

# Effects of Sensory Deprivation Float Tank Preceding Ketamine Administration

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Ketamine infusion is an emerging treatment for many mental illnesses. Most commonly studied in the treatment of resistant depression [1-4] studies are also being conducted on its effect in postpartum depression, eating disorders, PTSD, and addiction [5-8]. Zhou et al. showed that ketamine might have pro-cognitive effects that could mediate its positive effects on depression and suicide [9]. What makes ketamine infusion of particular interest in the management of mental illness is its ability to reduce suicidal ideation, and its rapid onset of action [10,11]. SSRIs can take up to 6 weeks to reach their full effect, whereas ketamine infusions begin to work immediately after treatment [12]. This is particularly important in suicide prevention as suicide has been correlated with impulsivity, and rapid onset of action could help stabilize patients with this condition [13].

The mechanism for ketamine's effect on mental health outcomes is not completely understood. Ketamine acts as an NMDA receptor antagonist, which affects neurotransmission; this may contribute to its anesthetic, analgesic, euphoric, dissociative, and hallucinogenic properties [14]. A single prolonged infusion of ketamine provides a tolerated, rapid, and sustained response in treatment-resistant depression and normalizes depression-related hyperconnectivity in the limbic system and frontal lobe [15]. There is a considerable effort toward determining ideal dosages and duration of treatment and prolonging the effect of ketamine infusion treatments [16-18]. Of particular interest to this study are combination therapies involving ketamine infusion to facilitate a more meaningful and durable experience.

Sensory deprivation flotation therapy is an interesting adjunct therapy to ketamine infusion because it has been shown to decrease symptoms of anxiety, depression, muscle aches, and poor sleep [19-21]. It is currently being studied as a treatment for depression, anxiety, anorexia, and insomnia [22-26]. A popular hypothesis for the positive effects of flotation therapy is that taking away the external stimuli allows the body to focus on the internal stimuli [27]. We believe this could augment the effect of ketamine infusions by improving the preparation phase of the treatment, which is recognized as an essential component of psychedelic-assisted treatments [28]. This study describes the experiences of research participants who engaged in ketamine infusion preceded by sensory deprivation flotation. (KI+SD).

## METHODS

Participants for this study were gathered through a list of clients who had previously participated in True North Float flotation and ketamine infusion treatment. As part of their treatment, the participants received a one-hour sensory deprivation float tank followed by ketamine infusion (SDFT/KI) [0.5-1 mg/kg]. Participants were contacted via email and telephone with the contact information provided by True North Float Health Spa. Informed consent to the release and use of medical record information was obtained, and assurance of confidentiality preceded the questionnaire. Ultimately, thirteen participants completed the entire survey. Table 1 contains all of the questions answered by the participants. All data was de-identified by Qualtrics Survey Software prior to data

analysis. Responses 1 and 2 were objective questions regarding the religious background and previous psychedelic experiences and did not require further data theming. Responses 3-16 were analyzed by five independent reviewers who categorized the responses into positive and nonpositive responses (Neutral and negative responses). The neutral and negative scores were combined to provide 2 data sets that were mutually exclusive of each other. The scoring of the participant responses was calculated as averages and 95% confidence intervals via Microsoft Excel statistical formulations.

Of the 64 emails sent, 17 started the Qualtrics survey. Thirteen participants completed the survey with a response rate of 20.3%. The four incomplete surveys were discarded from the analysis.

