EXAMINING CHANGES IN PERSONALITY OCCASIONED BY AYAHUASCA IN CEREMONIAL CONTEXT

by

Brandon Weiss

(Under the direction of Joshua D. Miller)

ABSTRACT

Objective: The present study examines whether the ceremonial use of ayahuasca is associated with change in personality traits; and the degree to which participant characteristics, baseline personality, and post-ayahuasca acute experiences amplify personality change processes. *Method:* 289 participants recruited from clients of three ayahuasca healing and spiritual centers in South and Central America completed measures of self- and informant-reported Five-Factor model personality at three measurement points (Baseline, Post, 3-month Follow-up) and moderating variables at two measurement points (Baseline, Post). *Results:* Descriptive analyses and bootstrap confidence intervals were used to examine change in personality domains and facets and moderation by covariates. A decrease in Neuroticism was observed between Baseline and Post, and Baseline and 3-month Follow-up, and this change was reflected in self- and informant-report data. Moderation of personality change by baseline personality, acute experiences, ceremonial elements, and purgative experiences was also observed.

INDEX WORDS: Ayahuasca, psychedelic, personality change

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Brandon Weiss, M.A.

B.A., Colgate University, 2007

M.A., Wake Forest University, 2015

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by

Brandon Weiss

Major Professor: Joshua D. Miller

Committee: W. Keith Campbell

Kristen M. Shockley

Nathan T. Carter

Electronic Version Approved:
Ron Walcott
Vice Provost for Graduate Education and Dean of the Graduate School
The University of Georgia
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CHAPTER 1

EXAMINING CHANGES IN PERSONALITY OCCASIONED BY AYAHUASCA IN CEREMONIAL CONTEXT

Contemporary interest in therapeutic applications of serotonergic psychedelic compounds (i.e., 5-HT_{2A} receptor agonists) has led to revived scientific investigation of their neurobiological, psychiatric, and psychological effects. A growing literature now links the use of psychedelic compounds to positive mental health outcomes (e.g., Carhart-Harris et al., 2018; Erritzoe et al., 2018), well-being (e.g., Griffiths et al., 2011; Schmid & Liechti, 2018), and long-term changes in personality (e.g., Erritzoe et al., 2018; MacLean, Johnson, & Griffiths, 2011). However, the research literature contains considerable variability in estimates of psychedelic-induced effects on long-term personality change (e.g., Griffiths et al., 2018; Schmid & Liechti et al., 2018; c.f. MacLean et al., 2011), which may stem from methodological limitations involving low sample size, low statistical power, elevated Type I error, and validity threats related to absent control groups. Furthermore, notwithstanding the valuable contributions that contemporary researchers have made in creating safe and effective psilocybin-assisted therapy protocols (e.g., Griffiths et al., 2011), therapeutic components from shamanic traditions have garnered less scholarly attention. These issues in the extant literature call for larger, well-powered studies equipped to examine moderating factors that may account for variability in psychedelic-induced psychological effects and greater focus on elements of shamanic practice. The purpose of the present study was to examine (a) whether personality changes in response to the ceremonial use of *ayahuasca*, a decoction of psychoactive plants indigenous to the Amazon

basin of South America; and (b) the degree to which predisposing factors, such as demographic characteristics and baseline personality, and experiential factors, such as non-ordinary states of affect and consciousness, potentiate (or limit) this change.

The Importance of Studying Ayahuasca and Ceremonial Practices

The ceremonial use of plants containing 5-HT_{2A} receptor agonists dates back at least three thousand years, involving numerous ancient cultures including Vedic (Wasson & Ingalls, 1971), Aztec (Ott & Bigwood, 1978; Schultes & Hofmann, 1979), Native American (Stewart, 1987), and Greek (Wasson, Hofmann, & Ruck, 1978). Archeological evidence suggests that ayahuasca was prepared and used as early as one thousand years ago (Miller, Albarracin-Jordan, Moore, & Caprilles, 2019) and is thought to have a long history of ceremonial use among indigenous peoples of Brazil and the Amazonian basin of South America (Dobkin, 1971; Schultes & Hofmann, 1979). Ayahuasca combines the woody vine of Banistereopsis caapi (Ott, 1994; Spruce, 1908; Quechua for "vine of the soul" or "vine of the dead"), containing β-carboline monoamine oxidase inhibitors that make it orally active, and plants (e.g., the shrub Psychotria viridis was used in this study; McKenna, Towers, & Abbott, 1984) containing N,N Dimethyltryptamine (DMT), the psychoactive 5-HT_{2A} receptor agonist.

The ceremonial use of plants containing 5-HT_{2A} receptor agonists has historically been much rarer and less central to human life in western industrialized nations. Although psychedelic compounds garnered greater interest and use in the 1960's, their popularity in this era triggered transnational criminalization of psychedelic use as well as restrictions on psychopharmacological research in the 1970's. In the last hundred years, western researchers have selected nondirective (e.g., Griffiths et al., 2011) and psychodynamic (Grof, 1975) psychotherapeutic modalities to support psychedelic-assisted treatment of mental disorders. Notwithstanding the utility these

modern modalities hold, it may be a mistake to leave unexamined the ceremonial practices embedded in the traditional use of ayahuasca. Although unique and culture-bound, these practices may have evolved to potentiate positive psychological changes, limit negative ones, and enhance safety, predictability, and reliability of the compound's acute psychological effects. The ayahuasca ceremony is one practice that combines multiple elements which may inform future protocols within the Western biomedical model of mental healthcare: a communal/group format, guiding elements (e.g., chanting of prayer over the course of the ceremony, use of adjunct plants such as tobacco, use of perfumated water, prayers), engagement with the shaman (e.g., icaro [medicine prayer] delivered by the shaman), and engagement with challenge (e.g., purgative aspects, emotional intensity, traumatic reexperiencing).

A further element that deserves consideration when evaluating processes underlying positive ayahuasca-induced effects is the philosophical framework within which shamanic traditions understand the therapeutic process. For Shipibo shamans, there are three broad components of the therapeutic process: First, the ayahuasca decoction is regarded as a pandora's box that facilitates attunement to the influence of spirits (positive spirits inclined toward revelations of unitive consciousness as well as negative spirits inclined toward perpetuating separateness and associated suffering). Second, the decoction is thought to possess a spirit itself that aids in the healing process. Third, the shaman's icaro is thought to open up "portals" that guide positive spirits (operating as muses or doctors) to minister to "blockages of energy" within ceremony participants. These "blockages" are regarded as the sources of persisting separateness and ignorance toward unitive consciousness. Notably, the icaro is not regarded as having originated from the shaman per se, but rather from the plant spirits that the shaman has previously connected with through long dietary regimens with traditional plants (i.e., dieta).

According to this conceptualization, the icaro represents the primary instrument of therapy, and the shaman serves as a secondary instrument (i.e., vessel of transmission) (correspondence with anonymous Shipibo-trained shaman). By contrast, western biomedical science focuses on the biochemical psychoactive properties of the ayahuasca decoction as the fundamental determinant of psychological influence.

Previous empirical work has linked the ceremonial use of ayahuasca to personality changes including lower worry and greater self-directedness (e.g., Barbosa et al., 2009; Fernandez et al., 2013); and two clinical studies, including a recent randomized placebo-controlled trial, have provided support for an antidepressant effect outside of a ceremonial context (Palhano-Fontes et al., 2019; Sanches et al., 2016). Anecdotal reports furthermore suggest that the ceremonial use of ayahuasca may hold unique efficacy for remediating certain clinical disorders (e.g., post-traumatic stress, addiction) relative to other serotonergic psychedelics, which may translate into utility for altering personality traits that are strongly linked to distress and impairment (e.g., emotional instability, negative affectivity; Kotov et al., 2017).[1]Ayahuasca healing centers are also increasingly popular sources of alternative mental health treatment, particularly among westerners whose mental illness has shown resistance to western clinical and pharmacological treatments.

Psychedelic Research as a Window onto Personality Change

Because personality is fairly stable over the life course (e.g., Terracciano, McCrae, & Costa, 2010), recent findings indicative of moderate to large psychedelic-induced changes to personality raises important questions about the degree to which neurobiological and

[1] For example, MAPS supports research on the effectiveness of ayahuasca-assisted treatment for drug addiction and Post-traumatic Stress Disorder (PTSD), and in recent years, organizations like Heroic Hearts (HHP) have begun connecting military veterans struggling with PTSD to ayahuasca therapy retreats.

psychological effects of psychedelic use may stimulate plasticity in the processes underlying personality. Defined as "how individuals differ from each other in their persistent patterns of emotion, motivation, cognition, and behavior" (DeYoung, 2015), personality is associated with the goals we select (e.g., Mount, Barrick, Scullen, & Rounds, 2005), the values we hold (Parks & Guay, 2009), our ability to achieve goals (Barrick & Mount, 1991), and, ultimately, the quality of the lives we lead (Ozer & Benet-Martinez, 2006; e.g., spirituality, well-being, physical health, longevity). Recent empirical findings indicate that the structure of basic personality such as the well-validated and widely used Five-Factor model (FFM; Costa & Widiger, 2002) of personality underlies the structure of mental illness, such that clinical and personality disorders are conceptualized as maladaptive variants of basic personality dimensions (e.g., Kotov et al., 2017; Widiger, Lynam, Miller, & Oltmanns, 2012). Indeed, inasmuch as individuals are able to change their personality, they may meaningfully improve the quality of their lives.

To date, psychologists have examined a number of pathways by which personality changes, including developmental, sociological, and psychotherapeutic (psychopharmacological or "talk therapy"). First, longitudinal evidence suggests that although FFM personality shows high mean-level stability over time (e.g., Roberts, 2009; Terracciano, McCrae, & Costa, 2010; c.f. Specht, Egloff, & Schmukle, 2011), normative personality changes reliably occur across the full life course (Roberts, Walton, & Viechtbauer, 2006). Scholars suggest that these changes may be driven by biological maturation processes (e.g., Bleidorn et al., 2009) and/or intrinsic temperamental or genetic factors (e.g., McCrae et al., 2000). Second, sociological variables have demonstrated associations with personality change such as new social and vocational roles (Hudson, Roberts, & Lodi-Smith, 2012; Roberts & Bogg, 2004) and major life events (Bleidorn, Hopwood, & Lucas, 2018; Specht, Egloff, & Schmukle, 2011). The social investment principle

holds that investing in specific roles within social institutions such as work, marriage, and family leads to personality change through contingent reward structures that offer stable reinforcement of certain personality states over others. Alternatively, it has been postulated that lasting change in personality may accompany commitment to new identities (e.g., being a good husband; Lodi-Smith & Roberts, 2007; Wood & Roberts, 2006). Third, given overlap between personality and mental illness, it is perhaps not surprising that clinical and pharmacological psychotherapy shows evidence of mediating change in almost all FFM traits, with the exception of Openness (e.g., Noordhof, Kamphuis, Sellbom, Eigenhuis, & Bagby, 2018; Roberts et al., 2017). Finally, three studies to date have examined volitional intention as a means of personality change, observing small to large changes in relation to structured personality change goals, specific intentions each week (Hudson & Fraley, 2015), and motivational coaching (Allan, Leeson, De Fruyt, & Martin, 2018).

Another pathway? Psychedelics and personality change. Over the last decade, empirical research has begun to furnish evidence for an additional pathway by which personality may change, though prospective findings have been mixed, and no meta-analysis has yet been published.

Cross-sectional findings. Cross-sectional studies comparing lifetime users of ayahuasca (and other psychedelic compounds) and healthy controls indicate that lifetime users exhibit lower Temperament and Character Inventory (TCI; Cloninger, Svrakic, & Przybeck, 1993) Harm Avoidance (Bouso et al., 2012, 2015; Schneider et al., 2015; Grob et al., 1996), characterized by dispositions toward worry, fear of uncertainty, shyness, and fatigability; higher TCI Reward Dependence (Bouso et al., 2012), characterized by tendencies to respond to signals of reward, including social approval, support, and sentiment; TCI Self-Transcendence (Bouso et al., 2015;

Schneider et al., 2015), characterized by spirituality and consciousness of being part of something greater than the individual self; and higher FFM Openness (Barbosa et al., 2016; Nour, Evans, & Carhart-Harris, 2017), characterized by intellectual curiosity, aesthetic sensitivity, and imagination. Cross-sectional design, however, places substantial constraints on interpretation, as significant differences found between users of psychedelic substances and non-users may be attributable to stable, preexisting personality traits that predispose use rather than psychedelic-induced change.

Prospective findings. Prospective studies in naturalistic and laboratory settings have yielded mixed evidence of psychedelic-induced personality change. A number of naturalistic studies have examined personality change associated with ceremonial use of ayahuasca, observing decreases in TCI Harm Avoidance (Barbosa et al., 2009; Fernandez et al., 2013) and increases in TCI Self-Directedness (Fernandez et al., 2013), consistent with cross-sectional findings. Prospective studies in controlled laboratory settings show heterogeneous effects that may depend in part on length of follow-up, sample size, conditions of administration, and experiences during the acute effects of the compounds. Changes in FFM Neuroticism (decreasing), Extraversion, Openness, Agreeableness, Conscientiousness (increasing), and Tellegen Absorption (Tellegen & Atkinson, 1974) have been reported across healthy (e.g., Barrett, Doss, Sepeda, Pekar, & Griffiths, 2020; Carhart-Harris et al., 2016; MacLean et al., 2011) and clinical (Erritzoe et al., 2018) samples. Nevertheless, meaningful changes in personality have not always been observed (Griffiths, Richards, Johnson, McCann, & Jesse, 2008; Griffiths, Richards, McCann, & Jesse, 2006; Griffiths et al., 2018; Schmid & Liechti, 2018), and the emergence of stable changes may depend on inner experiences during the compound's acute effects (e.g., Erritzoe et al., 2018; MacLean et al., 2011; cf. Griffiths et al.,

2018; Schmid & Liechti, 2018). It also bears noting that although these findings emerged from randomized, double-blind placebo designs, the majority did not employ a control group, which can accompany validity threats including regression to the mean and the Hawthorne effect (Borg & Gall, 1979). Notably, the single controlled laboratory study that included a control group did not show a statistically significant change in any personality domains (Griffiths et al., 2018), though low sample size and statistical power would have limited its capacity to detect a smaller statistically significant effect.

Accordingly, the foregoing literature shows substantial variability in the effect of psychedelic experience on personality. In view of the methodological limitations of extant studies and the null results associated with more rigorous ones (e.g., Griffiths et al., 2018), it may be the case that changes in self-reported personality are merely products of *placebo, expectancy* and/or *demand effects* following a particularly intense and compelling experience (Metzner, Litwin, & Weil, 1965). Nevertheless, this variability may also point to other responsible factors, such as low power in extant prospective studies, which renders smaller true effects undetectable, or the influence of subtle moderators that potentiate or limit personality change effects (e.g., sample and design characteristics, particular acute experiences).

Accounting for variability. Theoretical and empirical work have pointed to a number of candidate predisposing and experiential factors that may account for variability in the long-term effects of psychedelic compounds. Predisposing factors roughly map onto popularly observed determinants of psychedelic experience, (mind)set and setting (Fadiman, 2011), but also extend beyond these domains by incorporating individual differences such as demographic characteristics and baseline personality traits. Experiential factors refer to psychological and neurobiological features of psychedelic experience involving non-ordinary affective and

cognitive states (mental) and neural activity and connectivity (physical) that may have a probabilistic role within personality change processes.

Predisposing factors. Previous work has primarily examined predisposing factors as predictors of (a) affective and non-ordinary states during psychedelic experience and (b) self-reported significance ascribed to psychedelic experience. Among examined predisposing factors, dosage has shown associations with self-reported experiential intensity, personal meaning, and spiritual significance (e.g., Griffiths et al., 2011); and personality traits (e.g., Absorption), affective states (e.g., emotional excitability), age, and experimental setting have all shown associations with affective and mystical states during psychedelic experience (e.g., Erritzoe et al., 2018; Studerus, Gamma, Kometer, & Vollenweider, 2012).

Experiential factors. A small literature has examined non-ordinary psychological states as possible potentiating factors in personality change (Erritzoe et al., 2018; Gasser, Kirchner, & Passie, 2015; Griffiths et al., 2008; Griffiths et al., 2011; Griffiths et al., 2018; MacLean et al., 2011; Pahnke, 1969; Schmid & Liechti, 2018; Studerus et al., 2012). Among the most popular targets of inquiry are states of mystical-type, spiritual, ego-dissolving, and intense emotional experiences based on empirical and clinical research indicating convergence between psychedelic, religious, psychodynamic (i.e., involving confrontation with self, emotion, and conflict), and transpersonal (i.e., involving continuity between mental, physical, and metaphysical life) phenomenology (e.g., Gasser, Kirchner, & Passie, 2015; Grof, 1975; Pahnke, 1969; c.f. Doblin, 1991). Previous findings have indicated that non-ordinary states of unitive consciousness (i.e., feeling of being one with a larger whole), insightfulness (i.e., perceptions of encounter with ultimate reality), awe, and transcendence from time and space (collectively referred to as mystical experience; MacLean, Leoutsakos, Johnson, & Griffiths, 2012) may

substantively potentiate changes in FFM Openness (e.g., MacLean et al., 2011; cf. Erritzoe et al., 2018; Griffiths et al., 2018; Schmid & Liechti, 2018), Neuroticism, and Extraversion (Erritzoe et al., 2018; Roseman, Nutt, & Carhart-Harris, 2018). Other experiential factors currently under study include emotional confrontation, and connectedness to self, others, and nature (Carhart-Harris, Erritzoe, Haijen, Kaelen, & Watts, 2017). Figures 1, 2, and 3 delineate general and specific models that have some empirical support.

Neurobiological factors. Previous studies examining psychedelic-induced changes to neurobiology have been suggestive of neurobiological systems underlying personality processes. There are three notable bodies of findings with implications for personality change. The first body of findings has indicated that psychedelic administration produces changes in default mode network functioning (DMN; subserving self-reflection and introspection) namely decoupling within the DMN, decoupling between DMN regions and the medial temporal lobe, increased neural entropy and global functional connectivity, and concomitantly unconstrained cognition during psychedelic experience (e.g., Barnett, Muthukumaraswamy, Carhart-Harris, & Seth (2020); Carhart-Harris et al., 2012, 2014). Recent work has also shown longer-term changes to the DMN, including decreased functional connectivity in the DMN one day following ayahuasca use (Pasquini, Palhano-Fontes, & Araujo, 2019), and a structural link between the intensity and duration of ayahuasca use and reduced cortical thickness in the poster cingulate cortex, a core component of the DMN (Bouso et al., 2015). According to Carhart and colleagues' (2014), 5-HT_{2A} receptor stimulation produces neural entropy within the DMN and elsewhere, and the brain enters a state of "criticality" characterized by greater balance between two brain states, namely a state of order that is conducive to coherent cognitive functioning and a state of chaotic disorder (i.e., neural entropy) that is conducive to cognitive flexibility and adaptability (Atasoy et al.,

2017). The authors have suggested that psychedelic compounds may work on personality and psychopathological traits through "dismantling reinforced patterns of … thought and behavior by breaking down the stable spatiotemporal patterns of brain activity upon which they rest" (Carhart-Harris et al., 2014). This work suggests that phenotypes involving inflexible patterns of may be most susceptible to psychedelic effects, including Obsessive Compulsive Disorder, Substance Use Disorder, and, most notably, Neuroticism, which has been linked to 5-HT_{2A} receptor binding using positron emission tomography (Frokjaer et al., 2008). Heightened criticality has also been observed as a predictor of long-term increases in FFM Openness in a small sample (Lebedev et al., 2016).

The second body of findings has shown acute and longer-term neurobiological changes to the salience network (SN; subserving autonomic socioemotional processing [anterior insula] and formulation of visceromotor behavioral responses [anterior cingulate cortex]). Specifically, psychedelic administration has been observed to produce decreased functional connectivity in the SN during acute effects (Lebedev et al., 2016; Viol, Palhano-Fontes, Onias, de Araujo, & Viswanathan, 2017), as well as increased connectivity one day following ayahuasca use (Pasquini et al., 2019). Moreover, intensity and duration of ayahuasca use have been linked to increased cortical thickness in the anterior cingulate cortex, a core component of the SN (Bouso et al., 2015). Although evidence linking the SN to personality is more limited, structural neuroimaging studies have shown that white matter tract integrity within the anterior cingulate cortex may be associated with TCI Self-directedness (Prillwitz et al., 2018), and functional neuroimaging studies have shown that increased connectivity within the SN was linked to Borderline Personality Disorder (BPD) (Doll et al., 2013). Of note, both TCI Self-directedness

and BPD meaningfully overlap with FFM Neuroticism (De Fruyt, Van de Wiele, & Van Heeringen, 2000).

The third body of findings has observed global coupling of networks that are inversely correlated under ordinary states of consciousness including between the SN and DMN (Carhart-Harris et al., 2013; Sampedro et al., 2017) and between the task-positive network (subserving goal-directed cognition) and DMN (Carhart-Harris et al., 2014). The implications of these patterns for personality processes are not clear.

Limitations of Previous Research

Despite the considerable progress researchers have made in investigating psychedelic-induced personality change, a number of methodological limitations are notable. First, most findings regarding psychedelic-induced personality change are quite mixed, including the most well-studied effect of psychedelic compounds on FFM Openness. This pattern of findings suggests the need for further replication efforts with more rigorous designs, including tests of moderation to uncover predisposing and experiential factors that may potentiate or underlie changes. Second, extant studies tend to contain small samples that impair the external validity and generalizability of their findings, and accompany low statistical power, which impairs studies from detecting true effects of smaller size. Indeed, the average sample size in previous prospective studies examining personality is $n = 19$. Third, the research literature on ayahuasca contains just two prospective examinations of personality change (Barbosa et al., 2009; Fernandez et al., 2013). Finally, prospective self-reported change in personality has not yet been corroborated by informant-reported change, which could provide greater resolution on personality traits that are more behavioral in nature, such as Extraversion, and reduce the influence of placebo, demand, and expectancy effects among target participants.

Present Study

The present study builds upon these methodological limitations by examining personality change occasioned by the ceremonial use of ayahuasca in a large sample of 289 participants using self- and informant-report measures of FFM personality across three measurement points (i.e., Baseline, Post, 3-month Follow-up).

The first aim was to replicate and extend previous research examining *how* personality changes in relation to psychedelic experience. Specifically, self- and informant-report Baseline FFM domain and facet scores were compared to Post and Follow-up scores, separately, and 95% bootstrap confidence intervals were used to evaluate significant differences in personality between measurement points. In line with previous work (Erritzoe et al., 2018; MacLean, Johnson, & Griffiths, 2011), self- and informant-report FFM Openness and Extraversion were hypothesized to increase over time, and FFM Neuroticism was hypothesized to decrease over time.

The second aim was to extend and build upon previous work investigating *why* personality may change in relation to psychedelic experience. Specifically, we examined to what degree differences in FFM domain and facet scores between measurement points varied as a function of predisposing and experiential factors. Effect size differences were compared in relation to (a) predisposing factors including demographic characteristics, prior psychedelic experience, baseline personality, expectancies, and retreat variables (e.g., number of ceremonies); (b) experiential factors including mystical experience, altered states of consciousness, ego dissolution, and ayahuasca-specific experiences (e.g., purging, courage-building). Figure 4 presents a tentative conceptual model of ayahuasca-induced personality change processes. In line with previous work (MacLean et al., 2011), mystical experience was

hypothesized to contribute to a larger difference in FFM Openness between Baseline, on one hand, and Post and Follow-up, on the other.

CHAPTER 2

METHOD

Participants

Three-hundred-twenty-eight participants were recruited from three ayahuasca retreat centers across South and Central America: Arkana Spiritual Center (Requena, Loreto, Peru), Soltara Healing Center (Gulf of Nicoya, Costa Rica), and La Medicina (Cordilliera Escalera mountain range, Peru). Of the 328 participants who were recruited, 3% (N = 10) met criteria for invalid responding based on the Elemental Psychopathy Assessment validity scales and inadequate time-commitment (i.e., < 25% of average time contributed to personality questionnaire), leaving a sample of 318 validly responding participants possessing data at at least one measurement point.[2] Data were furthermore removed in pair-wise fashion for seven participants on the basis of inadequate time-commitment and untimely completion (e.g., completing Post measurement ahead of ceremony experience, completing Post measurement more than one month following retreat end). For the purposes of comparing scores between Baseline and Post, and Baseline and Follow-up, separately, two final samples containing complete self-report data for two measurement points were analyzed. The first sample, containing data at Baseline and Post, consisted of 289 participants (101 females and 186 males; mean age = 34.8 [SD = 9.8]; 91% White, 2% Black, 6% Asian, and 9% Hispanic, 4% Native American); the second sample, containing data at Baseline and Follow-up, consisted of 265

[2] Invariant responding was also utilized as a criterion for invalid responding (i.e., reliance on one response option for more than 80% of items). No participants met this criterion.

participants (98 females and 166 males; mean age = 34.8 [SD = 10.0]; 91% White, 2% Black, 6% Asian, 8% Hispanic, 3% Native American).

Further, independent samples t-test analyses were conducted to test for differences between validly responding participants who discontinued after Baseline (N = 25) or possessed data at only two measurement points (N = 41), on one hand (Total N = 66), and validly responding participants with no missing data (N = 252), on the other. At Baseline, participants with missing data exhibited higher Neuroticism (*d* = .28), higher Extraversion (*d* = .07), higher Openness (*d* =.18), lower Agreeableness (*d* =.12), and lower Conscientiousness (*d* = .35). However, differences were only statistically significant ($p < .05$) for Conscientiousness.

Of validly responding participants, 32% (N = 103) possessed informant-report measurement at Baseline and Follow-up, and an additional six cases of informant data from invalidly responding participants supplemented this sample, yielding an informant-report sample of 109 participants. Of note, informant-report data was only included from informants who reported at both Baseline and Follow-up measurement points to reduce error due to imperfect consensus between informants. The number of informants per participant ranged from one to three. Informant-report data was computed by averaging across informants at the item-level for each measurement point. Independent samples t-test analyses were conducted to test for differences between validly responding participants with informant data (N = 103) and validly responding participants without informant data (N = 215). Differences were very few and small; at Baseline, participants with informant data exhibited lower self-reported Agreeableness (*d* =.10) and Conscientiousness (*d* = .11).

Procedure

Participants were emailed two weeks before the date of their ayahuasca retreat with an invitation to enroll as participants in the study and a web address linking to the Baseline survey. Participants were informed that they would be compensated with a customized personality change report and entry into a raffle for a week-long retreat at Arkana Spiritual Center (valued at approximately $1,580.00). In the Baseline survey, participants were asked to include contact information of close significant others (informants), who were subsequently emailed with an invitation to provide informant-ratings of target participants' personality. On average, participants filled out the Baseline survey eight days before the beginning of the retreat (SD = 6.85 days).

On the first day of their retreat experience, participants were provided with a link to the Post survey and directions for internet access. On the last day of their retreat, participants were reminded to complete the Post survey. Up to two subsequent reminder emails were sent to remind participants about the Post survey. The second reminder email offered participants $20.00 compensation for their effort in completing the survey. On average, participants filled out the Post survey five days following retreat end (SD = 4.93 days).

Three months following the last day of their retreat, participants were provided with the Follow-up survey, and informants were invited to rate target participants' personality for the second time. Up to three reminder emails were subsequently sent to target participants. The second and third reminder emails offered an additional incentive of $20.00 and $30.00, respectively, to complete the survey. On average, participants filled out the Follow-up survey 18 days following their invitation (SD = 18.32 days). Accordingly, a substantive portion of participants filled out their Follow-up survey four months following retreat end.

Retreat center experience. Arkana Spiritual Center, Soltara Healing Center, and La Medicina host shamans from the Shipibo lineage (originating geographically in the west Amazon basin) who conduct multiple ceremonies each week. Among the ceremonies offered to retreat clients, the ayahuasca ceremony (offered approximately four times each week) can be regarded as the longest and most immersive. Ayahuasca ceremony and communal check-ins the following day are conjectured to contribute most meaningfully to the observed effects in outcomes of interest. Nevertheless, the ceremonial use of Nunu (tobacco and ash snuff), flower baths, Kambo (a purgative frog venom), Sapo (Bufo Alvarius toad venom containing 5-methoxy-N,N-dimethyltryptamine) and Wachuma (or San Pedro cactus containing 3,4,5-trimethoxyphenethylamine mescaline), among others, are also conducted during the retreat.

Data Collection and Missingness

To examine whether data were Missing Completely at Random (MCAR) or Missing at Random (MAR), missingness on either Post or Follow-up personality measures was regressed on personality domains, age, sex, ethnicity, parental income, personal income, and education level measured at Baseline. A threshold of $p < .01$ was set for statistical significance. Baseline Conscientiousness emerged as a significant but weak predictor of missingness ($b = .15$, $p < .01$), such that less conscientious participants were more likely to have missing data at one or two measurement points.

Measures

Outcome measure.

Five-factor model personality. A 120-item set of the International Personality Item Pool (IPIP-NEO-120; Maples, Guan, Carter, & Miller, 2014) was used to index self-reported dispositional FFM personality traits. The IPIP-NEO-120 consists of five 24-item FFM domain

subscales, and 30 4-item FFM facet subscales, and has demonstrated good reliability and construct validity when compared to the Revised NEO Personality Inventory (NEO PI-R; Costa & McCrae, 1992) (Maples et al., 2014). A 60-item set of the International Personality Item Pool (IPIP-NEO-60; Maples-Keller et al., 2019) was used to index informant-reported FFM traits. The IPIP-NEO-60 consists of five 12-item FFM domain subscales, and 30 2-item FFM facet subscales, and has demonstrated good reliability and construct validity (Maples-Keller et al., 2019). Of note, self- and informant-report data are regarded as showing adequate measurement invariance for comparing relative standings of individuals (Mottus, Allik, & Realo, 2020). FFM domains have shown adequate test-retest reliability across an average interval of four weeks (*r*s > .77; see Gnambs, 2014 for meta-analysis). Longitudinal measurement invariance has also been supported at the metric and scalar level in large samples (e.g., Lucas & Donnellan, 2011; Wortman, Lucas, & Donnellan, 2012). Internal consistency for domains and facets across measurement points are provided in Table 1.

Evaluation of validity.

Suggestibility. The Multidisciplinary Iowa Suggestibility Scale-Short (MISS; Kotov, Bellman, & Watson, 2004) was used to measure participants' susceptibility to internalize external influences and messages, which could contribute to artifactual self-rated changes in personality. The MISS is a 21-item self-report scale (e.g., "I am easily influenced by other people's opinions") that uses a 5-point likert scale (Strongly disagree to Strongly agree).

Expectancies. An original scale measuring expectancies of personality change via ceremonial use of ayahuasca was developed to test for the presence of possible expectancy effects (i.e., the degree to which self-rated personality changes may be driven by expectancy). The scale consists of ten items measuring expected ayahuasca-induced changes in FFM

personality domains (e.g., “I will become more open to experience, i.e., will become more intellectually curious, open to emotion, sensitive to beauty and/or willing to try new things”), spirituality (“I will become more spiritual”), and internalizing symptoms (e.g., “I will experience a significant reduction of depressive thinking”).

Experiential factor validity items. An original 3-item scale was used to measure overreporting of acute mystical-type experiences. Participants were asked the degree to which they experienced the following low base-rate phenomena: “Experience of a distant childhood friend you have not seen or thought of in a long time,” “Rapidly fluctuating pattern of feelings alternating from joy to sadness and back again,” “Experience of bodily fragmentation, such that parts of your body are separated from one another.” Due to the wide range of altered states of consciousness, unusual cognitions, and physical sensations that accompany psychedelic experience, the presence of any one of these is conceivable. However, endorsement of multiple low base-rate phenomena was regarded as indicative of heightened suggestibility and a higher potential for invalid reporting. The cut-off for invalid responding was defined as strong or extreme endorsement of all three validity items. On the basis of this cut-off, data for measures indexing acute experience was excluded for 11 participants.

Invalid responding. Two 8-item validity scales from the Elemental Psychopathy Assessment (Lynam et al., 2011) were used to detect invalid responding on measures of personality. These scales were the Infrequency scale (e.g., “Try to eat something almost every day”) and the Unlikely Virtue scale (e.g., “I have lied to someone at least once in my life”). In line with guidelines (Lynam et al., 2011), participants who endorsed more than three Infrequency scale items and more than two Unlikely Virtue scale items were eliminated. Exclusions based on invalid responding can be found in the Participants subsection.

Participant characteristics.

Demographic characteristics. Participant characteristics including sex, age, personal education level, and parents' income level were measured. Education level was a 7-point ordinal variable ranging from "Less than 7 years of school" to "Doctoral Degree." Income level was a 14-point ordinal variable ranging from "$0 - $5,000" to "$120,000 or more" in increments of $10,000.

Lifetime use of psychedelic compounds. Participants were asked to report previous use of classic psychedelic compounds and previous ceremonial use of ayahuasca. These variables were dichotomized to reflect the presence or absence of previous psychedelic experience. Complete data for lifetime use of ayahuasca was available for 259 (Baseline/Post) and 238 (Baseline/Follow-up) participants.

Experiential factors.

Mystical experience. The Revised-Mystical Experience Questionnaire (RMEQ; Barrett, Johnson, & Griffiths, 2015; MacLean et al., 2012) was used to assess mystical aspects of participants' experiences during ayahuasca ceremony. The RMEQ consists of thirty items originally represented on the 43-item Pahnke-Richards Mystical Experience Questionnaire (Pahnke, 1969; Richards, 1975), which was administered during the classic Good Friday experiment (Doblin, 1991; Pahnke, 1969). In line with previous psychometric work (Barrett et al., 2015), four subscales were assessed: *Mystical* containing 15 items encompassing early RMEQ subscales internal unity (e.g., "Experience of the fusion of your personal self into a larger whole"), external unity (e.g., "Experience of the insight that "all is One"), sacredness ("Sense of reverence"); and noetic quality (e.g., "Gain of insightful knowledge experienced at an intuitive level"); *Positive mood* (6-item; e.g., "Sense of awe or awesomeness"); *Transcendence of time*

and space (6-item; e.g., “Loss of your usual sense of space”); and *Ineffability* (3-item; e.g., “Sense that the experience cannot be described adequately in words”). Items asked participants to consider the degree to which they had experienced the preceding phenomena at any time during the ceremony, and items used a 5-point likert scale (None; Not at all = 1; Moderate = 4; Extreme [more than any other time in your life] = 6). The RMEQ has been used in previous research examining subjective effects of psilocybin in laboratory studies (Barrett et al., 2015) and in cross-sectional studies of psilocybin use (MacLean et al., 2012). One of the items from the internal unity subscale (RMEQ item 30) was excluded due to administrator error; however, as one of sixteen items within the Mystical subscale, internal consistency remained strong. Internal consistency (α) ranged from .87 (Ineffability) to .94 (Mystical). Complete data was available for 267 (Baseline/Post) and 239 (Baseline/Follow-up) participants.

Ego dissolution. The Ego Dissolution Inventory (EDI; Nour, Evans, Nutt, & Carhart-Harris, 2016) was used to measure dissolution of ego during the acute effects of ayahuasca. The EDI consists of eight items (e.g., “I experienced a disintegration of my ‘self’ or ego”) using a 5-point likert scale to measure the presence of dissolution phenomena (No more than usually = 1; Yes, much more than usually = 5). Internal consistency was good (α = .89). Complete data was available for 267 (Baseline/Post) and 239 (Baseline/Follow-up) participants.

