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„The Effects of Ayahuasca on Psychopathological Symptoms and Quality of Life in an Austrian and German sample"

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Content

Abstract

Background: Ayahuasca is a hallucinogenic substance used in the Amazon and is brewed out of two different plants containing N,N-Dimethyltryptamine (DMT) and the enzyme monoamine oxidase (MAO). In combination these two chemicals increase blood flow in the prefrontal and temporal cortex leading to hallucinations, distorted perception and thought processing. **Objectives**: This study wants to replicate previous research and explore further effects. **Method**: 25 participants in Germany and Austria were tested for differences in psychopathological symptoms and quality of life before, shortly after and 3 – 4 weeks after the intake of Ayahuasca. **Results**: Results showed significant lower scores for Somatization, Interpersonal Sensitivity, Anxiety, Phobic Anxiety, Psychoticism, and for overall psychopathological distress compared to baseline scores. Concerning quality of life participants reported significant higher scores for General Health. **Discussion**: The results of this study support the possibility of Ayahuasca having potential therapeutic effects for certain psychopathological symptoms.

Keywords: Ayahuasca, psychopathological symptoms, quality of life

Zusammenfassung

Hintergrund: Ayahuasca ist eine halluzinogene Substanz, die hauptsächlich im Amazonas konsumiert und aus verschiedenen Pflanzen gebraut wird. Sie enthält N,N-dimethyltrypatamin (DMT) und das Enzym Monoaminooxydase (MAO), die in Kombination die Durchblutung im Präfrontal- und Temporalkortex erhöhen und zu Halluzinationen, verzerrter Wahrnehmung und beschleunigten Gedankenprozessen führen. **Ziele**: Vorhandene Studien sollen mit dieser Arbeit repliziert und mögliche weitere Effekte untersucht werden. **Methoden**: 25 Teilnehmer in Deutschland und Österreich wurden vor, kurz nach und 3–4 Wochen nach dem Konsum von Ayahuasca auf Unterschiede in psychopathologischen Symptomen und gesundheitsbezogener Lebensqualität untersucht. **Ergebnisse**: Im Vergleich zur Voruntersuchung zeigten sich signifikant niedrigere Werte für Somatisierung, Unsicherheit, Angst, Phobische Angst, Psychotizismus und psychische Belastung. In Hinblick auf gesundheitsbezogene Lebensqualität gaben die Teilnehmer signifikant höhere Werte für Allgemeine Gesundheitswahrnehmung an. **Diskussion**: Die Ergebnisse zeigen, dass Ayahuasca potenzielle therapeutische Effekte auf einzelne psychopathologische Symptome haben kann.

Schlüsselwörter: Ayahuasca, psychopathologische Symptome, gesundheitsbezogene Lebensqualität

THEORETICAL PART

Introduction

Of all hallucinogenic substances none seems as interesting and polarising to write a thesis on as Ayahuasca. Newspaper articles are reporting about young teens, who travel to the Amazon in search for higher states of consciousness. They die tragically in the middle of the jungle from the acute effects of Ayahuasca (Escopedo, 2014). In contrast, recent studies are showing potential therapeutic effects of the *N,N-Dimethyltryptamine* (DMT) containing beverage that are worth looking into from a scientific point of view (Frecska, Bokor, & Winkelman, 2016; McKenna, 2004; Soler et al., 2016).

Ayahuasca is a bitter tasting, strong smelling brownish-red plant beverage used by over 70 indigenous groups in Brazil, Peru, Bolivia, Ecuador and Venezuela. (Santos, Landeira-Fernandez, Strassman, Motta, & Cruz, 2007; Stuckey, Lawson, & Luna, 2005). Ayahuasca means “vine of the soul” in Quechua language and describes both the tea and the jungle liana, which is the main ingredient. In Colombia the drink is called *Yage* and in Brazil *Caapi* (Rivier & Lindgren, 2016). The bark of the Ayahuasca-vine (*Banisteriopsis*) is soaked and brewed together with *Psychotria viridi* (also called *Chrakruna*) or *Diplopterys cabrerana* into a tea and taken orally in the context of a group ritual guided by a shaman (Santos et al., 2007; Stuckey et al., 2005). This process is very unique, as the plants alone have no physical or psychological effect and only in combination induce psychoactive effects. The brew contains the alkaloids DMT and *harmine*, which combined, are responsible for an increased blood flow in the prefrontal and temporal cortex leading to increased perception, thought processing and emotion (Bouso et al., 2012; McKenna, 2004). Indigenous people know of these effects since 1500 – 2000 BC and use Ayahuasca for magical, medical, religious or cultural purposes. But since the mid 19th century Western ethnographers caught eye on the beverage (McKenna, 2004). Nowadays, tourists are not only traveling to South America for drug tourism (Prayag, Mura, Hall, & Fontaine, 2016), the old shamanic cultural heritage started an underground scene in Europe and several organisations and little associations started offering group rituals including the intake of Ayahuasca.

Scientific research around Ayahuasca is still very young. The number of publications containing the keyword Ayahuasca is very little. Only 180 articles in

English or German language are published. Only a few are investigating effects on psychopathological symptoms, working memory, personality, life attitudes or brain activity leaving a high need for further investigations to better understand the substance, discover potentials and prevent misuse.

To extend current research this study wants to replicate previous studies that evaluated psychopathological symptoms and quality of life, but using an Austrian and German population. The proposed Master thesis aims to have a closer look on the one time use of Ayahuasca on psychopathological effects and changes in quality of life in western individuals. The first part of the thesis will illustrate the history, chemical compounds and effects on physical and mental levels and look at laws and governmental restrictions within Europe. In addition, psychopathological symptoms will be named, explained and a relationship to Ayahuasca will be drawn. The construct of quality of life will be explained and analysed. In the second part these concepts will be operationalized using clinical instruments. The study will be demonstrated, the hypotheses will be tested and results will be presented and later discussed. Critical comments and limitations of the study as well as future recommendations will round up this master thesis.

Background

Original heritage and the transition into the Western World

The origin of this fortune combination of plants is unknown (McKenna, 2004). Heckenberger et al. (2003) discovered evidence of a complex, technological agrarian civilization in the upper Xingu region of Brazil back in 1200 AD. This discovery does not directly explain the origin of Ayahuasca, but a civilisation capable of managing its forest may also have great knowledge about medicinal plants around them (McKenna, 2004). Ayahuasca was a widespread practice of aboriginal tribes in the Amazon Basin well before Pre-Columbian times. Until today these fishermen, cultivators and hunters living in Peru, Colombia and Ecuador use Ayahuasca as an important part in their ethnomedicinal and shamanic culture and tradition (McKenna, 2004; Rivier & Lindgren, 2016). The way of brewing the tea and the ingredients used may vary between the different tribes and the shamans. One purpose of taking Ayahuasca is to encounter the spirit of the second plant that is added to the

Ayahuasca-vine. Shamans learn about usage and healing power of the added plant, about its environment or the animals feeding of the plant (Buxbaum, 1999). Healing, divination, the use as a diagnostic tool and a magical pathway to the supernatural are other purposes of the mestizo folk (McKenna, 2004).

Another group including Ayahuasca in their rituals are the contemporary syncretic religious movements, like Uñiao do Vegetal (UDV), Barquinia and Santo Daime churches in Brazil (McKenna, 2004). There are significant differences in the procedures and ceremonies between these various churches (Barbosa, Giglio, & Dalgalarrondo, 2005). The UDV and the Santo Daime are the largest sects that consume Ayahuasca in a ritual manner in regular intervals (McKenna, 2004). These churches have spread into the urban areas of Brazil, parts of Europe, Japan, Canada and the USA throughout the last 35 years (Barbosa, Mizumoto, Bogenschutz, & Strassman, 2012). Nowadays, tourists travel to South America to take Ayahuasca in the jungle with a shaman or look out for organisations within Europe to experience the potent power of the substance. In Europe the plant is used for spiritual practices, psychotherapy, physical healing, and addiction treatment (Stuckey et al., 2005). Concerning the scientific world Ayahuasca became an interesting object to research on and is on the rise as a potential therapeutic substance.

Legal status

The UDV church is one of the main reasons that the ritual use of Ayahuasca was approved by the government of Brazil in 1987. This act did not only have an impact on Brazil. Since 1600 years it was the first time a government granted its nonindigenous citizens to use a psychedelic substance during group rituals and in religious ceremonies (McKenna, 2004). In Europe, the use of plants containing *category I* type drugs is only permitted to authorized individuals and scientific institutions (Übereinkommen von 1971 über psychotrope Stoffe, 1997). However, the consumerism of Ayahuasca seems to be a grey zone, making it possible for anyone to take part in Ayahuasca retreats. Only Sweden and France specifically prohibited the use of Ayahuasca (Varela, 2017).

Chemical composition and neuropsychological effects

Ayahuasca is unique in the sense that it takes one plant to facilitate the effect of another plant. *Banisteriopsis caapi* (see Figure 1) contains the ß-carboline

derivatives *harmine* (also called *banisterin*, *yagein* or *telepathin*), *tetrahydroharmine* (THH), and *harmaline* as mayor alkaloids (Callaway, Airaksinen, McKenna, Brito, & Grob, 1994; McKenna, 2004). *Psychotria virdis*, the admixture plant, contains DMT, which is the main psychotropic component and responsible for the hallucinogenic effect. DMT taken orally is normally metabolized by the enzyme *monoamine oxidase* (MAO) in the stomach and liver (Stuckey et al., 2005). The ß-carboline *harmine* is inhibiting the MAO, which protects the DMT in the brew and enabling it to surpass the blood-brain barrier (McKenna, 2004). The results are higher serotonin levels in the brain. At the same time the reuptake of serotonin, dopamine, noradrenaline and adrenaline in the synapsis is blocked, partly by THH (Prentner, 2010; Stuckey et al., 2005).