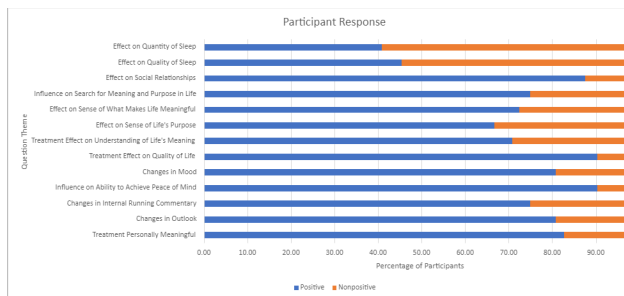


Figure 1

## RESULTS

Based on participants' response data, SD+KI was associated with positive effects on most factors. Due to the nature of free responses, responses were interpreted by five independent reviewers and broken into positive vs. nonpositive responses. Any discrepancies were discussed between reviews, and the overall favorable opinion was selected. SD+KI had the least effect on quality and quantity of sleep. Respondents reported "little to no change" in sleep, but did not report a negative effect. (Quality positive 45.45% 95% CI 0; neutral 50% 95% CI 5.14; negative 4.55% 95% CI 5.14) (Quantity positive

40.91% 95% CI 5.14; neutral 59.09% 95% CI 5.14; negative 0% 95% CI 0). The most significant changes were in the themes of peace of mind, quality of life, and effect on social relationships (figure 1 and table 1).

Table 1: The questionnaire consisted of following 15 questions:

1	What is your current religious affiliation? If you are not currently affiliated with a religion, what was your religious heritage, if at all?
2	How many previous experiences have you had with psychedelic compounds? a. 0-5 b. 5-10 c. >10
3	Describe how personally meaningful the SDFT/KI experience was in your life.
4	Describe any changes in your outlook on life after the SDFT/KI experience
5	Describe any changes regarding the running commentary in your mind
6	How has the SDFT/KI experience influenced your ability to achieve peace of mind
7	How has your mood been affected by the SDFT/KI experience, if at all?
8	How has your quality of life been affected by the SDFT/KI experience, if at all?
9	How has your understanding of life's meaning been affected by the SDFT/KI experience, if at all?
10	How has your sense of life's purpose been affected by the SDFT/KI experience, if at all?
11	How has your sense of what makes your life meaningful been affected by the SDFT/KI experience, if at all?
12	How has the SDFT/KI experience influenced your search for meaning and purpose in life?
13	How have your social relationships been positively or negatively affected, if at all?
14	How has your quality of sleep been positively or negatively affected, if at all?
15	How has your quantity of sleep been positively or negatively affected, if at all?

The post-treatment effects on the study participants were assessed using the secure survey. The participants were asked if they found the ketamine infusion and sensory deprivation float tank (the treatment) personally meaningful. 82.69% (95% CI 3.26) of participants reported it was personally meaningful, and 17.31% (95% CI 3.85) reported that the treatment was not meaningful. 80.77% (95% CI 3.26) reported positive changes in their outlook on life, and 19.23% (95% CI 4.35) reported nonpositive changes. 75% (95% CI 3.26) of study participants reported a positive change in their internal commentary after completing the treatment, and 25% (95% CI 3.77) reported nonpositive changes. 90.38% (95% CI 6.25) of participants reported that the treatment had a positive influence on their ability to achieve peace of mind, and 9.62% (95% CI 7.22) reported that the treatment had a nonpositive influence. Post-treatment, 80.77% (95% CI 6.53) of study participants

reported positive changes in mood, and 19.23% (95% CI 7.54) reported nonpositive changes. For changes in quality of life, 90.38% (95% CI 3.26) reported positive changes, and 9.62% (95% CI 3.77) reported nonpositive changes. 80.83% (95% CI 14.14) reported positive effects on understanding life’s meaning, and 29.17% (95% CI 14.14) reported nonpositive effects. 66.67% (95% CI 20.61) reported a positive influence on their sense of life’s purpose, and 33.33% (95% CI 15.71) reported a nonpositive influence. 72.5% (95% CI 14.70) reported a positive influence on their sense of what makes life meaningful, while 27.50% (95% CI 15.00) reported a nonpositive influence. 75% (95% CI 5.66) of participants reported a positive influence on their search for meaning and purpose in life, and 25% (95% CI 5.77) reported a nonpositive influence. 87.50% (95% CI 4.90) reported a positive impact on social relationships, and 12.50% (95% CI 5.00) reported a nonpositive impact. 45.45% (95% CI 0.00) reported a positive effect on the quantity of sleep, and 54.55% (95% CI 0.00) reported a nonpositive effect. 40.91% (95% CI 5.14) reported a positive effect on the quantity of sleep, while 59.09% (95% CI 5.25) reported a nonpositive effect (Table 2).