Ayahuasca experience. The Ayahuasca Experience Inventory (AEI) was developed for the purposes of the current study in collaboration with Arkana Spiritual Center and Soltara Healing Center shamans and facilitators to measure thoughts, feelings, behaviors, and attitudes that commonly arise within ayahuasca ceremonies (e.g., “I felt the sentiment, ‘I am on the right path,’” “I felt great compassion for others’ distress or pain”). An initial 50-item pool was generated from qualitative data (i.e., participant open-ended responses) and conversations with

shamans and facilitators of participating retreat centers. An additional twenty-five items were included from the Five Dimensions of Altered States of Consciousness Scale (5D-ASC; Dittrich, Lamparter, & Maurer, 2010) that were considered relevant to ayahuasca ceremony experiences. The total item pool (75 items) was subsequently submitted to shamans and facilitators at Arkana Spiritual Center and Soltara Healing Center, who generated additional item content and evaluated the adequacy of initial items on the basis of two criteria: prevalence within ceremony experience and predictiveness of positive change. The resulting 95-item pool was subsequently subjected to item consolidation and division in the service of eliminating double-barreled questions, reducing redundancy, and enhancing intelligibility. The remaining 88 items were added to the Post survey. Items asked participants to consider the degree to which they had experienced phenomena at any time during their ceremonies, and items were measured using a 5-point likert scale (None; Not at all = 1; Moderate = 4; Extreme [more than any other time in your life] = 6), consistent with the RMEQ response options.

Shamanic elements. Eleven of 88 items were separated for independent analysis because they reflected perceptions of shamanic elements whose meaning would not have been directly interpretable had they been factor-analyzed along with other items. The items captured perceptions of the shaman, icaro prayer, and ayahuasca brew, and experiences related to purging. Response options for these items were the same as the AEI and RMEQ. These items can be found in the Appendix in Table A3. Complete data was available for 217 (Baseline/Post) and 196 (Baseline/Follow-up) participants.

Ayahuasca Experience Inventory. Exploratory factor analyses were conducted on the remaining 77 items to examine its structure. The method and results for these analyses are presented in the Appendix. A three-factor solution emerged. The first factor appeared to capture

clarity, peace, self-connection, and self-esteem (referred to as Clarity). The second captured gratitude for lessons emanating from challenging experiences, cognitive reappraisal of negative beliefs about self and others, and courageous initiative to enact positive life changes (referred to as Reappraisal). The third factor captured unpleasant feelings of torment, discomfort, and isolation that seemed unending (referred to as Discomfort). AEI items and loadings can be found in the Appendix in Table A2. AEI factors exhibited internal consistency (α) ranging from .94 (Discomfort) to .97 (Clarity). Complete data was available for 208 (Baseline/Post) and 189 (Baseline/Follow-up) participants.

Ceremony characteristics. Participants were asked about characteristics of their ceremonies and retreat experience including the number of ceremonies in which they consumed ayahuasca, retreat length, average dosage of ayahuasca, and any other plant medicines they used (e.g., Wachuma, Sapo). Dosage was computed as the average ayahuasca quantity consumed across ceremonies in terms of glasses (e.g., one and one-half glasses). Notably, the dosage variable is approximate as glass size was not standardized and varied within and across retreat centers. Complete data for dosage and frequency of ceremonies was available for 274 (Baseline/Post) and 244 (Baseline/Follow-up) participants. Complete data concerning other plan medicines used was available for 250 (Baseline/Post) and 224 (Baseline/Post) participants.

Analytic Plan

Preregistration note. Analyses were preregistered using the Open Science Foundation web platform (https://osf.io/xk3ym). Two deviations from our original preregistered plan are notable. First, my plan was to examine fine-grained personality aspects (DeYoung, Quilty, & Peterson, 2007) in order to detect differential functioning of meaningfully distinct aspects within each domain while avoiding redundancy in facet-level analysis. However, hierarchical

confirmatory factor analytic (CFA) models in which IPIP-120 items relating to each FFM domain were loaded onto FFM facets, and FFM facets were loaded onto two related aspects (in line with meta-analytic work by Judge et al., 2013) resulted in poor model fit (according to Hu and Bentler's [1999] close-fit standard) across the majority of FFM domains. Exploratory factor analytic (EFA) models similarly provided weak support for two-factor models in line with the aspect structure. As such, the six-facet structure of the original IPIP-120 was used for analyses. Second, our original plan was to examine change in personality and moderation of personality change using a structural equation modeling (SEM) framework. However, preliminary evaluations of model fit for latent growth curve models in which Baseline, Post, and Follow-up personality scores were regressed on linear Time yielded very poor fit across FFM domains. Reasons for poor fit could reasonably include (a) uneven increments of time between Baseline, Post, and Follow-up measurement points; (b) a quadratic course of change (given the likelihood of lower incremental change between Post and Follow-up) that could not be examined using only three measurement points; and/or (c) small sample size and a non-normal distribution of personality data. Accordingly, a primarily descriptive and non-parametric approach to data analysis was conducted.

Normality. Evaluating the normality of the FFM domain and facet distributions was conducted on the basis of two criteria: (a) results from the Shapiro-Wilk test (Shapiro & Wilk, 1965) of univariate normality; and (b) visual observation of skewness in domain and facet distributions (see Histograms of facets in Figures 5-14). The Shapiro-Wilk test was calculated for all self- and informant-report domains and facets across measurement points ($p < .01$). For self-report data, just 12% of cases did not violate univariate normality; for informant-report data, 13% did not violate normality. Specifically, for both self- and informant-report data, all FFM

domains with the exception of Agreeableness showed evidence of normality across measurement points, whereas FFM Agreeableness and all facets did not. Histograms of FFM facets similarly showed evidence of skew across most facets. Specifically, for self-report data, noticeable skew was observed in Neuroticism facets Anxiety, Anger, and Self-Consciousness, Extraversion facets Friendliness and Gregariousness, Openness facet Intellect, Agreeableness facets Trust, Morality, Cooperation, and Sympathy, and Conscientiousness facet Self-Efficacy; for informant-report data, noticeable skew was observed in Neuroticism facets Anxiety, Anger, Depression, Self-Consciousness, Vulnerability, Extraversion facets Friendliness, Excitement-Seeking, and Cheerfulness, Openness facets Imagination, Artistic Interests, and Intellect, Agreeableness facets Morality, Altruism, Cooperation, and Sympathy, and Conscientiousness facets Dutifulness, Achievement-Striving, and Cautiousness. Results indicated that the majority of examined personality distributions showed evidence of non-normality.

Analyses. Five sets of analyses were planned. The first set of analyses (contained in the Appendix) examined the distributional properties (mean, variance, skew) of Baseline FFM personality scores in the present sample, and compared these properties to normative populations to delineate the uniqueness of the sampled population. The second set of analyses examined zero-order correlations among Baseline personality domains and experiential factors to investigate the degree to which personality may be associated with the incidence of particular acute experiences during ayahuasca ceremony and observe the pattern of correlations between putatively distinct experiential factors. The third set of analyses examined relations between self- and informant-reported FFM domains to confirm convergence between the two approaches and validate informant-reported scores. General normality of the Baseline FFM domain distributions permitted parametric correlational tests for the second and third sets of analyses.

The fourth and fifth sets of analyses examined main hypotheses. In view of heteroscedastic and non-normally distributed data and poor model fit using SEM-based maximum likelihood estimation, a non-parametric, primarily descriptive approach to analyses was undertaken. The fourth set of analyses examined the degree to which personality changed in relation to ayahuasca ceremony. Specifically, descriptive statistics of FFM domain and facet scores were compared between Baseline and Post, and Baseline and Follow-up. Cohen's *d* (Cohen, 1988) effect size estimates were computed as the difference between Post/Follow-up- and Baseline scores divided by the Baseline standard deviation of these scores. To evaluate whether differences between measurement points were statistically significant, non-parametric bootstrap confidence intervals were calculated using resampling with replacement. For each FFM domain and facet at each measurement point, 95% bootstrap confidence intervals were calculated based on 500 random bootstrap samples in which data from the original sample were selected at random. The low and high confidence intervals represent the 2.5^{th} percentile and 97.5^{th} percentile, respectively, of medians across the 500 samples. To calculate bootstrap confidence intervals, the boot function (Canty & Ripley, 2019) in R (R Core Team, 2013) was used.

The fifth set of analyses examined moderation of changes in personality scores by three sets of variables: Validity factors containing expectancies and suggestibility; predisposing factors containing demographic and personality characteristics; and experiential factors including acute experiences and ceremony characteristics. Specifically, moderation was examined using Cohen's *d* effect size estimates of change at different levels of each moderator. To do so descriptively, continuous moderators were dichotomized at three thresholds (i.e., cuts; 25^{th} quantile, 50^{th} quantile, 75^{th} quantile), producing three variables for each moderator variable. The costs of

dichotomizing continuous variables are well-known; they contribute to loss of information about individual differences within each level, distort effect size estimation, reduce statistical power, posit arbitrarily drawn subgroups, and limit generalizability to the wider population (MacCallum, Zhang, Preacher, & Rucker, 2002; Stone-Romero & Anderson, 1994). However, because a non-parametric, descriptive approach necessitated foregoing the use of a continuous moderator, three dichotomous thresholds were set as an improvement upon a simple median split. For moderators in which the score at the 25th, 50th, or 75th quantile was identical, only unique variable dichotomizations were computed.

Power analyses. Post-hoc paired-sample power analyses were conducted to evaluate the fourth set of analyses' capacity to detect a true difference in self- and informant-report FFM personality scores between measurement points. To do so, the pwr.boot.R function (Loladze, 2014, 2017) was used to generate two sets of 10,000 Monte Carlo simulations, one of which mirrored the properties of present data (H0), and another which added a given effect size (i.e., absolute mean difference; delta) to each observation (H1). A Type I error rate of .05 was specified. The proportion of 10,000 H1 samples that correctly showed a sample mean outside the 2.5th and 97.5th percentile confidence interval of its corresponding H0 sample represented the power estimate. A power model was tested for each FFM domain and facet at four Cohen's *d* effect size levels (*d* = .10, .125, .15, .20 for self-report data; *d* = .10, .15, .20, .25 for informant-report data) corresponding to four delta levels (e.g., absolute mean difference in FFM Neuroticism scores between Baseline and Post) (Appendix Table A6 & A7). Deltas were computed for each FFM domain and facet by multiplying each *d* effect size level by the standard deviation of Baseline FFM scores, separately. Results indicated sufficient power (> .80) to detect a true mean difference between measurement points for self-report data at a Cohen's *d* level of

.15, and for informant-report data at a *d* level of approximately .25. At these *d* levels, power ranged from .86 to 1.00 across FFM domains and facets for deltas in the self-report Baseline/Post sample, power ranged from .80 to 1.00 for deltas in the self-report Baseline/Follow-up sample, and power ranged from .77 to .97 for deltas in the informant-report Baseline/Follow-up sample.

CHAPTER 3

RESULTS

Relations among Baseline Personality and Experiential Factors

To investigate relations between Baseline FFM domains and experiential factors, correlations among variables were calculated using a statistical significance threshold of $p < .005$ to control for Type I error (Benjamin et al., 2018). Values are provided in Table 2. In describing effect size, small, moderate, and strong refer to Cohen's (1969) benchmarks (i.e., r = ~.10, ~.30, ~.50, respectively). First, the pattern of intercorrelations among FFM domains was consistent with meta-analytic findings (van der Linden, te Nijenhuis, & Bakkar, 2010), with some notable deviations. Correlations between Neuroticism, on one hand, and Extraversion and Conscientiousness, on the other, were stronger in magnitude (r = -.56, -.54, respectively, [versus -.26, -.32 in meta-analysis]); the correlation between Extraversion and Conscientiousness was larger in magnitude (r = .36 [versus .21]); and the correlation between Openness and Agreeableness was larger in magnitude (r = .32 [versus .14]). Second, experiential factor variables showed generally moderate to strong intercorrelations. Notably, AEI Discomfort exhibited null to weak correlations with all other variables including AEI Clarity and Reappraisal; and AEI Clarity showed evidence of being nearly interchangeable with RMEQ Mystical and Positive Mood subscales (r > .80). Third, correlations between Baseline FFM domains and experiential factor variables were examined. Only AEI Reappraisal and AEI Discomfort showed significant, albeit small, relations with FFM domains (i.e., AEI reappraisal and Discomfort with Neuroticism [r = .23, .25, respectively]; AEI Discomfort with Extraversion

[r = -.21]). Notably, Openness was not correlated with RMEQ subscales, a result in contrast to previous work (Russ, Carhart-Harris, Maruyama, & Elliott, 2019; Studerus et al., 2012).

Self- and Informant-report correlations

Scores on self- and informant-reported FFM domains were correlated to determine convergence between self- and informant-report data at Baseline and Follow-up (Table 3). Results indicated moderate to strong convergence between corresponding domains and measurement points. Extraversion showed substantial convergence for both measurement points (r_{T1} = .65; r_{T3} = .61) in line with work demonstrating enhanced informant-report accuracy for observable traits (e.g., Vazire, 2010). Notably, Neuroticism showed better than expected convergence across measurement points (r_{T1} = .55; r_{T3} = .40) relative to meta-analytic estimates (i.e., r = .32; Connolly, Kavanagh, & Viswesvaran, 2007). Openness, Agreeableness, and Conscientiousness generally showed moderate self-other convergence (Openness: r_{T1} = .43; r_{T3} = .33; Agreeableness: r_{T1} = .29; r_{T3} = .31; Conscientiousness: $r_{Baseline}$ = .56; r_{T3} = .35).

Examining Personality Change

FFM personality domain and facet scores were compared between Baseline and Post, and between Baseline and Follow-up. Cohen's *d* was calculated as a measure of effect size change between measurement points, with the standard deviation of Baseline scores serving as an estimate of variance. Benchmarks of magnitude in Cohen's *d* from a two-sample context (Cohen, 1988) were tentatively used for this paired-sample context, with small, medium, and large corresponding to *d* = .20, .50, and .80, respectively. To determine statistically significant differences, 95% bootstrap confidence intervals were calculated. Differences between measurement points were considered statistically significant where 95% bootstrap confidence intervals for each measurement point did not overlap. Figures 15 to 25 provide bar plots of the

observed changes in FFM domain and facet scores, and Table 4 presents means and bootstrap confidence intervals across measurement points.

Neuroticism. Self-report Neuroticism exhibited a large, statistically significant decline between Baseline and Post (d = -.80) that remained substantial and significant at Follow-up (d = -.69) (Figure 15 & 17, see Table 4 for bootstrap confidence intervals). On average, participants declined half a point (SD = .55) on the 5-point Likert scale from a score of 2.85 (out of five) to 2.30, and 75% of participants reported a decrease in Neuroticism between Baseline and Post. All self-report Neuroticism facets similarly exhibited statistically significant declines between measurement points, ranging from $|d|$ = -.55 (Self-Consciousness) to -.72 (Depression) between Baseline and Post, and from -.40 (Immoderation) to -.61 (Depression) between Baseline and Follow-up. The largest decline among Neuroticism facets was in Depression, which declined .72 and .60 points (out of five) on average from Baseline to Post and Follow-up, respectively.

Informant-report Neuroticism exhibited a medium-sized significant decline between Baseline and Follow-up (d = -.51) (Figure 16, Table 4). Four informant-report Neuroticism facets (Anxiety, Anger, Depression, Self-Consciousness) appeared to have contributed to this decline, ranging from d = -.36 (Self-Consciousness) to -.52 (Depression) between Baseline and Follow-up.

Extraversion. Self-report Extraversion exhibited a small-to-medium, significant increase between Baseline and Post (d = .38) that remained significant at Follow-up (d = .33) (Figure 18, Table 4). Three self-report Extraversion facets (Friendliness, Gregariousness, Cheerfulness) exhibited significant increases between Baseline and Post, ranging from d = .29 (Gregariousness) to .58 (Cheerfulness), with two of these facets (Friendliness, Cheerfulness) remaining significant at Follow-up ($d_{\text{Friendliness}}$ = .39; $d_{\text{Cheerfulness}}$ = .46). Among these facets, Cheerfulness exhibited the

largest effect, of medium magnitude. No significant effects were found for informant-report Extraversion domain or facets (Table 4).

Openness. Only two self-report Openness facets (but not the Openness domain) exhibited significant changes in scores between measurement points (Figure 20, Table 4). Specifically, Artistic Interests ($d_{T1\text{-}T2}$ = .25; $d_{T1\text{-}T3}$ = .28) and Adventurousness ($d_{T1\text{-}T2}$ = .31; $d_{T1\text{-}T3}$ = .22) exhibited generally small increases between Baseline and Post that remained significant at Follow-up. No significant effects were found for informant-report Openness domain or facets (Figure 21, Table 4).

Agreeableness. Self-report Agreeableness exhibited a small-to-medium, significant increase between Baseline and Post (d = .37) that remained significant at Follow-up (d = .26) (Figure 22, Table 4). Four self-report facets (Trust, Morality, Altruism, Cooperation) exhibited significant increases between Baseline and Post, ranging from d = .26 (Morality) to .45 (Trust), with two of these facets (Trust, Cooperation) remaining significant at Follow-up (d_{Trust} = .36; $d_{Cooperation}$ = .34). Notably, Modesty was the only facet to exhibit a significant decline between Baseline and Post (i.e., d = -.24). This decline did not remain significant at Follow-up. No significant effects were found for informant-report Agreeableness domain or facets (Figure 23, Table 4).

Conscientiousness. Self-report Conscientiousness exhibited a medium-sized, significant increase between Baseline and Post (d = .52) that remained significant at Follow-up (d = .36) (Figure 24, Table 4). Five self-report facets (Self-Efficacy, Orderliness, Dutifulness, Self-Discipline, Cautiousness) exhibited significant increases between Baseline and Post, ranging from d = .27 (Orderliness) to .47 (Self-Discipline), with three of these facets (Orderliness [d = .23], Dutifulness [d = .22], Cautiousness [d = .28]) remaining significant at Follow-up (d_{Order} =

.23; $d_{Dutiful}$ = .22, $d_{Cautious}$ = .28). No significant effects were found for informant-report Conscientiousness domain or facets (Figure 25, Table 4).

Examining Moderation of Personality Change

To investigate the degree to which ayahuasca-induced personality change depends on predisposing and experiential factors, analyses were conducted that examined change in self-report FFM personality domains at different levels of a series of moderator variables. Five sets of moderator variables were examined: validity variables (including expectancies and MISS suggestibility), participant characteristics (including demographic variables and lifetime use of psychedelics), Baseline personality scores, acute experience elements (including RMEQ subscales, EDI, and AEI subscales), and ceremony variables (including ceremony characteristics, perceptions of ceremony, and purgative experiences). Tables 5 to 30 present Cohen's *d* effect sizes at different levels of these moderators. Continuous variables were dichotomized at the 25th, 50th, and 75th quantiles. N0 and N1 indicate the sample size at each level of moderators; *d*0 and *d*1 indicate the effect size at each level of moderators; and Δ*d* indicates the difference in *d* between the moderator levels. Tables present information regarding change between Baseline and Post, and Baseline and Follow-up. Four-hundred-seventy-five analyses were conducted in total (95 moderation analyses for each FFM domain). Given the large number of analyses, moderators associated with a small effect size ($|\Delta d| \geq .20$) were noted, but only moderators for which Δ*d exceeded* a small effect size ($|\Delta d| \geq .30$) between Baseline and Follow-up were described and interpreted. "Meaningful" was used to characterize any moderation effect of small size ($|\Delta d| \geq .20$). Nevertheless, moderators associated with smaller effect size effects may still be deemed meaningful, especially those that possess ease of implementation and are tied to important outcomes (Funder & Ozer, 2019). For continuous moderators, moderation effects were

considered to be most credible that used a 50th quantile threshold because these generally maximized sample size within both variable levels. A summary of meaningful moderation results between Baseline and Follow-up is presented in Table 5.

Neuroticism.

Validity variables. Two sets of variables were examined (expectancies of change, MISS Suggestibility) (Table 6). With respect to expectancies, expectancies involving favorable change in Neuroticism (decrease), Extraversion (increase), Openness (increase), Agreeableness (increase), Anxiety (decrease), Depression (decrease), and expectancy involving engagement with inner conflict showed evidence ($|\Delta d| \geq .20$) of amplifying self-reported change in Neuroticism over time. Four of these moderators were associated with greater long-term change in Neuroticism between Baseline and Follow-up at the $|\Delta d| \geq .30$ level. These included expectancies of change in Neuroticism, Agreeableness, Anxiety, and Depression. Among these moderators, Δd ranged from -.30 (increase in Agreeableness) to -.50 (decrease in Neuroticism). These results were suggestive of a number of possibilities, namely that participants with expectancies of favorable change were (a) more likely to have reported personality change in Neuroticism; (b) more likely to have changed via placebo effects; and/or (c) were more susceptible to expectancy bias in Post and Follow-up reporting. Notwithstanding a legitimate possibility of the latter, it is notable that participants who denied an expectancy of reduced Neuroticism (e.g., N0 = 161 for Neuroticism) exhibited a substantive self-reported decline in Neuroticism between Baseline and Follow-up ($d0 = -.47$) that was statistically significant according to 95% bootstrap confidence intervals (N_{T1}: 2.33 [2.5%] < 2.42 < 2.52 [97.5%]; N_{T3}: 2.08 [2.5%] < 2.17 < 2.26 [97.5%]).

MISS Suggestibility was also associated with change in Neuroticism. Notably, the 50th quantile variable (i.e., reflecting dichotomization at the 50th quantile of Suggestibility scores) indicated an additive decline in self-reported Neuroticism of Δd = -.31 (Baseline/Post) and Δd = -.47 (Baseline/Follow-up) among individuals who endorsed suggestibility at levels of "Somewhat disagree" or greater. These results were suggestive that suggestibility may (a) contribute to true changes in Neuroticism; and/or (b) produce biases in reporting consistent with change. Of note, however, participants who endorsed low suggestibility (below the 50th quantile) exhibited medium change in Neuroticism between Baseline and Follow-up ($d0$ = -.53) that was statistically significant according to 95% bootstrap confidence intervals.

Participant characteristics. Demographic variables and lifetime psychedelic and ayahuasca use history were examined (Table 7). Small moderation effects were observed for age (such that personality change was smaller for older participants), socio-economic status (such that personality change was smaller for participants from households containing higher parental income), and lifetime psychedelic/ayahuasca use (such that psychedelic/ayahuasca-naïve participants reported greater change). $|\Delta d|$ ranged from .22 (Parents' Income Level, 75th quantile) to .31 (Age, 25th quantile) for Baseline/Post; and from .20 (Parents' Income Level, 75th quantile) to .27 (Age, 75th quantile) for Baseline/Follow-up. Moderation of Neuroticism by participant characteristics at the $|\Delta d| \geq .30$ level was not observed.

Baseline personality. Baseline FFM personality domains were examined (Table 8). Results indicated that all variables with the exception of Baseline Agreeableness exhibited small-to-large moderation effects on self-reported change in Neuroticism. Δd in 50th quantile variables ranged from .42 (Conscientiousness) to -1.24 (Neuroticism) for Baseline/Post; and from .21 (Openness) to -1.11 (Neuroticism) for Baseline/Follow-up. Because the moderation effect of

Baseline Openness was fairly small, and convergence in the effects of these FFM domains in particular are likely to be the product of strong interrcorrelation ($r > .50$), only Baseline Neuroticism was interpreted. Notably, participants who exhibited Baseline Neuroticism above the 50th quantile (Item-scale mean = 2.79) showed an additive decline in Neuroticism of more than one-standard-deviation between Baseline and Post and Baseline and Follow-up, relative to participants lower in Baseline Neuroticism. Indeed, with respect to longer-term change between Baseline and Follow-up, participants below the 50th quantile exhibited a change in Neuroticism of d = -.62, whereas participants above the 50th quantile exhibited a change of d = -1.73. This pattern of enhanced Δd in participants higher in Baseline Neuroticism was also reflected by 25th and 75th quantile dichotomizations of the variable.

Acute experience elements. Three acute experience measures were examined (RMEQ subscales, EDI, AEI subscales) (Table 9). Results indicated that all variables exhibited small-to-medium moderation effects on change in Neuroticism. Δd in 50th quantile variables ranged from -.23 (RMEQ Timespace) to -.62 (RMEQ Positive Mood) for Baseline/Post, and from -.23 (RMEQ Ineffable) to -.60 (AEI Reappraisal) for Baseline/Follow-up. Notably, AEI Reappraisal showed the most substantial evidence of moderation at both the Baseline/Post and Baseline/Follow-up timeframes. With respect to longer-term change (Baseline/Follow-up), participants who endorsed a "Moderate" or lower level of Reappraisal experience (50th quantile) exhibited a change in Neuroticism of d = -.42, whereas participants who endorsed a "Moderate" or greater level of Reappraisal experience (75th quantile) exhibited more than a full standard deviation change in Neuroticism (d = 1.02). This pattern of enhanced Δd in participants endorsing higher RMEQ Mystical, RMEQ Positive Mood, AEI Clarity, and AEI Reappraisal was also reflected by 25th and 75th quantile dichotomizations.

Ceremony variables. Three sets of variables were examined including ceremony characteristics, perceptions of ceremony, and purgative experiences (Table 10). With respect to ceremony characteristics, results indicated no meaningful evidence of moderation at the $|\Delta d| \geq .20$ level.

With respect to perception of ceremony variables, results indicated that trusting the shaman (Trusted shaman), feeling "mesmerized" by the shaman's icaro prayer (Mesmerized icaro), perceiving the icaro prayer to be healing (Icaro healing), and perceiving ayahuasca to be "medicinal" and "cleaning" (Medicine cleaning) were associated with greater self-reported change in Neuroticism. Δd ranged from -.42 (Mesmerized icaro, 25th quantile) to -.52 (Icaro healing, 25th quantile) for Baseline/Post; and from -.36 (Mesmerized icaro) to -.47 (Trusted shaman) for Baseline/Follow-up. Results suggested that participants who endorsed "Moderate" or "Strong" and higher levels of these perceptions exhibited a large effect size decline approaching one-standard deviation, whereas participants who endorsed a lower degree of these perceptions exhibited medium-sized decline in Neuroticism. Of note, most participants endorsed "Moderate" or higher levels of these perceptions suggesting that these effects were *activated* in relation to highly favorable appraisals of shaman, ayahuasca, and icaro prayer.

With respect to purgative experience variables, results indicated that all variables were associated with greater self-reported change in Neuroticism. Δd ranged from -.20 (War with entity, 50th quantile) to -.62 (Relationship object, 75th quantile) for Baseline/Post; and from -.22 (Purged physical ailment, 50th quantile) to -.55 (Purged self, 25th quantile) for Baseline/Follow-up. Results for Purging part of self and Purged completely suggested that participants who endorsed "Moderate" or "Strong" and higher levels of these perceptions exhibited an effect size change of approximately one-standard deviation, whereas participants who endorsed a lower

degree of these perceptions exhibited medium-sized declines in Neuroticism. Of note, most participants endorsed “Moderate” or higher levels of these perceptions, and moderation effects were associated with the presence of strong purgative experiences. Results for Relationship object were different. More than 50% of participants did not endorse Relationship object above “None.” Accordingly, this moderation effect appears to be associated with a lower threshold of this experience.

Extraversion.

Validity variables. Two sets of variables were examined (expectancies of change, MISS Suggestibility) (Table 11). With respect to expectancy variables, expectancies involving favorable changes in Neuroticism (decrease), Extraversion (increase), and Depression (decrease) were associated with small increases in self-reported change in Extraversion between Baseline and Post, and Baseline and Follow-up. Δ*d* ranged from .20 (decrease in Neuroticism) to .38 (increase in Extraversion) for Baseline/Post, and from .24 (decrease in Neuroticism) to .31 (increase in Extraversion) for Baseline/Follow-up. Notably, results indicated a medium effect for Extraversion expectancy ($\Delta d_{T1\text{-}T2} = .38$; $\Delta d_{T1\text{-}T3} = .31$). These results are suggestive that participants who endorsed expectancies of change in Extraversion were (a) more likely to have changed in Extraversion naturally; (b) more likely to have changed via placebo effects; and/or (c) were more susceptible to expectancy bias in reporting. Of note, participants who denied this expectancy exhibited a small self-reported change in Extraversion between Baseline and Follow-up ($d0 = .22$) that was not statistically significant according to 95% bootstrap confidence intervals. Moderation by MISS Suggestibility at the $|\Delta d| \geq .20$ level was only found at the 25th quantile dichotomization for Baseline/Follow-up.

Participant characteristics. Demographic variables and lifetime psychedelic and ayahuasca use history were examined (Table 12). Small moderation effects were observed for sex and age. Specifically, self-reported change in Extraversion was greater for women ($d_{\text{Baseline-Post}}$ = .49; $d_{\text{Baseline-Follow-up}}$ = .41) than men ($d_{\text{T1-T2}}$ = .20; $d_{\text{T1-T3}}$ = .18) in general; and lower for older participants ($\Delta d_{\text{T1-T2}}$ = -.26, 50$^{\text{th}}$ quantile) between Baseline and Post. Moderation of Extraversion by participant characteristics at the $|\Delta d| \geq .30$ level was not observed.

Baseline personality. Baseline FFM personality domains were examined (Table 13. Results indicated that all Baseline FFM domains showed small-to-large moderation effects. In particular, participants who exhibited Baseline Extraversion below the 50$^{\text{th}}$ quantile (Item-scale mean = 3.40) showed a one-standard deviation increase in Extraversion between Baseline and Post and Baseline and Follow-up, whereas participants who exhibited Baseline Extraversion above the 50$^{\text{th}}$ percentile showed no meaningful change. This pattern of enhanced Δd in participants lower in Baseline Extraversion was also reflected by 25$^{\text{th}}$ and 75$^{\text{th}}$ quantile dichotomizations.

Acute experience elements. Three acute experience measures were examined (RMEQ subscales, EDI, AEI subscales) (Table 14). All acute experience variables showed small moderation effects on change in Extraversion. Δd in 50$^{\text{th}}$ quantile variables ranged from .24 (EDI) to .37 (AEI Reappraisal) between Baseline and Post, and from .20 (RMEQ Ineffable) to .33 (AEI Reappraisal). Notably, AEI Reappraisal was the only acute experience subscale to be meaningfully associated with greater self-reported change in Extraversion between Baseline and Follow-up. Participants who endorsed Reappraisal experience at “Moderate” and higher levels (50$^{\text{th}}$ quantile; $d_{\text{T1-T2}}$ = .54; $d_{\text{T1-T3}}$ = .52) exhibited a difference in personality that was

approximately .33 standard deviations higher than participants who did not ($d_{\text{Baseline-Post}}$ = .17; $d_{\text{Baseline-Follow-up}}$ = .19).

Ceremony variables. Three sets of variables were examined including ceremony characteristics, perceptions of ceremony, and purgative ceremonies (Table 15). With respect to ceremony characteristics, results indicated no moderation of Extraversion at the $|\Delta d| \geq .20$ level.

With respect to perceptions of ceremony variables, all variables exhibited small moderation effects. Δd in 25th and 50th quantile variables ranged from .20 (Trusted shaman, 25th quantile) to .39 (Medicine cleaning, 25th quantile) for Baseline/Post, and from .22 (Trusted shaman, 25th quantile) to .38 (Medicine cleaning, 25th quantile) for Baseline/Follow-up. Notably, perceiving the icaro prayer to be healing (Icaro healing) and perceiving ayahuasca to be "medicinal" and "cleaning" (Medicine cleaning) was meaningfully associated with self-reported change in Extraversion between Baseline and Follow-up. Results suggested that participants who experienced Icaro healing at an "Extreme" level reported a half-standard-deviation change in Extraversion, whereas those who did not reported a small change (Δd = .32). With respect to Medicine cleaning, results suggested that participants who experienced Medicine cleaning at a "Strong" level or greater reported a half-standard-deviation change in Extraversion, whereas those who did not reported no change (Δd = .38).

With respect to purgative experience variables, Purging part of self, Purged completely, Relationship object variables exhibited small moderation effects. Δd in 50th quantile variables ranged from .28 (Relationship object) to .33 (Purged completely) for Baseline/Post, and from .22 (Purged completely) to .31 (Purged self) for Baseline/Follow-up. Results indicated that only the perception of purging out a challenging aspect of oneself (Purging part of self) was meaningfully associated with change in Extraversion between Baseline and Follow-up. Specifically,

participants who endorsed having the experience of purging out a negative part of themselves above the "So slight cannot decide" level (25th quantile) exhibited a change in Extraversion ($d_{\text{Baseline-Post}} = .45$; $d_{\text{Baseline-Follow-up}} = .47$) that was approximately a third- standard-deviation greater than those who did not. Participants who had this experience at "Extreme" intensity (75th quantile) exhibited still greater change in Extraversion than participants who had weaker experiences.

Openness.

Validity variables. Two sets of variables were examined (expectancies of change, MISS Suggestibility (Table 16). A small moderation effect of Openness expectancy was found for Baseline/Post. Of note, participants who denied an expectancy of enhanced Openness exhibited no change in Openness ($d0 = -.01$). One small effect of Suggestibility was also found in the 25th quantile dichotomization for Baseline/Follow-up, specifically.

Participant characteristics. Demographic variables and lifetime psychedelic and ayahuasca use history were examined (Table 17). Small moderation effects were observed for age and education level. Moderation of Openness by participant characteristics at the $|\Delta d| \geq .30$ level was not observed.

Baseline personality. Baseline FFM personality domains were examined (Table 18). Results indicated that Baseline Extraversion, Openness, and Agreeableness exerted small-to-large moderation effects on self-reported change in Openness. In particular, participants who exhibited Baseline Openness below the 50th quantile (Item-scale mean = 3.83) showed a half-standard-deviation increase in Openness between Baseline and Follow-up, whereas participants who exhibited Baseline Openness above the 50th percentile showed a decrease in Openness. This latter decrease could be suggestive of regression to the mean among participants particularly

high in Openness. This pattern of enhanced Δ*d* in participants lower in Baseline Openness was also reflected by 25th and 75th quantile dichotomizations. Because fewer than 30 participants exhibited average Baseline Openness below a mean of 3.00, it was difficult for the present study to characterize change in Openness among individuals low in Openness.

Acute experience elements. Three acute experience measures were examined (RMEQ subscales, EDI, AEI subscales) (Table 19). In general, all subscales except for AEI Discomfort showed small moderation effects on self-reported change in Openness for Baseline/Post. No moderation effects at the $|\Delta d| \geq .30$ level were observed.

Ceremony variables. Three sets of variables were examined including ceremony characteristics, perceptions of ceremony, and purgative ceremonies (Table 20). With respect to ceremony characteristics, one small effect of dosage was observed for Baseline/Follow-up (Δ*d* = .25, 75th quantile). With respect to perceptions of ceremony and purgative experience variables, small moderation effects were observed for Icaro healing, Medicine cleaning, Purged physical ailment, and Relationship object. No moderation effects at the $|\Delta d| \geq .30$ level were observed.

Agreeableness.

Validity variables. Two sets of variables were examined (expectancies of change, MISS Suggestibility) (Table 21). Small moderation effects of expectancies of favorable change in connectedness (Δ*d* = -.21) and Agreeableness (Δ*d* = .20) on change in Agreeableness between Baseline and Post were observed. Participants who denied an expectancy of increased Agreeableness exhibited a small self-reported increase in Agreeableness (*d*0 = .29) that was not statistically significant according to 95% bootstrap confidence intervals. Moderation of Agreeableness by validity variables at the $|\Delta d| \geq .30$ level was not observed.

