

Religiosity and LSD Users with Pre-existing Schizophrenic Tendencies

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Abstract

It is an opinion held by some that LSD users retain more spiritual, religious, and open-minded qualities than the average person. The attraction of its supposed spiritual benefits have contributed to the growing community of its users. However, the mechanism behind these effects, and whether they are as beneficial as the proponents of this drug claim they are, remains unclear. In some individuals, the resulting religiosity could actually be stemming from the psychological damage that the drug can cause, particularly in those with preexisting psychosis or similar schizophrenic tendencies. Long-lasting changes in perception or the onset of hallucinogen persisting perception disorder after the initial use of the psychedelic have been reported more frequently from this group than average users. Considering religious delusions are included in the myriad of LSDs adverse effects, it seems possible that this intensification of spiritual beliefs is caused by the drug's psychological consequences. To explore the true mechanism behind the drug's spiritual effects, correlations between religiosity, mental instability, and the injurious repercussions of LSD were examined from published sources in this review of research. Said format of research is necessary for this field of study due to the impossibility of empirical research, as LSD is a Schedule 1 substance and is therefore legally inaccessible. From an assessment of the sources analyzed here, the trends of worsened psychosis in mentally unstable individuals after their LSD use, alongside the observed religiosity among those with schizophrenic traits because of religion's role as a coping mechanism, suggest that this drug contributes to the psychosis which ultimately plays a role in their religious beliefs. Although spirituality has been viewed as a positive consequence of LSD, the suggestion that it is merely a causation of the worsened psychosis in some people may now deter those with schizophrenic illnesses from using the substance. Moreover, the applicability of these results to otherwise mentally stable users of the drug could be tested in future research to further the psychological understanding behind LSDs elicitation of spirituality.

Keywords: Religiosity, LSD, Schizophrenic Tendencies

1. Introduction

A young man sits at his television screen, flipping through dozens of channels for something interesting to watch. He sets the remote down, finding that Cinemax is playing *Taking Woodstock (2009)*, depicting the euphoric LSD experience of one of the main characters. The scene takes the viewer through a whirlwind of pulsing lights and colors, showing a group of people, intoxicated with LSD, as they move and dance around a fire in spiritual ecstasy. New age music plays throughout, giving the enactment a sense of mysticism and wonder, finally ending with two of the characters weeping from the pure beauty of the cityscape view. Although it is merely a movie, the scene has caught the attention of something deep in the young man's mind. He mentally remarks on the blandness of sobriety, on never having deviated far from one state of consciousness; his thoughts wander. He is curious. The man does not remember his family history of schizophrenia in this moment. He does not recall the psychiatrist appointment he is scheduled

for next week, or acknowledge the mental instability of his father, but instead feels compelled to experiment with LSD to see what it's really like, and, perhaps, to expand his mind. He wonders, hopes, even that if he has a perspective-shifting hallucinogenic experience, he can transcend his earthly and daily troubles. He yearns to develop a connection with God and the universe that is so deep that it gives birth to inner serenity and satisfaction; a spirituality so rich that it removes the discontent and mental struggle that comprises the human condition. However, particularly for this individual, it is uncertain that the peace he desires can be fulfilled by hallucinogenic drugs.

2. Background

Since the rise in popularity of LSD during the 1960s and 70s, the media has portrayed the drug in a variety of positive and negative ways. Exaggerated media depictions of the drug's effects, as in the scene from *Taking Woodstock (2009)*, have sparked the attraction that has contributed to the drug's increased use since its effects were discovered between 1954 and 1962 through experimentation by psychiatrist Oscar Janiger, M.D. As explained by author Marlene Dobkin de Rios, Ph.D in her work surrounding Janiger's findings on the effects of LSD, a "media uproar" had transpired after the revocation of Janiger's experimental privileges in 1962 and the psychedelic effects of the drug became known, which had led to the widespread use of LSD by young adults¹. Proponents of the drug failed to acknowledge its possible side effects and largely advocated it during the late 1900s because of its believed spiritual and mind-opening properties – qualities that were welcomed and valued highly by the progressivists of the 1970s. As stated by Philippe Huguelet, M.D., author of "Religiosity and Spirituality in Psychiatry", such properties include "perceptual distortions, illusions and hallucinations, and sometimes a sense of insight and spiritual awareness"² – all aspects which contributed to its attractiveness. Despite its research before it became a scheduled substance in 1967, such as the studies performed by the LSD-advocating psychologist Timothy Leary, the true causes behind these spiritual and religious properties of the psychedelic were not fully understood, and it is a question we are still asking today. It is unclear whether the transcendental viewpoints it leaves in its wake are a product of the mental instability it is capable of causing; this is where the danger lies. The popularization and glorification of LSD for spiritual reasons has led to the consumption of the drug by individuals who are more prone to the psychedelic's adverse consequences, which is reflected in the "sensationalized reports of negative effects"¹ that Rios remarks on in her work. Because research opportunities for LSD had been severely limited before its potentially long-term psychological impacts could be fully explored, misconceptions were made about its consequences.