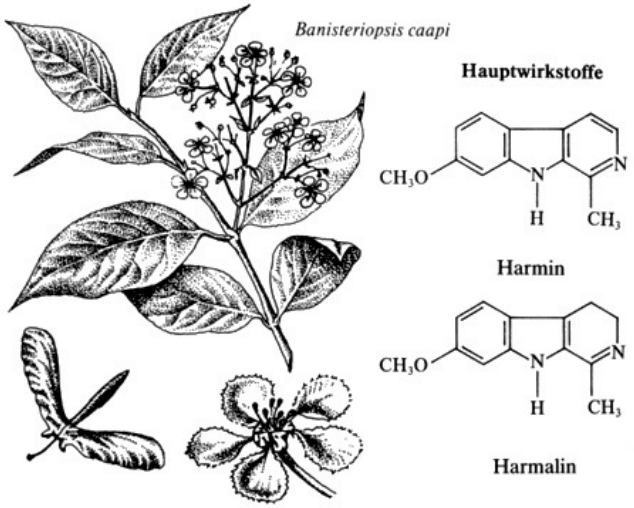

Figure 1: The plant Banisteriopsis caapi and the chemical formular of the mayor alkaloids. Prentner (2010)

The plant Ayahuasca itself has a mood-lightening and calming effect. *Harmine*, in small dosages (till 75mg) induces euphoria and in higher dosages leads to nausea, vomiting, diarrhea and shivering (Prentner, 2010). DMT taken orally by itself has no psychotropic effect up to 1000mg (Santos et al., 2007). Rivier and Lindgren (2016) reported an average of 30mg of *harmine*, 10 mg THH and 25mg of DMT in a 200ml Ayahuasca dose. The onset for the effect of Ayahuasca is about 35 to 40 minutes and lasts up to four hours (McKenna, 2004; Varela, 2017).

Complex thought processes, a general state of heightened awareness and visual imagery are effecting the individual's perception after the onset of Ayahuasca.

Perceptual, affective, and cognitive processes are significantly modified once Ayahuasca takes action (Callaway et al., 1999).

Fábregas et al. (2010) could even show, that regular Ayahuasca users do not have negative psychosocial effects that are typically associated with drug abuse. They compared an experimental and control group in a jungle and urban setting. Ayahuasca users showed significantly lower scores than controls on the ASI Alcohol use and Psychiatric Status subscales. These positive effects remained in the follow-up study one year later.

Therapeutic potential

Considering the current research that could not find acute harmful symptoms resulting from the consumption of Ayahuasca, there is a rising interest to discover potential therapeutic long and short term benefits.

Da Silveira et al. (2005) could show possible preventive effects of Ayahuasca by comparing Ayahuasca users with a control group. The study results showed that Ayahuasca users had 2.5% less psychiatric symptoms on the Self Report Questionnaire (SRQ), 17.5% lower symptoms concerning dysmorphic disorder and fulfilled 25% less DSM-IV criteria for attention deficit disorder (ADD). Barbosa et al. (2005) reported a change in behaviour towards assertiveness, serenity and joy. The same team could report higher scores on the Big Five Inventory (BFI) for the traits agreeableness and openness (Barbosa et al., 2016).

Bouso et al. (2012) investigated in their study subjective Life Attitude using the Spiritual Orientation Inventory (SOI), the Purpose of Life test (PLT) and the Psychosocial Well-Being (BIEPS). For the first assessment and the follow-up study the SOI showed higher scores for Ayahuasca users on all nine parameters: Transcendent Dimension, Meaning and Purpose in Life, Mission in Life, Sacredness of Life, Material Values, Altruism, Idealism, Awareness of the Tragic and Fruits of Spirituality. The PLT showed higher scores in the first assessment for Ayahuasca users but not in the follow-up condition.

There are a lot of clinical studies testing direct effects of the substance but just Thomas, Lucas, Capler, Tupper and Martin (2013) had a look on Ayahuasca-assisted therapy and tried to understand the effects that Ayahuasca has when taken in a group context and guided with psychotherapy. They collected pre-treatment and six month follow-up data from 12 participants who took part in a “Working with Addiction

and Stress" retreat. This retreat combined four days of intensive psychotherapy with two days of Ayahuasca ceremony. They found significant improvements on the scale of hopelessness, empowerment and mindfulness. Problematic cocaine use after the consumption of Ayahuasca reduced significantly. All participants reported long lasting positive effects. This study is especially interesting, because the setting of the study is similar to the current one, in which Ayahuasca use is imbedded in a psychotherapeutical context.

In sum, the presented studies show that Ayahuasca has positive benefits on various personality traits and on psychiatric symptoms without causing serious addictive symptoms.

Psychopathological Symptoms

Definition

Psychopathological symptoms are similar looking, recognisable experiences and behaviour, that are distinguishable from everyday behaviour of individuals of a certain culture (Scharfetter, 2010). The symptom is the smallest describable unit in the field of psychiatry. Symptoms can often appear in connection and form repetitive "clinical pictures". A single psychopathological symptom alone is not necessarily abnormal or diseased. A healthy person can show psychopathological symptoms in special situations, like sleep, tiredness, loneliness, stress or under hallucinogenic influences. A person that is showing psychopathological symptoms is not necessarily ill or is having a disorder. Psychopathological symptoms are problematic if they show up in a cultural and historical background, with a certain intensity, frequency, density, length and if the individual is suffering and not able to function properly in its current environment (Scharfetter, 2010).

Various psychopathological symptoms can be described starting from disorientation, forgetting, attention deficits, hallucinations, consuming large amounts of alcohol, aggression, loss of appetite or sexual disinterest. To measure these psychopathological symptoms and evaluate their psychotherapeutical interventions symptom checklists started to develop since the 1950's. The first was the 58-Hopkins Symptom Checklist (HSCL) followed by the Symptom Checklist-90 (SCL-90 and SCL-90-R) that summarized psychopathological symptoms within nine scales: somatization, obsessive compulsive, hostility, phobic anxiety, paranoid ideation and

psychoticism. These syndromes were chosen entirely by clinical expertise and repeated item-analysis (Glöckner-Rist & Stieglitz, 2011).

Symptoms which are in focus of this thesis are now described in more detail:

Somatic symptoms are targeting psychological distress that result from the perception of physical dysfunction, such as cardiovascular, gastrointestinal, respiratory, muscular pain and discomfort or physical symptoms of anxiety (Franke, 2000).

Obsessive-Compulsive symptoms can be persistent and recurrent thoughts, images, repetitive behaviour (such as hair pulling or nail biting) or urges that are unwanted and intrusive. The symptoms are time consuming and cause distress and anxiety (American Psychiatric Association, 2013).

Interpersonal Sensitivity describes symptoms ranging from social insecurity until the feeling of severe personal inadequacy. Feelings of inferiority and a missed feeling of self-worth, self-doubt and negative expectations in contact and relationships can also occur (Franke, 2000).

Depressive Symptoms are describing sad mood and feelings that effect the general interest in life, motivation and energy. Also hopelessness and suicidal thoughts as well as somatic and cognitive impairment can be correlated with depression (Franke, 2000).

Anxiety symptoms can be nervousness, shivering, panic attack, excessive worrying or fear (American Psychiatric Association, 2013).

Hostility describes a group of symptoms including irritability, imbalance or aggressiveness with hostile aspects (Franke, 2000).

Phobic anxiety describes a feeling of being threatened or massive phobic anxiety with regards to an object, places, people or situations and can lead to avoidance or flight behaviour (Franke, 2000).

Paranoid ideation describes feelings of distrust, low feelings of self-worth and paranoid thinking. Hostility, suspicion and delusion are additional symptoms (Franke, 2000).

Psychoticism describes feelings of isolation, alienation, hallucinations and dramatic psychotic episodes that can get as strong as schizophrenic thoughts (Franke, 2000).

Psychopathological Symptoms and Ayahuasca

Several studies could show that Ayahuasca has an effect on various psychopathological symptoms.

Da Silveira et al. (2005) explored if Ayahuasca consumers are less or more likely to suffer from mental condition. The team assessed 40 adolescents who consumed Ayahuasca regularly and compared them to a matched control group. They found that Ayahuasca users showed lower frequencies of positive scoring for anxiety, symptoms of body dysmorphic disorder, depressive symptoms and attentional problems. These results show the prevalence of psychopathological symptoms in Ayahuasca users only and can not be interpreted as a direct effect of the substance.

Santos et al. (2007) administered the effects of Ayahuasca on psychometric measures of state-anxiety, trait-anxiety, panic-like and hopelessness in nine subjects of the Santo Daime church, who consumed Ayahuasca for at least 10 years. The study was designed as a double-blind, placebo-controlled procedure. Participants under the acute effects of Ayahuasca scored lower on the scales for panic and hopelessness. No difference was found in state and trait anxiety.

Osório et al. (2015) tested the anti-depressant effect of Ayahuasca on six volunteers, who were diagnosed with recurrent Mayor Depressive Disorder (MDD) in first time Ayahuasca users. Their results showed that Ayahuasca is a fast-acting anxiolytic and antidepressant remedy for patients with a depressive disorder.

Bouso et al. (2012) investigated personality, life attitude, mental health and neuropsychological performance in long-term Ayahuasca users in comparison with a control group matched in age, sex and level of education. The team was meeting 127 members of two Ayahuasca churches living in the jungle and the urban area. Both groups were matched with two control groups from neighbouring villages. The study consisted of one initial assessment and a follow-up study one year later. The psychopathological status was examined with the Symptom Check-List-90-Revised (SCL-90R). Ayahuasca users scored significantly lower on all nine dimensions: Somatization, Obsessive-Compulsive, Interpersonal Sensitivity, Depression, Anxiety, Hostility, Phobic Anxiety, Paranoid Ideation and Psychoticism. In addition, Ayahuasca users had lower scores on the indices of General Severity (GSI) and Positive symptoms (PST). No difference was found on the Positive Symptom Distress (PSDI) index compared to both control groups. Results could be replicated

in the follow-up study one year later, with exception of Somatization and Depression. These scores were lower for Ayahuasca users but showed no significance comparing the groups.

Barbosa et al. (2005) evaluated the short-term psychological effects of 28 first time Ayahuasca users in two different temples in Brazil. Nineteen participants were belonging to the Santo Daime church and nine participants were belonging to União do Vegetal (UDV) church. The subjects were assessed one to four days before their first Ayahuasca intake (t0) and one to two weeks after their experience (t1). All subjects had only consumed Ayahuasca once between both assessments. The team used the Clinical Interview Schedule-Revised Edition (CIS-R). Results showed that psychiatric symptoms decrease significantly in the first assessment compared to the baseline. Barbosa et al. (2005) did not specify in which scales of the CIS-R the significant changes occurred. However, it is still a great indication of the positive effects of Ayahuasca and leaves room for study replications.

A follow-up study was conducted by Barbosa et al. (2009) approximately six month after the intake of Ayahuasca (t1). 23 participants were following through with the last assessment (t2). They repeatedly used the CIS-R. Results showed again a significant decrease of minor psychiatric symptoms comparing the baseline and the follow-up assessment.

Barbosa et al. (2016) followed up with another study. They investigated 30 volunteers of the UDV group and compared them to 27 non-Ayahuasca users matching the experimental group. The groups were tested for differences in socio-economic status, mood, personality traits, impulsiveness, drug use, quality of life, extrinsic and intrinsic religiosity and neuropsychological functions. Results showed that the UDV group using Ayahuasca had lower scores for depression and confusion.

Quality of life

Definition

Quality of life developed out of the limitation of medical science, which focused on healing people and lengthening their life span. But it became necessary to judge the success of medical interventions from a subjective perspective (Mayer, 1998). The World Health Organisation (WHO, 1947) defines: “Health is a state of complete physical, mental and social well-being and not merely the absence of disease or

infirmity" (p. 263). Psychological, physical aspects of health and the inclusion of the subjective well-being and functional potential moved in focus of doctor's attention. The self-judgement of a latent construct like quality of life is an important tool for the communication between psychiatrists, psychologists and patients (Bullinger, 2000). But until today there is no common consent about the exact definition of quality of life (Kramer, Füri, & Stute, 2014).

The first index to measure quality of life was the Karnofsky Index (Karnofsky, 1949). 1989 the first version of the Short Form (SF-36) was established for a medical outcome study that tried to determine how variations in patient outcomes can be explained by developing a more practical tool (Tarlov et al., 1989). This instrument is one of the pillars of this thesis.

Quality of life and Ayahuasca

Several researchers drew a connection between Ayahuasca and its impact on the well-being of the consuming individual and started to investigate.

Barbosa et al. (2016) found significant positive effects on role limitations due to physical health. As longer the participants took Ayahuasca as less likely they were to experience physical impairment in their daily life because of physical health problems.

Bouso et al. (2012) also investigated quality of life using the Psychosocial Well-Being scale (BIEPS-Bienestar Psicosocial). They found higher scores for the global BIEPS scale for both assessments on the dimensions of Self-Acceptance, Psychosocial Bonds and Projects. These effects remained in the second assessment.

Thomas et al. (2013) could report significant improvements for mindfulness, empowerment, hopefulness, quality of life-meaning and quality of life-outlook. Additional improvements were found for emotional regulation, quality of life-overall, and quality of life-psychological. These findings were not statistically significant.

The follow-up study conducted by Barbosa et al. (2009) also looked at the effects Ayahuasca had on the quality of life of the participants. The team used the Short Form (SF-36) and found significant changes in two scales of the SF-36: mental health and bodily pain. Regular users had higher scores on emotional role and social functioning compared to irregular users.

Summary and connection to research questions

In sum, the scientific background of the psychological effects of Ayahuasca are still inconclusive but point into the direction of positive effects. Outside the research environment western tourists have long started to travel to South America to look for meaning, therapy and restoration. Ayahuasca has a complex effect on the individual that are hard to predict and depend not only on the way it is brewed but also on the context situation while consuming the drug (McKenna, 2004). The substance is highly interesting to medical science and psychological research to explore its therapeutic potential. But Ayahuasca as a treatment has not been verified. There is a high need for study replications and clinical trials as the thousand different biological compounds that are activated in Ayahuasca are hard to control.

Three studies have shown significant effect of Ayahuasca for psychopathological symptoms. Changes between t0 and t2 were significant in most cases and no changes could be found between t1 and t2 (Barbosa et al., 2009). The present study aims to replicate these studies and is hypothesising a difference in psychopathological symptoms after individuals have consumed Ayahuasca. Concerning quality of life research could not find clear evidence of positive effects. Nevertheless, the present study is predicting changes in quality of life after the consumption of Ayahuasca to see whether new discoveries can be extracted.

EMPIRICAL PART

Method

Study implementation and design

The company *Ayahuasca International* (Varela, 2017) is offering events for people who want to take Ayahuasca in a psychotherapeutic context almost every weekend throughout Europe. Individuals who are interested sign up for the retreat independently. Participants were not specifically selected or recruited, but were asked on-site to take part in the study voluntarily. The assessments took place between May and July 2016.

The study was making use of quantitative measurements using a quasi-experimental setting. A one-group pretest-posttest design using a follow-up assessment was used. Therefore, there is no experimental or control setting.

The study consisted of two paper-pencil tests and one online assessment (see Table 1) and was structured as following: baseline (t0), first assessment/posttest (t1) and follow-up (t2). All three assessments were structured similarly using two validated instruments. Additionally, t0 had demographic questions and t2 asked for some conclusive judgements. The online assessment was done through SoSci Survey (Leiner, 2014) and the participants were able to access the questionnaire through www.soscisurvey.de/Ayahuasca.

To reduce dropouts participants were asked at the end of each assessment if they were planning to attend the next assessment.

Table 1

Duration and description of each assessment

t0	t1	t2
Baseline	Posttest	Follow-up
1 hour or minutes before the first consumption	10–15 hours after the immediate use and the acute effects	3–4 weeks after the use of Ayahuasca

Sample and participants

25 participants completed the assessment, consisting of 14 males and 11 females living in Germany or Austria (see Table 2). Participants were not necessarily from either of these three cities but from other parts of the Germany and Austria as well. The age ranged between 18 and 67 years. All participants that took part in all three assessments and were at least 18 years old were included in the study.

Dependent and independent variables

The independent variable in this study design is the effect Ayahuasca has over time. In detail, the three data sets t0, t1, t2 are representing the independent variable.

The dependent variables are the subscales of psychopathological symptoms and quality of life. These variables will be operationalized with the BSI-53 and the SF-36.

Table 2

Location, date, number of nights of the retreat and gender

Location	Date	Nights	n	m	f
Vienna	20.05 – 22.05.2016	2	5	3	2
Berlin	02.06 – 04.06.2016	2	7	5	2
Hamburg	24.06 – 26.06.2016	2	8	4	4
Vienna	30.06 – 03.07.2016	3	--	--	--
Berlin	05.07 – 10.07.2016	5	4	2	2
Online			1	--	1

Instruments

As a master thesis it was not possible to recruit preselected individuals with psychopathological symptoms or low perception of quality of life asking them to take Ayahuasca specifically for this study. Therefore, it was necessary to interview and test people, that already decided to take part in an Ayahuasca ceremony no matter their symptoms, causes or needs. This led to the conclusion of choosing a broad test of psychopathological symptoms and testing the overall quality of life to assess health and well-being changes within the participants. Most of the participants might not have had any symptoms at all but might show changes in the overall quality of life.

One demographic questionnaire and two diagnostic tests were used to operationalize the research questions and gather data for the analysis.

Demographic Questionnaire. The demographic questionnaire asked the participants to generate a personal code so that all three assessments could be matched. In addition, the questionnaire asked for gender, age, marital status, highest education and current occupation. There was no question asking for nationality as all the participants were either from Germany or Austria. A detailed categorisation seemed unimportant. Furthermore, the participants were asked to state if they had current chronic diseases or illnesses. A list of substances was indicated that is previously known from the European Addiction Severity Index (ASI) to ask participants about the drugs they had used at least once before (Gsellhofer et al., 1994). The same substance was indicated several times in different terms in case the participants knew only specific names. In addition, the individuals were asked to

indicate if they had taken Ayahuasca in the past and how often. The participants were also asked to indicate the reasons they were taking part in the ceremony. During the follow-up as assessment they were also asked to report if any mayor events happened between t1 and t2, to extract possible confounding variables.

Brief Symptom Inventory (BSI-53) – German Version (Franke, 2000). The BSI-53 is detecting physical and mental symptoms in a timeframe of seven days and is offering a multidimensional analysis as well as repeated assessments. The instrument is a short-form of the Symptom-Checklist (SCL-90-R). Participants are reporting their symptoms on a five-point Likert-scale from “not at all” (0) to “very much” (5). It is suited for individuals of 13 years and older and requires a reading level of grade 6. The assessment takes approximately 8–10 minutes making it a suitable instrument for repeated measurements over time (Franke, 2000).

The BSI-53 consists of nine scales: Somatization (SOM), Obsessive-Compulsive (O-C), Interpersonal Sensitivity (I-S), Depression (D), Anxiety (ANX), Hostility (HOS), Phobic Anxiety (PHOB), Paranoid Ideation (PAR), and Psychoticism (PSYC). In addition, the BSI-53 has three global indices: the Global Severity Index (GSI) is measuring the overall psychological distress, the Positive Symptom Distress Index (PSDI) is measuring the intensity of symptoms and the Positive Symptom Total (PST) is reporting the number of self-reported symptoms.

The internal consistency (Cronbachs α) of the scales in the populations of adults (N = 600) is between α = .39 and α = .72. For students (N = 589) the internal consistency is between α = .64 and α = .85 and for clinical patients with kidney failure (N = 529) between α = .63 and α = .85. The global index GSI has very high internal consistencies of α = .92 for adults, α = .95 for students and α = .96 for kidney failure patients. Slightly higher consistencies are reported by US studies. After one week the retest-reliability was between α = .73 and α = .93. The items are face-valid and moderate correlations with the “Freiburger Persönlichkeits-Inventar” (FPI-R) in the adult sample indicate construct validity. High scores on the scales of the BSI indicate high psychopathological distress of the participants. For example, high scores on the scale SOM indicate high psychological distress in result of perceived physical dysfunction. Participant’s results are alarming if the GSI T-scores or the T-scores of at least two scales are higher or the same as 63. The BSI is correlated with the “Münchner Lebensqualitäts-Dimensionen Liste” (MLDL), an instrument to

measure quality of life (Franke, 2000), meaning that an individual showing psychopathological symptoms will likely report low quality of life.

An example for items on the BSI-53 is given for the scale somatization: item seven: “During the last seven days, how much did you suffer from heart or chest pain” (Wie sehr litten Sie in den letzten sieben Tagen unter Herz- oder Brustschmerzen) or an example on the obsessive-compulsive scale is item 26: “During the last seven days, how much did you suffer from the urge to control what you are doing over and over again” (“Wie sehr litten Sie in den letzten sieben Tagen unter dem Zwang, etwas wieder und wieder zu kontrollieren, was Sie tun”) (Franke, 2000).

This study is not focusing on any symptoms of one disorder in particular and wants to evaluate the change of a broad variation of physical and mental symptoms which are detected by the BSI-53. It is a great instrument to investigate the psychopathological effects of Ayahuasca in this study. It is shorter than the SCL-90-R used by Bouso et al. (2012) and in result is better suited for repeated measures. The BSI-18 as an alternative instrument is too short and makes memorization possible, because of the short time between t0 and t1.

However, it is possible to compare results of the BSI to previous studies because of similar scales and constructs measured. The BSI has enough items to minimize memorization (Franke, 2000).