Participant characteristics. Demographic variables and lifetime psychedelic and ayahuasca use history were examined (Table 22). A small moderation effect was observed for age such that self-reported personality change was greater for younger participants, but this effect was only present between Baseline and Post and was not reflected in 25th and 75th quantile dichotomizations. In addition, a medium moderation effect of lifetime ayahuasca use was observed (Δd = -.33). Specifically, between Baseline and Post, ayahuasca-naïve participants showed a .40 standard deviation increase in Agreeableness, whereas participants with a history of ayahuasca use showed no meaningful change.

Baseline personality. Baseline FFM personality domains were examined (Table 23). High Baseline Neuroticism and low Extraversion, Openness, Agreeableness, and Conscientiousness were associated with small increases in change in Agreeableness. $|\Delta d|$ in 50th quantile variables ranged from .21 (Neuroticism) to -.96 (Agreeableness) for Baseline/Post, and ranged from -.21 (Extraversion) to -.86 (Agreeableness) for Baseline/Follow-up. In particular, participants who exhibited Baseline Agreeableness below the 50th quantile (Item-scale mean = 3.63) showed a large increase in Agreeableness between Baseline and Follow-up (d = .80), whereas participants who exhibited Baseline Agreeableness above the 50th percentile showed no meaningful change in Agreeableness. This pattern of enhanced Δd in participants lower in Baseline Agreeableness was also reflected by 25th and 75th quantile dichotomizations. Because fewer than 30 participants exhibited average Baseline Agreeableness below a mean of 3.00, it was difficult for the present study to characterize change in Agreeableness among individuals low in Agreeableness.

Acute experience elements. Three acute experience measures were examined (RMEQ subscales, EDI, AEI subscales) (Table 24). In general, all subscales with the exception of RMEQ

Ineffable and AEI Discomfort were associated with small differences in self-reported change in Agreeableness between Baseline and Post, and Baseline and Follow-up. Δ*d* in 50th quantile variables ranged from .23 (RMEQ Timespace) to .37 (RMEQ Mystical) for Baseline/Post, and from .20 (RMEQ Timespace) to .29 (EDI) for Baseline/Follow-up.

Ceremony variables. Three sets of variables were examined including ceremony characteristics, perceptions of ceremony, and purgative ceremonies (Table 25). With respect to ceremony characteristics, no moderation effects at the $|\Delta d| \geq .20$ level were observed. With respect to perceptions of ceremony variables, all variables were associated with small increases in self-reported change in Agreeableness between Baseline and Post. With respect to purgative experience variables, all variables (exception: Struggled to purge) showed small moderation effects. Only Purging self, Viewing object, and Relationship object were associated with self-reported change for Baseline/Follow-up.

Conscientiousness.

Validity variables. Two sets of variables were examined (expectancies of change, MISS Suggestibility) (Table 26). With respect to expectancy variables, expectancies involving favorable changes in Neuroticism (decrease), Extraversion (increase), Conscientiousness (increase), Anxiety (decrease), and Depression (decrease) were associated with small increases in self-reported change in Conscientiousness between Baseline and Post, and Baseline and Follow-up. Δ*d* ranged from .21 (increase in Extraversion) to .27 (increase in Neuroticism) for Baseline/Post, and from .23 (decrease in Depression) to .40 (increase in Conscientiousness) for Baseline/Follow-up. Notably, results indicated that expectancies of favorable change in Conscientiousness (increase) and Neuroticism (decrease) were meaningfully associated with longer-term self-reported change in Conscientiousness between Baseline and Follow-up (Δ*d* =

.40, .37, respectively). Participants who denied an expectancy of enhanced Conscientiousness exhibited a small self-reported increase in Conscientiousness between Baseline and Follow-up (*d*0 =.19) that was not statistically significant according to 95% bootstrap confidence intervals.

MISS Suggestibility was also associated with changed in Conscientiousness between Baseline and Follow-up. Notably, the 25th quantile variable indicated an additive decline in self-reported Conscientiousness of .40 standard deviations (Δd = .40) among individuals who endorsed suggestibility at levels of "Somewhat disagree" or greater. Of note, participants who endorsed low suggestibility (at 25th quantile) exhibited no meaningful self-reported change in Neuroticism (*d*0) between Baseline and Follow-up.

Participant characteristics. Demographic variables and lifetime psychedelic and ayahuasca use history were examined (Table 27). A meaningful moderation effect was observed for age, such that self-reported change in Conscientiousness was greater for younger participants (e.g., 50th quantile: $\Delta d_{T1\text{-}T2}$ = -.40; $\Delta d_{T1\text{-}T3}$ = -.23).

Baseline personality. Baseline FFM personality domains were examined (Table 28). Results indicated that all domains (exception: Agreeableness) showed small-to-large moderation effects. In particular, participants who exhibited Baseline Extraversion below the 50th quantile (Item-scale mean = 3.40) showed approximately a third-standard-deviation increase in Conscientiousness between Baseline and Follow-up. This pattern was also reflected by 75th quantile dichotomization. Most notably, participants who exhibited Baseline Conscientiousness below the 50th quantile (Item-scale mean = 3.54) showed a large increase in Conscientiousness between Baseline and Follow-up (Δd = -.84), whereas participants who exhibited Baseline Conscientiousness above the 50th percentile showed no meaningful change (Δd = .14). This

pattern of enhanced Δ*d* in participants lower in Baseline Conscientiousness was also reflected by 25th and 75th quantile dichotomizations.

Acute experience elements. Three acute experience measures were examined (RMEQ subscales, EDI, AEI subscales) (Table 29). All acute experience variables showed small moderation effects on change in Conscientiousness. Δ*d* in 50th quantile variables ranged from .21 (AEI Reappraisal) to .34 (RMEQ Positive Mood) for Baseline/Post, and from .20 (EDI) to .29 (AEI Reappraisal) for Baseline/Follow-up. No acute experience variable was associated with change in Conscientiousness between Baseline and Follow-up at the $|\Delta d| \geq .30$ level.

Ceremony variables. Three sets of variables were examined including ceremony characteristics, perceptions of ceremony, and purgative ceremonies (Table 30). With respect to ceremony characteristics, participants who attended more than 4 ceremonies showed meaningfully greater increases in Conscientiousness for Baseline/Follow-up (Δ*d* = ~.22).

With respect to perceptions of ceremony variables, all variables exhibited small moderation effects. Δ*d* in 25th quantile variables ranged from .26 (Medicine cleaning) to .31 (Icaro healing) for Baseline/Post, and from .23 (Trusted shaman) to .36 (Medicine cleaning) for Baseline/Follow-up. Notably, being mesmerized by the icaro prayer (Mesmerized icaro), perceiving the icaro prayer to be healing (Icaro healing), and perceiving ayahuasca to be "medicinal" and "cleaning" (Medicine cleaning) was most meaningfully associated with self-reported change in Conscientiousness between Baseline and Follow-up (Δ*d* > .30). Results indicated that participants who were mesmerized by the icaro prayer at an "Extreme" level or who experienced Icaro healing or medicinal cleaning at a "Strong" or greater level reported approximately a third-standard-deviation increase in Conscientiousness-related change.

With respect to purgative experience variables, Purging part of self, Purged completely, Viewed object, and Relationship object variables exhibited small moderation effects. Δ*d* ranged from .26 (Purging part of self, 25th quantile) to .28 (Relationship object, 50th quantile) for Baseline/Post, and from .20 (Viewed object, 75th quantile) to .39 (Purged self, 25th quantile) for Baseline/Follow-up. Notably, participants who endorsed having the experience of purging out a negative part of themselves above the "So slight cannot decide" level (25th quantile) exhibited a change in Conscientiousness that was more than a third-standard-deviation greater than those who did not. Participants who endorsed the presence of viewing a relationship between what they had purged and what others had purged (i.e., endorsed the item greater than "None") exhibited a change in Conscientiousness that was approximately a third-standard-deviation greater than those who did not.

TABLES

Table 1

Internal Consistency (α) of personality domains and facets

	Self-report			Informant-report	
Domain/Facet	T1	T2	T3	T1	T3
Neuroticism	.93	.92	.92	.85	.86
Extraversion	.91	.90	.89	.87	.84
Openness	.80	.81	.80	.78	.71
Agreeableness	.79	.80	.80	.87	.85
Conscientiousness	.86	.86	.85	.86	.87
N1 Anxiety	.82	.80	.80	.82	.83
N2 Anger	.89	.81	.85	.88	.89
N3 Depression	.89	.85	.87	.79	.86
N4 Self-Consciousness	.73	.75	.69	.71	.61
N5 Immoderation	.79	.80	.77	.80	.80
N6 Vulnerability	.77	.73	.74	.90	.87
E1 Friendliness	.85	.79	.78	.85	.75
E2 Gregariousness	.86	.83	.84	.86	.83
E3 Assertiveness	.84	.81	.74	.86	.88
E4 Activity Level	.74	.76	.73	.83	.85
E5 Excitement-Seeking	.71	.67	.72	.77	.79
E6 Cheerfulness	.79	.80	.74	.89	.85
O1 Imagination	.78	.77	.74	.73	.67
O2 Arstistic Interests	.76	.73	.73	.92	.88
O3 Emotionality	.81	.73	.74	.71	.67
O4 Adventurousness	.80	.76	.75	.74	.74
O5 Intellect	.81	.80	.77	.85	.84
O6 Liberalism	.70	.59	.60	.34	.42
A1 Trust	.86	.82	.84	.86	.84
A2 Morality	.67	.65	.62	.82	.85
A3 Altruism	.64	.62	.58	.84	.85
A4 Cooperation	.62	.66	.67	.81	.82
A5 Modesty	.70	.64	.64	.67	.57
A6 Sympathy	.63	.60	.68	.88	.86
C1 Self-efficacy	.79	.79	.74	.81	.79
C2 Orderliness	.74	.68	.73	.87	.84
C3 Dutifulness	.68	.65	.62	.85	.70
C4 Achievement-Striving	.65	.63	.60	.75	.80
C5 Self-Discipline	.86	.85	.84	.76	.75
C6 Cautiousness	.86	.80	.84	.88	.86

Note. Values represent Cronbach alphas (α); T1 = Baseline; T2 = Post; T3 = Follow-up.

Table 2

Correlations among Baseline FFM personality domains and experiential factors

Measure	1	2	3	4	5	6	7	8	9	10	11	12
1. Neuroticism												
2. Extraversion	-.56*											
3. Openness	-.07	.20*										
4. Agreeableness	-.20*	.09	.32*									
5. Conscientiousness	-.54*	.36*	.01	.25*								
6. RMEQ Mystical	.03	.02	.11	-.05	.04							
7. RMEQ Positive Mood	.06	.00	.09	-.02	.03	.80*						
8. RMEQ Timespace	.00	.08	.10	.02	.09	.65*	.52*					
9. RMEQ Ineffable	.07	-.08	.04	.00	-.04	.50*	.42*	.49*				
10. Ego Dissolution Inventory	.04	-.02	.00	-.03	-.08	.65*	.55*	.58*	.40*			
11. AEI Clarity	.02	.04	.11	-.10	-.01	.84*	.82*	.55*	.45*	.63*		
12. AEI Reappraisal	.23*	-.09	.13	-.05	-.13	.64*	.59*	.48*	.40*	.55*	.74*	
13. AEI Discomfort	.25*	-.21*	.08	.03	-.15	.07	.01	.27*	.26*	.12	.02	.35*

Note. RMEQ = Revised Mystical Experience Questionnaire; AEI = Ayahuasca Experience Inventory.

Table 3

Correlations between Self- and Informant-report personality domains

	Self-report				
Informant-report	N (T1, T3)	E (T1, T3)	O (T1, T3)	A (T1, T3)	C (T1, T3)
Neuroticism (T1, T3)	.55*, .41*				
Extraversion (T1, T3)		.65*, .61*			
Openness (T1, T3)			.43*, .33*		
Agreeableness (T1, T3)				.29*, .31*	
Conscientiousness (T1, T3)					.56*, .35*

Note. Self-report FFM T1 scores based on sample with complete data for Baseline and Post; N = Neuroticism; E = Extraversion; O = Openness; A = Agreeableness; C = Conscientiousness; T1 = Baseline; T3 = Follow-up; $N_{T1} = 103$; $N_{T3} = 90$; *$p < .005$.

Table 4

95% Bootstrap Confidence Intervals

	Self-report				Informant-report	
	T1	T2	T1	T3	T1	T3
	2.5% < 50% < 97.5%					
Neuroticism	**2.77 < 2.85 < 2.93**	**2.23 < 2.30 < 2.36**	**2.72 < 2.80 < 2.89**	**2.28 < 2.34 < 2.41**	**2.56 < 2.68 < 2.82**	**2.22 < 2.34 < 2.45**
Extraversion	**3.30 < 3.37 < 3.43**	**3.54 < 3.60 < 3.65**	**3.30 < 3.38 < 3.45**	**3.51 < 3.57 < 3.63**	3.48 < 3.61 < 3.72	3.59 < 3.69 < 3.80
Openness	3.73 < 3.78 < 3.83	3.77 < 3.82 < 3.87	3.72 < 3.77 < 3.82	3.78 < 3.82 < 3.86	3.66 < 3.76 < 3.87	3.78 < 3.85 < 3.93
Agreeableness	**3.57 < 3.61 < 3.66**	**3.72 < 3.76 < 3.81**	**3.58 < 3.63 < 3.67**	**3.69 < 3.73 < 3.78**	3.67 < 3.79 < 3.91	3.76 < 3.85 < 3.96
Conscientiousness	**3.48 < 3.54 < 3.59**	**3.73 < 3.78 < 3.82**	**3.50 < 3.56 < 3.61**	**3.67 < 3.73 < 3.77**	3.60 < 3.71 < 3.83	3.70 < 3.81 < 3.92
N1 Anxiety	**2.94 < 3.04 < 3.16**	**2.35 < 2.43 < 2.51**	**2.86 < 2.97 < 3.09**	**2.40 < 2.49 < 2.59**	**3.10 < 3.29 < 3.51**	**2.57 < 2.76 < 2.92**
N2 Anger	**2.78 < 2.89 < 3.02**	**2.25 < 2.35 < 2.44**	**2.70 < 2.83 < 2.95**	**2.26 < 2.35 < 2.44**	**2.30 < 2.52 < 2.7**	**1.95 < 2.11 < 2.26**
N3 Depression	**2.64 < 2.75 < 2.86**	**1.95 < 2.03 < 2.11**	**2.58 < 2.70 < 2.81**	**2.01 < 2.10 < 2.18**	**2.50 < 2.72 < 2.91**	**2.06 < 2.22 < 2.40**
N4 Self-Conscious	**2.63 < 2.73 < 2.83**	**2.19 < 2.26 < 2.35**	**2.62 < 2.72 < 2.82**	**2.20 < 2.28 < 2.36**	**2.05 < 2.23 < 2.41**	**1.72 < 1.86 < 2.02**
N5 Immoderation	**3.03 < 3.14 < 3.23**	**2.54 < 2.64 < 2.74**	**2.98 < 3.09 < 3.22**	**2.65 < 2.74 < 2.84**	2.63 < 2.80 < 2.97	2.54 < 2.72 < 2.9
N6 Vulnerability	**2.44 < 2.53 < 2.62**	**2.00 < 2.07 < 2.14**	**2.40 < 2.50 < 2.59**	**2.02 < 2.10 < 2.17**	2.35 < 2.53 < 2.72	2.20 < 2.35 < 2.51
E1 Friendliness	**3.31 < 3.42 < 3.52**	**3.74 < 3.81 < 3.88**	**3.31 < 3.42 < 3.54**	**3.69 < 3.77 < 3.85**	3.68 < 3.86 < 4.01	3.83 < 3.98 < 4.13
E2 Gregariousness	**2.60 < 2.72 < 2.83**	**2.89 < 3.01 < 3.11**	2.60 < 2.71 < 2.83	2.80 < 2.91 < 3.02	2.91 < 3.12 < 3.34	2.92 < 3.12 < 3.31
E3 Assertiveness	3.41 < 3.51 < 3.59	3.55 < 3.63 < 3.71	3.40 < 3.50 < 3.61	3.60 < 3.67 < 3.75	3.38 < 3.54 < 3.72	3.51 < 3.68 < 3.84
E4 Activity Level	3.17 < 3.26 < 3.34	3.31 < 3.39 < 3.48	3.19 < 3.28 < 3.39	3.30 < 3.38 < 3.47	3.14 < 3.31 < 3.48	3.25 < 3.41 < 3.59
E5 Excite-Seeking	3.64 < 3.71 < 3.79	3.60 < 3.67 < 3.74	3.64 < 3.72 < 3.80	3.62 < 3.69 < 3.76	3.86 < 4.02 < 4.18	3.89 < 4.03 < 4.16
E6 Cheerfulness	**3.51 < 3.60 < 3.69**	**4.00 < 4.07 < 4.14**	**3.52 < 3.62 < 3.73**	**3.91 < 3.99 < 4.07**	3.62 < 3.79 < 3.97	3.73 < 3.90 < 4.05
O1 Imagination	3.81 < 3.89 < 3.98	3.77 < 3.86 < 3.93	3.78 < 3.88 < 3.96	3.80 < 3.88 < 3.97	3.39 < 3.55 < 3.73	3.59 < 3.74 < 3.88
O2 Art Interest	**3.83 < 3.92 < 4.00**	**4.04 < 4.11 < 4.19**	**3.83 < 3.92 < 4.01**	**4.04 < 4.12 < 4.20**	3.93 < 4.09 < 4.26	4.01 < 4.18 < 4.34
O3 Emotionality	3.46 < 3.57 < 3.67	3.37 < 3.46 < 3.54	3.41 < 3.52 < 3.63	3.31 < 3.40 < 3.49	3.37 < 3.56 < 3.73	3.43 < 3.58 < 3.71
O4 Adventurous	**3.39 < 3.49 < 3.58**	**3.65 < 3.72 < 3.80**	**3.41 < 3.50 < 3.59**	**3.60 < 3.67 < 3.75**	3.25 < 3.41 < 3.55	3.46 < 3.59 < 3.74
O5 Intellect	4.09 < 4.17 < 4.25	4.12 < 4.20 < 4.28	4.07 < 4.16 < 4.25	4.11 < 4.19 < 4.26	3.94 < 4.11 < 4.29	4.02 < 4.17 < 4.33
O6 Liberalism	3.52 < 3.62 < 3.71	3.51 < 3.60 < 3.69	3.56 < 3.66 < 3.76	3.56 < 3.64 < 3.72	3.73 < 3.86 < 3.99	3.70 < 3.85 < 3.97
A1 Trust	**3.18 < 3.28 < 3.38**	**3.56 < 3.64 < 3.71**	**3.19 < 3.29 < 3.38**	**3.50 < 3.57 < 3.64**	3.27 < 3.41 < 3.55	3.27 < 3.43 < 3.57
A2 Morality	**3.47 < 3.55 < 3.63**	**3.65 < 3.72 < 3.79**	3.47 < 3.55 < 3.63	3.59 < 3.67 < 3.75	4.08 < 4.25 < 4.41	4.17 < 4.35 < 4.50
A3 Altruism	**3.96 < 4.02 < 4.09**	**4.15 < 4.20 < 4.26**	3.96 < 4.03 < 4.10	4.08 < 4.14 < 4.20	3.87 < 4.01 < 4.15	3.87 < 3.99 < 4.10
A4 Cooperation	**3.77 < 3.85 < 3.94**	**4.08 < 4.15 < 4.22**	**3.80 < 3.89 < 3.97**	**4.06 < 4.14 < 4.21**	3.84 < 4.01 < 4.17	4.04 < 4.21 < 4.35
A5 Modesty	**3.14 < 3.22 < 3.31**	**2.97 < 3.04 < 3.11**	3.15 < 3.24 < 3.33	3.03 < 3.11 < 3.19	3.14 < 3.31 < 3.48	3.19 < 3.35 < 3.52
A6 Sympathy	3.69 < 3.76 < 3.83	3.76 < 3.83 < 3.90	3.69 < 3.77 < 3.84	3.70 < 3.77 < 3.85	3.57 < 3.74 < 3.92	3.63 < 3.79 < 3.93
C1 Self-Efficacy	**3.74 < 3.81 < 3.88**	**3.93 < 3.99 < 4.05**	3.77 < 3.85 < 3.92	3.91 < 3.97 < 4.03	3.75 < 3.89 < 4.02	3.82 < 3.94 < 4.05

C2 Orderliness	**3.26 < 3.36 < 3.45**	**3.50 < 3.58 < 3.66**	3.25 < 3.36 < 3.47	3.46 < 3.55 < 3.63	2.86 < 3.09 < 3.28	3.21 < 3.39 < 3.56
C3 Dutifulness	**3.92 < 3.98 < 4.05**	**4.11 < 4.16 < 4.21**	**3.94 < 4.00 < 4.07**	**4.07 < 4.13 < 4.18**	3.88 < 4.03 < 4.19	4.03 < 4.14 < 4.28
C4 Achieve-Strive	3.80 < 3.88 < 3.96	3.91 < 3.97 < 4.03	3.79 < 3.87 < 3.95	3.86 < 3.93 < 4.00	4.01 < 4.16 < 4.31	3.94 < 4.09 < 4.23
C5 Self-Discipline	**2.88 < 2.99 < 3.10**	**3.32 < 3.41 < 3.50**	**2.92 < 3.02 < 3.14**	**3.20 < 3.30 < 3.39**	3.51 < 3.66 < 3.81	3.60 < 3.75 < 3.88
C6 Cautiousness	**3.11 < 3.20 < 3.31**	**3.48 < 3.56 < 3.65**	**3.15 < 3.25 < 3.35**	**3.39 < 3.48 < 3.57**	3.25 < 3.44 < 3.62	3.40 < 3.54 < 3.68

Note. T1 = Baseline; T2 = Post; T3 = Follow-up; bold indicates significant difference between Baseline and Post/Follow-up.

Table 5

Summary of Moderation effects for Baseline/Follow-up data

Moderator	N	E	O	A	C	Moderator	N	E	O	A	C
Expectancies						RMEQ Mystical	**+**	+		+	+
Increase in Spiritual						RMEQ Positive Mood	**+**	+		+	**+**
Increase in Connectedness						RMEQ Timespace	+			+	
Decrease in N	**+**	+			**+**	RMEQ Ineffable	+	+	+		+
Increase in E	+	**+**			+	Ego Dissolution Inventory	+	+	+	+	+
Increase in O	+				+	AEI Clarity	**+**	+	+	+	**+**
Increase in A	**+**				+	AEI Reappraisal	**+**	**+**		+	**+**
Increase in C					**+**	AEI Discomfort	+	+			+
Decrease in Anxiety	**+**					Number of ceremonies					+
Decrease in Depression	**+**	+			+	Average consumed			+		
Deal with inner conflict	+				+	Additional psychedelic					
Suggestibility	**+**		+		**+**	Retreat Length					
Female versus Male		+		+		Trusted shaman	**+**	+			+
Age	**-**			**-**	**-**	Mesmerized by icaro prayer	**+**				**+**
Education Level	+		**-**			Icaro prayer healing	**+**	**+**			**+**
Lower Parent Income	+					Medicine cleaning	**+**	**+**	+		**+**
Psychedelic-naïve	+					Struggled to purge	+				
Ayahuasca-naïve				+		War with entity	+				
High Baseline N	**+**	**+**		+	**+**	Purging self	**+**	+		+	**+**
Low Baseline E	**+**	**+**	+	**+**	**+**	Purged physical ailment	+		**-**		
Low Baseline O	**+**	**+**	**+**	**+**		Purged completely	**+**	+			+
Low Baseline A				**+**		Viewed object	**+**			+	+
Low Baseline C	**+**	+			**+**	Relationship object	**+**	+		+	**+**

Note. All effects are $\Delta d \geq .20$; bolded = $\Delta d \geq .30$; '+' = potentiating; '-' = muting; N = Neuroticism; E = Extraversion; O = Openness; A = Agreeableness; C = Conscientiousness.

Table 6

Moderation of Neuroticism by Validity variables

Moderator	Cut threshold	Score at cut	N0 (T2 / T3)	N1 (T2 / T3)	*d*0 (T2 / T3)	*d*1 (T2 / T3)	Δ*d* (T2 / T3)
Expectancies							
Increase in Spiritual	Dich		107 / 100	182 / 165	-.73 / -.62	-.86 / -.73	-.13 / -.11
Increase in Connectedness	Dich		67 / 58	222 / 207	-.74 / -.54	-.83 / -.73	-.09 / -.19
Decrease in N	Dich		161 / 148	128 / 117	-.59 / -.47	-1.09 / -.97	-.50 / -.50
Increase in E	Dich		115 / 110	174 / 155	-.66 / -.61	-1.09 / -.85	-.43 / -.24
Increase in O	Dich		139 / 127	150 / 138	-.71 / -.56	-.89 / -.80	-.18 / -.24
Increase in A	Dich		153 / 142	136 / 123	-.68 / -.56	-.98 / -.86	-.30 / -.30
Increase in C	Dich		176 / 164	113 / 101	-.76 / -.63	-.86 / -.75	-.10 / -.12
Decrease in Anxiety	Dich		150 / 141	139 / 124	-.63 / -.58	-1.13 / -.92	-.50 / -.34
Decrease in Depression	Dich		137 / 129	152 / 136	-.58 / -.53	-1.15 / -.96	-.57 / -.43
Deal with inner conflict	Dich		68 / 67	221 / 198	-.64 / -.52	-.87 / -.75	-.23 / -.23
Suggestibility	25%	Somewhat Disagree	81 / 74	208 / 191	-.57 / -.41	-.97 / -.87	-.40 / -.46
	50%	Somewhat Disagree	154 / 143	135 / 122	-.72 / -.53	-1.03 / -1.00	-.31 / -.47
	75%	Somewhat Disagree	216 / 201	73 / 64	-.76 / -.63	-1.07 / -.98	-.31 / -.35

Note. N0 & N1 = sample size at level 0 and 1 of moderator; *d*0 & *d*1 = *d* effect size change between level 0 and 1 of moderator; Δ*d* = difference in *d* between level 0 and 1 of moderator; Dich = dichotomous variable; T2 = Between Baseline and Post; T3 = Between Baseline and Follow-up.

Table 7

Moderation of Neuroticism by Participant characteristics

Moderator	Cut threshold	Score at cut	N0 (T2 / T3)	N1 (T2 / T3)	*d*0 (T2 / T3)	*d*1 (T2 / T3)	Δ*d* (T2 / T3)
Sex (Female 0; Male 1)	Dich		186 / 166	101 / 98	-.79 / -.66	-.82 / -.72	-.03 / -.06
Age (range: 18-71)	25%	28	92 / 87	195 / 177	-1.02 / -.81	-.71 / -.63	.31 / .18
	50%	33	148 / 134	139 / 130	-.94 / -.76	-.65 / -.61	.29 / .15
	75%	40	219 / 198	68 / 66	-.87 / -.75	-.58 / -.48	.29 / .27
Education Level	25%	Some High School	80 / 71	207 / 193	-.78 / -.75	-.81 / -.66	-.03 / .09
	50%	High School	194 / 182	93 / 82	-.76 / -.67	-.89 / -.73	-.13 / -.06
	75%	Some College	242 / 224	45 / 40	-.77 / -.66	-1.05 / -.89	-.28 / -.23
Parents' Income Level	25%	$40-50K	73 / 69	195 / 177	-.98 / -.82	-.75 / -.65	.23 / .17
	50%	$70-80K	149 / 138	119 / 108	-.92 / -.78	-.68 / -.6	.24 / .18
	75%	$110-120K	201 / 182	67 / 64	-.87 / -.75	-.65 / -.55	.22 / .2
Lifetime Psychedelic use	Dich		48 / 42	241 / 223	-.91 / -.87	-.78 / -.65	.13 / .22
Lifetime Ayahuasca use	Dich		212 / 192	47 / 46	-.83 / -.71	-.59 / -.6	.24 / .11

Note. N0 & N1 = sample size at level 0 and 1 of moderator; *d*0 & *d*1 = *d* effect size change between level 0 and 1 of moderator; Δ*d* = difference in *d* between level 0 and 1 of moderator; Dich = dichotomous variable; T2 = Between Baseline and Post; T3 = Between Baseline and Follow-up.

Table 8

Moderation of Neuroticism by Baseline Personality variables

Moderator	Cut threshold	Score at cut	N0 (T2 / T3)	N1 (T2 / T3)	*d*0 (T2 / T3)	*d*1 (T2 / T3)	Δ*d* (T2 / T3)
Baseline Neuroticism	25%	2.33	77 / 74	212 / 191	-.64 / -.31	-1.29 / -1.16	-.65 / -.85
	50%	2.79	145 / 141	144 / 124	-.73 / -.62	-1.97 / -1.73	-1.24 / -1.11
	75%	3.38	219 / 208	70 / 57	-.82 / -.66	-3.63 / -3.49	-2.81 / -2.83
Baseline Extraversion	25%	2.97	73 / 66	216 / 199	-1.38 / -.99	-.74 / -.70	.64 / .29
	50%	3.40	146 / 132	143 / 133	-1.18 / -.98	-.62 / -.56	.56 / .42
	75%	3.83	227 / 205	62 / 60	-.93 / -.82	-.53 / -.41	.40 / .41
Baseline Openness	25%	3.50	80 / 75	209 / 190	-.78 / -.69	-.82 / -.69	-.04 / .00
	50%	3.83	156 / 148	133 / 117	-.79 / -.78	-.82 / -.57	-.03 / .21
	75%	4.08	223 / 205	66 / 60	-.83 / -.77	-.74 / -.43	.09 / .34
Baseline Agreeableness	25%	3.38	84 / 73	205 / 192	-.92 / -.60	-.77 / -.73	.15 / -.13
	50%	3.63	147 / 135	142 / 130	-.88 / -.69	-.74 / -.69	.14 / .00
	75%	3.92	223 / 200	66 / 65	-.86 / -.69	-.61 / -.66	.25 / .03
Baseline Conscientiousness	25%	3.21	72 / 60	217 / 205	-1.54 / -1.14	-.72 / -.65	.82 / .49
	50%	3.54	155 / 135	134 / 130	-1.09 / -.87	-.67 / -.64	.42 / .23
	75%	3.88	219 / 197	70 / 68	-.90 / -.77	-.68 / -.58	.22 / .19

Note. N0 & N1 = sample size at level 0 and 1 of moderator; *d*0 & *d*1 = *d* effect size change between level 0 and 1 of moderator; Δ*d* = difference in *d* between level 0 and 1 of moderator; T2 = Between Baseline and Post; T3 = Between Baseline and Follow-up.

Table 9

Moderation of Neuroticism by Acute Experience elements

Moderator	Cut threshold	Score at cut	N0 (T2 / T3)	N1 (T2 / T3)	*d*0 (T2 / T3)	*d*1 (T2 / T3)	Δ*d* (T2 / T3)
RMEQ Mystical	25%	Slight	67 / 60	200 / 179	-.41 / -.36	-.94 / -.76	-.53 / -.40
	50%	Moderate	136 / 120	131 / 119	-.59 / -.55	-1.03 / -.78	-.44 / -.23
	75%	Strong	206 / 180	61 / 59	-.71 / -.58	-1.1 / -.90	-.39 / -.32
RMEQ Positive Mood	25%	Moderate	70 / 62	197 / 177	-.38 / -.37	-.96 / -.77	-.58 / -.40
	50%	Strong	143 / 122	124 / 117	-.52 / -.44	-1.14 / -.91	-.62 / -.47
	75%	Strong	218 / 191	49 / 48	-.72 / -.58	-1.19 / -.98	-.47 / -.40
RMEQ Timespace	25%	Slight	68 / 61	199 / 178	-.58 / -.38	-.87 / -.76	-.29 / -.38
	50%	Moderate	143 / 129	124 / 110	-.69 / -.53	-.92 / -.81	-.23 / -.28
	75%	Strong	205 / 181	62 / 58	-.76 / -.62	-.92 / -.78	-.16 / -.16
RMEQ Ineffable	25%	Moderate	80 / 70	187 / 169	-.64 / -.50	-.87 / -.73	-.23 / -.23
	50%	Strong	148 / 127	119 / 112	-.73 / -.58	-.88 / -.75	-.15 / -.17
	75%	Strong	183 / 159	84 / 80	-.77 / -.60	-.88 / -.79	-.11 / -.19
Ego Dissolution Inventory	25%	2.88	68 / 60	199 / 179	-.52 / -.45	-.90 / -.74	-.38 / -.29
	50%	3.75	140 / 124	127 / 115	-.63 / -.53	-.98 / -.80	-.35 / -.27
	75%	4.25	205 / 179	62 / 60	-.77 / -.66	-.90 / -.66	-.13 / .00
AEI Clarity	25%	Moderate	52 / 50	156 / 139	-.37 / -.30	-.93 / -.84	-.56 / -.54
	50%	Moderate	104 / 92	104 / 97	-.53 / -.46	-1.08 / -.93	-.55 / -.47
	75%	Strong	156 / 141	52 / 48	-.66 / -.55	-1.24 / -1.19	-.58 / -.64
AEI Reappraisal	25%	Slight	52 / 49	156 / 140	-.40 / -.29	-.94 / -.86	-.54 / -.57
	50%	Moderate	104 / 95	104 / 94	-.51 / -.42	-1.13 / -1.02	-.62 / -.60
	75%	Strong	156 / 143	52 / 46	-.66 / -.58	-1.21 / -1.06	-.55 / -.48
AEI Discomfort	25%	Cannot decide	53 / 50	155 / 139	-.67 / -.58	-.84 / -.75	-.17 / -.17
	50%	Cannot decide	105 / 97	103 / 92	-.66 / -.64	-.96 / -.77	-.30 / -.13
	75%	Slight	156 / 144	52 / 45	-.74 / -.64	-1.00 / -.90	-.26 / -.26

Note. N0 & N1 = sample size at level 0 and 1 of moderator; *d*0 & *d*1 = *d* effect size change between level 0 and 1 of moderator; Δ*d* = difference in *d* between level 0 and 1 of moderator; T2 = Between Baseline and Post; T3 = Between Baseline and Follow-up; AEI = Ayahuasca Experience Inventory; Ego Dissolution Inventory ranges from 1 to 5.