In correspondence with this, LSD was also portrayed hideously, in an equally exaggerated fashion, by those who disfavored drugs and feared its long-term health effects. Opponents of the drug depicted the psychedelic in a much darker light by painting each LSD experience as a hellish nightmare, calling attention to the possibility of a "bad trip," and promoting the implication that such an occurrence could ruin a person's mind irreparably. Such feared negative consequences included psychosis, permanent changes in perception, ego-death, and the onset of hallucinogen persisting perception disorder. Robert Masters, Ph.D, whose research attempts to define the LSD experience and the many stances on the topic, explains that the strange, hallucinogenic nature of the drug itself may serve as an explanation for the "widely held belief that 'LSD makes you crazy'"³. He goes on to verify that this belief "emerges repeatedly in the press"³, showing the opposite, more pessimistic opinion on LSD use. While propaganda from both viewpoints has generated mixed views of LSD's positive and negative outcomes, and said feared effects have proven to a reality for some, it seems impossible to generalize its benefits and injuries for each person in each circumstance. Certain individuals, such as those who suffer from schizophrenia and similar psychotic disorders, may be more susceptible to the negative consequences that the opponents of the drug advertise. However, many users still promote the positive outcomes of the hallucinogenic, including spiritual growth. Considering the unfavorable ramifications of the drug, alongside the fact that the true mechanism behind LSD's spiritual effects remains mostly unclear, this review of research explores the possibility that the resulting religiosity could actually stem from the psychological damage that the drug can cause. This notion challenges the purity of the observed spiritual outcomes, and questions whether or not religiosity is an advantage or yet another possible side effect of LSD. Although long-lasting changes in perception are not seen in all LSD users, the substance may contribute to the onset of psychosis of some individuals due to pre-existing mental instability, ultimately leading to an increase in spiritual beliefs as a cause.

3. Data

3.1 LSD Use Without Harmful Effects

Albeit some individuals experience adverse side-effects after using LSD, the number of people who have not sustained long-lasting psychological damage does significantly outweigh the number of those who have⁴. Many LSD users without pre-existing histories of schizophrenia or related psychotic illnesses have had harmless and even enjoyable encounters with the drug. Since those who are able to safely enjoy LSD make up the majority of its users, it has been assumed that the drug is universally safe – a notion that has contributed largely to its popularity. In fact, its presumed safety and spiritual effects have been explored by multiple researchers, including Michael Lerner. This author illustrates religiosity as a positive consequence of psychedelics. Lerner, voicing the opinion of those who view LSD favorably, declares that its criminalization and inaccessibility are not only inhibiting the scientific community's further research of it, but could be disserving the general population as a whole if the drug actually possesses useful spiritual and psychological effects that we're not fully aware of⁵. With these statements, he is considering the valuable opportunities that are available to LSD's average users: people who do not suffer from mental illness and who are not at a higher risk for side-effects.

There is further evidence that validates that the majority of users fall under this description of normativity. Henry David Abraham, a psychology professor at the Tufts University School of Medicine, makes reference to a study where 64 out of 66 subjects did not have prolonged psychotic reactions after undergoing LSD therapy in a laboratory setting. In this case, nearly 97% of individuals, who assumedly did not suffer from any psychopathological illnesses prior to the study, did not experience negative side effects. A similar experiment was also performed involving psychotic individuals, a classification defined by previous hospitalization for their mental afflictions. Here, 62 of the 65 participants did not experience unfavorable consequences after the administration of LSD, meaning that approximately 95% of them did not develop the “disturbances in mood affect and thought” that the other 3 subjects did⁴. This data suggests that, while LSD rarely causes psychotic effects in otherwise mentally stable individuals, the likelihood of developing such side-effects is higher in those who were already struggling with mental instability. The reasoning for this correlation is further defined in the following sections.