Short Form 36 Health Survey (SF-36) – German Version (Bullinger & Kirchberger, 1998). The SF-36 is by now the most used instrument to measure the subjective quality of life (Bellach, Ellert, & Radoschewski, 2000). The SF-36 is a measurement to operationalize the quality of life of an individual. The survey is used in clinical and epidemiological research and is not specifying any disorders. It consists of 36 Items and eight scales: Physical Function (PF), Role Physical (RP), Bodily Pain (BP), General Health (GH), Mental Health (MH), Role Emotional (RE), Social Function (SF) and Vitality (VT). To have a more general overview of the quality of life, the scales PF, RP, BP and GH can be summarized to an broader physical value and the MH, RE, SF and VT scales add up to a broader mental value. In addition, question 2 of the instrument can be evaluated separately. The SF-36 can be administered as an interview, self-report questionnaire or third-party evaluation, each available as a standard four weeks recall or acute version with one week recall.

In this study we will be using the SF-36 one week recall version for t1 and the SF-36 four weeks recall version for t0 and t2 as a self-report survey. High scores on all scales of the SF-36 indicate a good quality of life. For example high scores on the PF scale indicate that the health status is not limiting physical activities such as self-sufficiency, walking, walking stairs, bending, lifting and moderate and heavy tasks. The data for the internal consistency (Cronbachs α) is above α= .70 for most scales. Only the GH and the SF are showing consistencies of α = .57 and α = .69. Studies for the convergent and discriminant validity and specificity are in progress.

Overall the participants were asked to dedicate between 15 and 25 minutes of their time for each assessment and a total 45 till 75 minutes for the entire study. The second assessments were online using the platform www.socisurvey.com.

The SF-36 is a useful instrument for this study. It has a brief assessment time of seven till 15 minutes and is suitable for repeated assessment by minimizing the possibility of memorization. The SF-36 has been proven to be an appropriate instrument in previous studies that investigated the quality of life in Ayahuasca-users (Bouso et al., 2012). It will be interesting to compare and replicate these findings in a different setting.

Procedure

The participants were recruited through the company *Inner Evolution Retreat* that developed out of the community Ayahuasca International and is organizing events and conferences, workshops, courses and retreats throughout Europe and South America. Therapists, writers, facilitators and researchers are creating a space where people can overcome their struggles in life (Varela, 2016).

Ayahuasca retreats are taking place almost every weekend in cities like Amsterdam, Hamburg, Cologne, Berlin, Vienna, Madrid, Barcelona and Stockholm. To get a better understanding of the context, environment and processes, the procedure of the Berlin retreat of June 2nd 2016 is described as an example (see Figures 2, 3 and 4). All the retreats are structured in the same way.

Participants arrived around 5pm. Around 7pm registration and a short personal interview is completed. The facilitator asked the participant about previous illnesses, purpose of participation, fears and expectations. Around 9pm the integration started: the participants introduced themselves and described purpose of their participation and hopes concerning potential outcomes.

Some case examples: A woman, 30 years described relationship problems and a feeling to be under pressure. Another women reported that Ayahuasca decreased her anxiety symptoms in the past and she was hoping for more beneficial effects. A man struggled to handle his emotions and was describing a feeling of “being behind”. A male doctor described the believe in Ayahuasca as an alternative psychotherapy and wanted to learn more about the substance. A woman, age 67, was in therapy since 1972 and suffered from low self-esteem. The expectation of having to face her weaknesses through Ayahuasca made her cry. Lastly, a woman of 27 years described that Ayahuasca helped her learn more about herself.


Figure 2 and 3: on the left the beds in which the participants can spend the night. On the right the entire room is set up in a circle for better group discussions.

The introduction held by the administrators could take several hours by asking further questions, bring the attention of the participants to further issues or asks about perspectives, they might not have thought about before. Other times the introduction was short and each participant only summed up their thoughts briefly. After the introduction the objectives of this master thesis were presented and participants were recruited. Participants received the information sheet, the agreement paper and the questionnaires. The environment in which the participants filled out the questionnaires was noisy and they got interrupted or took breaks. It took about 15–40 minutes until all participants finished the questionnaires.

After the introduction the facilitators explained the most important rules of the retreat: not leaving the premises, a prohibition of smoking cannabis and not disturbing other participants while they were experiencing the acute effects of Ayahuasca.

Around 11pm the ceremony started. The participants lined up to receive *Rapé* or *Chakruna (psychotrica virdis)* which was blown into their nostrils. The facilitators described the use of rapé as a method to “open the brain and awaken the mind”. The *rapé* caused the participants to heavily tear up and sneeze strongly. They described a burning sensation in the forehead above the nose. After a few minutes the participants were able to clean their nose from the tobacco and calm down from the experiences. The retreat continued with the oral consumption of Ayahuasca. The participants were going one by one, mostly divided by men and women, to the shaman or the facilitator to receive a wooden little cup that contained the brew. The first dose was about 35g of Ayahuasca tea. Music was played or the shaman was singing and playing songs himself. People sat or lain down quietly and concentrated on their physical experience. Around one till two hours after the intake of Ayahuasca purging and hallucinations started. The participants got up to dance, to stand or keep lain down to deal with their visions and thoughts. The room was filled with moaning of the people. At 1:26am the participants could get a second dose of Ayahuasca. At 2:47am the people seemed to experience heavier effects of the substance. The facilitators played music, sang, or sprayed scents on the participants and in the room until around 4:40am.

Around 9am next morning the group therapy started, in which their personal experience was shared with the entire group. Individual meaning, background, perceptions and interpretation were discussed. The therapists used role play and confrontation to emphasise the learning and exploration for the participants.

Figure 4: The hallucinogenic substance Ayahuasca minutes before the consumption.

Research Questions and Hypotheses

Objectives of the study. The present study wants to continue research on Ayahuasca and ask new questions. With a new combination of instruments (BSI-53 and SF-36), a psychotherapeutical setting and a German and Austrian sample might extract interesting data and uncover new perspectives in the field of Ayahuasca.

Research question 1: Psychopathological symptoms. Is there a difference in the Obsessive-Compulsive symptoms of the participants (t0) after the immediate use of Ayahuasca (t1) or 3–4 weeks after the ceremony (t2)?

H_1 The participants' scores on the Obsessive-Compulsive (O-C) scale of the BSI-53 changed in t1 compared to t0 and changed in t2 compared to t0 and t1.

$\mu_{t0} \neq \mu_{t1} \neq \mu_{t2}$

H_0 The participants' scores on the Obsessive-Compulsive (O-C) scale of the BSI-53 did not change in t1 compared to t0 and did not change in t2 compared to t0 and t1.

$\mu_{t0} = \mu_{t1} = \mu_{t2}$

According to the scale Obsessive-Compulsive the remaining research questions and hypotheses for the seven scales and three indices of the BSI-53 are worded the same.

Previous studies found significant changes as well as no changes for psychopathological symptoms. Mixed results dominated. Therefore, all hypotheses are worded two-sided, as a direction of results can not be predicted.

Research question 2: Quality of life. Is there a difference in vitality of the participants after the immediate use of Ayahuasca or 3–4 weeks after the ceremony?

H_1 The participants' scores on the scale of Vitality (VT) of the SF-36 changed in t1 compared to t0 as well as in t2 compared to t0 and t1.

$\mu_{t0} \neq \mu_{t1} \neq \mu_{t2}$

H_0 The participants' scores on the scale of Vitality (VT) of the SF-36 did not change in t1 compared to t0 and did not change in t2 compared to t0 and t1.

$\mu_{t0} = \mu_{t1} = \mu_t$

According to the scale Vitality the remaining research questions and hypotheses for the seven scales and two composite scales of the SF-36 are worded the same. Previous research found only a few significant changes for quality of life. As a results, all hypotheses are worded two-sided.

Statistical procedure

The results were calculated using SPSS. Descriptive data, like gender, age, education, previous drug experiences, reason for participation as well as traumatic events (birth, loss of job, conflicts, death etc.) that happened between t0 and t1 and the individual time between the sessions were explored using frequency distributions, percentage, mean and other descriptive tools.

Repeated assessments of the participants are making the data sample dependent. The data are metric and a Kolmogorov-Smirnov test will check for normal distribution. If normal distribution was verified the hypotheses were tested using ANOVA, otherwise the Friedman test was the non-parametrical option. It was necessary to apply the Bonferroni correction as there was repeated execution of the same test and increased chance of a type 1 error. If hypotheses were showing significance, the effect size was evaluated using Cohens *d*. The level of $p < .05$ was chosen to detect significant differences.

Results

Demographic Characteristics

A total of 40 subjects took part in the study overall on six different occasions in Berlin, Vienna, Hamburg and online. Due to a 37.5% dropout only 25 individuals completed all three assessments. Nine subjects took part only in t0 and t1, and six subjects only filled out the first assessment. One participant did not complete t1 right after the ceremony but two weeks later and completed t2 almost two months after the acute ceremony of Ayahuasca. Of these 25 subjects that fully completed the study 14 were

male and 11 were female. The mean age was 39.13 (*SD* = 14.05). All of the participants were speaking German as a mother tongue and were either from Austria or Germany. Concerning the marital status 64% were unmarried, 16% were in a relationship, 12% divorced and 8% widowed. The sample was well educated: 44% went to University or a similar Academy, 20% completed the A level, 16% completed an apprenticeship, 8% finished middle school and 12% attended compulsory education. Concerning the occupation: 12% were retired, 32% employed or working, 32% were self-employed or entrepreneur, 8% were students, 4% were apprentice and 12% unemployed. Chronic diseases were reported by 24% and were bronchial asthma, high blood pressure, hashimoto (chronic inflammation of the thyroid), knee injuries, cocaine addiction and tonsillitis.

Previous drug experiences were very common. The category “opiate” consisted of substances such as heroin, mescaline, methadone, codeine, dilaudid, opium or morphine and 20% of the participants had experiences with one of these drugs. Hashish and Marihuana was taken before by 88% of the participants. Hallucinogens such as LSD, mushrooms, Ayahuasca or ketamine was experienced by 80% of the sample. 72% took amphetamine such as MDMA, speed, ecstasy, ritalin or crystal meth, 40% tried cocaine or crack, 80% were drinking alcohol, 76% smoked cigarettes and 12% took sniffing agents before.

For 52% of the sample it was the first time taking Ayahuasca. 32% took Ayahuasca once before. 12% took part in an Ayahuasca ceremony one till three times before and 4% reported are taking Ayahuasca regularly.

