



Correspondence



Letter to the editor: Are ketamine-induced subjective bodily experiences associated with antidepressant effects? A sensation of *floating* and a sensation of *lightness* are not the same – A comment on Acevedo-Diaz et al.

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Recently in this journal, Acevedo-Diaz and colleagues concluded in relation to a study of ours (Stocker et al., 2019) that their quantitative study with 82 participants suffering from treatment-resistant depression “does not support previous accounts from individuals’ qualitative reports [internet video testimonials] (Stocker et al., 2019) that sensations of lightness or floating during ketamine infusion were associated with relief of depressive symptoms” (Acevedo-Diaz et al., 2020, p. 283). In relation to *floating* after a ketamine infusion, the conclusions drawn by Acevedo-Diaz and colleagues are correct, as this sensation in their study did not mediate ketamine’s antidepressant effects at any measured post-infusion time point (neither up to 230 min nor one day after infusion). However, in relation to *lightness*, the conclusions drawn in the article of Acevedo-Diaz and colleagues are invalid for the simple reason that they did not measure this sensation (results involve a questionnaire item for “floating” and none for lightness).

In our qualitative study we included the following seven exemplary testimonials of depressed individuals reporting on experiences during and after the ketamine infusions (the full qualitative data can be found as supplemental material):

- (1) “After my first treatment I woke up the next morning and I had less heaviness in my throat and my chest. The heaviness that you feel on an ongoing basis saps your energy.”
- (2) “The weight was gone. The heaviness, the darkness, the weird, awful thoughts, the sadness – I had completely forgotten what it felt like.”
- (3) “I felt happy and light.”
- (4) “Bubbles are rising from the back of my neck ... all the pressure in my head just starts to feel light and normal again.”
- (5) “I kind of enjoyed the next few hours till dinner. I was still kind of floating on air.”
- (6) “I had this awkward weight that I carried around me wherever I went ... Literally I had the sensation of this steel armor that I wore my entire life ... [that] chunks of it were falling off.”

- (7) “I did immediately following the first session – and in the second and in the subsequent – feel a little bit of a lift to the weight on my chest. And if you suffer from depression I think you know what I’m talking about. You physically feel this turning in your stomach. It makes you physically nauseous ... I didn’t experience what I call my breakthrough session until it was my ninth ketamine session and it was so profound and I felt like I broke through so many emotional barriers that I was able to see things differently ... and during that time I was still progressively feeling lighter and lighter as each session went on.”

These examples make immediately apparent that subjective feelings of lightness/less heaviness and floating are not the same. To illustrate, examples like “less heaviness in my throat and my chest” (1) or “chunks of [this steel armor] were falling off” (6) cannot be considered as floating. Only one of the quotes above was related to floating: “still kind of floating on air” (5). When we reported that 27.4% (17 out of 62) of the individuals with depression spontaneously reported a sense of subjective lightness or floating, we collectively reported on lightness and floating, as these two concepts are semantically related; but this does mean that we suggested that lightness and floating are the same, as we have further elaborated in our article’s online supplement. While we did not mention it in our study, we might add here the crucial information that out of the 17 testifiers that reported ketamine-induced lightness or floating, only 2 (11.8%) reported floating, while the other 15 (88.2%) reported lightness.

Acevedo-Diaz and colleagues conceptualized floating as “a depersonalization SE (a subtype of the dissociative SE” (p. 280; SE = side effect). In contrast, we conceptualized lightness and floating as typical parts of “psychoactive-substance- or psychologically induced altered states of consciousness [ASCs]” (p. 182). While both conceptual frameworks – dissociation and ASC – can be applied to the sensation of *floating*, it is not clear (and an issue left unaddressed by Acevedo-Diaz and colleagues) if *lightness* could be fruitfully conceptualized in dissociative terms. In contrast, in ASC psychometrics not only the concept of

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floating (e.g., Shor, 1960, pp. 158–159; Studerus et al., 2010, p. 9), but also the concept of a sensation of general (bodily-unspecified) lightness (e.g., Abramson et al., 1955, p. 6) as well as a sensation of bodily lightness (e.g., Linton and Langs, 1962, p. 355; Hill et al., 1963, p. 185; Strassman et al., 1994) have long been measured as typical parts of an ASC.

At the outset of their article, Acevedo-Diaz and colleagues had high hopes for their hypothesis that floating mediates the antidepressant effects of ketamine: “the experience of floating could be further explored and validated as a predictor of treatment response that could minimize the need to expose patients to repetitive dosing and the associated risks of ulcerative cystitis ..., abuse ..., or neurotoxicity associated with high doses of ketamine in animal models” (p. 281). Acevedo-Diaz and colleagues’ results clearly show that these hopes for the experience of post-infusion ketamine-induced floating were not met in their study. However, the experience of ketamine-induced lightness could have the very same potential benefits as the ones that Acevedo-Diaz and colleagues envisioned for ketamine-induced floating. Furthermore, while floating can also be associated with negative emotions such as fear (Irwin, 1985) or negative sensations such as vertigo and dizziness (Kitahara et al., 2019), a sensation of bodily lightness is typically associated with positive feelings (e.g., Hamdi, 2015; Hartmann et al., 2021). Thus, floating and lightness might differ in terms of valence of the experience, which might be a crucial aspect for their possible mediating role in the antidepressant effect of ketamine. Additionally, the antidepressant potential of having experienced floating *during* the ketamine-induced experience should also be investigated (rather than focusing exclusively on post-infusion floating as Acevedo-Diaz and colleagues did) – since it has been shown for psychoactive substances other than ketamine that experiences *during* an ASC can have antidepressant benefits (e.g., Griffiths et al., 2016; Ross et al., 2016; Palhano-Fontes et al., 2018).

To conclude, we suggest that future studies should investigate potential antidepressant effects of ketamine-induced lightness and floating by measuring these two sensations separately, and by measuring them during and after the infusion (at several time points, e.g., every 15 minutes over 90 minutes).

Declaration of competing interest

We, the authors, received no external financial support for this study, and have no conflicts of interest or competing financial interests to report.

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