3.2 LSD Use With Harmful Effects In Connection To Pre-Existing Schizophrenic Tendencies

The small, particular subset of people who are more likely to suffer from LSD-induced psychological damage can be characterized by their pre-existing psychotic tendencies. A history of mental illness alongside hallucinogenic drug use evidently results in the worsening of psychotic symptoms in some cases^{4, 6}. Abraham, whose study ultimately established that LSD is capable of producing adverse effects, makes reference to multiple studies where this outcome is so. This author began his work with the hypothesis that, despite the assertions of other researchers at the time, the drug did have potentially negative psychological side-effects in some individuals. He argues that long-term changes in mood, perception, and prolonged hallucinations following the ingestion of LSD have been reported by multiple individuals during several independent studies. Although he analyzes cases where side-effects are seen in general, nonspecialized groups, the negative effects are most prominent in those who suffered from schizophrenic tendencies or similar psychopathological characteristics prior to the drug use. For instance, schizophrenics made up 23% of a group of 105 LSD using members in an outpatient psychiatric facility, in comparison to a group of non-LSD using clinical psychiatric patients, where schizophrenics only made of 12% of this population. Essentially, there was a 13% increase in the schizophrenic population of psychiatric patients when LSD use was specifically included⁴.

Furthermore, controversy has manifested within the scientific community amongst the discussion of LSD's benefits and consequences. Abraham suggests that the psychotic side-effects actually contribute to the religiosity that Lerner optimistically makes reference to, stating that amongst hallucinations and hallucinogenic moods, religious delusions are also included in the myriad of ramifications. He expresses that the residual spirituality is further indication of psychosis or mental instability because of the believed harmful effects of LSD, therefore portraying the LSD experience as something that carries a much more injurious risk than others have previously acknowledged. By providing quantitative evidence that exposes the likelihood of developing a psychotic illness after using LSD, Abraham portrays the substance in a less favorable light.

To offer more support towards the correlation between mental illness and LSD side-effects, Shaul Lev-Ran, an addiction specialist at Sheba Medical Center, conducted a study on the relationship between schizophrenia and hallucinogen persisting perception disorder, or HPPD, which is a serious psychological condition that manifests itself

in hallucinations and perceptual changes long after the initial dose of LSD has already dissipated. In their experiment, Lev-Ran and his team of researchers gathered 80 hospitalized schizophrenic patients, all of whom had previously used LSD. The subjects completed two questionnaires to gauge the prominence of their psychotic symptoms and one other survey to record which substances they had previously used. First, the Structural Clinical Interview for DSM-IV-TR Axis I disorders (SCID-I), a diagnostic tool, was used to verify whether the patient did or did not have HPPD. A Positive and Negative Symptoms Scale (PANNS), which surveys how severe a schizophrenic's symptoms are, was then used to record the symptom severity and functionality of the individuals in both groups of the experiment. There were 37 of these participants who were diagnosed with HPPD in addition to schizophrenia, and 43 who experienced schizophrenic symptoms alone⁶. His evidence shows a connection between schizophrenics who used psychedelics and the development or worsening of long-term, psychotic symptoms after the experience.

While the findings of both Lev-Ran and Abraham primarily focus on how the psychedelic has the potential to cause or contribute to mental illness, they each separately acknowledge the possibility of psychopathology being a contributing factor to an individual's original decision to take the drug. Lev-Ran notes that there is an increased use of psychedelics among the schizophrenic community, a notion that is verified by Abraham's mention of Tsuang's 1982 experiment, where a large percentage of drug addicts with psychotic disorders were more likely to use hallucinogenic substances than other drugs. In fact, this observed trend provided more reason for Lev-Ran to conduct his research and to claim that there could be a neuropsychological interaction between LSD and the schizophrenic mind that causes some schizophrenic patients to develop HPPD. While this served as the starting point for Lev-Ran's study, Abraham unexpectedly uncovered this information later into his research, when he began to analyze the trends of drug abuse, psychopathology, and their connection to the likelihood of hallucinogen use. Substance abuse is more common among those with mental illness and, in turn, the abuse of some substances, particularly hallucinogenic drugs, potentially worsens the mental illness^{4, 6}. Proposing another aspect to consider, Lev-Ran notes that there was a direct connection between a schizophrenic suffering a "bad trip" during the LSD experience and the later commencement of HPPD in that individual, which was an unanticipated result that proves to be one of the more intriguing parts of his study. This fact allowed Lev-Ran to conclude that, although the schizophrenics who were diagnosed with HPPD were not necessarily so debilitated that it further inhibited their daily function, there is a connection "between initial aversive experiences caused by LSD use and the occurrence of HPPD among patients with schizophrenia"⁶. This evidence suggests that schizophrenics who had a bad experience with the psychedelic are also more likely to develop HPPD after its use. Collectively, the conclusions made by both Abraham and Lev-Ran provide a fairly concrete description of individuals who are more likely to suffer from the side-effects of LSD.