To report reasons for participation in the retreat, the participants were able to choose more than one option. 4% reported to take Ayahuasca to experience visions and hallucinations. 72% took Ayahuasca in hope for therapeutic effects on psychological and physical problems. To have a change in perspective 48% took Ayahuasca. 91.3% reported to take Ayahuasca for self-knowledge and learn about their own boundaries. No one took Ayahuasca because of religious connections to the Santo Daime church and 16% were looking for more experiences with the substance. 20% were taking part because of recommendations from friends or family and 20% were hoping for enlightenment. 24% took bad experiences in the past as a trigger to participate. Open answers were integrated into these categories: *to improve the connection to one’s own heart (“Beziehung zum Herzen verbessern”)* was integrated into self-knowledge. *Extended experiences and spirituality (“erweiterte*

Erfahrung/Spiritualität") was integrated into experience with the substance and enlightenment. *Peace ("Frieden")* as well as *physical healing ("körperliche Heilung")* was integrated into the category hope for therapeutic effects. *Self-knowledge and spirituality ("Selbsterkenntnis & spirituelle Erfahrung")* was again added to the matching categories and the last open answer *tobacco addiction ("um meine Tabaksucht "los" zu werden")* was also integrated into hope for therapeutic effects.

Between t1 and t2 the participants reported the following events that happened during that time: 16% lost their job, 8% lost an important relationship in their life, 4% started a new one, 4% had relationship problems, 4% had a case of death in the family or friend context. 64% reported no event during t1 and t2. The mean amount of days the participants spend in the retreat were 2.4 (*SD = 0.82*).

To judge the overall subjective effect Ayahuasca had on their physical and mental state in t2 the participants were able to choose more than one option. 73.9% reported that Ayahuasca had a positive effect on their body. 43.5% reported that Ayahuasca had a positive impact on their mental state. 8.7% reported a negative effect of Ayahuasca on their mental state. 4% reported that Ayahuasca had no effect on their mental or physical state.

Results BSI-53

Franke (2000) provides T-values which help to better interpret the results of the participants and that were used for all calculations. The author also documented cut-off scores to determine abnormal psychologically stressed individuals. These individuals show a score of ≥ 63 for the GSI scale or for two or more other scales of the BSI-53. In the baseline 52% out of N = 25 were abnormal psychologically stressed. In t1 48% hit beyond the cut-off score and in t2 only 44% were still psychologically stressed. However, it is not the case that simply two individuals showing highly psychological symptoms in t0 were able to reduce them over the course of the study. In fact, 40% showed a change from abnormal to normal symptoms or from normal to abnormal symptoms within these four weeks. Compared to the baseline 16% did no longer meet abnormal criteria after the first treatment in t1 or latest in t2. Suddenly 8% of individuals were abnormal psychologically stressed in t2 while being below the cut-off score in the baseline and t1. After showing abnormal scores in the baseline 8% of the participants showed improvement in t1 and fell back

past the cut-off score in t2. Also 8% of the participants showed normal scores in the baseline, had abnormal symptoms in t1 and fell below the cut-off score in t2, again.

The Friedman test was applied for most scales except the GSI and the PST scale. To investigate where differences occurred exactly the Wilcoxon signed rank test was applied for non-parametric data. The GSI and the PST scale showed normal distribution and where assessed using ANOVA for multiple measures and using the t-test for paired measures to follow up the findings. For all follow-up procedures a Bonferroni correction was applied to reduce the familywise error. A new significant level of α=.017 was used for the Wilcoxon signed rank test and the t-test for paired measures.

Somatization. Results showed a significant difference of psychopathological symptoms on the scale of SOM with *N* = 25 between all three measures, $\chi^2(2) = 8.886$, $p = .012$, $r = .596$. Separate effects were analysed using the Wilcoxon test because of non-parametric data. A significant effect between t0 and t1 was found, $z = -2.50$, $p = .013$, $r = .559$. The scores increased from a mean of $M = 52.56$ ($SD = 10.28$) in t0 to a mean of $M = 60.12$ ($SD = 11.42$) in t1 representing the highest scores in this scale due to the acute effects of Ayahuasca. In addition, the effects between t1 and t2 were also significant, $z = -3.51$, $p < .001$, $r = .702$. The mean decreased below baseline in t2 with a mean of $M = 49.12$, $SD = 9.78$. There was no significant effect between t0 and t2, $z = -1.880$, $p = .060$.

Obsessive-Compulsive. No significant results were found for the scale of O-C with $N = 25$, $\chi^2(2) = 0.483$, $p = .786$. In result, the in-between testing results using the Wilcoxon test were also non-significant. Nevertheless, scores were the lowest for t2 with a mean of $M = 48.32$ ($SD = 10.60$) and the highest for the baseline with a mean of $M = 50.72$ ($SD = 11.96$). The first post-test t1 had a mean of $M = 49.76$ ($SD = 12.74$).

Interpersonal Sensitivity. The Friedman test showed significant score differences of the scale I-S with $N = 25$, $\chi^2(2) = 6.543$, $p = .038$, $r = .512$. Analysing details with Wilcoxon only a significant difference could be found for t0 and t2, $z = -2.78$, $p = .005$, $r = .556$. Effects between t0 and t1 remained non-significant, $z = -0.76$, $p = .446$, same for effects between t1 and t2, $z = -1.37$, $p = .170$. Looking

at the descriptive statistics the mean of t0 was the highest with *M* = 53.36 (*SD* = 14.63) and t2 being the lowest with *M* = 47.76 (*SD* = 10.75). The first post-test t1 had a mean of *M* = 50.72 (*SD* = 13.94).

Depression. The scale of D showed significant differences in all three measures, *N* = 25, $\chi^2(2) = 8.848$, *p* = .012, *r* = .595. To follow-up the findings the Wilcoxon test was used but showed no significant results between the assessments t0 and t2, *z* = -2.34, *p* = .019, for t0 and t1, *z* = -1.25, *p* = .211 or for t1 and t2, *z* = -1.09, *p* = .278. The baseline was the highest scores with *M* = 53.88 (*SD* = 10.87) and t2 the lowest with *M* = 48.68 (*SD* = 9.28). The second assignment had a mean of *M* = 50.92 (*SD* = 10.96).

Anxiety. Results within the scale of ANX proofed to be significant, *N* = 25, $\chi^2(2) = 9.06$, *p* = .011, *r* = .602. Detailed testing with the Wilcoxon test showed significant results between t0 and t2, *z* = -2.77, *p* = .006, *r* = .554. Bonferroni correction of *p* = .017 was applied. Non-significant results were found for t1 and t2, *z* = -1.83, *p* = .067. The data of the assessments t0 and t1 were parametric and were tested using a t-test for paired measures. Results were non-significant, *t*(24) = .324, *p* = .749. In general, the baseline score (*M* = 54.96, *SD* = 10.92) did not change compared to t1 (*M* = 54.16, *SD* = 11.86) but decreased drastically in t2 (*M* = 49.00, *SD* = 10.67).

Hostility. Changes in the scores of HOS were not significant, *N* = 25, $\chi^2(2) = 1.787$, *p* = .409. Double checking the differences between the assessments with Wilcoxon, none of the tested pairs were significant. Looking at the descriptive statistics the baseline had the highest scores with *M* = 52.16 (*SD* = 11.55). Scores decreased after consuming Ayahuasca in t1 with a mean of *M* = 49.04 (*SD* = 12.12) and remained in t2 (*M* = 49.24, *SD* = 9.76).

Phobic Anxiety. Results for PHOB were significant, *N* = 25, $\chi^2(2) = 11.433$, *p* = 003, *r* = .676. The Wilcoxon test showed significant results between the measurements t0 and t1, *z* = -2.42, *p* = .016, *r* =.484. Differences between t0 and t2 were non-significant, *z* = -1.79, *p* = .074, as well as for the difference between t1 and t2, *z* = -1.24, *p* = .216. The descriptive data shows interesting details. This is the only

scale were the scores in t2 (M = 51.48, SD = 9.10) were slightly increased compared to t1 (M = 48.24, SD = 8.52) but still remained below the baseline (M = 54.84, SD = 11.27).

Paranoid Ideation. The Friedman test showed no significant results for the scale PAR, N = 25, $\chi^2(2) = 0.125$, p = .939. Wilcoxon tests confirmed no significant differences between the assessments. The descriptive data showed almost no changes between the means of t1 (M= 48.44, SD = 9.06) and t2 (M = 47.28, SD = 8.03) compared to baseline (M = 48.08, SD = 9.73).

Psychoticism. The scores of the assessments in PSYC did change significantly, N = 25, $\chi^2(2) = 7.825$, p = .020, r = .560. Applying Wilcoxon test onto the dataset significant differences could be found for t0 and t2, z = -2.63, p = .009, r = .526. There was no significant difference found between t0 and t1, z = -.221, p = 825 and t1 and t2, z = -2.32, p = .020. The means of t0 (M = 54.84, SD = 12.54) and t1 (M = 54.44, SD = 11.92) are relatively similar, but the mean dropped significantly in t2 (M = 48.72, SD = 9.25).

GSI. When applying the Kolmogorov-Smirnov test the GSI scale showed parametric traits. Therefore, a oneway repeated measures ANOVA was used to test for significant differences between all three assessments. Mauchly's test was not significant. Therefore, the assumption of sphericity has not been violated, $\chi^2(2) = 2.915$, p = .233. The results showed that the general psychopathological index was significantly effected by the time Ayahuasca was consumed, $F(2) = 3.362$, p = .043, d = 0.819. The t-test for paired measures could only validate a significant difference between t0 and t2, $t(24) = 3.002$, p = .006, d = 0.500. No significance was found for t1 and t2, $t(24) = 1.702$, p = .102 as well as t0 and t1, $t(24)$ = .540, p = .594. The Bonferroni correction was also applied to these post-hoc tests, $p < .017$. In conclusion, the overall psychopathological stress was significantly reduced in t2 (M = 54.04, SD = 16.48) compared to t1 (M = 60.12, SD = 17.07) and the baseline (M = 61.88, SD = 14.46).

PST. The scale for PST also showed parametric traits after applying the Kolmogorov-Smirnov test. The repeated measures ANOVA was also used to

calculate differences between all three measurements. Mauchly's test was non-significant and in result we can assume sphericity. The ANOVA showed significant results, $F(2) = 4.171$, $p = .021$, $d = 0.828$. The t-test for paired measures found significant differences between the baseline ($M = 48.96$, $SD = 12.12$) and t2 ($M = 42.72$, $SD = 11.88$), $t(24) = 3.251$, $p = .003$, $d = .520$. No difference was found for t1 and t2, $t(24) = 1.643$, $p = .114$ and between the baseline and t1, $t(24) = 1.008$, $p = .324$.

PSDI. The Friedman test showed a significant result in all three measure concerning the intensity of the reported symptoms with, $\chi^2(2) = 9.566$, $p = .008$, $r = .659$. Using the Wilcoxon test significant differences were found between t1 and t2, $z = -2.47$, $p = .013$, $r = .465$ as well as for the baseline and t2, $z = -2.42$, $p = .016$, $r = .483$). The difference between the baseline and the first assessment was checked using the t-test for paired measures because of normal distribution. No significant results were found here, $t(22) = -0.540$, $p = .595$. Descriptive statistics show these differences in detail. The baseline has a mean of $M = 57.73$ ($SD = 9.00$) which increased after taking Ayahuasca in t1 ($M = 58.36$, $SD = 10.19$). The mean dropped in the follow-up assessment below the baseline ($M = 51.59$, $SD = 7.22$). Therefore, the intensity of the symptoms reduced after the acute effects of Ayahuasca have passed.

Add-On questions. The add-on questions include psychopathological symptoms such as bad appetite, problems with falling asleep, thinking of death and dying and feelings of guilt (Franke, 2000). These questions were evaluated separately using simply the sum of the items as the manual did not provide T-values for this scale. The Friedman and Wilcoxon test were applied to see whether there were worsening or improving after the use of Ayahuasca. Results showed a significant difference between all three measure, $\chi^2(2) = 9.66$, $p = .008$, $r = .622$. The in-between measures showed significant differences between t1 and t2, $z = -2.46$, $p = .014$, $r = .492$ and t0 and t2, $z = -2.80$, $p = .005$, $r = .560$. No significant results were found between t0 and t1, $z = -0.307$, $p = .758$. The descriptive statistics showed that after the acute intake of Ayahuasca the symptoms were highest in t1 ($M = 2.12$, $SD = 2.35$) and dropped below the baseline ($M = 1.76$, $SD = 1.56$) after 3–4 weeks in

the follow-up assessments (*M* = 0.84, *SD* = 1.07). An overview of results is given in Table 3 and 4.

Table 3

Means, standard deviations, significance and effect sizes of the BSI-53 scales (T-value)

	t0		t1		t2				
scale	*M*	*SD*	*M*	*SD*	*M*	*SD*	*p*	Cohen's *d*	*r*
SOM	52.56	10.28	60.12	11.42	49.12	9.78	.012*	--	.596
O-C	50.72	11.96	49.76	12.74	48.32	10.60	.786	--	.139
I-S	53.36	14.63	50.72	13.94	47.76	10.75	.038*	--	.512
D	53.88	10.87	50.92	10.96	48.68	9.28	.012*	--	.595
ANX	54.96	10.92	54.16	11.86	49.00	10.67	.011*	--	.602
HOS	52.16	11.55	49.04	12.12	49.24	9.76	.409	--	.267
PHOB	54.84	11.27	48.24	8.52	51.68	9.10	.003*	--	.676
PAR	48.44	9.06	48.08	9.73	47.28	8.04	.939	--	.071
PSYC	54.84	12.54	54.44	11.92	48.72	9.25	.020*	--	.560
GSI	61.88	14.46	60.12	17.07	54.04	16.48	.043*	0.819	--
PSDI	57.73	9.00	58.36	10.19	51.59	7.22	.008*	--	.659
PST	48.96	12.12	46.80	11.85	42.72	11.88	.021*	0.828	--
Add-On	1.76	1.56	2.12	2.35	0.84	1.07	.008*	--	.622

Note: *p < .05

Table 4

Significance pattern of the scales of Wilcoxon tests with Bonferroni correction (p = .017)

	t0 & t1	t1 & t2	t0 & t2
SOM	.013* (r = .559)	.001* (r = .702)	.060
O-C	.637	.420	.186
I-S	.446	.170	.005* (r = .556)
D	.211	.278	.019
ANX	.749	.067	.006* (r = .554)
HOS	.141	1.00	.138
PHOB	.016* (r = .484)	.216	.074
PAR	.634	.475	.691
PSYC	.825	.020	.009* (r = .526)
GSI	.594	.102	.006* (d = 0.500)
PSDI	.595	.013* (r = .465)	.016* (r = .483)
PST	.324	.114	.003* (d = 0.520)
Add-On	.758	.014* (r = .492)	.005* (r = .560)

Note: *p < .05

Demographic variables and BSI-53 scores

The significant effects found were analyzed for differences in sociodemographic variables such as age (young and old), gender and education (high or low). The t-test for dependent samples was used to check for differences.

As a preparation for the t-test the median of the age (34) was used to split the sample into old (past 34) or young (34 and below). Significant results (t(7) = 2.667, p = .032) were found for the PSDI scale between the time points t1 and t2. It is important to mention that the mean of the young age group is higher in t1 (M = 62.36, SD = 9.04) compared to the older age group (M = 55.30, SD = 10.08). However, the score dropped down in both groups in t2 with a mean of M = 52.00 (SD = 7.15) in the young age group and a mean of M = 51.00 (SD = 6.47) in the older age group. Scores in the baseline differed with a mean of M = 53.25 (SD = 12.76) for the young

participants and *M* = 57.55 (*SD* = 8.21) for the older participants. Age seems to interfere with the effects of Ayahuasca on positive symptoms distress between t1 and t2. As older the participants as lower the scores of PSDI after the intake of the substance and as lower the difference between t1 and t2.

For education the samples were split in low education (no school certificate, middle school, secondary school, apprenticeship) and high education (Academy, University). After applying the Bonferroni correction no significant differences between the education groups could be found, *p* = .250. Education does not have an influence on the changes in t1 or t2.

Concerning the gender test, results showed significant differences in the scale PSYC between t1 and t2 (*p* = .008). Male participants showed a significant higher change between t1 and t2 than female participants. The mean score difference for men was 8.71 (*SD* = 12.98) while females showed only a difference of a mean of 1.91 (*SD* = 4.91). Gender seems to effect the improvement Ayahuasca has on psychopathological effects in the scale of PSYC after 3–4 weeks after the acute effects of Ayahuasca compared to shortly after the retreat. However, men have significant (*p* = .012) higher scores in t1 (*M* = 59.57, *SD* = 12.65) compared to women (*M* = 47.91, *SD* = 6.99). In t2 males have a mean of *M* = 50.86 (*SD* = 11.25) and females show a mean of *M* = 46.00 (*SD* = 5.14).

Interesting results were found comparing the effect Ayahuasca had on people with experience taking Ayahuasca compared to people who took Ayahuasca for the first time. The t-test showed significant results (*p* = .004) in the scale of ANX in t1 and t2. People with no experience with Ayahuasca showed a mean difference of 9.23 (*SD* = 7.73) compared to people who had taken Ayahuasca one till five times in the past. These participants showed a mean difference of 2.42 (*SD* = 7.74). Interesting is that both groups had very similar T-values in t1 but participants with no experience had a greater improvement in t2 with a mean of 46.17 (*SD* = 8.31) compared to the experienced participants who had a mean of 52.17 (*SD* = 12.58) after 3–4 weeks after the acute effects of Ayahuasca.

Sorting the sample by occupation no significant effects were found comparing the three points in time. The sample was divided into working people (self employed, worker and employed people) and non-working individuals (retired, jobless or constantly ill). Students and young people in apprenticeship were excluded because they could not be sorted in either of these groups and were only four participants.

Analyzing the reasons people decided to take Ayahuasca and take part in such a ceremony the reason “hope for therapeutic effects on psychological and physical problems” stood out. Comparing the change for individuals who had these hopes and individuals who had other or no reasons significant effects could be found for the scale Anxiety in t1 and t2 (p = .003). Individuals with no therapeutic hopes had a lower mean difference of 0.70 (SD = 6.53) compared to people with therapeutic hopes (M = 9.47, SD = 7.65). Looking at the T-values for these scales individuals with no therapeutic hopes had a lower t1 score (M = 47.40, SD = 9.34) compared to individuals with therapeutic hopes (M = 57.50, SD = 12.86). The improvement was greater for individuals with therapeutic hopes (M = 52.00, SD = 2.10) but still remained below the t2 scores of the group with no therapeutic hopes (M = 45.50, SD = 9.65). A t-test showed significantly higher baseline scores on the scale of anxiety (p = .006) and the GSI (p = .022).

Results SF-36

For the scales of the SF-36 non-parametric tests had to be applied due to significance of the Kolmogorov-Smirnov test for all scales. Therefore, Friedman and Wilcoxon test were the statistical procedures used to calculate differences in means for the sample pools.

Physical functioning. The scores for the scale PF were non-significant, N = 24, $\chi^2(2)$ = 2.863, p = .239. No significant results could be found using the Wilcoxon test to compare difference between the assessments. Looking at the descriptive statistics the mean did increase in t1 (M = 91.25, SD = 18.13) and t2 (M = 92.50, SD = 18.47) compared to the baseline (M = 88.13, SD = 21.71). Only N = 24 participants were included in this calculation.

Role Physical. Due to missing data only N = 24 participants were included in the Friedman test. Results for RP showed non-significant scores comparing all three measurements, $\chi^2(2)$ = 0.186, p = .911. The lowest scores were found in t2 (M = 83.33, SD = 32.69) compared to t0 (M = 84.38, SD = 27.40) and t1 (M = 85.42, SD = 29.41).

Bodily Pain. For the scale of BP no significant results could be found testing a difference between all three time points using the Friedman test, $\chi^2(2) = 0.982$, $p = .612$. Looking at the exact differences between the assessments the Wilcoxon test showed none of the in-between measurements proofed to differentiate significantly in any way. The mean for t0 was $M = 82.32$ ($SD = 19.99$) and increased slightly in t1 ($M = 83.12$, $SD = 23.67$) and increased even more in t2 ($M = 83.44$, SD =23.72).

General Health. For the scale GH a significant result could be found testing for a difference between all three measurements, $\chi^2(2) = 7.167$, $p = .028$, r = .535. The Wilcoxon test showed significant results comparing the baseline and the t1 assessment, $z = -3.11$, $p = .002$, $r = -.623$. Other comparisons remained non-significant. However, the baseline results ($M = 71.20$, $SD = 17.64$) were lower compared to t2 ($M = 78.60$, $SD = 21.53$) and t1 proofed to have the highest scores again ($M = 80.40$, $SD = 17.26$). Therefore, Ayahuasca did have significant positive effects on the general health of the participants.

Vitality. Results were non-significant for the scale of VT using the Friedman test and increased slightly after the intake of Ayahuasca, $\chi^2(2) = 3.658$, $p = .161$. Descriptive data revealed a positive trend after the consumption of the substance. The baseline showed a mean of $M = 61.80$ ($SD = 17.13$) and increased to a mean of $M = 64.00$ ($SD = 18.71$) in t1 and even to $M = 64.40$ ($SD = 2.88$) in t2.

