



## Exploring the transformative potential of out-of-body experiences: A pathway to enhanced empathy

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### ABSTRACT

Out-of-body experiences (OBEs) are subjective phenomena during which individuals feel disembodied or perceive themselves as outside of their physical bodies, often resulting in profound and transformative effects. In particular, experiencers report greater heightened pro-social behavior, including more peaceful relationships, tolerance, and empathy. Drawing parallels with the phenomenon of ego dissolution induced by certain psychedelic substances, we explore the notion that OBEs may engender these changes through ego dissolution, which fosters a deep-seated sense of unity and interconnectedness with others. We then assess potential brain mechanisms underlying the link between OBEs and empathy, considering the involvement of the temporoparietal junction and the Default Mode Network. This manuscript offers an examination of the potential pathways through which OBEs catalyze empathic enhancement, shedding light on the intricate interplay between altered states of consciousness and human empathy.

### 1. Introduction

*“My husband was working outside of the country. It was an unusual day as it was raining heavily. We really needed the rain. I put my children to bed with the usual bedtime stories and songs. I got into bed and was reading my book. I can never go to sleep without reading my book. I then found myself standing at the end of my bed. I was looking at me....the ‘Meatsuit’ .....sitting up....holding a book. My first thought was.... ‘that ....is not me!’ This is me! There was someone else standing behind me to my left. It was a Male energy. But at the time I didn't know who he was. He spoke to me ... telepathically... and said ... ‘Do you want to go on a fun-filled trip to the stars?’ I said ... ‘Yes!’ (I have no idea why). We began very slowly floating upwards. We went through the ceiling into the loft. I recognized everything in the loft. We then floated above the house. I remember thinking ‘Wow! It's raining and I'm not getting wet!’ Instead of thinking ‘How am I floating about my home?’ Then in an instant, I became part of the Universe. I felt connected to everything. Connected to everyone. I was completely surrounded by 100 % unconditional love. I have never felt that before! I did not want to leave! I could see my home. I could see my children asleep in their beds. I felt unconditional love for my babies. But ... I didn't want to leave where I was. I knew my children would be OK. What I didn't realize was it wasn't my choice to make. In an instant ... I was slammed back into my physical body. I felt like I weighed a thousand pounds! So, so, so heavy! I realized at that moment*

*that where I had been was our true Home. Not here. Not here on the Earth Plane. This is a place where we come to have experiences. To grow. To learn how to show LOVE. Then we go back.....HOME! To a place full of unconditional LOVE!”*

The excerpt above comes from an individual who perceived their consciousness as separated from their physical body—an out-of-body experience (OBE). This phenomenon can be defined as a subjective experience in which the person has the feeling of existence without a physical body (*i.e.*, disembodiment), usually accompanied by various phenomenological features, such as differing degrees of lucidity, realism, control of actions, anomalous cognition, emotional content, among others (Weiler, M., de Almeida, A.M. and Monti, M.M. 'Distinguishing Out-of-Body Experiences from Lucid Dreaming: a phenomenological analysis'. <https://doi.org/10.31234/osf.io/9f78v>) (Weiler, de Almeida and Monti). OBEs occur in roughly 15 % of the population (Blackmore, 1982; de Boer, 2020), and can manifest spontaneously, in life-threatening circumstances such as near-death experiences (Charland-Verville et al., 2020; Greyson, 1983), or be induced through sensory deprivation/stimulation, hypnosis, or psychedelic compounds (Juszczak, 2017; Hashimoto, 2020; Facco et al., 2019).

Importantly, the experiencer explains that the experience generated a change of perspective and purpose in life, that may subsequently have had a long-term impact on their relationships. As exemplified in the re-

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port, such experiences can be very profound, exerting a marked and lasting impact on individuals' lives, precipitating shifts in attitudes, heightened prosocial behavior, and even profound alterations in worldview beliefs (Sellers, 2019; Shaw, Gandy and Stumbrys, 2023). However, the relationship between OBEs and empathy remains a complex and understudied area. While some research suggests a potential connection between OBEs and enhanced empathy, the mechanisms underlying this relationship are not yet fully understood and more studies are needed to explore the extent of the effects of OBEs on empathy and to elucidate the underlying psychological and neurobiological mechanisms.

This manuscript embarks on an exploration of OBEs as transformative experiences capable of instilling and augmenting empathy in individuals who undergo them. We posit that this phenomenon arises from the dissolution of the ego, facilitated by the shift in perspective inherent in OBEs, thereby fostering a profound sense of unity and interconnectedness with others. Through a comprehensive examination of this mechanism, we aim to shed light on the potential of OBEs to nurture empathy and promote deeper connections among individuals. In conducting our literature search, we did not adhere to any specific guidelines.