3.2.1 mechanism

Having observed the correlation between mental illness and psychotic side effects from LSD, including religious delusions, there is further evidence that roughly explains the mechanism behind why these trends exist. Although Abraham speculates that, since LSD produces a strong chemical current that may cause the death or damage of neurons associated with receiving serotonergic signals and that such disturbances in serotonin levels can contribute to schizophrenia-like symptoms⁴, the neurochemical reasoning behind this phenomenon is not fully explained in his work. Alan Breier, a professor of psychiatry at Indiana University, offers more insight on the subject with his research concerning the involvement of serotonin and schizophrenia. With schizophrenia originally thought to be caused solely by an overabundance of dopamine, this author's primary hypothesis is that varying levels of serotonin can cause both the positive and negative symptoms of schizophrenia⁷. Brian Roth, a pharmacology professor at the University of North Carolina School of Medicine, also shares this claim, remarking on the "biochemical and anatomical complexity and diversity of the serotonergic system" to point out that "its extensive interactions with multiple neurotransmitters" can allow it to have a wide array of psychological effects⁸. The disruption of serotonin's regulations, which include mood, perception, and endocrine function, also happen to make up the core characteristics of schizophrenia. Researcher Javier González-Maeso, Ph.D., whose work involves the connections between psychedelics and schizophrenia, agrees with this and reiterates this notion with his statement that "the effects of hallucinogenic drugs resemble some of the core symptoms of schizophrenia"⁹. In a more specific outline of what is included in the primary symptoms of schizophrenia, positive schizophrenic symptoms are defined by present behaviors or experiences, such as hallucinations and delusions, while negative schizophrenic symptoms are characterized by the absence of an appropriate response, such as a lack of emotional expression.

The possibility of serotonin playing a role in schizophrenia was first explored in regards to the relationship between LSD and its similar psychotic effects. Because LSD has a molecular structure that is similar to serotonin, this would

allow it to fit into serotonin (5-HT) receptors, which is how it carries out its effects⁹. Most exogenous drugs usually carry out their effects by mimicking the endogenous proteins, such as the neurotransmitter serotonin, that are already present in our bodies, therefore allowing them to bind to the same receptors and elicit the same neurological responses. In this fashion, LSD-induced psychosis produces effects similar, but not equal, to both positive and negative schizophrenic symptoms. Although LSD-induced psychosis may not directly mimic or cause schizophrenia itself, it appears to trigger and establish the observed schizophrenic and psychotic tendencies. This information is congruent with the findings of Philippe Huguélet, M.D., whose literature explores the psychiatric importance and functionality of spiritual ideations. He reestablishes that psychedelic drugs like LSD “are known to perturb the 5-HT system in several brain regions”².

Breier describes a study that further analyzed the prevalence of serotonin in schizophrenia using mCPP tests. The serotonin agonist, mCPP, works by attaching to the reuptake sites of 5-HT receptors and blocking the reuptake of serotonin from within the synapse, consequently causing there to be more serotonin available in the synapse to be transferred to the postsynaptic neuron, and an increase in serotonin overall. This substance “exacerbated psychotic symptoms in schizophrenic patients” when it was administered, conveying that an increase of serotonin worsens the positive symptoms of the disorder⁷. Roth was also able to conclude, in his analysis of multiple other studies, that “alterations in serotonergic systems have been correlated with specific symptoms of schizophrenia”⁸. The evidence provided by both Breier and Roth, alongside the information concerning LSD-induced psychosis and the drug’s structural similarity to serotonin, indicate that this psychedelic’s interference with the serotonergic system is responsible for the psychotic effects it can elicit, especially in those whose serotonin levels are already disrupted. In addition, this coincides with González-Maeso’s statement that both LSD and schizophrenia involve a disturbance of the serotonergic system⁹.

3.3 Religiosity As A Consequence Of The Adverse Effects Of LSD In Psychotic Individuals

Moreover, the psychological explanations for changes in mental state and intensified spirituality, separate from the neurochemical mechanism, is becoming more understood. While the mental instability or vulnerability that is naturally associated with schizophrenic disorders may provide the opportunistic grounds for LSD’s side effects to manifest, it may also offer an explanatory connection between these unfortunate psychological symptoms, including prolonged changes in perception, and an increase in religious beliefs. Kevin Nelson (2011), a neuromuscular neurologist at the Kentucky Neuroscience Institute, views said alteration of consciousness as the root of spiritual experiences. Spirituality and religious visions can stem from any subtle or drastic alteration of the conscious state of mind, which Nelson elaborates on as he further discusses the more “in-between,” ambiguous planes of consciousness¹⁰. While consciousness can be shifted in a variety of intense, naturally occurring situations, such as near-death experiences and dream-like states, hallucinogenic drugs are specifically intended for this alteration of consciousness. This being said, while these drugs predictably alter cognition for as long as the substance runs its course, this shift in perception can be permanent or semi-permanent for individuals with already unstable mindsets as part of the residual side effects that they seem to be more prone to.

It is also rumored that LSD users generally retain more spiritual, religious, and open-minded qualities than the average person. To test the accuracy of this assumption, Lerner directed a study which explored the spiritual and personal values of psychedelic drug users from multiple cultural backgrounds. This author used the actuality that hallucinogens have the capacity to invoke religious experiences as a foundation for his theory, which was that, in a population of psychedelic users, there would be a significant, observable increase in spiritual beliefs in comparison to the general population⁵. Lerner does mention that preceding religious beliefs could be a confounding variable that remains to be explored, but the implication that the drugs themselves are what triggers these beliefs is embodied within his claim. A drug use questionnaire was used to determine which drugs each person had or had not used, and two other surveys were used to record the participants’ spiritual beliefs and life values. Characteristics such as spirituality, empathy, and humility were some of the key attributes that were included in the Life Values Inventory, which was formed by Brown & Crace in 1996 and measured “14 life values by means of 42 items rated for importance to one’s life on four-point Likert scales”⁵. Secondly, the Mystical Beliefs Questionnaire, “based on Pahnke’s (1966) Peak Experience Profile” was implemented to gauge how strongly the subjects valued spiritual and transcendental beliefs such as universal oneness, God, and the physicality of our own existences⁵. The results of these surveys did, in fact, validate Lerner’s claim that the mystical experiences brought on by psychedelic drugs provides a long-lasting change of the user’s perspective on life. The results showed that “regardless of culture of origin, users of psychedelic drugs

scored significantly higher than users of other illegal drugs and non-users on mystical beliefs”⁵. This study also determined that the life values that are expected to stem from psychedelic experiences, such as oneness with God and the universe, were much more prominent in the group of participants who had previously used hallucinogenic substances. This study implicitly suggests that many LSD users are left with an assumedly newfound spirituality as a cause of their psychedelic drug use. Although Lerner provides evidence to suggest that LSD users do have more spiritual or religious beliefs than other demographics of drug users and non-users, he leaves the mechanism behind this unexplained.

3.3.1 mechanism

In those whose psychotic or schizophrenic illnesses have been worsened by LSD, the hallucinogenic drug use could be indirectly causing their religiosity, with the primary component being the intensified mental instability. Now that these individuals are burdened by *two* factors that contribute to the fragility of their psyches, their preexisting mental issue and whatever long-lasting perceptual changes they acquired from the consumption of the drug, it is unsurprising that they would be inclined to find security in a higher power, as if clinging to a post in a wicked storm. Tracy Prout, professor of psychology at the Ferkauf Graduate School of Psychology, validates this psychological phenomenon with her study which determined the importance of God in the lives of schizophrenics and those with similar disorders¹¹. To test the hypothesis that there is a connection between psychosis and religiosity, Prout and her research team compared the severity of psychosis alongside how much value they placed in God and religious beliefs. The author included several other studies to support the idea that, since schizophrenic and psychotic patients have difficulty with object representation, meaning that they experience instability in normally concrete things, such as interpersonal relationships, they tend to find solace in a higher power: something greater and more stable. Prout includes Bell’s reiteration of this with their statement that “the most common deficits in object relatedness among individuals with psychosis are lack of trust in relationships and a sense of disconnection”¹¹. This disconnect with reality and the physical world can cause feelings of loneliness and confusion, ultimately worsening psychotic symptoms and slowing recovery.