Social Functioning. The Friedman test included $N = 24$ participants and was non-significant, $\chi^2(2) = 3.250$, $p = .197$. Same for the Wilcoxon test, that could not show significant results for any of the assessments. Surprisingly t1 showed the lowest mean scores ($M = 83.33$, $SD = 23.22$) compared t0 ($M = 83.85$ ($SD = 21.96$) and t2 had the highest scores with a mean of $M = 91.67$ ($SD = 15.05$).

Role Emotional. Scores in RE did increase slightly over time but the Friedman test was non-significant, $\chi^2(2) = 1.118$, $p = .572$. In addition, no significant results were found for Wilcoxon test. The mean was the lowest in t0 ($M = 85.33$, $M = 29.00$) and increased in t1 ($M = 86.67$, $SD = 27.22$) and in t2 ($M = 92.00$, $SD = 22.11$) compared to the baseline.

Mental Health. The Friedman test showed non-significant results for the scale of MH, $\chi^2(2) = 5.370$, $p = .068$. The applied Bonferroni correction ($p = .017$) lead to non-significant results for all three in-between comparisons with Wilcoxon test. The scores on the scale of MH increased compared to the baseline. In the baseline the mean score was 75.68 (*SD* = 16.16) and increased to 76.32 (*SD* = 15.74) in t1. The follow-up test showed higher scores (*M* = 82.40, *SD* = 2.44) compared to the baseline.

Physical Scales. A general physical composite scale can be evaluated by aggregating the scores of the four physical scale PF, RP, BP and GH. The Friedman test showed significance, $\chi^2(2) = 9.023$, $p = .011$, $r = .601$. The baseline score for the physical index was M = 81.44 (*SD* = 16.90) and increased in t1 (*M* = 84.94, *SD* = 6.23) and in t2 (*M* = 84.24, *SD* = 20.61). Follow-up tests with Wilcoxon tests were non-significant.

Mental Scales. Aggregating the four mental scales VT, SF, RE and MH to a total mental composite scale gives a general impression about the mental changes participants that might have occurred for the participants. The Friedman test showed no significance for all three measurements, $\chi^2(2) = 5.083$, $p = .079$. The Wilcoxon test showed no significant results for the differences between the measurements. The mean mental composite score for t0 was *M* = 77.39 (*SD* = 15.10) and decreased slightly in t1 (*M* = 76.31, *SD* = 17.30) only to increase again past the baseline in t2 (*M* = 82.40, *SD* = 13.67). In sum, Ayahuasca did not have beneficial effects on the mental health of the participant's long term.

Question 2. Question 2 of the SF-36 is asking how the participants are judging their general health status compared to a week before. This question is not part of the overall analysis and will be evaluated separately using the exact raw scores. There were no significant changes of the answers of that question between all three assessments using Friedman test, $\chi^2(2) = 3.406$, $p = .182$, nor were significant changes found for the in-between measurements using Wilcoxon test. The mean score for t0 was the lowest (*M* = 3.16, *SD* = 0.85) followed by t2 (*M* = 3.28, *SD* = 0.79) and in t1 (*M* = 3.48, *SD* = 1.05). An overview of results is given in table 5 and 6.

Table 5

Means, standard deviations, significance and effect size of the SF-36 scales

	t0		t1		t2			
scales	M	SD	M	SD	M	SD	*p*	*r*
PF	88.13	21.71	91.25	18.13	92.50	18.47	.239	
RP	84.38	27.40	85.42	29.41	83.33	32.69	.911	
BP	82.32	19.99	83.12	23.67	83.44	23.72	.612	
GH	71.20	17.63	80.40	17.26	78.60	21.53	.028*	.535
VT	61.80	17.13	64.00	18.71	64.40	2.88	.161	
SF	83.85	21.96	83.33	23.22	91.67	15.05	.197	
RE	85.33	29.00	86.67	27.22	92.00	22.11	.572	
MH	75.68	16.16	76.32	15.74	82.40	12.44	.068	
PHYS	81.44	16.90	84.94	16.23	84.24	20.61	.011*	.601
PSYC	77.39	15.10	76.31	17.30	82.40	13.67	.079	
QUE 2	3.16	0.850	3.48	1.05	3.28	0.792	.182	

Note: * p < .05

Table 6

Significance pattern of SF-36 scales with Wilcoxon test and Bonferroni correction (*p* = .017)

	t0 & t1	t1 & t2	t0 & 2	r
PF	.225	.906	.327	
RP	.952	.672	.786	
BP	.833	.972	.711	
GH	.002*	.683	.078	-.623
VT	.979	.617	.183	
SF	.680	.093	.126	
RE	.887	.234	.357	
MH	.859	.035	.024	
PHYS	.110	.848	.144	
PSYC	.989	.052	.109	
QUE2	.322	.438	.593	

Note: * p < .05

Demographic variables and SF-36

The variable age was divided by the median (34) into a young age group (*n* = 12) and an old age group (*n* = 11). Checking the GH scores with the t-test for paired measures no significant results could be found. Age does not have an influence on the general health outcomes of participants in the baseline or the first assessment.

Same procedure occurred for the education variable. The high and low educated group was evaluated for differences using a t-test for paired measures. No significant effects could be found. The level of education does not have an effect on the general health outcomes of the participants after using Ayahuasca.

For gender, no significant effect could be found evaluating the GH scale of the baseline and the first assessment with the Wilcoxon signed rank test. Gender does not have an effect on the general health status and the effects that go ahead with the consumption of Ayahuasca.

Participants were divided in one group with no experience with Ayahuasca and a group that took Ayahuasca between one and five times to evaluate if this could have an effect on the changes after consuming Ayahuasca. No significant results were found ($t(11) = -1.715$, $p = .114$).

Looking at the reasons why people took part in an Ayahuasca ceremony: only two reasons were compared because of equivalent group sizes: the hope for therapeutic benefits which was evaluated with a t-test for paired measures and the wish to experience new shifts in perspectives which was tested using the Wilcoxon signed rank test. None of these reasons had an modulated the effect that Ayahuasca had on the participants.

Additional information for measurements t0 and t1 (N = 33)

Eight participants missed to fill out the t2 assessments. However, these participants can be used to evaluate more detailed results for the differences between the baseline and the first assessment t1. Therefore, the statistical procedure that was done for the main hypothesis was repeated using N = 33 participants. After applying the Kolmogorov-Smirnov test, the Wilcoxon test and the t-test for paired measures was used to check for differences in mean sores.

The mixed results of the BSI-53 showed significant differences between t0 and t1 for the scales PHOB, D and SOM. The remaining scales did not show any significant differences.

The scale PHOB showed significantly lower results in t1 (*M* = 49.33, *SD* = 9.45, *z* = -3.142, *p* = .002, *r* = .628) compared to the baseline assessment (*M* = 56.88, *SD* = 12.15). Therefore, the participants had much lower phobic symptoms after the immediate consumption of Ayahuasca. Participants had significant higher scores in the scale D (*z* = -1.97, *p* = .049, *r* = -.393) before the immediate use of Ayahuasca. The participants showed a mean of *M* = 56.15 (*SD* = 12.78) in the baseline and a mean of *M* = 51.42 (*SD* = 11.73) in the post-assessment. Concerning the SOM scale participants showed significantly higher scores after the intake of Ayahuasca in t1 (*z* = -2.91, *p* = .004, *r* = -.581). The mean for the baseline was *M* = 53.06 (*SD* = 10.59) and increased in t1 to *M* = 60.90, (*SD* = 2.24).

The results for the SF-36 confirmed the significant differences in the GH scale of the instrument. All other scales remained insignificant. The post-assessment showed significantly higher scores (*M* = 78.48, *SD* = 17.57, *z* = -2.95, *p* = .003, *r* = -.589) compared to the baseline assessment (*M* = 70.60, *SD* = 18.90). In sum, the immediate effects of Ayahuasca improved the general health status of participants.

Discussion

Overview

The present study investigated psychopathological symptoms and quality of life in relationship to the consumption of Ayahuasca. The purpose of the study was to replicate some of the findings of previous research and to make new discoveries of potential negative or positive effects of the substance. Differences in results compared to other studies could be due to the use of different instruments, sample size, research design, location of the assessments or language in which the testing situation took place.

Accordance to hypothesis

Psychopathological symptoms: The hypotheses concerning the first research questions predicted that there is a difference in psychopathological symptoms between all three measurements for the intake of Ayahuasca. These hypotheses could be partly confirmed for the scales SOM, I-S, ANX, PHOB, PSYC, the GSI, PST and the PSDI scale as well as the Add-on questions. Ayahuasca had positive effects and decreased psychopathological symptoms in certain scales. All

follow-up scores were below the baseline. For the scales SOM, PSDI and the Add-On questions the second assessment (t1) showed higher scores compared to the baseline. These scales sum up physical symptoms and were negatively effected by the acute effects of Ayahuasca such as nausea, vomiting, physical weakness, hallucinations and deprived sleep during the retreats.

For the scales I-S, ANX, PSYC, GSI, PSDI, PST, and Add-On questions significant differences were found comparing the baseline and the follow-up assessment. These results were the most important ones, to show that Ayahuasca has short-term effects and changes did not only occur as a result of mood, the experience itself, acute physical symptoms or other environmental confounders that are a result for the t1 scores.

This study could also show that individuals with hopes for therapeutic benefits showed greater improvements for anxiety symptoms after the intake of Ayahuasca. This could be due to a placebo effect that results from a greater believe in the substance. Also men seemed to experience greater positive effects in psychotic symptoms after the intake of Ayahuasca but at the same time showed higher scores after the acute effects of the substance.

Quality of life. The second hypothesis was examining a change in quality of life after the consumption of Ayahuasca. The only significant results could be found for the scales General Health and the total Physical scale. Looking at the in-between test results the physical composite score was no longer significant in any of the assessments. The scale GH was still significant between the baseline and t1. This result was due to a high increase of quality of life in t1. 36% reported a significant event that happen during t1 and t2, such as loss of / new job, death, loss of / new important relationship or relationship problems. This can be another explanation, that the overall quality of life did not decrease again 3–4 weeks after Ayahuasca or could explain why scores in the remaining scales did not change significantly. These events could have been confounding variables. In addition, 24% of the sample reported to have chronic diseases that could have also modulated the outcome of these hypotheses. In conclusion, Ayahuasca seems to have a positive short term effect on general health concerning quality of life.