## 2. OBEs as transformative experiences

Due to their strong impact on experiencers, OBEs have been classified within the more general categories of exceptional human experiences (Palmer and Hastings, 2013; Sagher, Butzer and Wahbeh, 2019; Brown, 2000), transformative experiences (Chirico et al., 2022), spiritually transformative experiences, or non-ordinary transcendence experiences (Sellers, 2019). These equivalent types of experiences are so impactful that they typically rank among life's most profound moments (Yaden et al., 2017).

The exploration of the process in which exceptional human experiences impact individuals' lives is traced back to the early 20th century with the renowned psychologist William James (James, 2023), and has been further developed by Rea A. White (White, 1994b) (White R.A., *Except. Hum. Exp. more we are: Except. Hum. Exp. Identit.-. 1994 1-13*Citation:White, 1994) and Suzanne V. Brown (Brown, 2000) decades later. According to their work, certain experiences act as 'seeds' (*i.e.*, starting points, initial catalysts, or triggers that set off or initiate profound spiritual or transformative experiences) that, under specific conditions, can sprout and evolve into an exceptional human experience (White, 1994b)(White R.A., *Except. Hum. Exp. more we are: Except. Hum. Exp. Identit.-. 1994 1-13*Citation:White, 1994). Given that OBEs involve a strong sense of detachment from the physical body—giving the experiencer the impression that the mind can exist independently from the body—, they usually fall within the 'anomalous' experience category (Brown, 2000). However, as White (1994a) astutely observed, the ontological reality of these experiences is not the central focus; rather, it is the profound impact they have on individuals' lives that warrants our attention (White, 1994a).

When these seed experiences are disregarded or overlooked, they remain dormant, mere fragments of memory that fail to blossom into something more profound. However, when these moments of significance capture our attention, they have the power to catalyze a transformative journey of self-discovery and personal growth. This process of diving deeper into the potential significance and meaning of these experiences is known as integration. This transition, from being dismissed to being recognized as an exceptional human experience, marks a significant shift in perspective leading to the acquisition of insights (Sagher, Butzer and Wahbeh, 2019). These experiences act as transitional moments, serving as a bridge between an old identity—disconnected, small, and seemingly insignificant—, and a potentially new one—who is spontaneously connected to everyone and everything else (White,

1994a). Consequently, the sense of self is no longer centered on the 'me' and is perceived more as a process than as a separate entity.

## 3. The impact of OBEs

OBEs are typically reported to have a profound impact on experiencers. They are often so impactful that individuals usually struggle to describe them, and commonly use words such as 'life-changing,' 'extraordinary,' 'ineffable,' 'mind-blowing,' 'benevolent,' and 'epic' to capture their essence (Shaw et al., 2023). To quantify, 55 % of individuals who had an OBE reported that their life was profoundly changed by the experience, 71 % described it as an encounter of lasting benefit, while an overwhelming 84 % expressed a desire to undergo it again; remarkably, 40 % of the subjects regarded it as the greatest event ever to occur in their lives (Gabbard, Twemlow and Jones, 1982).

Remarkably, OBEs can induce a shift in worldview, as the sensation of detachment from the physical body in OBEs is often perceived as 'more real' than reality itself (Twemlow et al., 1982). In this sense, an important characteristic of OBEs is their striking realism, evoking a profound conviction that the encountered reality surpasses the mundane experiences of everyday life. Consequently, individuals undergoing such experiences often convince themselves of their ability to exist independently of their physical form, entertaining the notion of survival beyond the cessation of bodily functions (Gabbard et al., 1982). Not surprisingly, OBEs are recognized for their ability to diminish the fear of death among those who undergo such phenomena (Shaw, Gandy and Stumbrys, 2023; de Foe, 2016; Bourdin et al., 2017). Approximately half of the individuals who have had OBEs report that 'because of the OBE, they now have some understanding of death' or 'because of the OBE, they live more intensely,' indicating shifts in metaphysical reflections on consciousness and perspectives on life and death (de Boer, 2020). Thus, OBEs have been viewed by those who experience them as 'turning points' in their lives, sometimes sparking a spiritual awakening or triggering a quest for meaning (de Boer, 2020), positively altering the subject's philosophy of life (Shaw et al., 2023).

Finally, a notable and persisting effect of OBEs, which is the main focus of the present paper, is a heightened understanding of interpersonal perspectives and increased awareness of thought processes, emotions, and habits (Sagher et al., 2019). Subjects often report becoming more attuned to the needs of others, exhibiting greater patience and compassion, while concurrently displaying less tolerance for negative behavior (Shaw et al., 2023). In terms of interpersonal relationships, the impact of OBEs is substantial: 54 % described their relationships with others as more peaceful and harmonious; 44 % claimed to have become more tolerant, amiable, and understanding; and 52 % claimed to have become more attached to their families (Tiberi, 1993). Relatedly, a standout effect of these experiences is the cultivation of increased prosocial behavior (Lindström et al., 2022), more specifically compassion, altruism, and empathy (Vieta et al., 2006). