GLM showed no significant differences based on the number of times ayahuasca was used. Those who had taken ayahuasca more than 100 times only differed in age (as they tended to be older) and in personal values (demonstrating more valued living and general engaged living). The finding regarding personal values suggests a reinforcement of personal values through a sustained participation in contexts where those values are endorsed. Participants in Santo Daime ceremonies visited mental health services fewer times in the previous six months than participants in neo-shamanic groups, which may be explained by their adherence to a religious group (Bouso et al. 2012) in which, besides spirituality, healing is one of the main goals of the doctrine (MacRae 1998).

A linear regression model was also used to determine if any variables could be seen as predictors of the sample’s mental health status. One of our main interests was to see if the use of ayahuasca could predict mental health status, following findings obtained in clinical contexts. However, only Valued Living, Engaged Living, and Self-Perceived Health Status could be included in the model as predictor variables. While the latter is reasonable, it is surprising to find personal values highly correlated with mental health status. However, early research in this field found similar results, showing moderate to high correlations between psychological well-being and variables closely related to what was measured here as engaged living (Ryff 1989; Ryff and Keyes 1995).

Finally, the positive results obtained in this study cannot be attributed to an eventual higher socioeconomic position of our sample, since there were no differences with regard to the general Spanish population in experiencing financial difficulties (24.3%; INEBase 2017).

The main limitation of this study is that the sample was self-selected. It is possible that only those who obtain some benefit from the regular use of ayahuasca are able to maintain this practice, so we may be underestimating potential risks and overestimating potential benefits. A study focused on people who used ayahuasca but then stopped using it at some point is necessary. Another

limitation is that no sample-size calculations were conducted and the sample was not stratified by gender or region, so our sample may not be representative of the general Spanish population. For example, more than 20% of the sample worked in the health sector (whereas only 5.6% of the general Spanish population works in this sector; Fedea 2014) and almost 30% lived in towns with fewer than 5,000 inhabitants (the majority of the Spanish population lives in cities with 20,000 to 50,000 people; INEBase 2016). Similarly, the number of ayahuasca users in Spain cannot be known, since national surveys concerning drug use have not included ayahuasca.

To our knowledge, this is the first study to assess regular ayahuasca users from a communitarian public health perspective. The data suggest that the study participants had high levels of general, mental, and positive health, and showed excellent levels in terms of adjustment and coping strategies, in addition to having healthy lifestyle habits. Study results do not suggest the possible effects of ayahuasca, but they show how the ritualistic use of a drug considered a hallucinogen is not associated with negative consequences in terms of adjustment or physical and psychological health. It is possible that the sample would have scored similarly even before starting to use ayahuasca, and that this practice had been adopted as another self-care activity that allows them to achieve a healthy lifestyle. The main conclusion of this study is that a respectful and controlled use of hallucinogenic/psychedelic drugs taken in communitarian settings can be incorporated into modern society with potential benefits for public health. Studies using health indicators with more representative samples of psychedelic users in communitarian settings are warranted.

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ORCID

Rafael G. Dos Santos  <http://orcid.org/0000-0003-2388-4745>

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