Having said this, finding solid ground through social or spiritual relationships and obligations can help these individuals recover their “sense of self” and allow them to “reestablish ego boundaries” that will assist them in leading functional lives¹¹. The information surrounding object representation serves as the mechanism for why schizophrenics and those with schizoaffective disorders would be more inclined to develop and find comfort in religious ideals. To test these theories, the researchers conducted a psychological experiment in which 46 psychotic individuals participated. Data was collected using two surveys, the first being the Object Relations Inventory, developed by Blatt in 1988, which recorded how the participants characterized and valued themselves, God, and close relationships, specifically their connections with their parental figures. Secondly, the Positive and Negative Syndrome Scale (PANNS), originally developed by Kay, measured the positive and negative symptoms as well as the general severity of the psychopathology of each person. Both of these surveys, combined, allowed the researchers to compare the severity of psychosis to how much value they placed in God and parental figures, the significance of which they analyzed using a categorical rating system. The interpretation of these results was that the individuals generally “demonstrated a profound ability to take refuge and find strength in their relationship with God”¹¹. The comfort that religious and spiritual ideals offers when an individual is coping with mental instability could explain why a belief in God was the second most common theme that emerged out of the participants’ responses in the rating system that was used in this study; in fact, a majority had expressed that they had found strength through God and that their religious ideations had helped them in their recovery process. Prout offered that the participants were, either consciously or unconsciously, using religiosity as a form of self-therapy and as a reliable foundation in their unsteady lives. These findings provide a mechanism behind why spiritual beliefs are more common among psychotic individuals and suggests the comfort and reassurance gained from the belief in a higher power offers soothing qualities. This would explain why those with schizophrenic-like symptoms that stemmed from, or were worsened by, LSD use would correspondingly be more inclined to adopt this observed trend of spiritual dependency. In summary, the religious ideations would therefore be a secondary, psychological impact of the psychedelic, with the primary, neurochemical impact being the LSD’s disturbance of the already vulnerable serotonergic system within the schizophrenic mind.

3.4 Summary Of The Reviewed Findings

The purpose of this research was to identify the mechanism behind LSD's spiritual effects to ultimately determine if this psychedelic poses a greater risk of adverse psychological effects for individuals with schizophrenia-like illnesses. It was speculated that the religiosity was a secondary impact of the drug, originating from the mental instability worsened by the hallucinogenic substance. This being said, the trends observed in this review of research suggest that the elicitation of spirituality from LSD use may not be a reason to use the drug, as its proponents have advertised, but another possible side-effect. The conclusions established by Abraham and Lev-Ran are consistent with one another in the regard that the onset of LSD side-effects like prolonged psychosis and HPPD were more commonly seen in those with already unstable mindsets^{4, 6}. The neurochemical mechanism surrounding this phenomenon, with particular consideration for the serotonergic system which both LSD and schizophrenic disorders have been said to influence, were consistently remarked on by researchers Breier, Roth, Huguelet, and González-Maeso^{2, 7, 8, 9}. The considerable prominence of religiosity found within the schizophrenic participants of Prout's study also correlates with the notion that this mental instability breeds spirituality and religious views¹¹. These results, analyzed alongside Lerner's validation that hallucinogenic drug users do maintain more spiritual and mystical beliefs than non-users or users of other drugs⁵, support the hypothesis that LSD's consequential psychotic side-effects are responsible for the spirituality it imparts on its mentally unstable users.

4. Discussion

Although spirituality has been viewed as a positive consequence of LSD by some, the indication that it is merely a causation of the worsened psychosis in some people may now deter those with schizophrenic illnesses from using the substance. The increase in religiosity among schizophrenics, in comparison with the rise in spiritual beliefs of LSD users, suggests that the religious ideations are a symptom, not necessarily an advantage, of LSD's negative consequences, and should be regarded as such. Most users can consume the drug without long-term effects, but those with psychotic illnesses should carefully consider the ramifications of using hallucinogenic substances, out of the concern for their mental states and any progress they have made or are trying to make in their recovery from their disorders.