Comparison to other studies

Demographic characteristics. The sample in this study was in accordance to previous research concerning demographic variables. The participants willing to take Ayahuasca seemed to be relatively young adults and more male than female (Cakic, Potkonyak, & Marshall, 2010). Another characteristic is the good educational level. Cakic et al. (2010) found that 60.3% of their sample completed university, had a high employment rate and a fair amount of students. The current study could validate these findings. The phenomenon might be explained through the hypothesis that literate individuals are more likely to consume substances, because of specific personality traits such as novelty seeking, stimulation seeking, openness to experiences and the intellectualisation for the consumption (Bidwell et al., 2015; Terracciano, Löckenhoff, Crum, Bienveu, & Costa, 2008).

The large amount of previous drug experiences of the participants before taking Ayahuasca was also in line with the study of Cakic et al. (2010). This does not seem surprising. Ayahuasca is a strong hallucinogenic substance that is hard to get, potent and unpredictable. First-time users might not try this substance at this high cost without having any idea of the general effects of drugs. Cakic et al. (2010) also found that 31.1% of their participants smoked DMT for potential psychotherapeutic benefits. In this sample the therapeutic expectations towards Ayahuasca was much higher (72%). This could be explained by the psychotherapeutic context (group ceremony, integration, shamanistic rituals) in which Ayahuasca was consumed and the efforts and costs that it came with.

Psychopathological symptoms. The overall results of psychopathological symptoms are in line with previous research. Barbosa et al. (2005) could also report significantly lower psychiatric symptoms (CIS-R) after the intake of Ayahuasca around seven till 14 days later in comparison to the baseline (t0). These findings can be compared with the global GSI index of this study, as Barbosa et al. (2005) did not report more detailed results for the specific scales.

Concerning depressive symptoms other studies found a significant decrease of 72% after the immediate use of Ayahuasca and even after more than two weeks (Osório et al., 2015). The results of the current study were not as strong comparing t0 and t2. This could be due to the small sample size and the fact that participant were

not preselected for depressive disorder and had a lower baseline compared to the sample characteristics of Osório et al. (2015).

Comparing results to the study of Bouso et al. (2012) significant results could be replicated for the following scales: SOM, I-S, ANX, PHOB, PSYC, GSI and PST. Participants who took Ayahuasca scored lower on these scales compared to the control group. These differences could be due to a greater sample of Bouso et al. (2012). This study only had 25 participants and five sample groups (Berlin, Vienna, Hamburg). It is possible, that the Obsessive-Compulsive, Hostility and Paranoid symptoms were less present in a small sample or that other confounding variables, that could not be standardized (therapist, preselected participants by the organisation, the context in which the study took place) biased these symptoms.

Quality of life. Previous studies could show significant effects of Ayahuasca for the scale MH and for the scales BP of the SF-36 between t0 and t2 (Barbosa et al., 2009). Regular Ayahuasca users had a higher score in the dimension of RE and the dimension of SF. In addition, Barbosa et al. (2016) reported significant effects for the scale of RP. None of these results could be replicated in this study.

Bellach et al. (2000) were predicting a difference of subjective quality of life in age for the scale of GH and RP and difference in gender for all scales except the GH scale. These findings could not be replicated in this study. Again, one reason for these different findings can be the difference in sample size of both studies (N = 6964 vs. N = 25).

Limitations of the study

A few factors were limiting the outcomes of this study. The most obvious limitation of the study is the small sample size. Sample size could have been doubled by using multilingual instruments to include participants who speak English. A small sample size might have had an effect on the outcome.

Future experiments should have a better overview and control more confounding variables. Chronic diseases and life events that happened between the assessments can be strong confounding variables and cause an increase or decrease of psychopathological symptoms and quality of life that are not due to Ayahuasca. In addition, the testing environment should be controlled. Participants

should be able to fill out the questionnaire in a quit room before the retreat even started.

Another critical factor was the broad variables that the study tried to investigate. Especially, as this field of Ayahuasca is very young and only a specific group of researchers published their empirical work, such a variety of constructs measured does not lead to strong results. An alternative could have been to focus on one single symptom group such as depression and use instruments like the Beck Depression Inventory (BDI) to get more specific results. To even intensify this factor, participants could have been recruited that meet full criteria for a DSM-5 disorder such as depression or anxiety disorder and to see the effect of direct therapeutically interventions. *Ayahuasca International* (Varela, 2017) is offering special events that focus on people with strong addictions. In this case the participants might have had higher scores on psychopathological symptoms or could have been tested using the Addiction Severity Index (ASI) to see more specific changes. These options are to be considered in future studies.

Conclusion

Ayahuasca is known to be used since thousands of years in the Amazon Basin. Generation after generation shamans are teaching their children about the therapeutic effects that the brew has on the health of the indigenous community. Now the substance traveled to Europe and people of all age and background are turning to this substance to find physical or mental healing. Previous studies could already pave the way into seeing Ayahuasca as a positive discovery for several disorders. But every medicine needs to be analysed for exact effects to know which diagnosis, disorders and diseases the substance is helpful or harmful for. In addition, long-term effects need to be investigated. Meanwhile people are deciding for themselves if they want to try Ayahuasca and set their hopes in this medication without any clinical administration. This study could show beneficial therapeutic effects of Ayahuasca for somatic symptoms and general health, anxiety symptoms, psychotic symptoms and general psychopathological distress. It is the responsibility of future clinical studies to evaluate the areas in which Ayahuasca can take positive effects, to prevent individuals from using Ayahuasca without clinical expertise and help patients to receive Ayahuasca as a new potential aid.

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Appendix

List of figures

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List of abbreviation

DMT	N,N-dimethyltrypatamine
MAO	Monoamine oxidase
THH	Tetrahydroharmine
UDV	Uñiao do Vegetal
ADD	Attention Deficit Disorder
SCL-90	Symptom Checklist 90
SRQ	Self Report Questionare

BSI-53	**Brief Symptom Inventor 53**
ANX	Anxiety
D	Depression
GSI	Global Severity Index
HOS	Hostility
I-S	Interpersonal Sensitivity
O-C	Obsessive-Compulsive
PAR	Paranoid Ideation
PHOB	Phobic Anxiety
PSDI	Positive Symptom Distress Index
PST	Positive Symptom Total
PSYC	Psychoticism
SOM	Somatization

SF36	**Short Form 36**
BP	Bodily Pain
GH	General Health
MH	Mental Health
PF	Physical Function
RE	Role Emotional
RP	Role Physical
SF	Social Function
VT	Vitality

Einwilligungserklärung

Ich erkläre mich bereit, freiwillig an der Studie „**Effects of Ayahuasca on psychopathological symptoms and quality of life in an Austrian and German population**“ auf Deutsch: „Effekte von Ayahuasca auf psychopathologische Symptome und Lebensqualität in einer österreichischen und deutschen Stichprobe“ teilzunehmen. Ich habe die Teilnehmerinformation gelesen und bin über die Studie aufgeklärt.

Ich bin mir bewusst, dass ich diese Zustimmung jederzeit und ohne Angabe von Gründen widerrufen kann. Eine Kopie der Teilnehmerinformation und Einwilligungserklärung habe ich erhalten. Das Original verbleimt beim Testleiter.

_____ _____

Datum Unterschrift

Demographische Daten

Codenummer: [bestehend aus den **ersten zwei Buchstaben Ihres Vornamens +**

den **letzten zwei Ziffern Ihres Geburtsjahres +**

den **ersten zwei Buchstaben des Vornamens Ihrer Mutter +**

den **ersten zwei Buchstaben Ihres Geburtsortes**.

Bsp.: Julia 1989 Rita Bernau = Ju89RiBe]: _____

Geschlecht: ○ männlich ○ weiblich

Alter:

Aktueller Familienstand:

- ○ ledig
- ○ In Partnerschaft lebend
- ○ geschieden
- ○ verwitwet

Höchste abgeschlossene Schulbildung:

- ○ Kein Pflichtschulabschluss
- ○ Pflichtschule (inkl. 9.Schuljahr)
- ○ Lehre
- ○ Berufsbildende mittlere Schule (ohne Matura)
- ○ Höhere Schule (mit Matura)
- ○ Hochschulverwandte Lehranstalt (z.B. Pädagogische Akademie)
- ○ Universität/Hochschule (BA, MA, Diplom)
- ○ Postdoktoraler Abschluss (Dr, PhD.)

Derzeitige Beschäftigung:

- ○ Pensionist
- ○ Langzeitkrankenstand
- ○ Angestellter
- ○ Arbeiter
- ○ Selbstständig
- ○ Student
- ○ Lehrling in Ausbildung
- ○ Arbeitslos

Leiden Sie derzeit an einer chronischen Krankheit oder erlitten Sie einen Unfall?

○ Ja ○ Nein

Wenn ja, bitte spezifizieren Sie: _____

Welche Ihnen bekannten Substanzen haben Sie bereits konsumiert?

☐	**Amphetamine**	☐	**Freebase**	☐	**Palfium**
☐	**Cannabis**	☐	**Benzin**	☐	**PCP**
☐	**Kokain**	☐	**Klebstoff**	☐	**Ritalin**
☐	**Codein**	☐	**Haschisch**	☐	**Temgesic**
☐	**Crack**	☐	**Heroin**	☐	**THC**
☐	**Dilaudid**	☐	**LSD**	☐	**Toluen**
☐	**Alkohol**	☐	**Marihuana**	☐	**Trichloraethylen**
☐	**Tabak/Zigaretten**	☐	**Mescalin**	☐	**Gras**
☐	**Ecstasy**	☐	**Morphine**	☐	**Ketamin**
☐	**Aether**	☐	**Opium**	☐	**MDMA**
☐	**Speed**	☐	**Crystal Meth**	☐	**Methadon**
☐	**Keine Erfahrung mit Drogen**				

Haben Sie in der Vergangenheit bereits einmal Ayahuasca konsumiert?

○ Nein ○ 1x ○ 1-3x ○ Mehr als 3x ○ regelmäßiger Konsum

Welches sind Ihre Gründe für die Teilnahme an einer Ayahuasca-Zeremonie?

- ○ um Visionen und Halluzinationen zu erleben
- ○ die Hoffnung auf therapeutische Effekte bei psychischen oder physischen Problemen
- ○ Wunsch nach Perspektivenwechsel
- ○ um sich Selbst kennenzulernen/ eigene Grenzen auszutesten
- ○ Interesse an bzw. Mitglieder der *Santo Daime* Kirche
- ○ um weitere Erfahrungen mit Drogen zu sammeln
- ○ Empfehlung von Familien und Freunden
- ○ Wunsch nach Erleuchtung
- ○ Aufgrund schwierigen Erlebnissen in der Vergangenheit
- ○ Sonstiges: _____