Table 10

Moderation of Neuroticism by Ceremony variables

Moderator	Cut	Score at cut	N0 (T2 / T3)	N1 (T2 / T3)	*d*0 (T2 / T3)	*d*1 (T2 / T3)	Δ*d* (T2 / T3)
Ceremony characteristics							
Retreat length							
(1 wk = 0; > 1 wk = 1)	Dich		196 / 178	93 / 87	-.77 / -.68	-.88 / -.71	-.11 / -.03
Number of ceremonies	25%	3	112 / 96	162 / 148	-.70 / -.64	-.87 / -.73	-.17 / -.09
	50%	4	198 / 175	76 / 69	-.79 / -.66	-.85 / -.78	-.06 / -.12
	75%	5	208 / 185	66 / 59	-.79 / -.66	-.85 / -.79	-.06 / -.13
Average volume / ceremony	25%	Half-glass	70 / 65	204 / 179	-.77 / -.66	-.81 / -.71	-.04 / -.05
	50%	3/4th glass	139 / 128	135 / 116	-.79 / -.67	-.81 / -.72	-.02 / -.05
	75%	Full glass	207 / 190	67 / 54	-.81 / -.66	-.80 / -.81	.01 / -.15
Additional psychedelic	Dich		68 / 62	182 / 162	-.77 / -.66	-.80 / -.68	-.03 / -.02
Perceptions of Ceremony							
Trusted shaman	25%	Strong	101 / 92	116 / 104	-.53 / -.44	-.99 / -.91	-.46 / -.47
Mesmerized icaro	25%	Strong	101 / 93	116 / 103	-.55 / -.50	-.97 / -.86	-.42 / -.36
Icaro healing	25%	Moderate	74 / 67	143 / 129	-.44 / -.41	-.96 / -.85	-.52 / -.44
	50%	Strong	112 / 103	105 / 93	-.54 / -.49	-1.04 / -.92	-.50 / -.43
Medicine cleaning	25%	Moderate	61 / 52	155 / 143	-.42 / -.38	-.92 / -.80	-.50 / -.42
	50%	Strong	124 / 113	92 / 82	-.59 / -.54	-1.03 / -.91	-.44 / -.37
Purgative Experience							
Struggled to purge	25%	None	84 / 75	133 / 121	-.69 / -.58	-.83 / -.76	-.14 / -.18
	50%	Slight	134 / 118	83 / 78	-.72 / -.58	-.87 / -.87	-.15 / -.29
	75%	Moderate	166 / 150	51 / 46	-.76 / -.64	-.78 / -.81	-.02 / -.17
War with entity	50%	None	129 / 115	88 / 81	-.70 / -.62	-.90 / -.80	-.20 / -.18
	75%	Slight	175 / 158	42 / 38	-.75 / -.69	-.85 / -.65	-.10 / .04
Purging self	25%	Cannot decide	58 / 53	159 / 143	-.43 / -.30	-.92 / -.85	-.49 / -.55
	50%	Strong	147 / 132	70 / 64	-.62 / -.56	-1.08 / -.94	-.46 / -.38
Purged physical ailment	25%	None	81 / 71	135 / 124	-.68 / -.55	-.83 / -.77	-.15 / -.22
	50%	Cannot decide	116 / 104	100 / 91	-.67 / -.59	-.89 / -.81	-.22 / -.22
	75%	Strong	185 / 169	31 / 26	-.73 / -.67	-.99 / -.78	-.26 / -.11
Purged completely	25%	Cannot decide	56 / 48	160 / 147	-.38 / -.41	-.92 / -.79	-.54 / -.38
	50%	Moderate	111 / 99	105 / 96	-.58 / -.53	-.98 / -.86	-.40 / -.33
	75%	Strong	174 / 157	42 / 38	-.71 / -.63	-1.00 / -.92	-.29 / -.29
Viewed object	50%	None	127 / 119	89 / 76	-.67 / -.57	-.94 / -.90	-.27 / -.33

	75%	Moderate	179 / 166	37 / 29	-.73 / -.68	-.94 / -.74	-.21 / -.06
Relationship object	50%	None	143 / 131	73 / 64	-.64 / -.58	-1.18 / -1.00	-.54 / -.42
	75%	Slight	171 / 156	45 / 39	-.68 / -.62	-1.30 / -1.05	-.62 / -.43

Note. N0 & N1 = sample size at level 0 and 1 of moderator; *d*0 & *d*1 = *d* effect size change between level 0 and 1 of moderator; Δ*d* = difference in *d* between level 0 and 1 of moderator; Dich = dichotomous variable; T2 = Between Baseline and Post; T3 = Between Baseline and Follow-up.

Table 11

Moderation of Extraversion by Validity variables

Moderator	Cut threshold	Score at cut	N0 (T2 / T3)	N1 (T2 / T3)	*d*0 (T2 / T3)	*d*1 (T2 / T3)	Δ*d* (T2 / T3)
Expectancies							
Increase in Spiritual	Dich		107 / 100	182 / 165	.36 / .27	.39 / .36	.03 / .09
Increase in Connectedness	Dich		67 / 58	222 / 207	.52 / .29	.34 / .34	-.18 / .05
Decrease in N	Dich		161 / 148	128 / 117	.27 / .20	.47 / .44	.20 / .24
Increase in E	Dich		115 / 110	174 / 155	.24 / .22	.62 / .53	.38 / .31
Increase in O	Dich		139 / 127	150 / 138	.29 / .25	.47 / .40	.18 / .15
Increase in A	Dich		153 / 142	136 / 123	.33 / .27	.45 / .40	.12 / .13
Increase in C	Dich		176 / 164	113 / 101	.33 / .26	.44 / .40	.11 / .14
Decrease in Anxiety	Dich		150 / 141	139 / 124	.32 / .27	.45 / .40	.13 / .13
Decrease in Depression	Dich		137 / 129	152 / 136	.26 / .24	.50 / .42	.24 / .18
Deal with inner conflict	Dich		68 / 67	221 / 198	.39 / .30	.38 / .33	-.01 / .03
Suggestibility	25%	Somewhat Disagree	81 / 74	208 / 191	.33 / .16	.40 / .39	.07 / .23
	50%	Somewhat Disagree	154 / 143	135 / 122	.43 / .26	.32 / .41	-.11 / .15
	75%	Somewhat Disagree	216 / 201	73 / 64	.42 / .31	.28 / .38	-.14 / .07

Note. N0 & N1 = sample size at level 0 and 1 of moderator; *d*0 & *d*1 = *d* effect size change between level 0 and 1 of moderator; Δ*d* = difference in *d* between level 0 and 1 of moderator; Dich = dichotomous variable; T2 = Between Baseline and Post; T3 = Between Baseline and Follow-up.

Table 12

Moderation of Extraversion by Participant characteristics

Moderator	Cut threshold	Score at cut	N0 (T2 / T3)	N1 (T2 / T3)	*d*0 (T2 / T3)	*d*1 (T2 / T3)	Δ*d* (T2 / T3)
Sex (Female 0; Male 1)	Dich		186 / 166	101 / 98	.49 / .41	.20 / .18	-.29 / -.23
Age (range: 18-71)	25%	28	92 / 87	195 / 177	.52 / .40	.31 / .29	-.21 / -.11
	50%	33	148 / 134	139 / 130	.51 / .36	.25 / .30	-.26 / -.06
	75%	40	219 / 198	68 / 66	.43 / .37	.25 / .21	-.18 / -.16
Education Level	25%	Some High School	80 / 71	207 / 193	.49 / .43	.34 / .29	-.15 / -.14
	50%	High School	194 / 182	93 / 82	.36 / .32	.43 / .34	.07 / .02
	75%	Some College	242 / 224	45 / 40	.37 / .31	.43 / .44	.06 / .13
Parents' Income Level	25%	$40-50K	73 / 69	195 / 177	.45 / .31	.37 / .35	-.08 / .04
	50%	$70-80K	149 / 138	119 / 108	.42 / .37	.35 / .29	-.07 / -.08
	75%	$110-120K	201 / 182	67 / 64	.41 / .36	.35 / .29	-.06 / -.07
Lifetime Psychedelic use	Dich		48 / 42	241 / 223	.35 / .48	.39 / .30	.04 / -.18
Lifetime Ayahuasca use	Dich		212 / 192	47 / 46	.40 / .37	.28 / .24	-.12 / -.13

Note. N0 & N1 = sample size at level 0 and 1 of moderator; *d*0 & *d*1 = *d* effect size change between level 0 and 1 of moderator; Δ*d* = difference in *d* between level 0 and 1 of moderator; Dich = dichotomous variable; T2 = Between Baseline and Post; T3 = Between Baseline and Follow-up.

Table 13

Moderation of Extraversion by Baseline Personality variables

Moderator	Cut threshold	Score at cut	N0 (T2 / T3)	N1 (T2 / T3)	*d*0 (T2 / T3)	*d*1 (T2 / T3)	Δ*d* (T2 / T3)
Baseline Neuroticism	25%	2.33	77 / 74	212 / 191	.14 / .08	.49 / .44	.35 / .36
	50%	2.79	145 / 141	144 / 124	.25 / .17	.57 / .57	.32 / .40
	75%	3.38	219 / 208	70 / 57	.30 / .23	.80 / .80	.50 / .57
Baseline Extraversion	25%	2.97	73 / 66	216 / 199	'1.71 / 1.35	.28 / .28	-1.43 / -1.07
	50%	3.40	146 / 132	143 / 133	1.10 / .99	.08 / .04	-1.02 / -.95
	75%	3.83	227 / 205	62 / 60	.65 / .60	-.35 / -.62	-1.00 / -1.22
Baseline Openness	25%	3.50	80 / 75	209 / 190	.47 / .42	.36 / .30	-.11 / -.12
	50%	3.83	156 / 148	133 / 117	.45 / .44	.33 / .22	-.12 / -.22
	75%	4.08	223 / 205	66 / 60	.44 / .41	.25 / .11	-.19 / -.30
Baseline Agreeableness	25%	3.38	84 / 73	205 / 192	.43 / .38	.36 / .31	-.07 / -.07
	50%	3.63	147 / 135	142 / 130	.44 / .37	.33 / .29	-.11 / -.08
	75%	3.92	223 / 200	66 / 65	.45 / .37	.17 / .21	-.28 / -.16
Baseline Conscientiousness	25%	3.21	72 / 60	217 / 205	.54 / .53	.34 / .28	-.20 / -.25
	50%	3.54	155 / 135	134 / 130	.50 / .48	.28 / .20	-.22 / -.28
	75%	3.88	219 / 197	70 / 68	.42 / .38	.30 / .19	-.12 / -.19

Note. N0 & N1 = sample size at level 0 and 1 of moderator; *d*0 & *d*1 = *d* effect size change between level 0 and 1 of moderator; Δ*d* = difference in *d* between level 0 and 1 of moderator; T2 = Between Baseline and Post; T3 = Between Baseline and Follow-up.

Table 14

Moderation of Extraversion by Acute Experience elements

Moderator	Cut threshold	Score at cut	N0 (T2 / T3)	N1 (T2 / T3)	*d*0 (T2 / T3)	*d*1 (T2 / T3)	Δ*d* (T2 / T3)
RMEQ Mystical	25%	Slight	67 / 60	200 / 179	.16 / .15	.45 / .37	.29 / .22
	50%	Moderate	136 / 120	131 / 119	.23 / .23	.56 / .42	.33 / .19
	75%	Strong	206 / 180	61 / 59	.30 / .27	.68 / .49	.38 / .22
RMEQ Positive Mood	25%	Moderate	70 / 62	197 / 177	.16 / .21	.45 / .35	.29 / .14
	50%	Strong	143 / 122	124 / 117	.22 / .21	.56 / .43	.34 / .22
	75%	Strong	218 / 191	49 / 48	.31 / .28	.71 / .49	.40 / .21
RMEQ Timespace	25%	Slight	68 / 61	199 / 178	.25 / .24	.42 / .34	.17 / .10
	50%	Moderate	143 / 129	124 / 110	.25 / .24	.52 / .41	.27 / .17
	75%	Strong	205 / 181	62 / 58	.33 / .32	.56 / .32	.23 / .00
RMEQ Ineffable	25%	Moderate	80 / 70	187 / 169	.20 / .17	.45 / .38	.25 / .21
	50%	Strong	148 / 127	119 / 112	.30 / .22	.46 / .42	.16 / .20
	75%	Strong	183 / 159	84 / 80	.33 / .28	.47 / .39	.14 / .11
Ego Dissolution Inventory	25%	2.88	68 / 60	199 / 179	.15 / .15	.46 / .38	.31 / .23
	50%	3.75	140 / 124	127 / 115	.27 / .26	.51 / .39	.24 / .13
	75%	4.25	205 / 179	62 / 60	.32 / .27	.64 / .49	.32 / .22
AEI Clarity	25%	Moderate	52 / 50	156 / 139	.12 / .17	.45 / .44	.33 / .27
	50%	Moderate	104 / 92	104 / 97	.18 / .26	.54 / .45	.36 / .19
	75%	Strong	156 / 141	52 / 48	.25 / .29	.74 / .58	.49 / .29
AEI Reappraisal	25%	Slight	52 / 49	156 / 140	.06 / .13	.47 / .45	.41 / .32
	50%	Moderate	104 / 95	104 / 94	.17 / .19	.54 / .52	.37 / .33
	75%	Strong	156 / 143	52 / 46	.29 / .30	.57 / .51	.28 / .21
AEI Discomfort	25%	Cannot decide	53 / 50	155 / 139	.17 / .20	.42 / .42	.25 / .22
	50%	Cannot decide	105 / 97	103 / 92	.23 / .25	.50 / .48	.27 / .23
	75%	Slight	156 / 144	52 / 45	.31 / .30	.51 / .54	.20 / .24

Note. N0 & N1 = sample size at level 0 and 1 of moderator; *d*0 & *d*1 = *d* effect size change between level 0 and 1 of moderator; Δ*d* = difference in *d* between level 0 and 1 of moderator; T2 = Between Baseline and Post; T3 = Between Baseline and Follow-up; AEI = Ayahuasca Experience Inventory; Ego Dissolution Inventory ranges from 1 to 5.

Table 15

Moderation of Extraversion by Ceremony variables

Moderator	Cut	Score at cut	N0 (T2 / T3)	N1 (T2 / T3)	*d*0 (T2 / T3)	*d*1 (T2 / T3)	Δ*d* (T2 / T3)
Ceremony characteristics							
Retreat length							
(1 wk = 0; > 1 wk = 1)	Dich		196 / 178	93 / 87	.39 / .35	.37 / .27	-.02 / -.08
Number of ceremonies	25%	3	112 / 96	162 / 148	.34 / .34	.39 / .33	.05 / -.01
	50%	4	198 / 175	76 / 69	.35 / .35	.40 / .32	.05 / -.03
	75%	5	208 / 185	66 / 59	.34 / .35	.44 / .31	.10 / -.04
Average volume / ceremony	25%	Half-glass	70 / 65	204 / 179	.29 / .30	.39 / .35	.10 / .05
	50%	3/4th glass	139 / 128	135 / 116	.33 / .29	.40 / .39	.07 / .10
	75%	Full glass	207 / 190	67 / 54	.35 / .30	.40 / .46	.05 / .16
Additional psychedelic	Dich		68 / 62	182 / 162	.32 / .36	.39 / .33	.07 / -.03
Perceptions of Ceremony							
Trusted shaman	25%	Strong	101 / 92	116 / 104	.24 / .23	.44 / .45	.20 / .22
Mesmerized icaro	25%	Strong	101 / 93	116 / 103	.23 / .25	.46 / .44	.23 / .19
Icaro healing	25%	Moderate	74 / 67	143 / 129	.20 / .20	.44 / .44	.24 / .24
	50%	Strong	112 / 103	105 / 93	.22 / .21	.51 / .53	.29 / .32
Medicine cleaning	25%	Moderate	61 / 52	155 / 143	.07 / .07	.46 / .45	.39 / .38
	50%	Strong	124 / 113	92 / 82	.24 / .26	.52 / .49	.28 / .23
Purgative Experience							
Struggled to purge	25%	None	84 / 75	133 / 121	.34 / .31	.37 / .38	.03 / .07
	50%	Slight	134 / 118	83 / 78	.36 / .32	.35 / .41	-.01 / .09
	75%	Moderate	166 / 150	51 / 46	.37 / .33	.32 / .42	-.05 / .09
War with entity	50%	None	129 / 115	88 / 81	.33 / .26	.40 / .48	.07 / .22
	75%	Slight	175 / 158	42 / 38	.37 / .33	.31 / .42	-.06 / .09
Purging self	25%	Cannot decide	58 / 53	159 / 143	.11 / .06	.45 / .47	.34 / .41
	50%	Strong	147 / 132	70 / 64	.24 / .25	.57 / .56	.33 / .31
Purged physical ailment	25%	None	81 / 71	135 / 124	.33 / .28	.38 / .40	.05 / .12
	50%	Cannot decide	116 / 104	100 / 91	.33 / .31	.39 / .40	.06 / .09
	75%	Strong	185 / 169	31 / 26	.31 / .34	.57 / .44	.26 / .10
Purged completely	25%	Cannot decide	56 / 48	160 / 147	.10 / .17	.45 / .42	.35 / .25
	50%	Moderate	111 / 99	105 / 96	.20 / .25	.53 / .47	.33 / .22
	75%	Strong	174 / 157	42 / 38	.27 / .30	.72 / .57	.45 / .27
Viewed object	50%	None	127 / 119	89 / 76	.29 / .29	.45 / .45	.16 / .16

	75%	Moderate	179 / 166	37 / 29	.33 / .33	.46 / .46	.13 / .13
Relationship object	50%	None	143 / 131	73 / 64	.28 / .27	.56 / .56	.28 / .29
	75%	Slight	171 / 156	45 / 39	.30 / .30	.61 / .58	.31 / .28

Note. N0 & N1 = sample size at level 0 and 1 of moderator; *d*0 & *d*1 = *d* effect size change between level 0 and 1 of moderator; Δ*d* = difference in *d* between level 0 and 1 of moderator; Dich = dichotomous variable; T2 = Between Baseline and Post; T3 = Between Baseline and Follow-up.

Table 16

Moderation of Openness by Validity variables

Moderator	Cut threshold	Score at cut	N0 (T2 / T3)	N1 (T2 / T3)	*d*0 (T2 / T3)	*d*1 (T2 / T3)	Δ*d* (T2 / T3)
Expectancies							
Increase in Spiritual	Dich		107 / 100	182 / 165	.14 / .16	.09 / .08	-.05 / -.08
Increase in Connectedness	Dich		67 / 58	222 / 207	.12 / .19	.11 / .08	-.01 / -.11
Decrease in N	Dich		161 / 148	128 / 117	.07 / .15	.14 / .08	.07 / -.07
Increase in E	Dich		115 / 110	174 / 155	.06 / .09	.19 / .13	.13 / .04
Increase in O	Dich		139 / 127	150 / 138	-.01 / .03	.21 / .17	.22 / .14
Increase in A	Dich		153 / 142	136 / 123	.05 / .10	.19 / .12	.14 / .02
Increase in C	Dich		176 / 164	113 / 101	.06 / .08	.17 / .14	.11 / .06
Decrease in Anxiety	Dich		150 / 141	139 / 124	.08 / .14	.14 / .08	.06 / -.06
Decrease in Depression	Dich		137 / 129	152 / 136	.06 / .16	.15 / .06	.09 / -.10
Deal with inner conflict	Dich		68 / 67	221 / 198	.18 / .25	.09 / .06	-.09 / -.19
Suggestibility	25%	Somewhat Disagree	81 / 74	208 / 191	.03 / -.04	.15 / .17	.12 / .21
	50%	Somewhat Disagree	154 / 143	135 / 122	.12 / .08	.09 / .15	-.03 / .07
	75%	Somewhat Disagree	216 / 201	73 / 64	.09 / .07	.18 / .25	.09 / .18

Note. N0 & N1 = sample size at level 0 and 1 of moderator; *d*0 & *d*1 = *d* effect size change between level 0 and 1 of moderator; Δ*d* = difference in *d* between level 0 and 1 of moderator; Dich = dichotomous variable; T2 = Between Baseline and Post; T3 = Between Baseline and Follow-up.

Table 17

Moderation of Openness by Participant characteristics

Moderator	Cut threshold	Score at cut	N0 (T2 / T3)	N1 (T2 / T3)	*d*0 (T2 / T3)	*d*1 (T2 / T3)	Δ*d* (T2 / T3)
Sex (Female 0; Male 1)	Dich		186 / 166	101 / 98	.14 / .14	.04 / .05	-.10 / -.09
Age (range: 18-71)	25%	28	92 / 87	195 / 177	.27 / .21	.04 / .06	-.23 / -.15
	50%	33	148 / 134	139 / 130	.23 / .14	-.01 / .07	-.24 / -.07
	75%	40	219 / 198	68 / 66	.16 / .13	-.04 / .03	-.20 / -.10
Education Level	25%	Some High School	80 / 71	207 / 193	.13 / .26	.10 / .05	-.03 / -.21
	50%	High School	194 / 182	93 / 82	.14 / .14	.05 / .03	-.09 / -.11
	75%	Some College	242 / 224	45 / 40	.12 / .11	.05 / .08	-.07 / -.03
Parents' Income Level	25%	$40-50K	73 / 69	195 / 177	.21 / .20	.08 / .09	-.13 / -.11
	50%	$70-80K	149 / 138	119 / 108	.15 / .18	.07 / .04	-.08 / -.14
	75%	$110-120K	201 / 182	67 / 64	.11 / .15	.11 / .01	.00 / -.14
Lifetime Psychedelic use	Dich		48 / 42	241 / 223	.07 / .06	.12 / .12	.05 / .06
Lifetime Ayahuasca use	Dich		212 / 192	47 / 46	.12 / .15	-.06 / -.04	-.18 / -.19

Note. N0 & N1 = sample size at level 0 and 1 of moderator; *d*0 & *d*1 = *d* effect size change between level 0 and 1 of moderator; Δ*d* = difference in *d* between level 0 and 1 of moderator; Dich = dichotomous variable; T2 = Between Baseline and Post; T3 = Between Baseline and Follow-up.

Table 18

Moderation of Openness by Baseline Personality variables

Moderator	Cut threshold	Score at cut	N0 (T2 / T3)	N1 (T2 / T3)	*d*0 (T2 / T3)	*d*1 (T2 / T3)	Δ*d* (T2 / T3)
Baseline Neuroticism	25%	2.33	77 / 74	212 / 191	-.01 / .04	.16 / .14	.17 / .10
	50%	2.79	145 / 141	144 / 124	.05 / .04	.17 / .18	.12 / .14
	75%	3.38	219 / 208	70 / 57	.10 / .08	.14 / .21	.04 / .13
Baseline Extraversion	25%	2.97	73 / 66	216 / 199	.22 / .26	.07 / .06	-.15 / -.20
	50%	3.40	146 / 132	143 / 133	.20 / .19	.03 / .03	-.17 / -.16
	75%	3.83	227 / 205	62 / 60	.16 / .15	-.03 / -.01	-.19 / -.16
Baseline Openness	25%	3.50	80 / 75	209 / 190	.81 / .79	-.02 / -.03	-.83 / -.82
	50%	3.83	156 / 148	133 / 117	.46 / .51	-.24 / -.36	-.70 / -.87
	75%	4.08	223 / 205	66 / 60	.29 / .30	-.76 / -.80	-1.05 / -1.10
Baseline Agreeableness	25%	3.38	84 / 73	205 / 192	.21 / .13	.07 / .10	-.14 / -.03
	50%	3.63	147 / 135	142 / 130	.18 / .11	.05 / .11	-.13 / .00
	75%	3.92	223 / 200	66 / 65	.16 / .10	-.10 / .14	-.26 / .04
Baseline Conscientiousness	25%	3.21	72 / 60	217 / 205	.15 / .16	.10 / .09	-.05 / -.07
	50%	3.54	155 / 135	134 / 130	.13 / .16	.08 / .06	-.05 / -.1
	75%	3.88	219 / 197	70 / 68	.09 / .11	.18 / .10	.09 / -.01

Note. N0 & N1 = sample size at level 0 and 1 of moderator; *d*0 & *d*1 = *d* effect size change between level 0 and 1 of moderator; Δ*d* = difference in *d* between level 0 and 1 of moderator; T2 = Between Baseline and Post; T3 = Between Baseline and Follow-up.

Table 19

Moderation of Openness by Acute Experience elements

Moderator	Cut threshold	Score at cut	N0 (T2 / T3)	N1 (T2 / T3)	*d*0 (T2 / T3)	*d*1 (T2 / T3)	Δ*d* (T2 / T3)
RMEQ Mystical	25%	Slight	67 / 60	200 / 179	-.11 / -.03	.17 / .13	.28 / .16
	50%	Moderate	136 / 120	131 / 119	.04 / .09	.16 / .10	.12 / .01
	75%	Strong	206 / 180	61 / 59	.06 / .09	.23 / .11	.17 / .02
RMEQ Positive Mood	25%	Moderate	70 / 62	197 / 177	-.08 / .04	.16 / .11	.24 / .07
	50%	Strong	143 / 122	124 / 117	-.03 / .04	.24 / .15	.27 / .11
	75%	Strong	218 / 191	49 / 48	.06 / .08	.32 / .17	.26 / .09
RMEQ Timespace	25%	Slight	68 / 61	199 / 178	.02 / -.04	.12 / .14	.10 / .18
	50%	Moderate	143 / 129	124 / 110	-.01 / .02	.23 / .18	.24 / .16
	75%	Strong	205 / 181	62 / 58	.07 / .08	.20 / .14	.13 / .06
RMEQ Ineffable	25%	Moderate	80 / 70	187 / 169	.01 / -.03	.13 / .14	.12 / .17
	50%	Strong	148 / 127	119 / 112	-.01 / -.01	.23 / .20	.24 / .21
	75%	Strong	183 / 159	84 / 80	.03 / .05	.23 / .17	.20 / .12
Ego Dissolution Inventory	25%	2.88	68 / 60	199 / 179	-.06 / -.06	.15 / .14	.21 / .20
	50%	3.75	140 / 124	127 / 115	.02 / .02	.18 / .17	.16 / .15
	75%	4.25	205 / 179	62 / 60	.07 / .07	.19 / .16	.12 / .09
AEI Clarity	25%	Moderate	52 / 50	156 / 139	-.07 / -.04	.14 / .17	.21 / .21
	50%	Moderate	104 / 92	104 / 97	-.03 / .07	.21 / .15	.24 / .08
	75%	Strong	156 / 141	52 / 48	.03 / .04	.27 / .34	.24 / .30
AEI Reappraisal	25%	Slight	52 / 49	156 / 140	-.08 / -.02	.14 / .16	.22 / .18
	50%	Moderate	104 / 95	104 / 94	.00 / .05	.18 / .18	.18 / .13
	75%	Strong	156 / 143	52 / 46	.07 / .08	.17 / .23	.10 / .15
AEI Discomfort	25%	Cannot decide	53 / 50	155 / 139	.08 / .17	.10 / .09	.02 / -.08
	50%	Cannot decide	105 / 97	103 / 92	.08 / .19	.10 / .02	.02 / -.17
	75%	Slight	156 / 144	52 / 45	.11 / .14	.03 / .01	-.08 / -.13

Note. N0 & N1 = sample size at level 0 and 1 of moderator; *d*0 & *d*1 = *d* effect size change between level 0 and 1 of moderator; Δ*d* = difference in *d* between level 0 and 1 of moderator; T2 = Between Baseline and Post; T3 = Between Baseline and Follow-up; AEI = Ayahuasca Experience Inventory; Ego Dissolution Inventory ranges from 1 to 5.

Table 20

Moderation of Openness by Ceremony variables

Moderator	Cut	Score at cut	N0 (T2 / T3)	N1 (T2 / T3)	*d*0 (T2 / T3)	*d*1 (T2 / T3)	Δ*d* (T2 / T3)
Ceremony characteristics							
Retreat length							
(1 wk = 0; > 1 wk = 1)	Dich		196 / 178	93 / 87	.10 / .11	.14 / .09	.04 / -.02
Number of ceremonies	25%	3	112 / 96	162 / 148	.00 / .08	.18 / .14	.18 / .06
	50%	4	198 / 175	76 / 69	.09 / .14	.13 / .07	.04 / -.07
	75%	5	208 / 185	66 / 59	.09 / .14	.13 / .05	.04 / -.09
Average volume / ceremony	25%	Half-glass	70 / 65	204 / 179	.09 / .02	.11 / .15	.02 / .13
	50%	3/4th glass	139 / 128	135 / 116	.14 / .11	.07 / .13	-.07 / .02
	75%	Full glass	207 / 190	67 / 54	.11 / .06	.07 / .31	-.04 / .25
Additional psychedelic	Dich		68 / 62	182 / 162	.15 / .13	.09 / .12	-.06 / -.01
Perceptions of Ceremony							
Trusted shaman	25%	Strong	101 / 92	116 / 104	.04 / .04	.11 / .17	.07 / .13
Mesmerized icaro	25%	Strong	101 / 93	116 / 103	.00 / .02	.15 / .19	.15 / .17
Icaro healing	25%	Moderate	74 / 67	143 / 129	-.07 / /00	.15 / .17	.22 / .17
	50%	Strong	112 / 103	105 / 93	.03 / .03	.13 / .20	.10 / .17
Medicine cleaning	25%	Moderate	61 / 52	155 / 143	-.07 / -.04	.14 / .16	.21 / .20
	50%	Strong	124 / 113	92 / 82	.04 / .08	.13 / .16	.09 / .08
Purgative Experience							
Struggled to purge	25%	None	84 / 75	133 / 121	.07 / .16	.09 / .08	.02 / -.08
	50%	Slight	134 / 118	83 / 78	.07 / .13	.09 / .08	.02 / -.05
	75%	Moderate	166 / 150	51 / 46	.08 / .12	.08 / .07	.00 / -.05
War with entity	50%	None	129 / 115	88 / 81	.02 / .10	.16 / .13	.14 / .03
	75%	Slight	175 / 158	42 / 38	.07 / .10	.13 / .13	.06 / .03
Purging self	25%	Cannot decide	58 / 53	159 / 143	-.02 / .02	.12 / .14	.14 / .12
	50%	Strong	147 / 132	70 / 64	.07 / .11	.10 / .11	.03 / .00
Purged physical ailment	25%	None	81 / 71	135 / 124	.03 / .07	.11 / .14	.08 / .07
	50%	Cannot decide	116 / 104	100 / 91	.08 / .11	.08 / .12	.00 / .01
	75%	Strong	185 / 169	31 / 26	.11 / .15	-.09 / -.09	-.20 / -.24
Purged completely	25%	Cannot decide	56 / 48	160 / 147	-.04 / .01	.12 / .15	.16 / .14
	50%	Moderate	111 / 99	105 / 96	.05 / .09	.11 / .14	.06 / .05
	75%	Strong	174 / 157	42 / 38	.05 / .10	.20 / .19	.15 / .09
Viewed object	50%	None	127 / 119	89 / 76	.05 / .08	.13 / .17	.08 / .09

	75%	Moderate	179 / 166	37 / 29	.08 / .14	.08 / -.01	.00 / -.15
Relationship object	50%	None	143 / 131	73 / 64	.02 / .09	.22 / .16	.20 / .07
	75%	Slight	171 / 156	45 / 39	.05 / .11	.21 / .12	.16 / .01

Note. N0 & N1 = sample size at level 0 and 1 of moderator; *d*0 & *d*1 = *d* effect size change between level 0 and 1 of moderator; Δ*d* = difference in *d* between level 0 and 1 of moderator; Dich = dichotomous variable; T2 = Between Baseline and Post; T3 = Between Baseline and Follow-up.

Table 21

Moderation of Agreeableness by Validity variables

Moderator	Cut threshold	Score at cut	N0 (T2 / T3)	N1 (T2 / T3)	*d*0 (T2 / T3)	*d*1 (T2 / T3)	Δ*d* (T2 / T3)
Expectancies							
Increase in Spiritual	Dich		107 / 100	182 / 165	.37 / .17	.38 / .31	.01 / .14
Increase in Connectedness	Dich		67 / 58	222 / 207	.54 / .21	.33 / .28	-.21 / .07
Decrease in N	Dich		161 / 148	128 / 117	.30 / .24	.42 / .27	.12 / .03
Increase in E	Dich		115 / 110	174 / 155	.33 / .25	.45 / .28	.12 / .03
Increase in O	Dich		139 / 127	150 / 138	.32 / .22	.43 / .31	.11 / .09
Increase in A	Dich		153 / 142	136 / 123	.29 / .20	.49 / .35	.20 / .15
Increase in C	Dich		176 / 164	113 / 101	.43 / .29	.31 / .22	-.12 / -.07
Decrease in Anxiety	Dich		150 / 141	139 / 124	.31 / .26	.44 / .26	.13 / .00
Decrease in Depression	Dich		137 / 129	152 / 136	.30 / .21	.44 / .31	.14 / .10
Deal with inner conflict	Dich		68 / 67	221 / 198	.32 / .24	.39 / .27	.07 / .03
Suggestibility	25%	Somewhat Disagree	81 / 74	208 / 191	.40 / .22	.36 / .28	-.04 / .06
	50%	Somewhat Disagree	154 / 143	135 / 122	.40 / .21	.35 / .33	-.05 / .12
	75%	Somewhat Disagree	216 / 201	73 / 64	.34 / .23	.49 / .37	.15 / .14

Note. N0 & N1 = sample size at level 0 and 1 of moderator; *d*0 & *d*1 = *d* effect size change between level 0 and 1 of moderator; Δ*d* = difference in *d* between level 0 and 1 of moderator; Dich = dichotomous variable; T2 = Between Baseline and Post; T3 = Between Baseline and Follow-up.

Table 22

Moderation of Agreeableness by Participant characteristics

Moderator	Cut threshold	Score at cut	N0 (T2 / T3)	N1 (T2 / T3)	*d*0 (T2 / T3)	*d*1 (T2 / T3)	Δ*d* (T2 / T3)
Sex (Female 0; Male 1)	Dich		186 / 166	101 / 98	.44 / .38	.31 / .11	-.13 / -.27
Age (range: 18-71)	25%	28	92 / 87	195 / 177	.47 / .28	.33 / .25	-.14 / -.03
	50%	33	148 / 134	139 / 130	.48 / .31	.28 / .21	-.20 / -.10
	75%	40	219 / 198	68 / 66	.41 / .32	.27 / .10	-.14 / -.22
Education Level	25%	Some High School	80 / 71	207 / 193	.39 / .33	.37 / .24	-.02 / -.09
	50%	High School	194 / 182	93 / 82	.36 / .28	.41 / .23	.05 / -.05
	75%	Some College	242 / 224	45 / 40	.38 / .27	.31 / .19	-.07 / -.08
Parents' Income Level	25%	$40-50K	73 / 69	195 / 177	.48 / .26	.35 / .28	-.13 / .02
	50%	$70-80K	149 / 138	119 / 108	.44 / .29	.32 / .25	-.12 / -.04
	75%	$110-120K	201 / 182	67 / 64	.40 / .29	.35 / .21	-.05 / -.08
Lifetime Psychedelic use	Dich		48 / 42	241 / 223	.45 / .36	.36 / .24	-.09 / -.12
Lifetime Ayahuasca use	Dich		212 / 192	47 / 46	.40 / .27	.07 / .06	-.33 / -.21

Note. N0 & N1 = sample size at level 0 and 1 of moderator; *d*0 & *d*1 = *d* effect size change between level 0 and 1 of moderator; Δ*d* = difference in *d* between level 0 and 1 of moderator; Dich = dichotomous variable; T2 = Between Baseline and Post; T3 = Between Baseline and Follow-up.

Table 23

Moderation of Agreeableness by Baseline Personality variables

Moderator	Cut threshold	Score at cut	N0 (T2 / T3)	N1 (T2 / T3)	*d*0 (T2 / T3)	*d*1 (T2 / T3)	Δ*d* (T2 / T3)
Baseline Neuroticism	25%	2.33	77 / 74	212 / 191	.30 / .14	.41 / .31	.11 / .17
	50%	2.79	145 / 141	144 / 124	.27 / .19	.48 / .34	.21 / .15
	75%	3.38	219 / 208	70 / 57	.32 / .21	.55 / .42	.23 / .21
Baseline Extraversion	25%	2.97	73 / 66	216 / 199	.49 / .28	.33 / .26	-.16 / -.02
	50%	3.40	146 / 132	143 / 133	.48 / .37	.27 / .16	-.21 / -.21
	75%	3.83	227 / 205	62 / 60	.44 / .33	.16 / .03	-.28 / -.30
Baseline Openness	25%	3.50	80 / 75	209 / 190	.56 / .42	.33 / .22	-.23 / -.20
	50%	3.83	156 / 148	133 / 117	.45 / .39	.30 / .11	-.15 / -.28
	75%	4.08	223 / 205	66 / 60	.45 / .34	.15 / .01	-.30 / -.33
Baseline Agreeableness	25%	3.38	84 / 73	205 / 192	1.35 / .98	.31 / .19	-1.04 / -.79
	50%	3.63	147 / 135	142 / 130	1.03 / .8	.07 / -.06	-.96 / -.86
	75%	3.92	223 / 200	66 / 65	.65 / .5	-.39 / -.43	-1.04 / -.93
Baseline Conscientiousness	25%	3.21	72 / 60	217 / 205	.55 / .39	.32 / .23	-.23 / -.16
	50%	3.54	155 / 135	134 / 130	.49 / .32	.25 / .20	-.24 / -.12
	75%	3.88	219 / 197	70 / 68	.39 / .28	.33 / .21	-.06 / -.07

Note. N0 & N1 = sample size at level 0 and 1 of moderator; *d*0 & *d*1 = *d* effect size change between level 0 and 1 of moderator; Δ*d* = difference in *d* between level 0 and 1 of moderator; T2 = Between Baseline and Post; T3 = Between Baseline and Follow-up.

Table 24

Moderation of Agreeableness by Acute Experience elements

Moderator	Cut threshold	Score at cut	N0 (T2 / T3)	N1 (T2 / T3)	*d*0 (T2 / T3)	*d*1 (T2 / T3)	Δ*d* (T2 / T3)
RMEQ Mystical	25%	Slight	67 / 60	200 / 179	.11 / .08	.46 / .33	.35 / .25
	50%	Moderate	136 / 120	131 / 119	.19 / .13	.56 / .41	.37 / .28
	75%	Strong	206 / 180	61 / 59	.31 / .20	.54 / .45	.23 / .25
RMEQ Positive Mood	25%	Moderate	70 / 62	197 / 177	.09 / .10	.47 / .32	.38 / .22
	50%	Strong	143 / 122	124 / 117	.22 / .15	.52 / .37	.30 / .22
	75%	Strong	218 / 191	49 / 48	.32 / .24	.59 / .38	.27 / .14
RMEQ Timespace	25%	Slight	68 / 61	199 / 178	.25 / .21	.40 / .28	.15 / .07
	50%	Moderate	143 / 129	124 / 110	.26 / .17	.49 / .37	.23 / .20
	75%	Strong	205 / 181	62 / 58	.32 / .20	.53 / .45	.21 / .25
RMEQ Ineffable	25%	Moderate	80 / 70	187 / 169	.31 / .14	.38 / .31	.07 / .17
	50%	Strong	148 / 127	119 / 112	.30 / .19	.45 / .35	.15 / .16
	75%	Strong	183 / 159	84 / 80	.32 / .21	.45 / .37	.13 / .16
Ego Dissolution Inventory	25%	2.88	68 / 60	199 / 179	.12 / .05	.45 / .33	.33 / .28
	50%	3.75	140 / 124	127 / 115	.23 / .12	.51 / .41	.28 / .29
	75%	4.25	205 / 179	62 / 60	.30 / .21	.56 / .42	.26 / .21
AEI Clarity	25%	Moderate	52 / 50	156 / 139	.10 / .07	.42 / .32	.32 / .25
	50%	Moderate	104 / 92	104 / 97	.19 / .13	.47 / .37	.28 / .24
	75%	Strong	156 / 141	52 / 48	.29 / .19	.44 / .40	.15 / .21
AEI Reappraisal	25%	Slight	52 / 49	156 / 140	.13 / .15	.40 / .28	.27 / .13
	50%	Moderate	104 / 95	104 / 94	.17 / .14	.53 / .38	.36 / .24
	75%	Strong	156 / 143	52 / 46	.29 / .23	.45 / .31	.16 / .08
AEI Discomfort	25%	Cannot decide	53 / 50	155 / 139	.23 / .29	.36 / .23	.13 / -.06
	50%	Cannot decide	105 / 97	103 / 92	.24 / .26	.42 / .24	.18 / -.02
	75%	Slight	156 / 144	52 / 45	.28 / .25	.47 / .25	.19 / .00

Note. N0 & N1 = sample size at level 0 and 1 of moderator; *d*0 & *d*1 = *d* effect size change between level 0 and 1 of moderator; Δ*d* = difference in *d* between level 0 and 1 of moderator; T2 = Between Baseline and Post; T3 = Between Baseline and Follow-up; AEI = Ayahuasca Experience Inventory; Ego Dissolution Inventory ranges from 1 to 5.

Table 25

Moderation of Agreeableness by Ceremony variables

Moderator	Cut	Score at cut	N0 (T2 / T3)	N1 (T2 / T3)	*d*0 (T2 / T3)	*d*1 (T2 / T3)	Δ*d* (T2 / T3)
Ceremony characteristics							
Retreat length							
(1 wk = 0; > 1 wk = 1)	Dich		196 / 178	93 / 87	.39 / .29	.33 / .20	-.06 / -.09
Number of ceremonies	25%	3	112 / 96	162 / 148	.33 / .28	.39 / .24	.06 / -.04
	50%	4	198 / 175	76 / 69	.39 / .29	.30 / .18	-.09 / -.11
	75%	5	208 / 185	66 / 59	.39 / .29	.27 / .16	-.12 / -.13
Average volume / ceremony	25%	Half-glass	70 / 65	204 / 179	.46 / .24	.33 / .26	-.13 / .02
	50%	3/4th glass	139 / 128	135 / 116	.47 / .23	.28 / .28	-.19 / .05
	75%	Full glass	207 / 190	67 / 54	.41 / .24	.24 / .30	-.17 / .06
Additional psychedelic	Dich		68 / 62	182 / 162	.50 / .24	.36 / .28	-.14 / .04
Perceptions of Ceremony							
Trusted shaman	25%	Strong	101 / 92	116 / 104	.16 / .18	.47 / .29	.31 / .11
Mesmerized icaro	25%	Strong	101 / 93	116 / 103	.20 / .18	.44 / .30	.24 / .12
Icaro healing	25%	Moderate	74 / 67	143 / 129	.12 / .15	.44 / .29	.32 / .14
	50%	Strong	112 / 103	105 / 93	.17 / .17	.50 / .32	.33 / .15
Medicine cleaning	25%	Moderate	61 / 52	155 / 143	.14 / .13	.39 / .27	.25 / .14
	50%	Strong	124 / 113	92 / 82	.25 / .17	.43 / .32	.18 / .15
Purgative Experience							
Struggled to purge	25%	None	84 / 75	133 / 121	.29 / .25	.34 / .23	.05 / -.02
	50%	Slight	134 / 118	83 / 78	.33 / .27	.31 / .20	-.02 / -.07
	75%	Moderate	166 / 150	51 / 46	.32 / .27	.31 / .15	-.01 / -.12
War with entity	50%	None	129 / 115	88 / 81	.24 / .25	.45 / .23	.21 / -.02
	75%	Slight	175 / 158	42 / 38	.28 / .25	.47 / .19	.19 / -.06
Purging self	25%	Cannot decide	58 / 53	159 / 143	.16 / .08	.38 / .29	.22 / .21
	50%	Strong	147 / 132	70 / 64	.24 / .18	.47 / .34	.23 / .16
Purged physical ailment	25%	None	81 / 71	135 / 124	.29 / .23	.34 / .24	.05 / .01
	50%	Cannot decide	116 / 104	100 / 91	.29 / .25	.35 / .23	.06 / -.02
	75%	Strong	185 / 169	31 / 26	.32 / .25	.35 / .16	.03 / -.09
Purged completely	25%	Cannot decide	56 / 48	160 / 147	.13 / .10	.40 / .29	.27 / .19
	50%	Moderate	111 / 99	105 / 96	.26 / .16	.38 / .32	.12 / .16
	75%	Strong	174 / 157	42 / 38	.29 / .22	.45 / .32	.16 / .10
Viewed object	50%	None	127 / 119	89 / 76	.29 / .16	.38 / .37	.09 / .21

	75%	Moderate	179 / 166	37 / 29	.29 / .23	.50 / .32	.21 / .09
Relationship object	50%	None	143 / 131	73 / 64	.25 / .15	.49 / .44	.24 / .29
	75%	Slight	171 / 156	45 / 39	.29 / .20	.46 / .42	.17 / .22

Note. N0 & N1 = sample size at level 0 and 1 of moderator; *d*0 & *d*1 = *d* effect size change between level 0 and 1 of moderator; Δ*d* = difference in *d* between level 0 and 1 of moderator; Dich = dichotomous variable; T2 = Between Baseline and Post; T3 = Between Baseline and Follow-up.

Table 26

Moderation of Conscientiousness by Validity variables

Moderator	Cut threshold	Score at cut	N0 (T2 / T3)	N1 (T2 / T3)	*d*0 (T2 / T3)	*d*1 (T2 / T3)	Δ*d* (T2 / T3)
Expectancies							
Increase in Spiritual	Dich		107 / 100	182 / 165	.49 / .26	.54 / .42	.05 / .16
Increase in Connectedness	Dich		67 / 58	222 / 207	.52 / .25	.52 / .40	.00 / .15
Decrease in N	Dich		161 / 148	128 / 117	.37 / .15	.64 / .52	.27 / .37
Increase in E	Dich		115 / 110	174 / 155	.44 / .25	.65 / .53	.21 / .28
Increase in O	Dich		139 / 127	150 / 138	.44 / .25	.6 / .46	.16 / .21
Increase in A	Dich		153 / 142	136 / 123	.45 / .25	.60 / .50	.15 / .25
Increase in C	Dich		176 / 164	113 / 101	.41 / .19	.67 / .59	.26 / .40
Decrease in Anxiety	Dich		150 / 141	139 / 124	.41 / .29	.64 / .44	.23 / .15
Decrease in Depression	Dich		137 / 129	152 / 136	.41 / .25	.63 / .48	.22 / .23
Deal with inner conflict	Dich		68 / 67	221 / 198	.42 / .21	.55 / .42	.13 / .21
Suggestibility	25%	Somewhat Disagree	81 / 74	208 / 191	.46 / .07	.56 / .47	.10 / .40
	50%	Somewhat Disagree	154 / 143	135 / 122	.49 / .26	.56 / .50	.07 / .24
	75%	Somewhat Disagree	216 / 201	73 / 64	.50 / .34	.58 / .43	.08 / .09

Note. N0 & N1 = sample size at level 0 and 1 of moderator; *d*0 & *d*1 = *d* effect size change between level 0 and 1 of moderator; Δ*d* = difference in *d* between level 0 and 1 of moderator; Dich = dichotomous variable; T2 = Between Baseline and Post; T3 = Between Baseline and Follow-up.

Table 27

Moderation of Conscientiousness by Participant characteristics

Moderator	Cut threshold	Score at cut	N0 (T2 / T3)	N1 (T2 / T3)	*d*0 (T2 / T3)	*d*1 (T2 / T3)	Δ*d* (T2 / T3)
Sex (Female 0; Male 1)	Dich		186 / 166	101 / 98	.52 / .40	.51 / .28	-.01 / -.12
Age (range: 18-71)	25%	28 years	92 / 87	195 / 177	.80 / .55	.41 / .29	-.39 / -.26
	50%	33 years	148 / 134	139 / 130	.73 / .49	.33 / .26	-.40 / -.23
	75%	40 years	219 / 198	68 / 66	.59 / .41	.29 / .20	-.30 / -.21
Education Level	25%	Some High School	80 / 71	207 / 193	.55 / .49	.5 / .31	-.05 / -.18
	50%	High School	194 / 182	93 / 82	.48 / .36	.59 / .36	.11 / .00
	75%	Some College	242 / 224	45 / 40	.50 / .35	.67 / .47	.17 / .12
Parents' Income Level	25%	$40-50K	73 / 69	195 / 177	.60 / .39	.48 / .35	-.12 / -.04
	50%	$70-80K	149 / 138	119 / 108	.57 / .41	.44 / .29	-.13 / -.12
	75%	$110-120K	201 / 182	67 / 64	.54 / .39	.44 / .26	-.10 / -.13
Lifetime Psychedelic use	Dich		48 / 42	241 / 223	.49 / .40	.52 / .35	.03 / -.05
Lifetime Ayahuasca use	Dich		212 / 192	47 / 46	.53 / .39	.36 / .33	-.17 / -.06

Note. N0 & N1 = sample size at level 0 and 1 of moderator; *d*0 & *d*1 = *d* effect size change between level 0 and 1 of moderator; Δ*d* = difference in *d* between level 0 and 1 of moderator; Dich = dichotomous variable; T2 = Between Baseline and Post; T3 = Between Baseline and Follow-up.

Table 28

Moderation of Conscientiousness by Baseline Personality variables

Moderator	Cut threshold	Score at cut	N0 (T2 / T3)	N1 (T2 / T3)	*d*0 (T2 / T3)	*d*1 (T2 / T3)	Δ*d* (T2 / T3)
Baseline Neuroticism	25%	2.33	77 / 74	212 / 191	.44 / .14	.59 / .47	.15 / .33
	50%	2.79	145 / 141	144 / 124	.42 / .23	.71 / .55	.29 / .32
	75%	3.38	219 / 208	70 / 57	.46 / .26	.98 / .94	.52 / .68
Baseline Extraversion	25%	2.97	73 / 66	216 / 199	.61 / .43	.51 / .36	-.10 / -.07
	50%	3.40	146 / 132	143 / 133	.60 / .52	.46 / .22	-.14 / -.30
	75%	3.83	227 / 205	62 / 60	.57 / .45	.38 / .12	-.19 / -.33
Baseline Openness	25%	3.50	80 / 75	209 / 190	.49 / .40	.53 / .35	.04 / -.05
	50%	3.83	156 / 148	133 / 117	.43 / .39	.64 / .32	.21 / -.07
	75%	4.08	223 / 205	66 / 60	.50 / .41	.57 / .18	.07 / -.23
Baseline Agreeableness	25%	3.38	84 / 73	205 / 192	.57 / .31	.52 / .40	-.05 / .09
	50%	3.63	147 / 135	142 / 130	.53 / .32	.51 / .42	-.02 / .10
	75%	3.92	223 / 200	66 / 65	.54 / .36	.45 / .38	-.09 / .02
Baseline Conscientiousness	25%	3.21	72 / 60	217 / 205	2.06 / 1.88	.47 / .28	-1.59 / -1.6
	50%	3.54	155 / 135	134 / 130	1.21 / .98	.39 / .14	-.82 / -.84
	75%	3.88	219 / 197	70 / 68	.84 / .70	.27 / -.37	-.57 / -1.07

Note. N0 & N1 = sample size at level 0 and 1 of moderator; *d*0 & *d*1 = *d* effect size change between level 0 and 1 of moderator; Δ*d* = difference in *d* between level 0 and 1 of moderator; T2 = Between Baseline and Post; T3 = Between Baseline and Follow-up.

Table 29

Moderation of Conscientiousness by Acute Experience elements

Moderator	Cut threshold	Score at cut	N0 (T2 / T3)	N1 (T2 / T3)	*d*0 (T2 / T3)	*d*1 (T2 / T3)	Δ*d* (T2 / T3)
RMEQ Mystical	25%	Slight	67 / 60	200 / 179	.33 / .21	.58 / .42	.25 / .21
	50%	Moderate	136 / 120	131 / 119	.36 / .31	.70 / .42	.34 / .11
	75%	Strong	206 / 180	61 / 59	.44 / .32	.82 / .50	.38 / .18
RMEQ Positive Mood	25%	Moderate	70 / 62	197 / 177	.32 / .29	.59 / .39	.27 / .10
	50%	Strong	143 / 122	124 / 117	.36 / .27	.70 / .46	.34 / .19
	75%	Strong	218 / 191	49 / 48	.44 / .31	.92 / .62	.48 / .31
RMEQ Timespace	25%	Slight	68 / 61	199 / 178	.43 / .24	.55 / .41	.12 / .17
	50%	Moderate	143 / 129	124 / 110	.42 / .29	.63 / .46	.21 / .17
	75%	Strong	205 / 181	62 / 58	.46 / .35	.73 / .42	.27 / .07
RMEQ Ineffable	25%	Moderate	80 / 70	187 / 169	.43 / .21	.56 / .43	.13 / .22
	50%	Strong	148 / 127	119 / 112	.41 / .24	.65 / .50	.24 / .26
	75%	Strong	183 / 159	84 / 80	.49 / .34	.58 / .42	.11 / .08
Ego Dissolution Inventory	25%	2.88	68 / 60	199 / 179	.27 / .24	.60 / .41	.33 / .17
	50%	3.75	140 / 124	127 / 115	.37 / .27	.68 / .47	.31 / .20
	75%	4.25	205 / 179	62 / 60	.44 / .37	.81 / .35	.37 / -.02
AEI Clarity	25%	Moderate	52 / 50	156 / 139	.24 / .13	.59 / .49	.35 / .36
	50%	Moderate	104 / 92	104 / 97	.37 / .26	.63 / .51	.26 / .25
	75%	Strong	156 / 141	52 / 48	.44 / .32	.71 / .59	.27 / .27
AEI Reappraisal	25%	Slight	52 / 49	156 / 140	.25 / .16	.59 / .48	.34 / .32
	50%	Moderate	104 / 95	104 / 94	.40 / .24	.61 / .53	.21 / .29
	75%	Strong	156 / 143	52 / 46	.45 / .32	.67 / .61	.22 / .29
AEI Discomfort	25%	Cannot decide	53 / 50	155 / 139	.47 / .30	.52 / .42	.05 / .12
	50%	Cannot decide	105 / 97	103 / 92	.43 / .32	.59 / .47	.16 / .15
	75%	Slight	156 / 144	52 / 45	.48 / .33	.59 / .61	.11 / .28

Note. N0 & N1 = sample size at level 0 and 1 of moderator; *d*0 & *d*1 = *d* effect size change between level 0 and 1 of moderator; Δ*d* = difference in *d* between level 0 and 1 of moderator; T2 = Between Baseline and Post; T3 = Between Baseline and Follow-up; AEI = Ayahuasca Experience Inventory; Ego Dissolution Inventory ranges from 1 to 5.

Table 30

Moderation of Conscientiousness by Ceremony variables

Moderator	Cut	Score at cut	N0 (T2 / T3)	N1 (T2 / T3)	*d*0 (T2 / T3)	*d*1 (T2 / T3)	Δ*d* (T2 / T3)
Ceremony characteristics							
Retreat length							
(1 wk = 0; > 1 wk = 1)	Dich		196 / 178	93 / 87	.51 / .34	.53 / .40	.02 / .06
Number of ceremonies	25%	3	112 / 96	162 / 148	.42 / .31	.58 / .42	.16 / .11
	50%	4	198 / 175	76 / 69	.48 / .32	.63 / .54	.15 / .22
	75%	5	208 / 185	66 / 59	.49 / .33	.61 / .54	.12 / .21
Average volume / ceremony	25%	Half-glass	70 / 65	204 / 179	.48 / .38	.53 / .38	.05 / .00
	50%	3/4th glass	139 / 128	135 / 116	.56 / .39	.48 / .36	-.08 / -.03
	75%	Full glass	207 / 190	67 / 54	.55 / .38	.44 / .38	-.11 / .00
Additional psychedelic	Dich		68 / 62	182 / 162	.42 / .27	.57 / .43	.15 / .16
Perceptions of Ceremony							
Trusted shaman	25%	Strong	101 / 92	116 / 104	.41 / .26	.58 / .49	.17 / .23
Mesmerized icaro	25%	Strong	101 / 93	116 / 103	.44 / .24	.57 / .54	.13 / .30
Icaro healing	25%	Moderate	74 / 67	143 / 129	.30 / .19	.61 / .50	.31 / .31
	50%	Strong	112 / 103	105 / 93	.43 / .32	.60 / .48	.17 / .16
Medicine cleaning	25%	Moderate	61 / 52	155 / 143	.32 / .12	.58 / .48	.26 / .36
	50%	Strong	124 / 113	92 / 82	.46 / .32	.57 / .48	.11 / .16
Purgative Experience							
Struggled to purge	25%	None	84 / 75	133 / 121	.46 / .32	.54 / .43	.08 / .11
	50%	Slight	134 / 118	83 / 78	.51 / .37	.50 / .41	-.01 / .04
	75%	Moderate	166 / 150	51 / 46	.50 / .35	.52 / .50	.02 / .15
War with entity	50%	None	129 / 115	88 / 81	.47 / .36	.56 / .42	.09 / .06
	75%	Slight	175 / 158	42 / 38	.49 / .40	.56 / .36	.07 / -.04
Purging self	25%	Cannot decide	58 / 53	159 / 143	.32 / .11	.58 / .50	.26 / .39
	50%	Strong	147 / 132	70 / 64	.45 / .31	.62 / .54	.17 / .23
Purged physical ailment	25%	None	81 / 71	135 / 124	.47 / .29	.54 / .46	.07 / .17
	50%	Cannot decide	116 / 104	100 / 91	.47 / .33	.55 / .46	.08 / .13
	75%	Strong	185 / 169	31 / 26	.50 / .37	.57 / .50	.07 / .13
Purged completely	25%	Cannot decide	56 / 48	160 / 147	.41 / .35	.52 / .40	.11 / .05
	50%	Moderate	111 / 99	105 / 96	.41 / .28	.58 / .50	.17 / .22
	75%	Strong	174 / 157	42 / 38	.47 / .36	.60 / .57	.13 / .21
Viewed object	50%	None	127 / 119	89 / 76	.47 / .31	.56 / .52	.09 / .21

	75%	Moderate	179 / 166	37 / 29	.48 / .36	.63 / .56	.15 / .20
Relationship object	50%	None	143 / 131	73 / 64	.43 / .30	.71 / .62	.28 / .32
	75%	Slight	171 / 156	45 / 39	.46 / .33	.73 / .68	.27 / .35

Note. N0 & N1 = sample size at level 0 and 1 of moderator; *d*0 & *d*1 = *d* effect size change between level 0 and 1 of moderator; Δ*d* = difference in *d* between level 0 and 1 of moderator; Dich = dichotomous variable; T2 = Between Baseline and Post; T3 = Between Baseline and Follow-up.

FIGURES

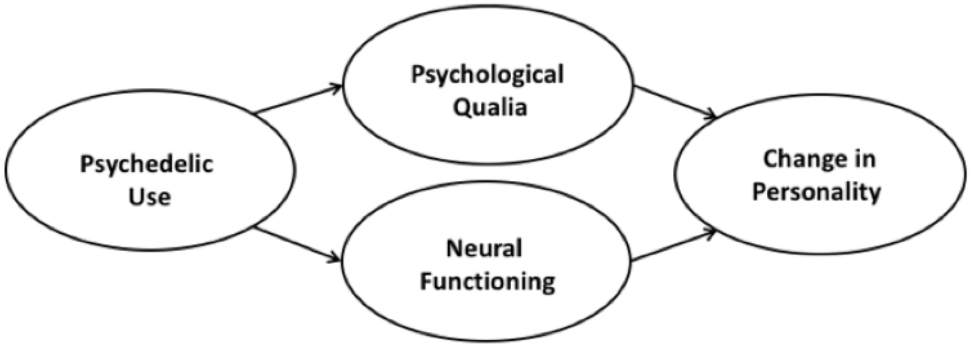

Figure 1. Reduced Conceptual Model for Psychedelic-induced Personality Change Process

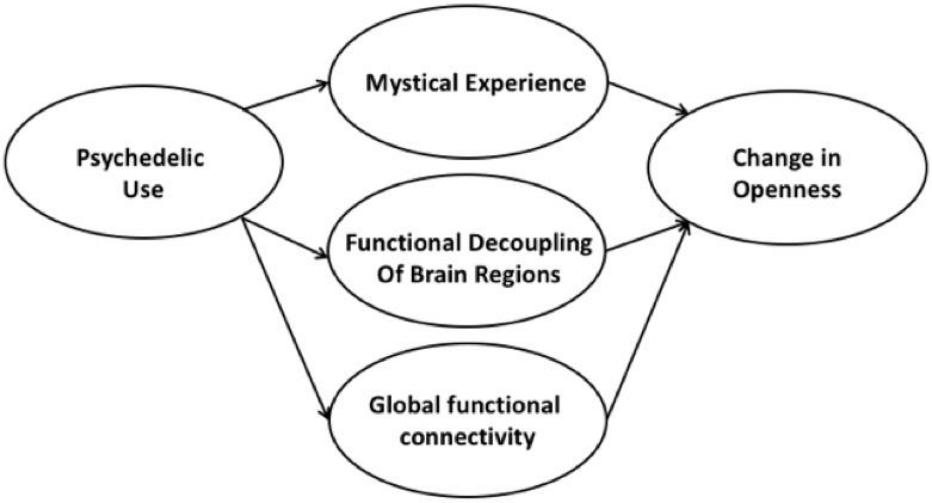

Figure 2. Conceptual Model for Psychedelic-induced Change in Openness with some empirical support (Erritzoe et al., 2018; Lebedev et al., 2016; MacLean et al., 2011)

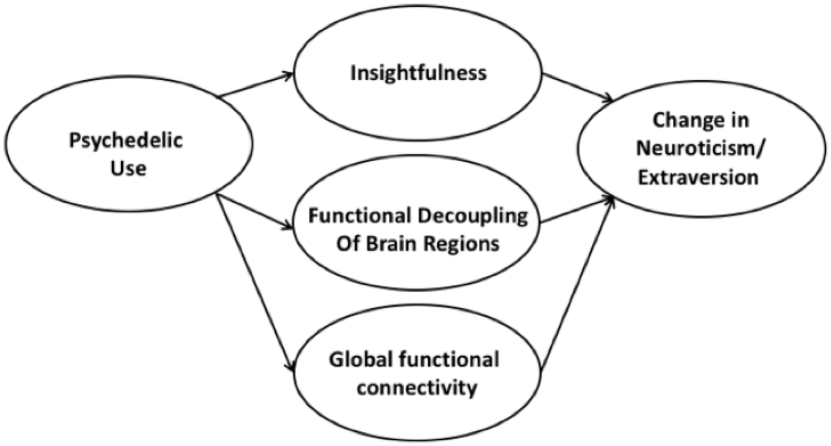

Figure 3. Conceptual Model for Psychedelic-induced Change in Neuroticism and Extraversion with some empirical support from a clinical sample (Erritzoe et al., 2018)

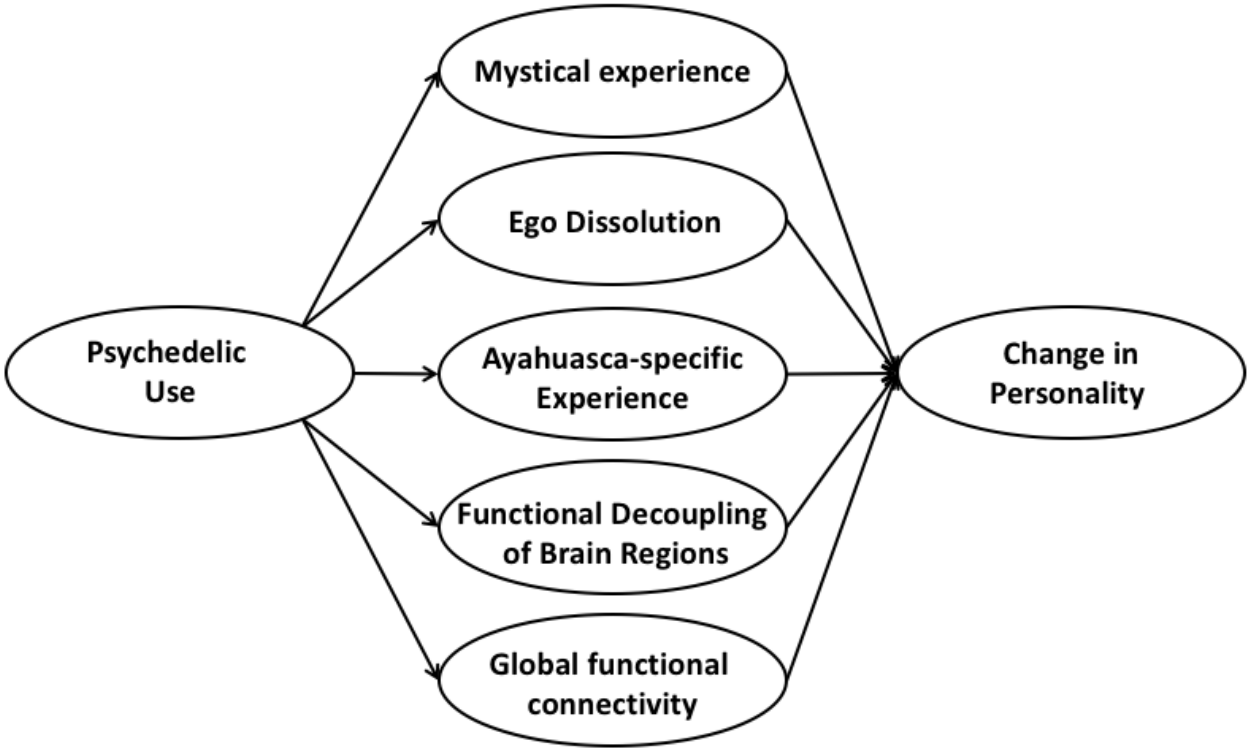

Figure 4. Conceptual Model for Ayahuasca-induced Change in Personality

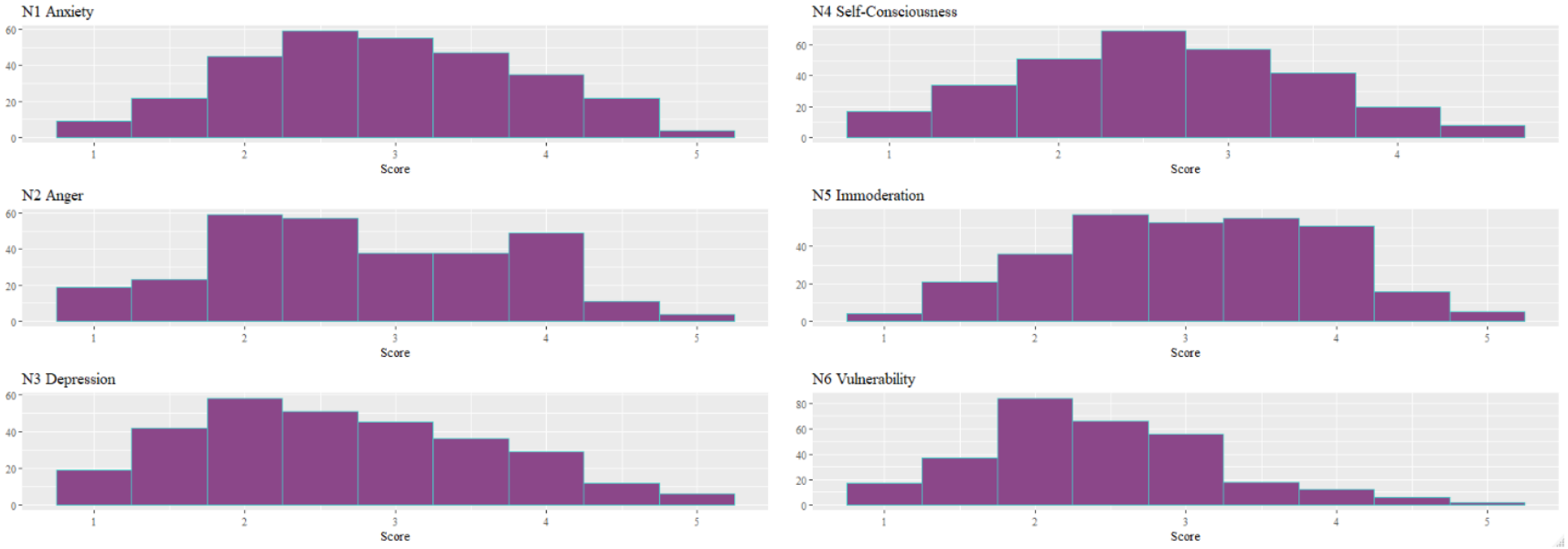

Figure 5. Baseline Neuroticism Histograms – Self-Report

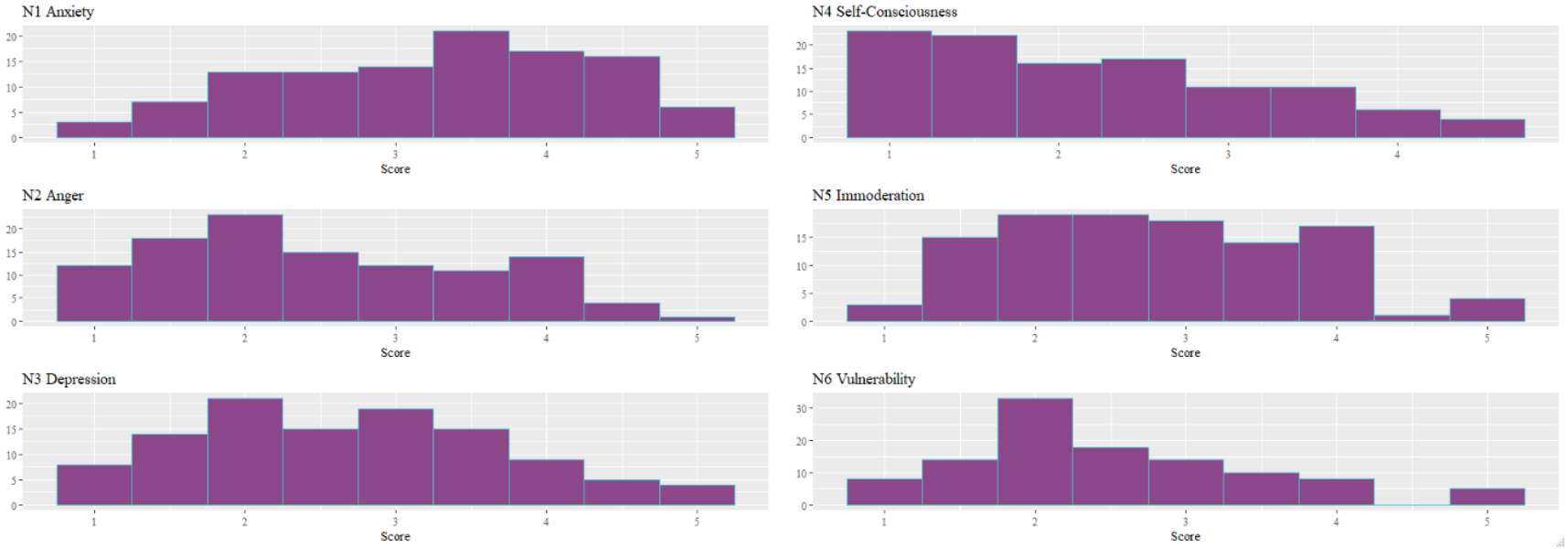

Figure 6. Baseline Neuroticism Histograms – Informant-Report

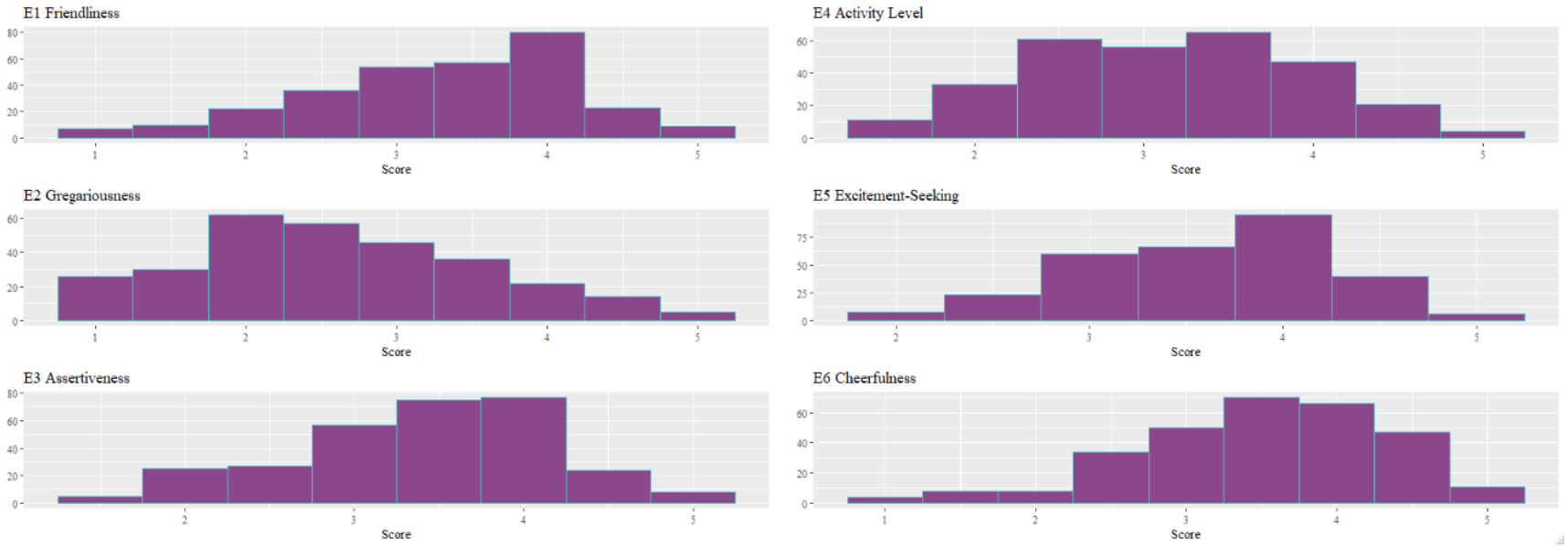

Figure 7. Baseline Extraversion Histograms – Self-Report

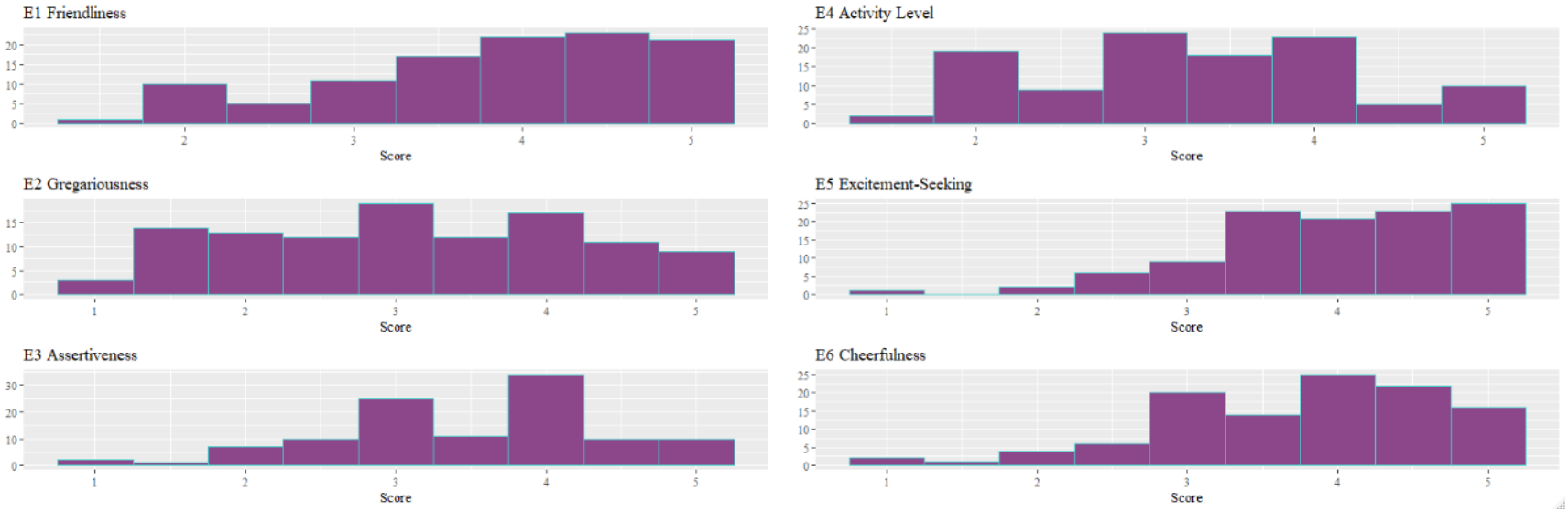

Figure 8. Baseline Extraversion Histograms – Informant-Report

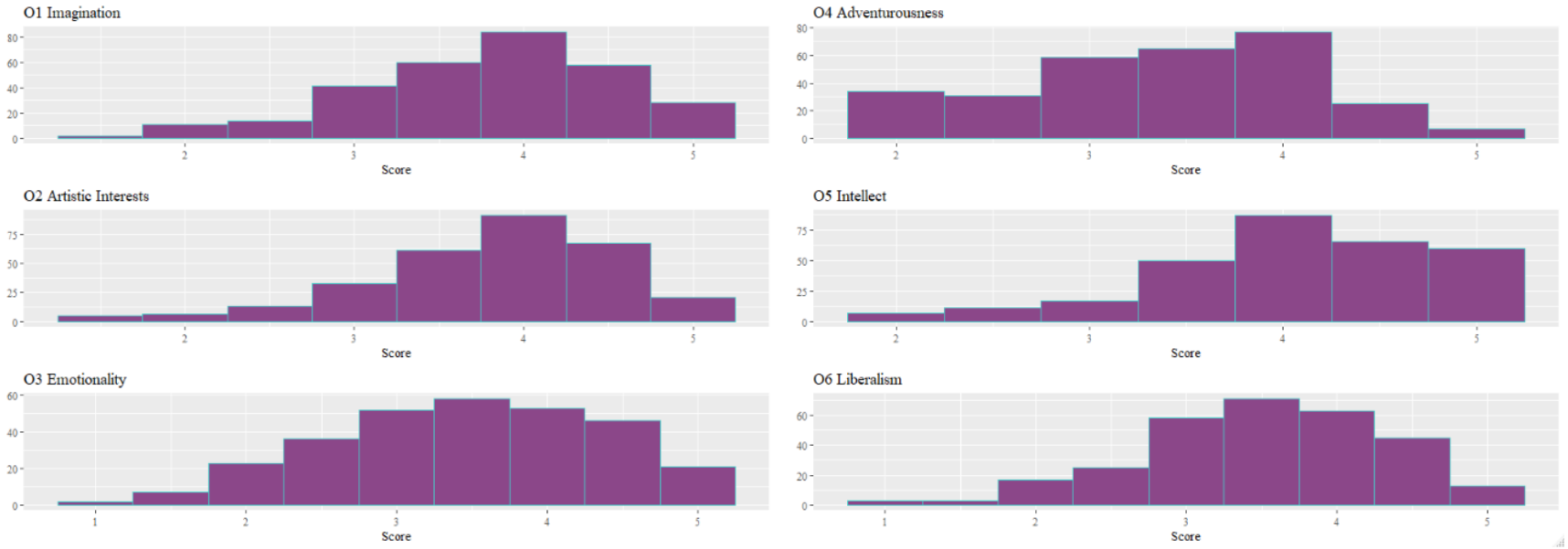

Figure 9. Baseline Openness Histograms – Self-Report

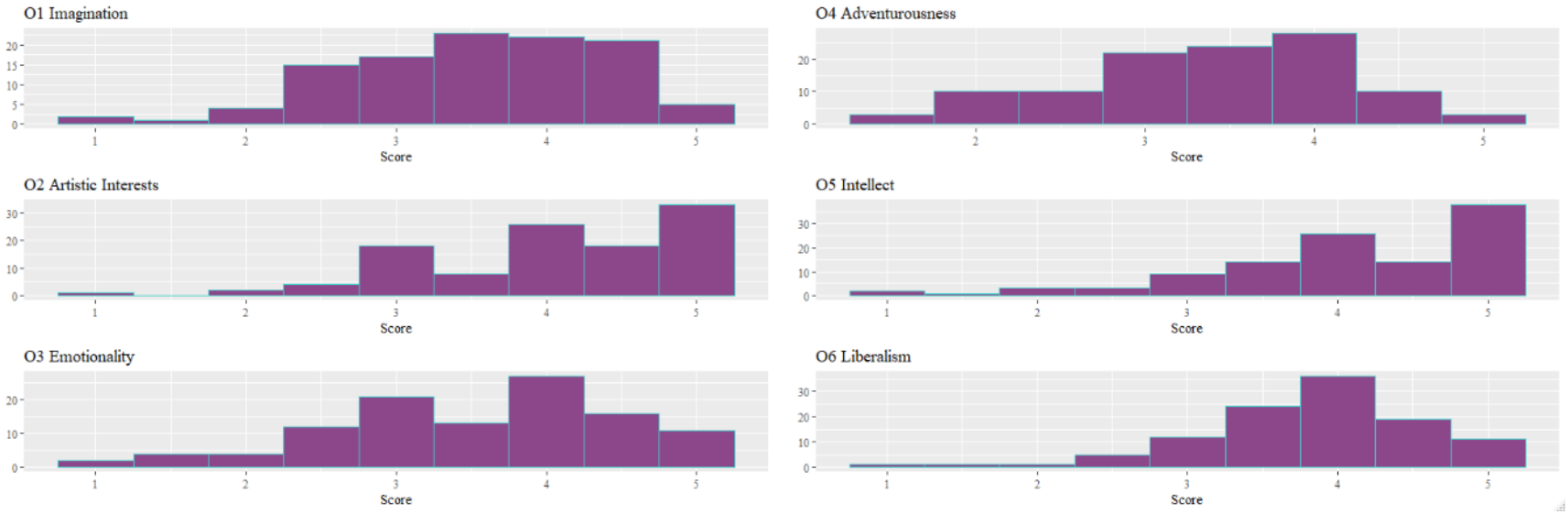

Figure 10. Baseline Openness Histograms – Informant-Report

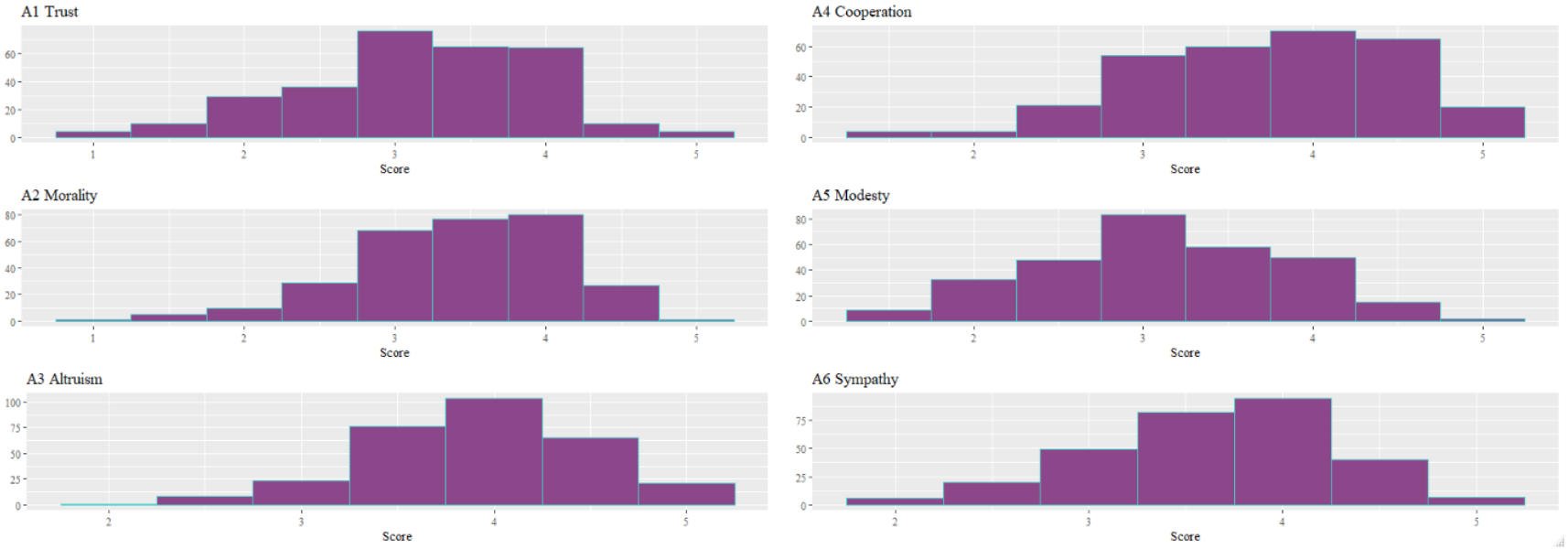

Figure 11. Baseline Agreeableness Histograms – Self-Report

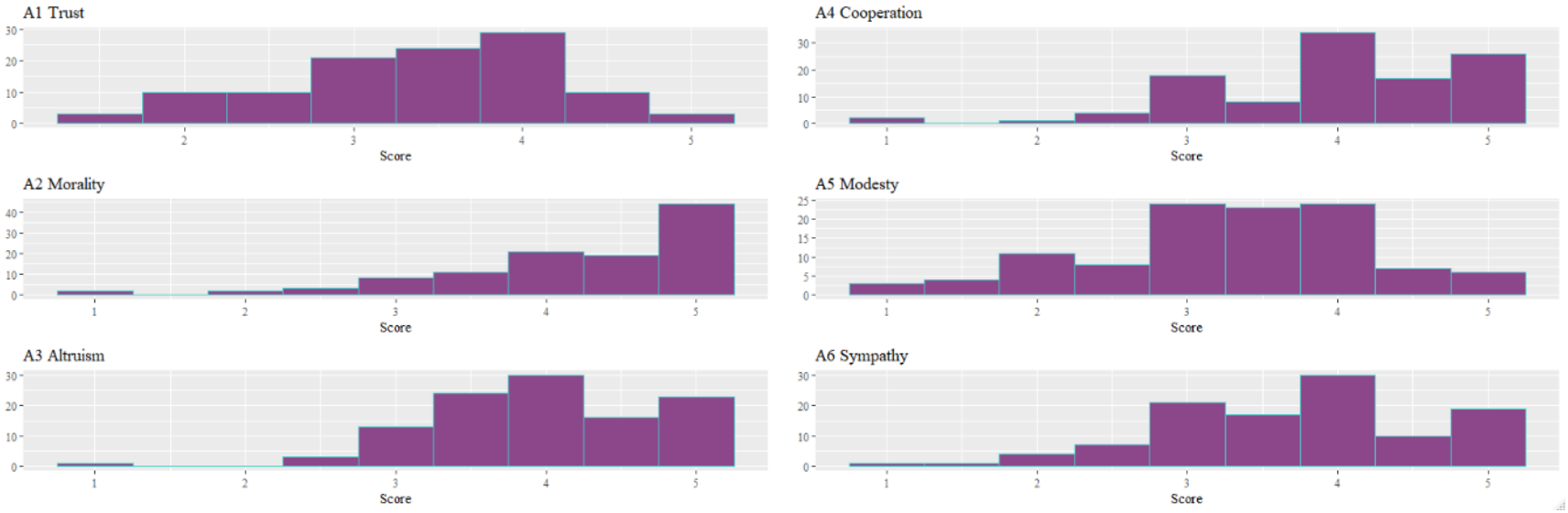

Figure 12. Baseline Agreeableness Histograms – Informant-Report

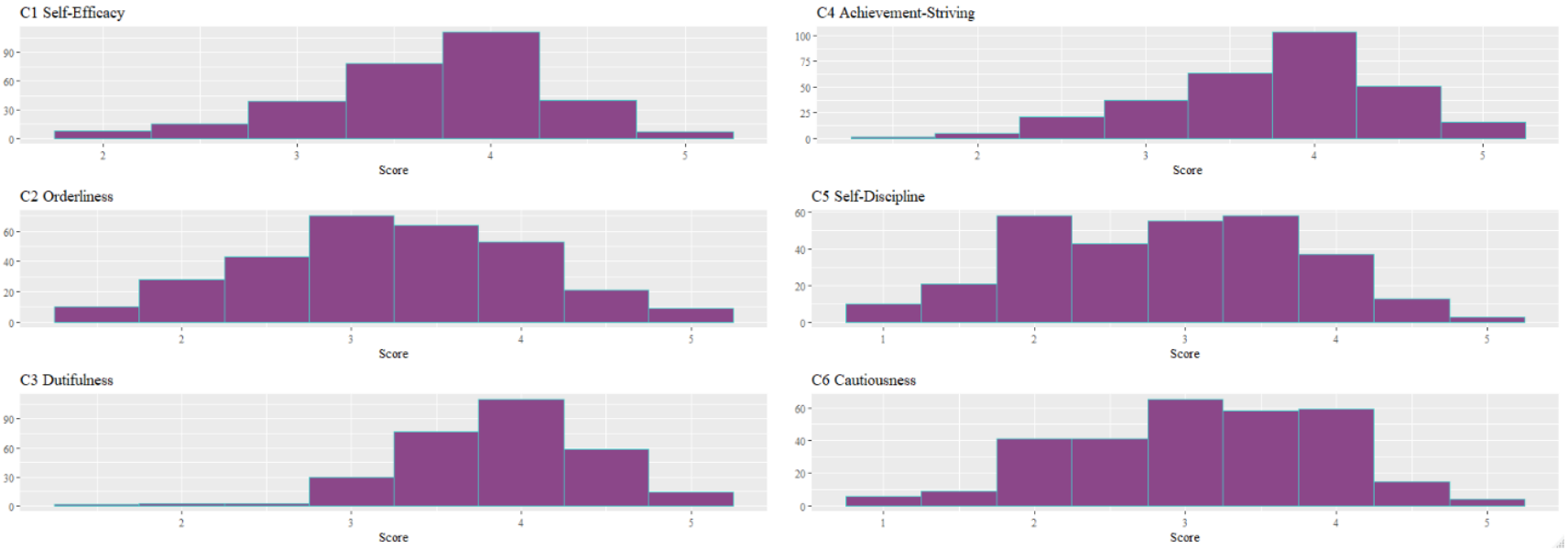

Figure 13. Baseline Conscientiousness Histograms – Self-Report

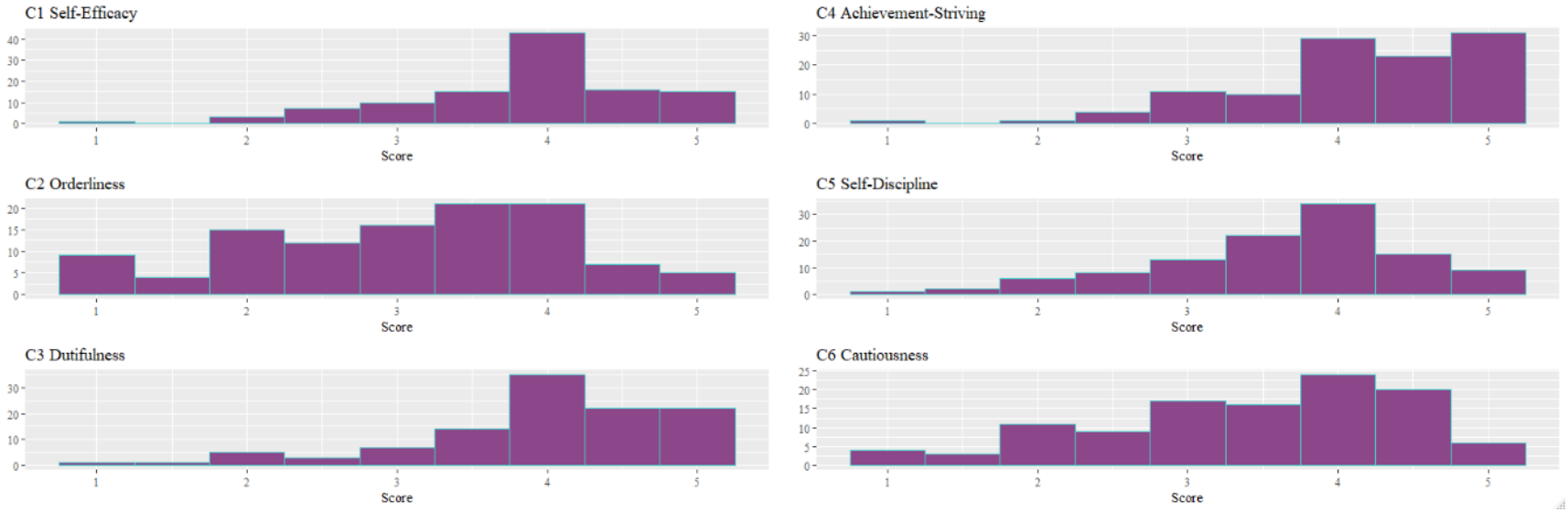

Figure 14. Conscientiousness Histograms – Informant-Report

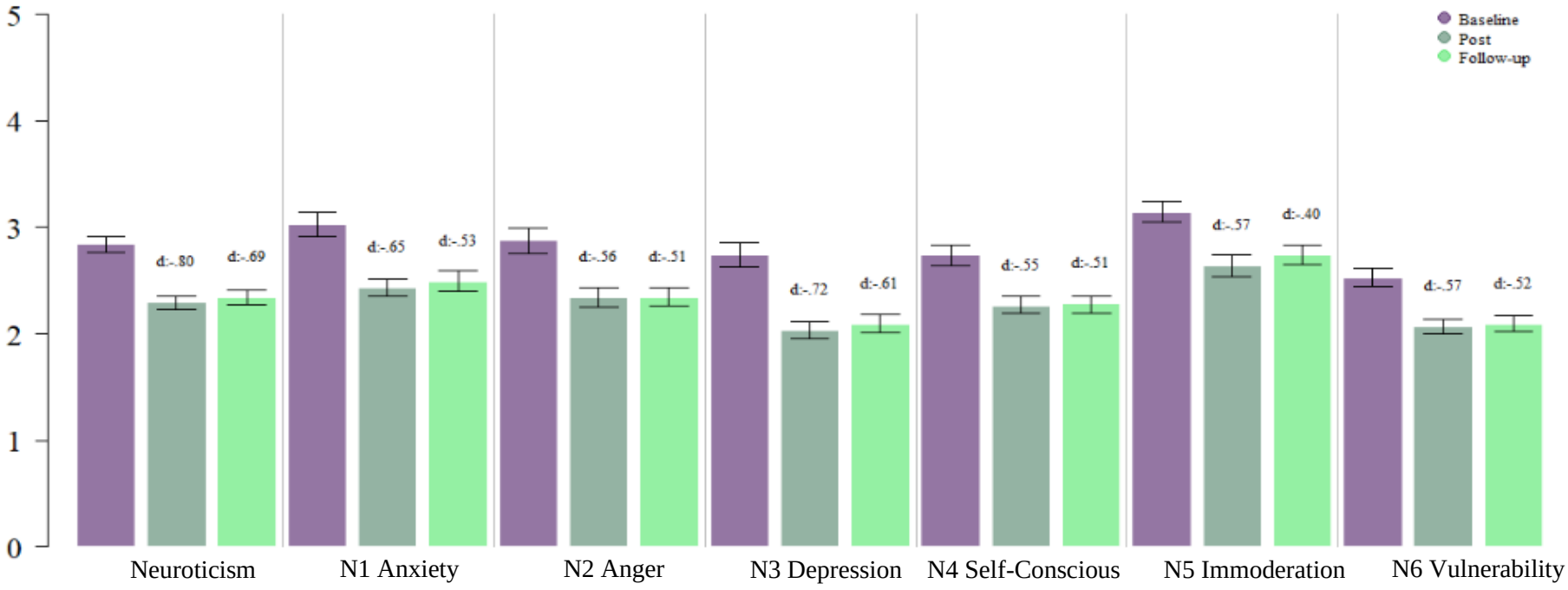

Figure 15. Change in Neuroticism – Self-report

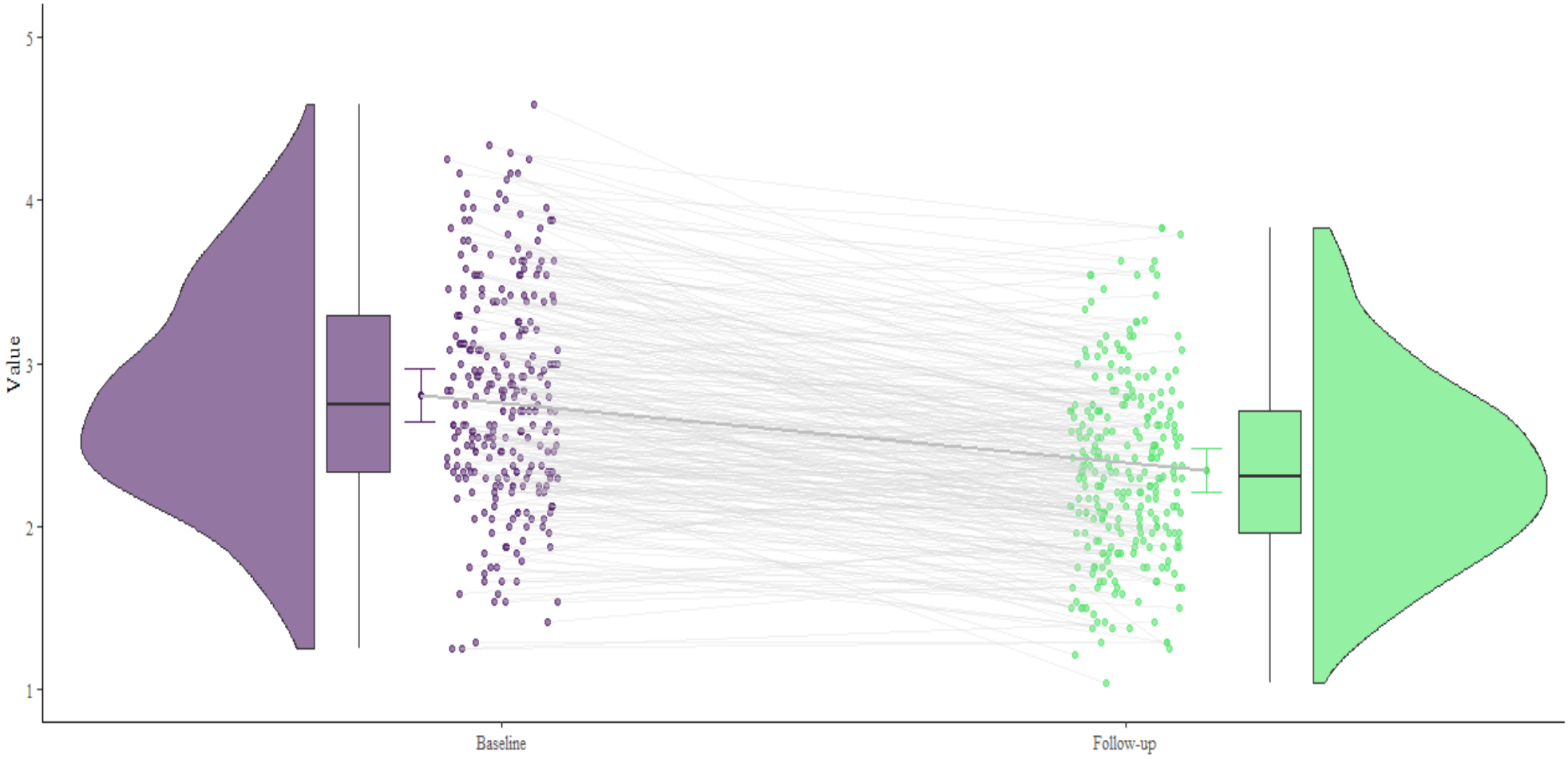

Figure 16. Change in Neuroticism – Box and Violin plots (van Langen, 2020)