## DISCUSSION

The results of this study indicate that ketamine infusion preceded by flotation therapy has a generally positive effect on participants in a small sample size. This has potential implications for improving the ketamine experience and prolonging the duration of the effect of ketamine on depressive symptoms. Additionally, further investigation into potential combination therapies, such as sensory deprivation flotation therapy, that increase the efficacy and duration of ketamine infusions is necessary. In this study, the majority of subjects recorded positive responses, indicating that preceding ketamine infusion with flotation therapy may increase the perceived quality of the ketamine experience. Nonpositive responses to the combination treatment were small, indicating that the treatment did not cause harm. Nonpositive outcomes were considerably higher in the effects on quality and quantity of sleep. It is unclear if the treatment caused this, if most participants reported no effect on sleep, or if it was due to a small sample size.

Further studies could consider gathering data on the effects of ketamine preceded by flotation therapy on sleep. The survey revealed particularly high positive responses to questions on the quality of life, peace of mind, and effects on social relationships. It is unclear if these effects have a longer duration or more substantial effect than ketamine alone. The participants in this study ranged from individuals seeking treatment for mental illness to those searching for experiences in self-discovery. This indicates that this therapy could benefit a wide range of individuals positively. Further research should control for psychiatric history to determine if the effects of this treatment change based on the diagnosis.

Table 2:  
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Questions Theme	Percent Positive Response (Average)	95% CI	Percent Non-Positive Response (Average)	95% CI
Treatment Personally Meaningful	82.69	3.77	17.31	3.85
Changes in Outlook	80.77	4.35	19.23	4.44
Changes in Internal Running Commentary	75.00	3.77	25.00	3.85
Influence on Ability to Achieve Peace of Mind	90.38	7.22	9.62	7.36
Changes in Mood	80.77	7.54	19.23	7.69
Treatment Effect on Quality of Life	90.38	3.77	9.62	3.85
Treatment Effect on Understanding of Life's Meaning	70.83	14.14	29.17	14.43
Effect on Sense of Life's Purpose	66.67	20.61	33.33	15.71
Effect on Sense of What Makes Life Meaningful	72.50	14.70	27.50	15.00
Influence on Search for Meaning and Purpose in Life	75.00	5.66	25.00	5.77
Effect on Social Relationships	87.50	4.90	12.50	5.00
Effect on Quality of Sleep	45.45	0.00	54.55	0.00
Effect on Quantity of Sleep	40.91	5.14	59.09	5.25

## **LIMITATIONS**

Considering that the purpose of this study was to conduct a preliminary exploration into preceding ketamine by flotation therapy, this study has potential limitations. The sample size was relatively small. As a retrospective sample of volunteers, it did not have a control group to control the effectiveness of the individual therapies. In addition, the thirteen completed surveys had an average of 113 days since their SDFT/KI experience, with a range of 6 - 279 days, which could have influenced survey responses due to decreased recall. Many participants had received psychedelic treatments at one point in their lives; this could have introduced the mere exposure effect, where participants have a preference for the treatment simply because they are more familiar with it than the layperson. In addition, we were unable to identify if ketamine, flotation, or the combination of each of these treatments provided the benefits listed in the results of this paper. Future research could evaluate the timeframe until the effects of treatment are lost, dosing levels and frequency, and quantitative data rather than qualitative data.

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## **CONFLICT OF INTEREST**

No financial support was provided for the work on which the manuscript is based. The

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