Furthermore, the applicability of these results to otherwise mentally stable users of the drug could be tested in future research to advance the psychological understanding behind LSD's elicitation of spirituality. In Abraham's study, there was a small percentage of individuals who suffered from long-lasting side-effects after using LSD, but had never experienced any psychotic illness prior to the event⁴. While a higher percentage of those with psychotic disorders experienced adverse effects when a similar trial was conducted, the issue of LSD induced-psychosis in otherwise normal individuals remains unresolved. Speculations can be made concerning whether or not these presumably level-minded participants had a family history of psychotic illnesses and whether this could have contributed to the side effects they suffered after the LSD experience. In the same way that schizophrenic symptoms can abruptly surface in the early or middle stages of adulthood due to a traumatic life event, particularly among those who have a family history of said disorders, it is worth researching whether or not this dormant psychosis can be unleashed by psychedelic drugs as well. Perhaps there is some heritable component of psychosis that does not always manifest itself so obviously and only emerges in response to extreme neurological disturbances. In this case, the possible side effects of LSD could extend to a greater portion of its users, meaning that those with already recognized, pre-existing schizophrenic tendencies are not exclusively susceptible. Although Breier offers an explanation to the psychosis observed in a more generalized group by remarking on the drug's ability to produce effects similar to schizophrenia including a "dramatic distortion of reality including paranoid and grandiose delusions, ideas of reference, perceptual distortions, and sudden mood fluctuation"⁷ because of its interaction with the serotonergic system, there is no indisputable way to answer the second part of this puzzle: the causation of spiritual beliefs in LSD users with no history of schizophrenia-like disorders. LSD-induced psychosis may offer an explanation to the spirituality that the drug produces, but it is unknown whether this is the sole cause. Although there is no concrete "God" center of the mind for the psychedelic to stimulate, further studies concerning LSD's interactions with the brain's neurochemical systems are likely to yield some answers, in the instance that the drug contributes to religiosity in its normal users in other ways besides its psychotic consequences. Regardless of whether or not the sudden development of psychosis in previously mentally stable individuals is the true reason behind an onset of spiritual beliefs, as seen in those with pre-existing schizophrenic

tendencies, clinical psychologists should establish who exactly is more prone to the negative consequences of this hallucinogenic substance to avoid any psychological damage that could occur from its use.

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6. References

1. Henry David Abraham and Andrew Aldridge, "Adverse Consequences of Lysergic Acid Diethylamide," *Addiction* 88, no. 10 (1993): 1327-34. doi: 10.1111/j.1360-0443.1993.tb02018.x.
2. Michael Lerner and Michael Lyvers, "Values and Beliefs of Psychedelic Drug Users: A Cross-Cultural Study," *Journal of Psychoactive Drugs* 38, no. 2 (2006): 143-147. doi: 10.1080/02791072.2006.10399838.
3. Shaul Lev-Ran et al., "Schizophrenia and Hallucinogen Persisting Perception Disorder: A Clinical Investigation," *The American Journal on Addictions* 24, no. 3 (2015): 197-99. doi: 10.1111/ajad.12204.
4. Brian Roth and Herbert Meltzer, "The Role of Serotonin in Schizophrenia," *Psychopharmacology: A Fourth Generation in Progress* (2000): 1215-27. doi: 10.1002/ddr.430350314.
5. Alan Breier, "Serotonin, Schizophrenia and Antipsychotic Drug Action," *Schizophrenia Research* 14, no. 3 (1995): 187-202. doi: 10.1016/0920-9964(94)00043-8.
6. Kevin Nelson, *The Spiritual Doorway in the Brain* (New York: Dutton, 2011): 37-59.
7. Tracy Prout et al., "Parental and God Representations among Individuals with Psychosis: A Grounded Theory Analysis," *Journal of Religion and Health* 55, no. 6 (2016): 2141-53. doi: 10.1007/s10943-016-0265-0.
8. Robert Masters and Jean Houston, *The Varieties of the Psychedelic Experience: The Classic Guide to the Effects of LSD on the Human Psyche* (Rochester: Park Street Press, 1966): 51.
9. Javier González-Maeso and Stuart C. Sealfon, "Psychedelics and schizophrenia," *Trends in Neurosciences* 32, no. 4 (2009): 225-232. doi: 10.1016/j.tins.2008.12.005.
10. Marlene Dobkin de Rios and Oscar Janiger, *LSD, Spirituality, and the Creative Process* (Rochester: Park Street Press, 2003): 1-3.
11. Philippe Huguelet and Harold G. Koenig, *Religion and Spirituality in Psychiatry* (New York: Cambridge University Press, 2009): 49.