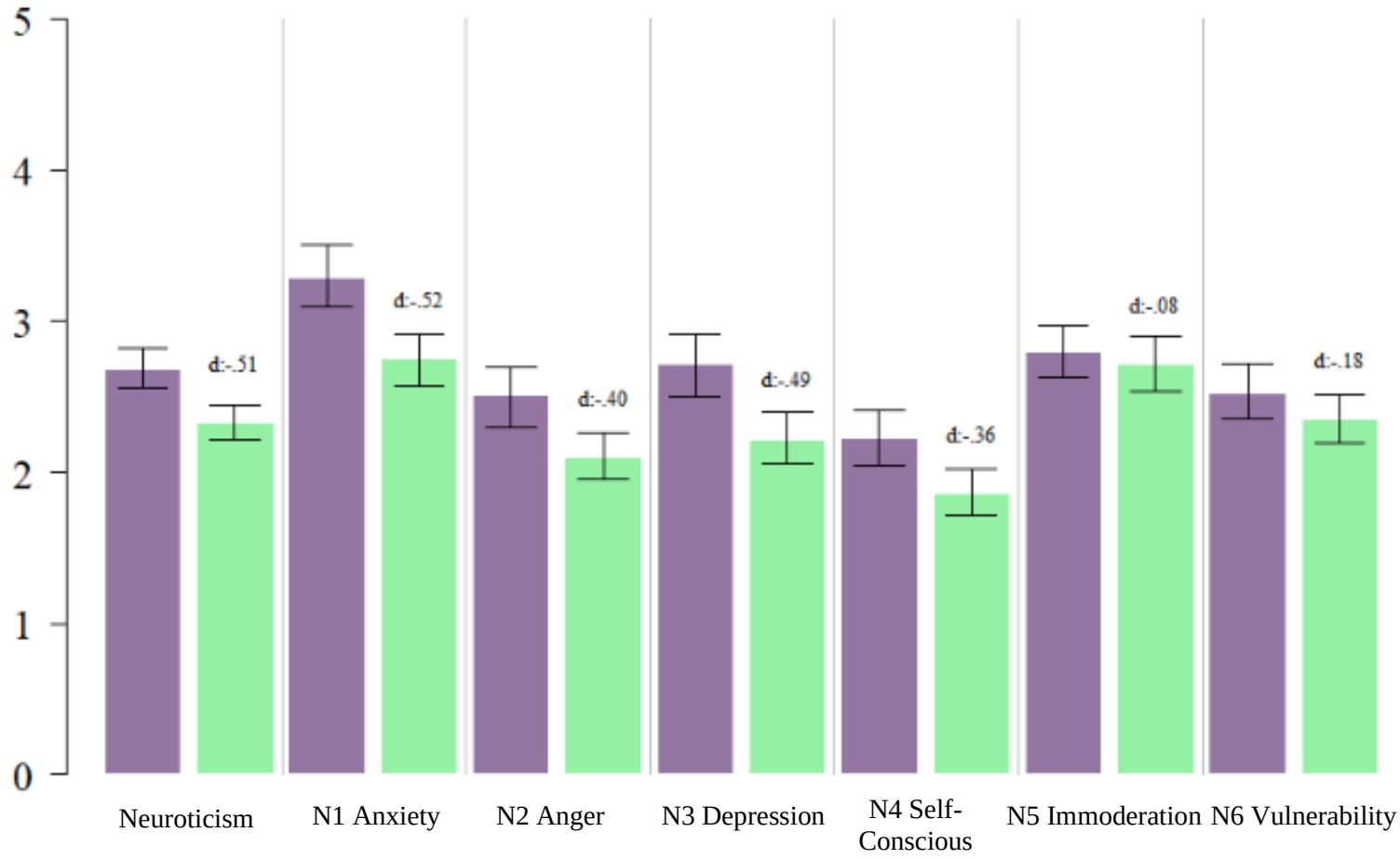

Figure 17. Change in Neuroticism – Informant-report

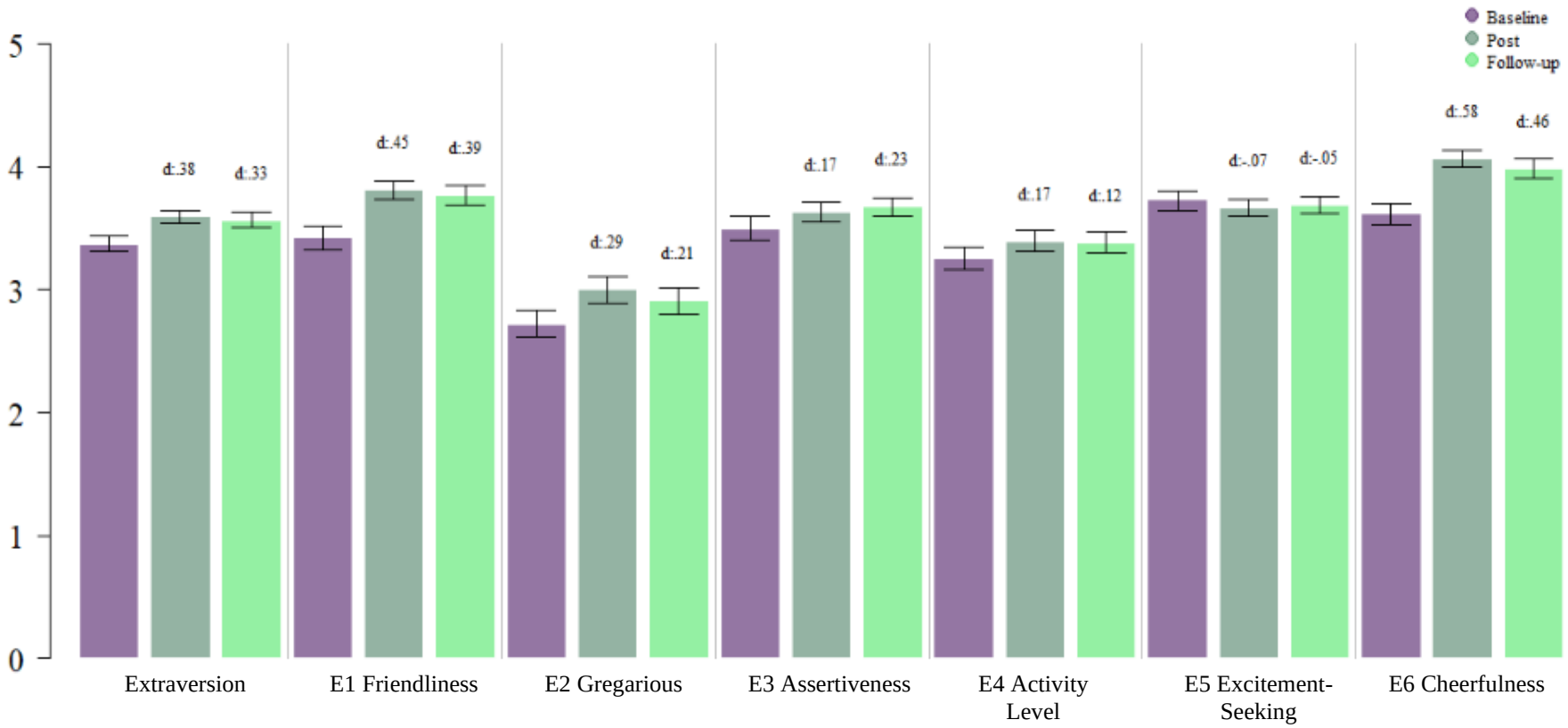

Figure 18. Change in Extraversion – Self-report

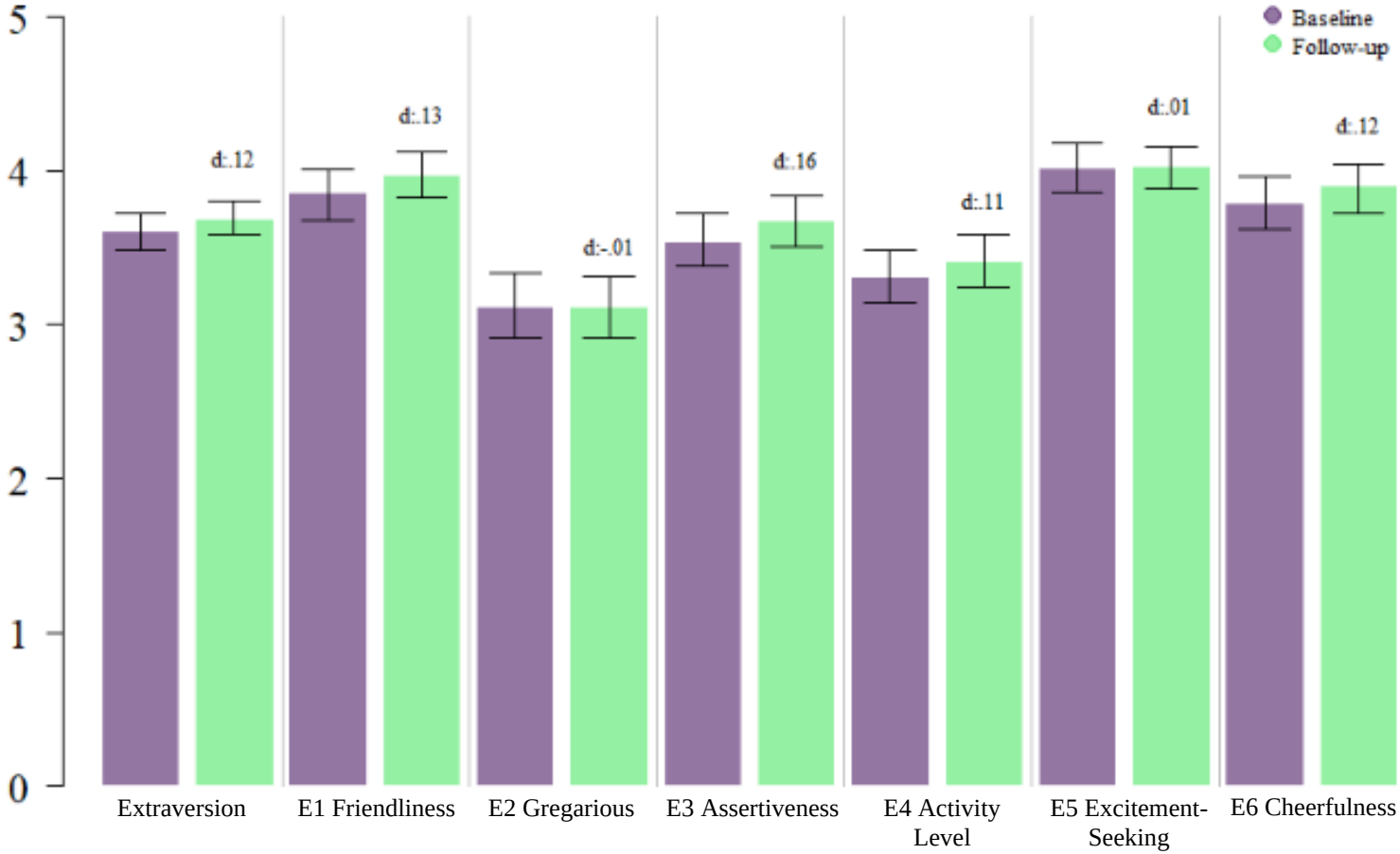

Figure 19. Change in Extraversion – Informant-report

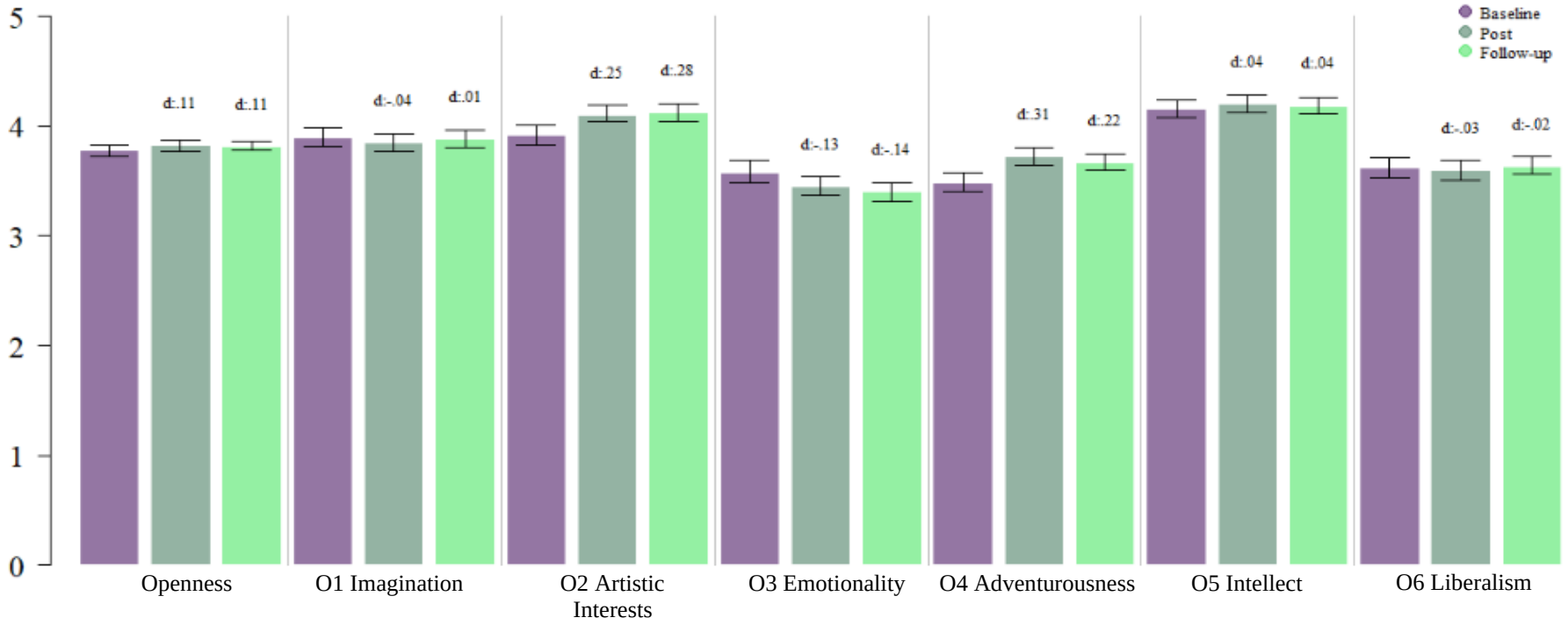

Figure 20. Change in Openness – Self-report

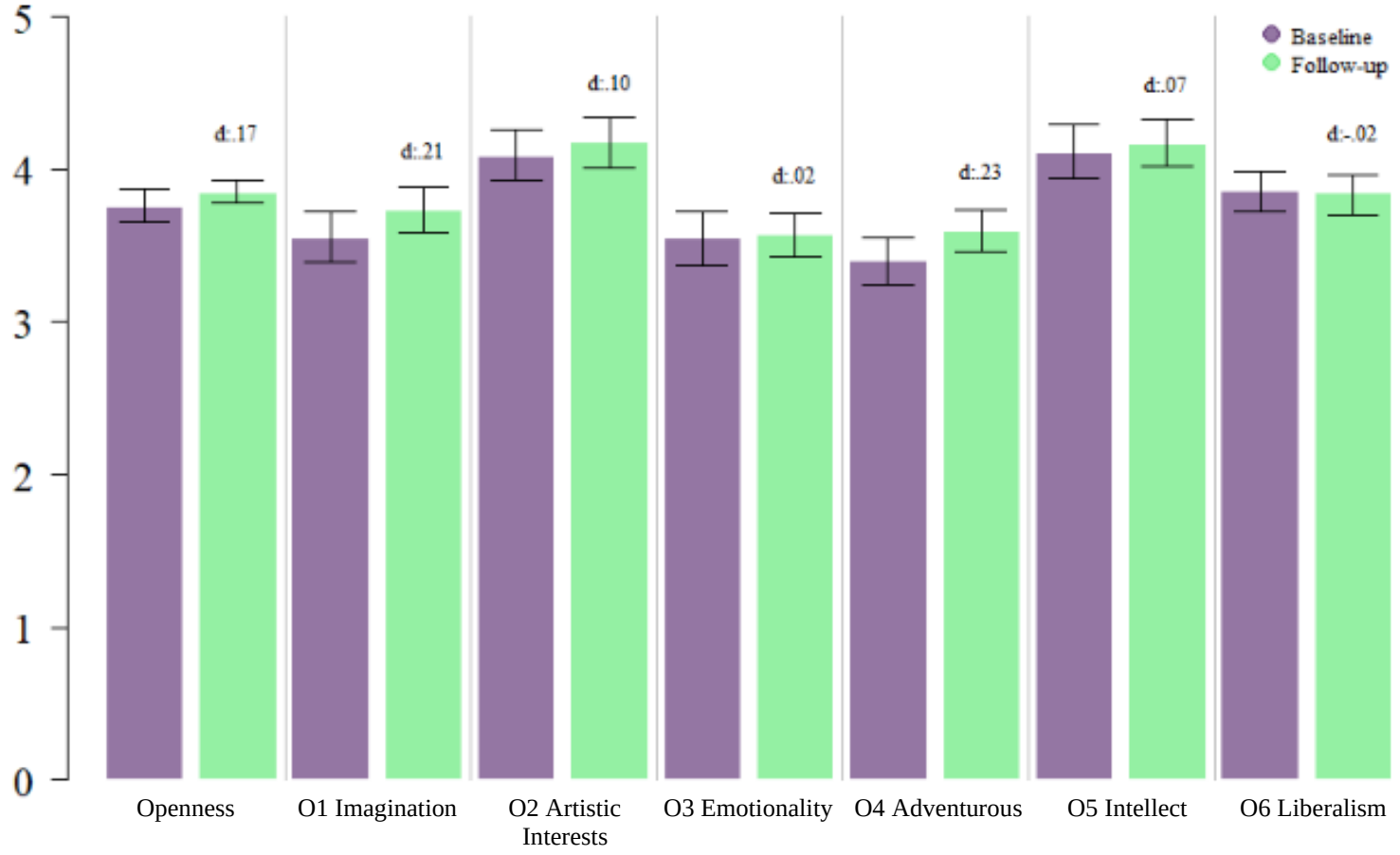

Figure 21. Change in Openness – Informant-report

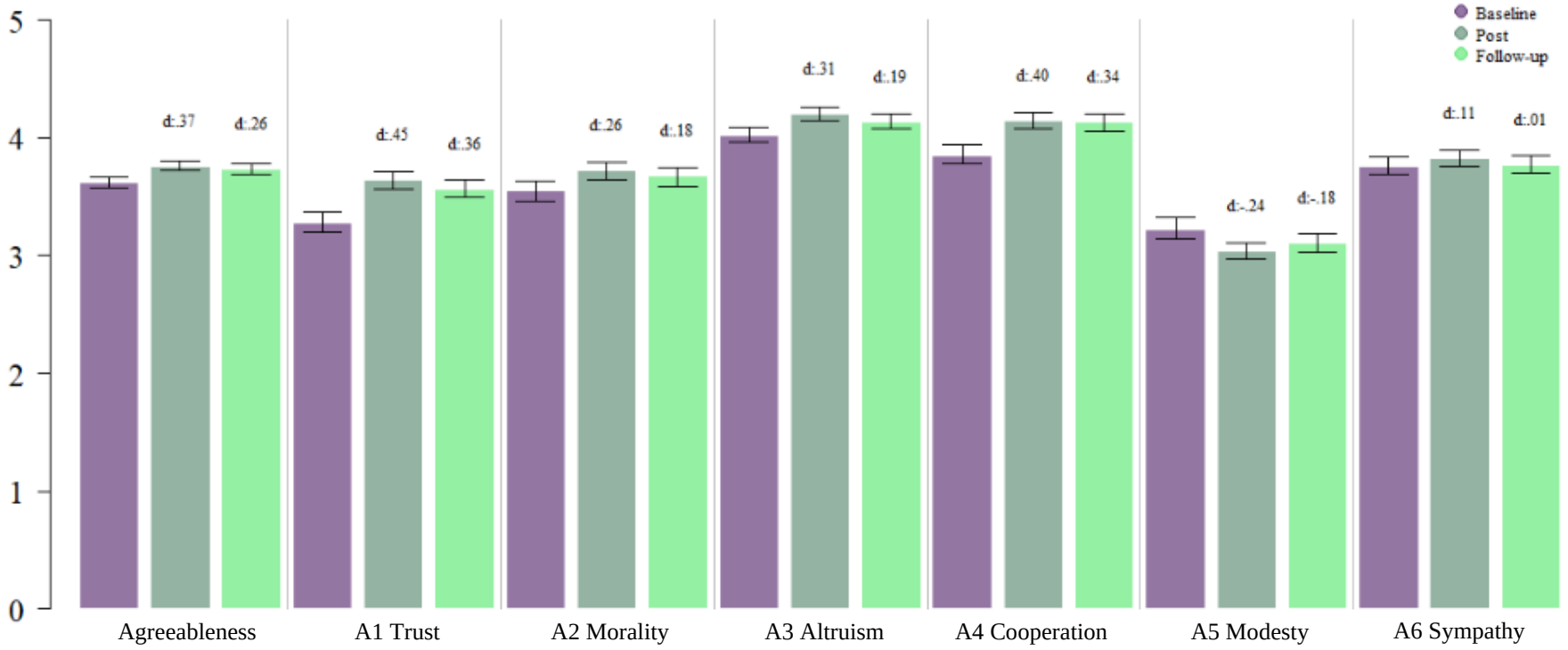

Figure 22. Change in Agreeableness – Self-report

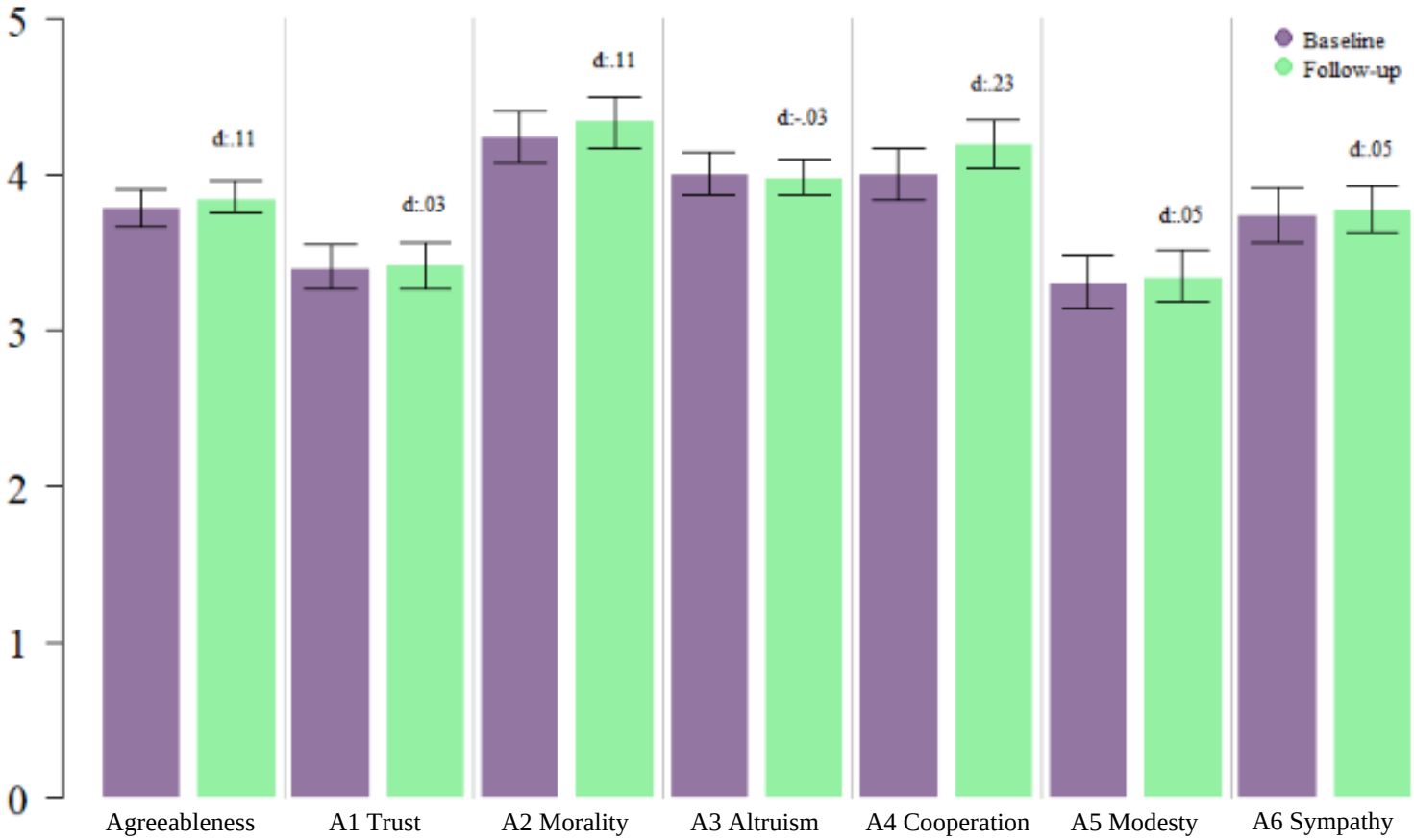

Figure 23. Change in Agreeableness – Informant-report

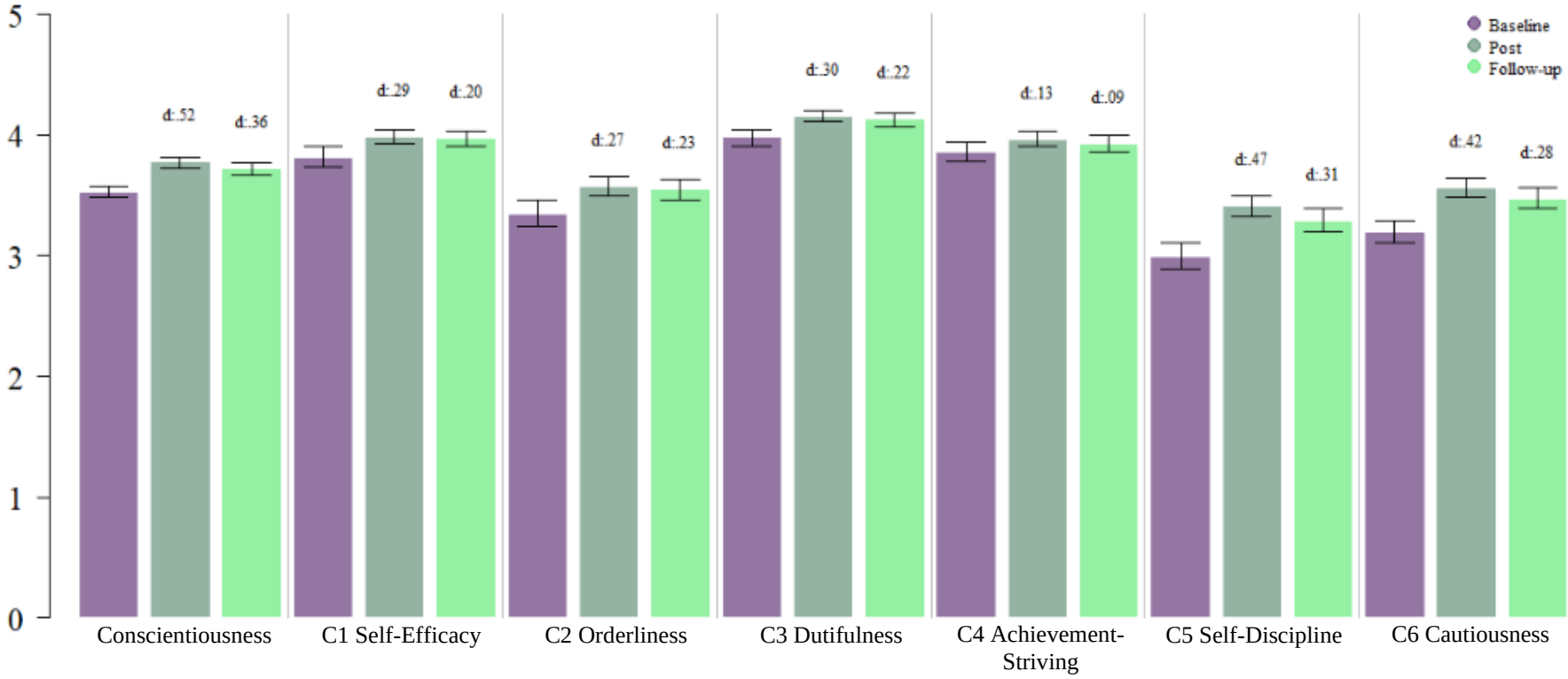

Figure 24. Change in Conscientiousness – Self-report

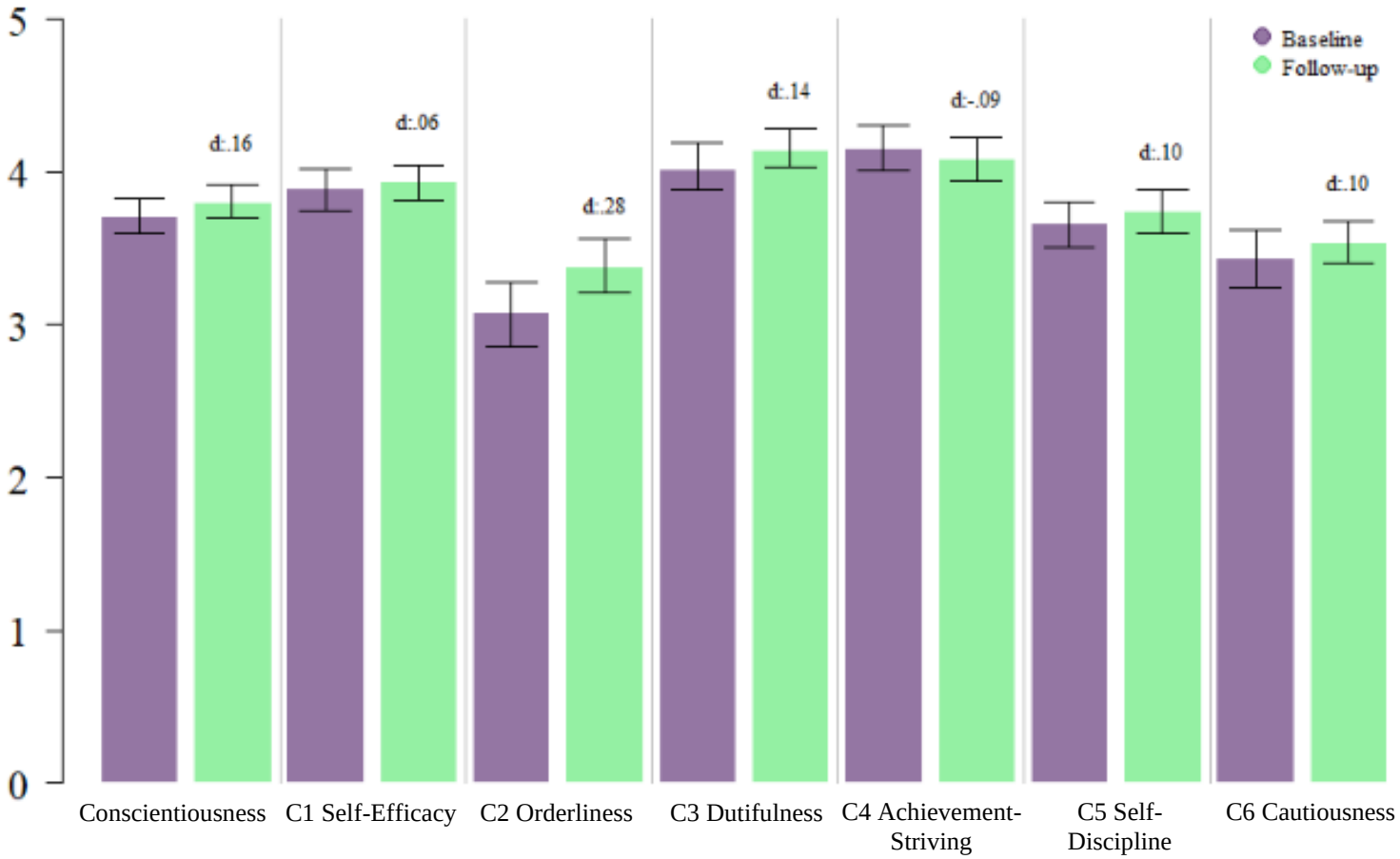

Figure 25. Change in Conscientiousness – Informant-report

CHAPTER 4

DISCUSSION

The present study prospectively explored the ceremonial use of ayahuasca as a potential driver of change in personality. Three main questions were examined: (a) Does the ceremonial use of ayahuasca occasion changes in self- and informant-reported personality as operationalized by the FFM?; (b) Are there factors that predispose change in personality?; and (c) Are there experiential factors during the acute effects of ayahuasca that lead to change in personality? Using a relatively well-powered sample and moderation-based analyses, the study aimed to build upon previous work by identifying important factors that may potentiate adaptive personality changes. Such factors also hold implications for explaining the substantial variability across previous research findings with respect to main effects on personality. Given the inability to implement a control condition with placebo, I implemented a series of methodological safeguards to reduce placebo, expectancy, and demand threats. First, participant were excluded who showed a higher risk of inaccurately endorsing personality change and/or over-endorsing experiential phenomena in ceremony. Second, in view of significant placebo and expectancy effects on clinical outcomes (e.g., Lambert & Barley, 2001; Price, Finniss, & Benedetti, 2008) and demonstrated placebo effects on the very presence of psychedelic states (Olson, Suissa-Rocheleau, Lifshitz, Raz, & Veissiere, 2020), trait suggestibility and expectancies of favorable change were measured and controlled when examining personality change. Third, because placebo effects are likely to decline following retreat experience, personality was measured three months following retreat. Finally, corroborating informant-report data was measured.

Does ceremonial use of ayahuasca occasion changes in personality?

One of the major aims of the study was to test the hypotheses that FFM Extraversion, Openness, and Neuroticism change in relation to the ceremonial use of ayahuasca. Only one of these hypotheses garnered adequate support to guide conclusions. Specifically, FFM Neuroticism was observed to decline .80 standard deviations between pre-retreat measurement and the week following the retreat, and remain approximately .70 standard deviations below pre-retreat scores three months following ceremonial use of ayahuasca. These results were consistent with a number of previous findings including effects of ayahuasca on worry, self-directedness, and major depression (Barbosa et al., 2009; Fernandez et al., 2013; Palhano-Fontes et al., 2019; Sanches et al., 2016), and effects of psilocybin-assisted therapy on major depression and Neuroticism (Carhart-Harris et al., 2018; Erritzoe et al., 2018).

Although no placebo-control group was present to adequately evaluate the influence of validity threats, this effect on Neuroticism was unique among observed personality domains in remaining statistically significant among participants who were less susceptible to placebo and expectancy biases (i.e., lower in suggestibility) and participants who denied an expectancy of enhanced emotional stability post-retreat. Notably, the decline was also reflected in both self- and informant-reports of personality, with informant-report data showing a .50 standard deviation decline in Neuroticism between baseline measurement and three months following the retreat.

Evidence of informant-reported change in Neuroticism was particularly significant for two main reasons. First, the influence of placebo, expectancy, and demand effects are likely to have been reduced in informant-report data, as informants had not, in most cases, been directly exposed to the sources of these effects, namely engagement with shamans and facilitators,

ceremonial experiences, and descriptions by study personnel about the purpose of the questionnaire. Providing some partial support for this was the absence of support for change in most domains (e.g., Extraversion) within informant-report data, despite a high frequency of expectancies related to favorable change in these domains as well. Second, self-report data shows evidence of being more accurate than informant-report data in describing Neuroticism (Vazire, 2010) so it is notable that effects found in informant-data were large enough to be detectable. Given the importance of informant-report data, it is worth highlighting the four Neuroticism facets that showed significant declines across both self- and informant-data, namely Anxiety, Anger, Depression, and Self-Consciousness.

Judging the magnitude of the effect on Neuroticism may be best supported through comparison to meta-analyzed effects of clinical psychotherapeutic and pharmacological interventions on self-reported FFM Neuroticism. In a large meta-analysis (k = 199; N = ~20,000), Roberts and colleagues (2017) estimated a .57 average pre-post effect size (*d*) decline in self-report Neuroticism following clinical intervention. This effect size was enhanced among a subset of studies that examined change at 6 month follow-up (*d* = -.81; k = ~77), as well as among the subset of studies that administered a specifically cognitive-behavioral intervention (*d* = -.73; k = ~65). Pertinent to the present examination, the authors observed that interventions lasting less than four weeks tended to have small effects. By comparison, the results of the present study were quite favorable. Self-reported change in Neuroticism following an average of 1.4 weeks at the retreat center and 4.4 ayahuasca ceremonies was associated with an effect comparable to the average effect of many weeks of clinical intervention. The present results were also consistent with previous findings for psychedelic-assisted therapy including Erritzoe and colleagues' observation of a medium-sized reduction in Neuroticism at three months follow-up

(*d* = -.57). More broadly, the present results are suggestive that the ceremonial use of ayahuasca parallels the effects of psilocybin-assisted therapy and may be associated with a superior effect size change, especially among individuals with higher baseline Neuroticism scores.

Other hypotheses. Robust support for hypotheses predicting change in Extraversion and Openness was not found. With respect to Extraversion, informant-report data was particularly weighted in the evaluation in view of evidence indicating that informant-report data may be more accurate than self-report data in describing Extraversion on the basis of more observable associated behaviors (Vazire, 2010). For informant-report data, effect size changes in Extraversion were nonsignificant and of very small magnitude. Although this study was not sufficiently powered to detect effects in informant-report Extraversion data below approximately *d* = .20, it is questionable as to whether even significant effects below this threshold of magnitude would be regarded as a meaningful change. With respect to Openness, hypotheses obtained even less support, with only two facets in self-report data showing evidence of change. Given the clearly elevated levels of mean Baseline Openness in the present sample (mean = 3.78) relative to normative samples, the possibility of a ceiling effect limiting upward change in Openness cannot be ruled out.

Null effects. Because the present study was favorably powered to detect small effects in personality change, it was well disposed to uncover personality domains that may be unlikely to change in relation to ayahuasca ceremony. Indeed, given that placebo and expectancy effects may be particularly strong in a naturalistic study of this kind, the absence of personality changes despite these biasing effects could be quite telling. Results from power analyses suggested that this study was well-powered to detect a very small effect size (*d* = .15) change in self-report personality for Baseline/Post and Baseline/Follow-up. Null long-term personality change effects

between Baseline and Follow-up consisted of Extraversion facets including Gregariousness, Assertiveness, Activity Level, and Excitement-Seeking, Agreeableness facets including Morality, Altruism, Modesty, and Sympathy, and Conscientiousness facets including Self-Efficacy, Orderliness, and Achievement-Striving. Baseline scores on each of these variables was either comparable to or lower than normative undergraduate and community samples, suggesting a low probability of a ceiling effect as a competing explanation for null results. Of note, effects on the Openness domain and many of its facets were similarly null, but these were excluded from discussion due to the higher possibility that null effects emanated from restriction of range in Baseline Openness scores within this population.

Future replication. A number of effects outside of Neuroticism were supported by self-report data, but did not find support in informant-report data and did not survive evaluations of validity effects (e.g., expectancy). In view of less favorably powered informant-report analyses in the present study, and the possibility that certain facets may undergo change even if domains do not, replication efforts remain important. In particular, it is the author's view that Openness facet Adventurousness (d = .23, informant-report), Agreeableness facet Cooperation (d = .23, informant-report) and Conscientiousness facet Orderliness (d = .28, informant-report) warrant attention in future replication efforts.

Are there any factors that predispose individuals to change in personality?

As psychedelic-assisted therapies gain greater acceptance as practical tools for clinical treatment, one major question is whether any individual difference factors predispose positive or negative outcomes. The present study examined three main sets of predisposing factors: demographic characteristics, history of psychedelic use, and baseline personality. Three main findings were notable. First, the most important finding was that Baseline FFM personality

emerged as a strong moderator of adaptive changes in personality across domains. Specifically, higher levels of Neuroticism and lower levels of Extraversion, Openness, Agreeableness, and Conscientiousness seemed to predispose participants to larger adaptive changes. Participants in the higher 50th quantile of Baseline Neuroticism and lower 50th quantile of Baseline Extraversion, Openness, Agreeableness, and Conscientiousness exhibited self-reported changes of d = -1.73, .99, .51, .80, and .70 between Baseline and Follow-up in these domains, respectively, and these effect sizes were amplified at the 75th quantile (for Neuroticism) and 25th quantile (for other domains). Analyses were also conducted to examine whether a regression to the mean effect could better explain these results. Specifically, because extreme scores are particularly vulnerable to regression, analyses were rerun while excluding participants above the 20th quantile of Baseline Neuroticism and below the 20th quantile of the other domains. Notably, evidence of moderation by baseline personality was still evident with the possible exception of Openness (i.e., revised results matching 50th quantile d values above: d = -2.84, .67, .23, .40, .43). There are a number of implications of this overall finding. First, the psychedelic-induced personality effects are likely to depend strongly on an individual's initial standing on personality. Second, because the results of research studies are similarly likely to depend on the mean level and variance of personality contained in their samples, baseline personality may account for variability in extant personality change-related findings, and notably explain why Erritzoe and colleagues' (2018) sample containing individuals with higher levels of Neuroticism (i.e., treatment-resistant depression) showed change in Neuroticism whereas other studies have not. It may be important for researchers to be deliberate in selecting samples conducive to detecting change. The second major finding was that with a few exceptions, demographic characteristics tended not to be a strong influence on the magnitude of personality change. Third, although

lifetime use of ayahuasca and psychedelics were not generally strong predictors of personality change, it was notable that participants without any psychedelic experience underwent more adaptive change in Neuroticism than participants with previous psychedelic experience. As such, having no previous experience with psychedelics and with the healing properties of psychedelic compounds may predispose individuals to greater potential for benefit.

Are there any experiential factors during the acute effects of ayahuasca that lead to change in personality?

Unlike most pharmacological interventions, psychedelic administration accompanies altered states of consciousness whose quality seems to influence subsequent changes in personality (e.g., Insightfulness [Erritzoe et al., 2018]; Mystical-type experience [MacLean et al., 2011]). Identifying and promoting these experiential factors may be a particularly powerful means of effecting positive outcomes. The present study examined four sets of experiential factors: acute experience elements, ceremony characteristics, and perceptions of ceremony, and purgative experiences. Three main findings were notable. First, the dosage of ayahuasca ceremony experiences, measured by ceremony frequency, approximate dosage of ayahuasca drink, and retreat length were generally not associated with long-term changes in personality. This suggests that whatever factors are instrumental in producing longer-term change may be sufficiently present within a one week stay and four ceremonies. Second, consistent with previous literature (e.g., Erritzoe et al., 2018; Lebedev et al., 2016; MacLean et al., 2011) and my moderation-based hypothesis, mystical-type and ego dissolution experiences were associated with larger changes in personality across all personality domains, including Openness. Notably, RMEQ Timespace showed the least consistent association with personality change, suggesting that this realm of acute experience may be least relevant to personality change processes.

Further, strong empirical overlap between RMEQ Mystical, RMEQ Positive Mood, and AEI Clarity ($rs \geq .80$) and largely convergent effects on personality change outcomes are suggestive that these may be largely interchangeable constructs that broadly capture the core of mystical experience. Consistent with previous theoretical and empirical work (e.g., Barrett et al., 2015; Stace, 1960), this core reflects a sense of oneness with the world (unitive consciousness), feelings of profound joy and peace, and a sense of sacredness. Data from the AEI Clarity construct further delineate facets of this core, involving strong feelings of centeredness and clarity, as well as, most notably, self-acceptance, -love, and -trust. It is intriguing that unitive consciousness covaries so strongly with ostensibly disparate states of positive affect, and self-value within psychedelic experience, and yet, this covarying core appears fairly coherently instantiated across a number of spiritual and psychological traditions (e.g., Hinduism's *Atman* [true-self]; Stace's (1960) components of spiritual experience; Freud's (1930) "oceanic state" and "bond with the universe;" Jung's (1982) "revelatory" states in the unconscious; Maslow's (1964) peak-experience).

Third, AEI Reappraisal, a construct reflecting introspective reappraising of difficult life experiences and negative core beliefs during ayahuasca ceremony, emerged as the strongest experiential moderator of change in Neuroticism (e.g., participants above the 50^{th} quantile exhibited $d = -1.02$). Although AEI Reappraisal encompasses a wide range of thoughts and attitudes, the construct is notable in resembling core elements of psychotherapy. Items reflect a process of testing the accuracy of existing beliefs (as in the cognitive approach; Hollon & Beck, 2013), deriving new meaning from past traumas (as in cognitive processing therapy; Resick, Monson, & Chard, 2017), confronting fears and enacting courage (as in the behavioral approach; Hollon & Beck, 2013), meta-cognition on otherwise unconscious patterns of thinking, feeling,

and behaving (as in the psychodynamic approach; Barber, Muran, McCarthy, & Keefe, 2013), and employing psychological flexibility and orienting toward values, meaning, and growth (as in acceptance-commitment and humanistic approaches; Elliott, Greenberg, Watson, Timulak, & Friere, 2013; Hayes, Strosahl, & Wilson, 2011; Luoma, Sabucedo, Eriksson, Gates, & Pilecki, 2019). It will be important for future research to examine the degree to which mechanisms of change within ayahuasca ceremony and psychedelic experiences, more broadly, naturally facilitate adaptive processes that converge with those of western psychotherapy.

Fourth, the presence of support for the influence of ceremonial and purgative elements (e.g., trusting the shaman, viewing what another group member purged, finding the icaro prayer healing) raises questions about the unique value of a shamanic context for personality change. Possible explanations for the effects of shamanic elements include (a) a larger "dose" of authentically medicinal elements emanating from the icaro, in line with Shipibo theory; (b) a heightened mystical state of consciousness that merely covaries with favorable attitudes toward shamanic elements; and/or (c) a higher susceptibility to placebo on the part of participants with favorable attitudes toward shamanic elements. Of note, the first and second explanations were supported by a moderate-to-strong correlation between favorable attitudes and mystical-type experience, whereas the third explanation failed to find support in additional analyses examining relations between favorable attitudes and suggestibility/expectancies (rs < .20). Further, it has long been considered whether the purgative elements unique to ayahuasca ceremony produce an additive therapeutic effect. Results indicated that discomfort associated with purging was not well associated with outcomes, whereas experiencing the purgative act as (a) an opportunity to expel a negative part of oneself (e.g., addiction), and as (b) satisfying and "complete" were linked to positive outcomes in Neuroticism, Agreeableness, and Conscientiousness. It will be

important for future research to investigate whether these purgative elements are additive in the prediction of long-term change over and above other experiential elements.

What can be learned from Ayahuasca Ceremony?

As the research literature grows, and western healthcare institutions increasingly consider the therapeutic benefits of psychedelic-assisted therapies, it is important to consider what unique attributes of ayahuasca ceremony are conducive to positive outcomes. Results from the present study add to a growing body of work supporting the adaptive effect of ayahuasca on Neuroticism and internalizing symptoms. Whether elements of ayahuasca ceremony hold additive benefit for individuals with higher Neuroticism than individual psilocybin-assisted therapy as practiced in most modern research programs deserves ongoing attention. Contextual behavioral science, for example, is one approach that may be helpful in evaluating the optimal conditions for psychedelic-assisted treatment as it applies a scientific approach to identifying the additive influence of context (i.e., set and setting) on psychedelic experience and subsequent outcomes (Luoma et al., 2019).

The present study shows support for the therapeutic benefit of the shaman, icaro, purgative elements, cognitive reappraisal, sacramental atmosphere, and communal/group context. Parallels between these elements and modern psychedelic-assisted protocols are notable. For example, in therapeutic protocols from Johns Hopkins and Imperial College London, carefully curated music is selected to guide research participants (e.g., Kaelen et al., 2018), and therapists, like shamans, unobtrusively guide the participant while encouraging inward focus (e.g., Johnson, Richards, & Griffiths, 2008). Nevertheless, ayahuasca ceremony may hold implications for the efficacy of additional therapeutic components. First, it may be the case that the live nature of the music, its visceral presence, and its convergence with the guide's (i.e.,

shaman, therapist) other roles produces stronger mystical-type experiences. Second, the large effect observed in the present study may be suggestive of benefit tied to a communal, group-based format of psychedelic-assisted therapy. Indeed, clinical researchers have recently begun reviewing the empirical base for the efficacy of psychedelic-assisted group therapy, and have found qualified evidence of support (Trope et al., 2019). Dominant maintenance factors for post-traumatic stress and internalizing symptoms include negative beliefs about others and the world, psychological avoidance of feared experiences, and failures to connect with supportive and normalizing social influences. Inasmuch as group dynamics during ayahuasca retreat address these beliefs and tendencies through expanding understanding of the world and activating social reward via operant conditioning, therapeutic benefit may follow. Active mechanisms of change within ayahuasca ceremony may also include conditions of vulnerability and adversity that promote empathy, bonding, trust-building, and courage among group members.

The present results also provided some tentative support for the role of shamanic and purgative elements in uniquely shaping adaptive outcomes. For example, sharing the shamanic cosmology could be an independent driver of positive outcomes to the degree that conceptualizing patterns of negative mood or life dissatisfaction as being connected to concrete spirits bolster psychological leverage and self-efficacy. Accordingly, future research will need to examine more critically the degree to which shamanic (e.g., icaro prayer) and purgative elements produce additive effects on positive outcomes over and above the effects of western psychedelic-assisted therapy components. Two ways of evaluating the additive effects of ayahuasca-specific components more rigorously might involve multivariate and dismantling studies. Multivariate analyses can identify components that are unique from others in the prediction of therapeutic efficacy (e.g., do mystical experience and purgative experiences exert unique or overlapping

effects?). A dismantling design would be even more informative for identifying which components meaningfully enhance therapeutic efficacy (e.g., Bell, Markus, & Goodlad, 2013). For example, it will be key for future studies to separate the myriad components of shamanic practice (e.g., group-format, shaman's influence, convergence of music and therapist, live icaro prayer) into different therapeutic conditions. Researchers could then observe the competing effects of conditions containing (a) shaman versus no shaman, (b) live icaro versus recorded icaro, (c) ceremonial use of ayahuasca with versus without gastrointestinal distress/vomiting, and/or (d) group format versus individual format.

Limitations

Despite this study's strengths, notable limitations include the absence of a placebo-control group or blinding protocols. Indeed, the naturalistic approach of the present study precluded the use of a control group, whose absence raises the potential for significant methodological issues including the influence of placebo, expectancy, demand, and Hawthorne effects. For example, it is possible that merely attending a therapeutically designed retreat in a foreign country would in and of itself produce positive changes to personality. The present study attempted to protect against such effects as well as possible through testing personality after three months, excluding invalid respondents, measuring informant-report data, and controlling for the presence of suggestibility and expectancy effects. Second, given the uniqueness of the present sample (e.g., skewed personality score distribution, high Baseline Openness), the implications of this study may have limited relevance to a fairly unique population of individuals inclined toward exotic travel and activity. Replication in samples from different populations is therefore needed. Third, measuring changes in personality no more than three to four months following retreat limits insight into the full duration of observed personality change. It will be

important for future research to investigate the duration of more positive personality states given that many contemporary antidepressant options show diminishing effects over time (Uher & Pavlova, 2016).

Conclusion

The present study represented a well-powered examination of personality change in relation to ayahuasca ceremony. Consistent with previous findings, the results signaled a medium to large effect of ayahuasca ceremony experience on Neuroticism and pointed to a series of predisposing and experiential factors that may potentiate personality change processes. Attributes of ayahuasca ceremony may be particularly powerful as a treatment for Neuroticism and internalizing psychopathology, especially among individuals at elevated baseline levels. Furthermore, baseline personality, mystical-type experiences, meta-cognitive reappraisal, and favorable engagement with shamanic elements emerged as the strongest predictors of favorable personality change. Implications of the present study include the importance of (a) well-powered samples and appropriate tests of moderation; (b) conducting research on personality change with samples that include participants lower in Extraversion, Openness, Agreeableness, and Conscientiousness and higher in Neuroticism; (c) using methodological safeguards against Type I error within observational work including larger samples, informant-report data, and validity controls; and (d) continuing to investigate the degree to which psychedelic-induced changes in negative core beliefs about oneself, others, and the world may underlie changes in Neuroticism.

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APPENDIX

To uncover parsimonious latent factors within the AEI item pool, exploratory factor analyses were conducted on the remaining seventy-seven items using a principal axis factoring method with promax rotation, allowing factors to correlate. A parallel analysis indicated the presence of ten factors (Horn, 1965); however, closer examination of the parallel analysis plot (Figure A1) indicated that the seven latter factors did not explain meaningful variance beyond simulated factors. As such, models containing up to three factors were considered. Velicer's Minimum average partial (MAP; Velicer, 1976) achieved a minimum of .01 with ten factors. Among the three factor models indicted by parallel, a minimum of .013 was found with three factors. Model fit indices for 1-3 factors are provided in Table A1. All factor solutions were identified. SRMR values indicated good fit for the two and three factor models; notably, however the close-fit standard recommended by Hu and Bentler (1999) was not reached across the three factor solutions on account of lower than acceptable RMSEA and TLI values. Nevertheless, the three-factor solution was supported by (a) the Bayesian Information Criterion (BIC), which achieved a minimum with three factors (Raftery, 1995); (b) the presence of a meaningful amount of variance explained by the third factor in addition to the first two factors (i.e., 23%); and (c) clearly demarcated and meaningful conceptual differences between the second and third factors.

These results provided support for a three-factor structure of the AEI (see Table A2 in Appendix). The first factor appeared to capture clarity, peace, self-connection, and self-esteem (referred to as *Clarity*). The second captured gratitude for lessons emanating from challenging experiences, cognitive reappraisal of negative beliefs about self and others, and courageous initiative to enact positive life changes (referred to as *Reappraisal*). The third factor captured

unpleasant feelings of torment, discomfort, and isolation that seemed unending (referred to as *Discomfort*). The three extracted factors showed a pattern of correlation involving large association between Clarity and Reappraisal (r = .72), small association between Reappraisal and Discomfort (r = .33), and no meaningful association between Clarity and Discomfort (r = .01). The factor scores, generated using Thurstone regression-based weighting, were saved and used to index standing on Clarity, Reappraisal, and Discomfort. AEI factors exhibited internal consistency (α) ranging from .94 (Discomfort) to .97 (Clarity). Complete data was available for 208 (Baseline/Post) and 189 (Baseline/Follow-up) participants.

Sample properties

To understand the distributional properties of the present sample, means and variance for Baseline FFM personality domains and facets were compared to the properties of two normative samples: an undergraduate sample (N = 359; Maples et al., 2014) and a community sample (N = 501; Goldberg et al., 2006) (Appendix Table A4 & A5). With respect to mean properties, Baseline Neuroticism scores were more elevated than in the undergraduate sample (d = .36) and the community sample (d = .81); Baseline Extraversion scores were lower than the undergraduate sample (d = .72), but not the community sample (d = .04; p > .005); Baseline Openness scores were substantially more elevated than in the undergraduate sample (d = .87) and community sample (d = 1.04); Baseline Agreeableness scores were lower than in the undergraduate sample (d = .20) and community sample (d = .71); and Baseline Conscientiousness scores were lower than in the community sample (d = .94), but not the undergraduate sample (d = .02; p > .005). In sum, the sampled population of ayahuasca retreat-goers exhibited meaningfully elevated Neuroticism and Openness, and lower Agreeableness and

Conscientiousness than the general population. These observations should however be qualified by the suboptimally small size of the normative samples.

With respect to variance properties, the standard deviations of FFM domains were generally comparable to normative samples with the exception of Neuroticism and Openness which exhibited higher and lower standard deviations, respectively ($diff_{SD} > .10$). Notably, the lower variance in Baseline Openness was reflected in histograms of FFM Openness facets (Figure 9). Collectively, observations regarding mean and variance properties of Baseline FFM data were suggestive of broader variability in and higher mean Neuroticism scores and more restricted variability and higher mean Openness scores than the general population. In view of my hypotheses, whereas the distribution of Neuroticism scores was more conducive to uncovering personality change trends if they exist, the distribution of Openness scores was suggestive of possible restriction of range issues with respect to elevations in already high scores over time.

With respect to skew properties, histograms for all Baseline self- and informant-report FFM facets can be found in Figures 5 to 14. Neuroticism facets were generally positively skewed; whereas Extraversion, Openness, Agreeableness, and Conscientiousness facets were generally negatively skewed.

Table A1

Model fit indices for Ayahuasca Ceremony Inventory

Structure	MAP	RMSEA	TLI	SRMR	BIC
One-factor	.03	.11	.44	.13	-2846
Two-factor	.01	.10	.60	.06	-5847
Three-factor	.01	.09	.64	.05	-6321

Note. MAP = Velicer's Minimum Average Partial index; RMSEA = root mean square error of approximation index; TLI = Tucker-Lewis index; SRMR = Standardized Root Mean Square Residual; BIC = Bayesian Information Criterion

Table A2

Exploratory factor analysis item loadings for Ayahuasca Experience Inventory

Item	Clarity	Reappraisal	Discomfort
I felt clarity.	**.93**	-.11	
I felt centered	**.92**		
I experienced profound inner peace.	**.84**		-.18
I basked in my experience of the ceremony	**.81**		
I experienced a kind of awe.	**.81**		.12
I experienced an all embracing love.	**.80**		
I was able to perceive my thoughts/feelings with exceeding clarity.	**.80**		
I saw a roadmap for living in alignment with my authentic self	**.80**		
I felt extraordinary powers within myself.	**.79**		
I felt the sentiment, "I am on the right path."	**.79**	-.11	
I felt connected to myself	**.77**		-.14
My purpose in life became clear	**.77**	-.11	
I experienced boundless pleasure.	**.74**		
I had insights into connections that had previously puzzled me.	**.74**		.15
Many things appeared to me as breathtakingly beautiful.	**.71**		
I had very original thoughts.	**.71**	-.16	.15
I felt extreme love and acceptance for myself.	**.64**	.19	
I felt great trust in myself.	**.63**	.18	-.14
I felt totally free and released from all obligations.	**.58**		
I was able to understand the meaning of life.	**.56**	.18	
Bodily sensations were very enjoyable.	**.50**		
I felt like I was able to accept everything for what it was	**.49**	.27	-.14
Conflicts and contradictions seemed to dissolve.	**.49**	.26	
Worries and anxieties of everyday life felt unimportant.	**.47**	.18	
I realized how much I value myself	**.46**	.38	-.11
Felt trusting of others in the room.	**.43**	.18	
Things in my environment had a new strange meaning.	**.42**	.26	
I felt boundless love for people close to me.	**.40**	.36	
I felt connected to others in the ceremonial space	**.36**	.24	
I could see images from my memory or imagination with extreme clarity.	**.35**	.29	
Many things seemed incredibly funny to me.	**.33**	.26	
Felt a desire to repair a relationship	**.27**	.23	
Felt gratitude for the lessons I learned from people that had wronged me	-.17	**.90**	-.16
Felt gratitude for the little or previously insignificant moments in my life		**.85**	-.16
I considered that I am too hard on myself.	-.15	**.76**	
I realized that I am unncessarily bound to repeat patterns of acting/feeling/behaving	-.18	**.74**	
I was able to see new positive meaning in a past trauma		**.73**	
Laughter or humor helped me overcome conflicts, fears, or difficult past experiences.		**.72**	
Felt gratitude for the challenges life had given me		**.71**	-.11
I saw the humor in situations that I previously may have taken too seriously		**.71**	-.14

I felt that I was forced to confront negative perceptions I've had of myself	-.13	**.71**	.22
I recognized that I can live more freely, without a sense of obligation.		**.70**	-.15
I identified aspects of myself that cause me pain.		**.69**	.11
I realized that I am unnecessarily bound to follow social norms		**.65**	
I realized how courageous I am.		**.64**	
I felt forgiveness	.18	**.59**	
I felt deep compassion for people who have wronged me or people close to me		**.55**	
I felt courageous	.16	**.54**	
I related to my physical pain with a sense of braveness		**.52**	
I felt capable of living courageously	.31	**.50**	
I realized that I can just be, without obligation or pressure to act in a particular way	.31	**.50**	-.13
I realized how critical it is that I make changes in my life.	.18	**.50**	.11
I faced my fears	.24	**.42**	.27
I overcame/resolved my fears	.40	**.40**	
I wrestled with my inner conflicts	.20	**.39**	.36
Felt gratitude for the love and support of those around me	.31	**.36**	.11
Felt a disappearance of opposing forces such as good and bad, right and wrong.	.16	**.36**	
I felt that I have great potential in me to achieve what I need in life.	.35	**.34**	
Engaged in problem-solving about how to communicate with someone.	.26	**.34**	
I experienced deep compassion for others	.30	**.33**	
I felt great compassion for others' distress or pain.	.31	**.31**	
I felt that I missed loved ones greatly.	.23	**.26**	.12
I felt tormented.		-.15	**.88**
I experienced everything as frighteningly distorted.			**.82**
I felt threatened.		-.18	**.82**
I felt lost	-.11		**.81**
I felt overwhelmed by the experience	.11	-.21	**.79**
I felt as if dark forces had overtaken me.		-.12	**.78**
I felt an unpleasant flow of information that I couldn't control			**.75**
Time passed slowly in a tormenting way.	-.12		**.74**
I felt isolated from everything and everyone.		-.16	**.74**
I felt agony.		.16	**.73**
I was afraid that the state I was in would last forever.			**.68**
I experienced my surroundings as strange and weird.			**.64**
I experienced great physical discomfort	-.29	.32	**.55**
I felt exhausted.		.16	**.51**
I stayed frozen in an very unnatural position for an extended period of time.	.12		**.46**

Note. Loadings with absolute values less than .1 were removed. Strongest loading for each item is in bold.

Table A3

Shamanic elements

Item name	Item Content
Trusted shaman	I trusted the shaman(s)
Mesmerized icaro	I was mesmerized by the icaro's song
Icaro healing	I felt that the icaro prayer was healing parts of me
Medicine cleaning	I felt that the medicine was cleaning me.
Struggled to purge	I struggled to purge.
War with entity	As I attempted to purge, I felt at war with some external entity who was responsible.
Purging self	I felt that I was purging out an aspect of myself (e.g., addiction, depression).
Purged physical ailment	I purged a physical issue or ailment.
Purged completely	I felt that I purged completely
Viewed object	I saw what someone else purged.
Relationship object	I saw that what someone else purged was related to something that I had experienced as well.

Table A4

Domain and Facet means compared to Undergraduate and Community population

	Undergraduate (N = 359)	Community (N = 501)	Baseline Self	Post Self	Follow-up Self	Baseline Informant	Follow-up Informant
Neuroticism	2.62	2.34	2.85	2.30	2.35	2.68	2.34
Extraversion	3.78	3.39	3.37	3.60	3.57	3.61	3.69
Openness	3.33	3.26	3.78	3.83	3.82	3.76	3.85
Agreeableness	3.70	3.89	3.61	3.76	3.73	3.79	3.85
Conscientiousness	3.53	3.97	3.54	3.78	3.73	3.71	3.81
N1 Anxiety	3.06	2.46	3.04	2.44	2.50	3.29	2.76
N2 Anger	2.62	2.52	2.89	2.35	2.35	2.52	2.11
N3 Depression	2.18	2.06	2.75	2.04	2.10	2.72	2.22
N4 Self-Conscious	2.56	2.46	2.73	2.27	2.29	2.23	1.86
N5 Immoderation	2.95	2.42	3.14	2.65	2.75	2.80	2.72
N6 Vulnerability	2.37	2.13	2.53	2.08	2.11	2.53	2.35
E1 Friendliness	4.01	3.69	3.42	3.55	3.55	3.86	3.98
E2 Gregariousness	3.57	2.71	2.72	3.00	2.90	3.12	3.12
E3 Assertiveness	3.57	3.41	3.51	3.63	3.67	3.54	3.68
E4 Activity Level	3.55	3.61	3.26	3.40	3.38	3.31	3.41
E5 Excite-Seeking	3.83	3.11	3.71	3.66	3.69	4.02	4.03
E6 Cheerfulness	4.14	3.83	3.60	4.07	3.98	3.79	3.90
O1 Imagination	3.71	3.16	3.89	3.86	3.88	3.55	3.74
O2 Artistic Interest	3.63	3.83	3.92	4.10	4.12	4.09	4.18
O3 Emotionality	3.40	3.32	3.57	3.46	3.41	3.56	3.58
O4 Adventurous	2.97	2.87	3.49	3.73	3.67	3.41	3.59
O5 Intellect	3.70	3.53	4.17	4.20	4.18	4.11	4.17
O6 Liberalism	2.58	2.85	3.62	3.61	3.64	3.86	3.85
A1 Trust	3.65	3.67	3.28	3.64	3.57	3.41	3.43
A2 Morality	3.52	4.12	3.55	3.72	3.67	4.25	4.35
A3 Altruism	4.24	4.22	4.02	4.20	4.14	4.01	3.99
A4 Cooperation	3.79	4.37	3.85	4.15	4.14	4.01	4.21
A5 Modesty	3.20	3.21	3.22	3.04	3.11	3.31	3.35
A6 Sympathy	3.77	3.74	3.76	3.82	3.77	3.74	3.79
C1 Self-efficacy	3.93	4.02	3.81	3.99	3.97	3.89	3.94
C2 Orderliness	3.24	3.86	3.36	3.57	3.55	3.09	3.39
C3 Dutifulness	4.14	4.51	3.98	4.16	4.13	4.03	4.14
C4 Achieve-Strive	4.00	4.00	3.88	3.96	3.93	4.16	4.09
C5 Self-Discipline	2.75	3.59	2.99	3.42	3.30	3.66	3.75
C6 Cautiousness	3.14	3.84	3.20	3.55	3.47	3.44	3.54

Note. Baseline Self-report personality reflects the Baseline/Post sample data.

Table A5

Domain and Facet standard deviation compared to Undergraduate and Community population

	Undergraduate (N = 359)	Community (N = 501)	Baseline Self	Post Self	Follow-up Self	Baseline Informant	Follow-up Informant
Neuroticism	.58	.57	.68	.54	.55	.67	.58
Extraversion	.54	.51	.59	.48	.48	.64	.57
Openness	.60	.57	.42	.39	.39	.53	.43
Agreeableness	.51	.39	.40	.35	.36	.60	.52
Conscientiousness	.51	.44	.47	.41	.41	.61	.56
N1 Anxiety	.96	.81	.93	.78	.75	1.03	.92
N2 Anger	.97	.88	.98	.73	.77	1.04	.82
N3 Depression	.91	.88	.99	.72	.76	1.03	.86
N4 Self-Conscious	.83	.76	.84	.66	.66	1.01	.75
N5 Immoderation	.85	.86	.88	.80	.80	.96	.93
N6 Vulnerability	.76	.69	.81	.58	.59	.98	.81
E1 Friendliness	.73	.81	.88	.80	.71	.94	.76
E2 Gregariousness	.98	.93	.98	.87	.86	1.12	1.07
E3 Assertiveness	.86	.80	.76	.68	.62	.90	.84
E4 Activity Level	.71	.82	.79	.72	.73	.93	.93
E5 Excite-Seeking	.75	.75	.65	.58	.59	.82	.73
E6 Cheerfulness	.62	.70	.81	.63	.62	.92	.81
O1 Imagination	.88	.85	.75	.67	.67	.87	.74
O2 Artistic Interest	.98	.83	.74	.66	.65	.87	.82
O3 Emotionality	.88	.87	.90	.71	.74	.96	.79
O4 Adventurous	.82	.79	.78	.65	.65	.81	.74
O5 Intellect	.88	.97	.70	.66	.63	.93	.83
O6 Liberalism	1.12	1.11	.80	.71	.73	.75	.75
A1 Trust	.82	.69	.79	.62	.64	.82	.75
A2 Morality	.76	.59	.68	.62	.61	.89	.84
A3 Altruism	.57	.55	.58	.46	.46	.75	.67
A4 Cooperation	.85	.59	.74	.62	.64	.86	.79
A5 Modesty	.88	.77	.76	.65	.62	.93	.82
A6 Sympathy	.74	.69	.64	.58	.63	.88	.77
C1 Self-efficacy	.62	.56	.63	.51	.49	.78	.66
C2 Orderliness	.90	.82	.81	.66	.71	1.07	1.04
C3 Dutifulness	.64	.49	.58	.48	.47	.84	.70
C4 Achieve-Strive	.66	.62	.67	.56	.58	.79	.75
C5 Self-Discipline	.83	.88	.90	.77	.81	.85	.77
C6 Cautiousness	.91	.71	.85	.71	.77	1.01	.80

Note. Self = Self-report; Informant = Informant-report; Baseline Self-report personality reflects the Baseline/Post sample data.

Table A6

95% Bootstrap Power analyses for self-report personality data

	Difference scores at each *d* level				Power (Baseline & Post, N = 289)				Power (Baseline & Follow-up, N = 265)			
Trait	*d* = .10	*d* = .125	*d* = .15	*d* = .20	*d* = .10	*d* = .125	*d* = .15	*d* = .20	*d* = .10	*d* = .125	*d* = .15	*d* = .20
Neuroticism	.07	.09	.10	.14	.55	.77	.88	.99	.58	.75	.87	.99
Extraversion	.06	.07	.09	.12	.69	.86	.96	1.00	.70	.88	.96	1.00
Openness	.04	.05	.06	.08	.72	.87	.96	1.00	.71	.88	.97	1.00
Agreeableness	.04	.05	.06	.08	.64	.84	.94	1.00	.65	.86	.95	1.00
Conscientiousness	.05	.06	.07	.09	.64	.83	.94	1.00	.57	.78	.91	.99
N1 Anxiety	.09	.12	.14	.19	.55	.75	.88	.98	.56	.70	.86	.98
N2 Anger	.10	.12	.15	.20	.57	.76	.87	.98	.52	.71	.85	.98
N3 Depression	.10	.12	.15	.20	.56	.72	.87	.98	.50	.68	.83	.97
N4 Self-Consciousness	.08	.11	.13	.17	.65	.82	.94	1.00	.59	.78	.91	.99
N5 Immoderation	.09	.11	.13	.18	.57	.74	.87	.99	.54	.71	.85	.98
N6 Vulnerability	.08	.10	.12	.16	.55	.75	.88	.99	.52	.71	.84	.98
E1 Friendliness	.09	.11	.13	.18	.57	.74	.87	.99	.61	.80	.92	.99
E2 Gregariousness	.10	.12	.15	.20	.71	.87	.96	1.00	.69	.88	.96	1.00
E3 Assertiveness	.08	.10	.11	.15	.68	.86	.95	1.00	.58	.78	.90	.99
E4 Activity Level	.08	.10	.12	.16	.74	.88	.97	1.00	.58	.78	.90	.99
E5 Excitement-Seeking	.07	.08	.10	.13	.63	.82	.93	.99	.51	.75	.88	.99
E6 Cheerfulness	.08	.10	.12	.16	.55	.76	.90	.99	.52	.70	.85	.98
O1 Imagination	.08	.09	.11	.15	.59	.77	.91	.99	.59	.79	.92	.99
O2 Arstistic Interests	.07	.09	.11	.15	.68	.85	.96	1.00	.63	.81	.92	.99
O3 Emotionality	.09	.11	.14	.18	.53	.74	.88	.99	.50	.68	.82	.97
O4 Adventurousness	.08	.10	.12	.16	.55	.76	.90	.99	.47	.68	.82	.97
O5 Intellect	.07	.09	.11	.14	.56	.75	.88	.99	.63	.80	.92	.99
O6 Liberalism	.08	.10	.12	.16	.92	.99	1.00	1.00	.89	.97	1.00	1.00
A1 Trust	.08	.10	.12	.16	.55	.71	.86	.99	.48	.64	.80	.96
A2 Morality	.07	.09	.10	.14	.66	.84	.94	1.00	.63	.82	.92	1.00
A3 Altruism	.06	.07	.09	.12	.54	.73	.86	.98	.56	.74	.89	.99
A4 Cooperation	.07	.09	.11	.15	.62	.80	.92	.99	.51	.70	.85	.98
A5 Modesty	.08	.10	.11	.15	.61	.77	.90	.99	.55	.73	.88	.99
A6 Sympathy	.06	.08	.10	.13	.57	.77	.91	.99	.52	.71	.85	.98
C1 Self-efficacy	.06	.08	.09	.13	.60	.78	.92	1.00	.55	.74	.88	.98
C2 Orderliness	.08	.10	.12	.16	.72	.90	.97	1.00	.62	.82	.91	1.00

C3 Dutifulness	.06	.07	.09	.12	.56	.76	.87	.99	.45	.66	.81	.96
C4 Achieve-Striving	.07	.08	.10	.13	.58	.77	.91	.99	.51	.70	.85	.98
C5 Self-Discipline	.09	.11	.14	.18	.59	.78	.91	.99	.52	.71	.86	.98
C6 Cautiousness	.09	.11	.13	.17	.56	.77	.90	.99	.46	.64	.80	.95

Note. *d* = Cohen's *d* effect size (mean difference / standard deviation of Baseline FFM scores); Difference scores at each *d* level = difference between measurement points that corresponds to each *d* effect size based on the standard deviation of Baseline FFM scores).

Table A7

95% Bootstrap Power analyses for informant-report personality data

	Difference scores at each *d* level				Power (Baseline & Follow-up, N = 110)			
	d = .10	*d* = .15	*d* = .20	*d* = .25	*d* = .10	*d* = .15	*d* = .20	*d* = .25
Neuroticism	.07	.10	.13	.17	.23	.48	.71	.89
Extraversion	.06	.10	.13	.16	.32	.62	.86	.96
Openness	.05	.08	.11	.13	.26	.53	.75	.90
Agreeableness	.06	.09	.12	.15	.34	.63	.87	.97
Conscientiousness	.06	.09	.12	.15	.31	.56	.81	.94
N1 Anxiety	.10	.15	.21	.26	.20	.37	.60	.78
N2 Anger	.10	.16	.21	.26	.25	.51	.73	.90
N3 Depression	.10	.15	.21	.26	.29	.56	.80	.94
N4 Self-Consciousness	.10	.15	.20	.25	.25	.50	.73	.90
N5 Immoderation	.10	.14	.19	.24	.21	.39	.63	.81
N6 Vulnerability	.10	.15	.20	.24	.25	.54	.77	.92
E1 Friendliness	.09	.14	.19	.23	.30	.59	.83	.95
E2 Gregariousness	.11	.17	.22	.28	.31	.61	.85	.96
E3 Assertiveness	.09	.14	.18	.23	.31	.57	.81	.94
E4 Activity Level	.09	.14	.19	.23	.26	.51	.77	.92
E5 Excitement-Seeking	.08	.12	.16	.20	.22	.44	.67	.85
E6 Cheerfulness	.09	.14	.18	.23	.20	.38	.59	.78
O1 Imagination	.09	.13	.17	.22	.23	.44	.68	.85
O2 Artistic Interests	.09	.13	.17	.22	.24	.48	.72	.89
O3 Emotionality	.10	.14	.19	.24	.27	.52	.76	.92
O4 Adventurousness	.08	.12	.16	.20	.19	.37	.59	.77
O5 Intellect	.09	.14	.19	.23	.23	.44	.69	.85
O6 Liberalism	.08	.11	.15	.19	.25	.52	.74	.91
A1 Trust	.08	.12	.16	.20	.20	.39	.63	.81
A2 Morality	.09	.13	.18	.22	.32	.58	.84	.96
A3 Altruism	.07	.11	.15	.19	.28	.55	.76	.92
A4 Cooperation	.09	.13	.17	.22	.33	.61	.83	.95
A5 Modesty	.09	.14	.19	.23	.25	.49	.72	.88
A6 Sympathy	.09	.13	.18	.22	.23	.46	.69	.86
C1 Self-efficacy	.08	.12	.16	.19	.21	.41	.64	.81
C2 Orderliness	.11	.16	.21	.27	.26	.51	.78	.92
C3 Dutifulness	.08	.13	.17	.21	.25	.45	.71	.88
C4 Achievement-Striving	.08	.12	.16	.20	.25	.50	.73	.89
C5 Self-Discipline	.08	.13	.17	.21	.26	.54	.77	.91
C6 Cautiousness	.10	.15	.20	.25	.26	.50	.76	.92

Note. *d* = Cohen's *d* effect size (mean difference / standard deviation of Baseline FFM scores); difference scores at each *d* level = difference in item-scale FFM scores between measurement points that corresponds to each *d* effect size based on the standard deviation of Baseline FFM scores).

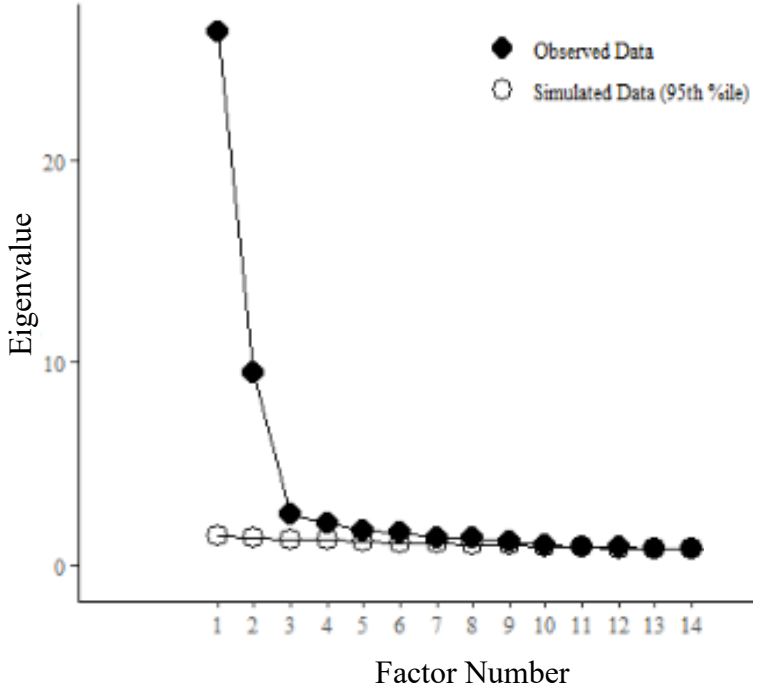

Figure A1. Eigenvalues of EFA-derived Ayahuasca Experience Inventory factors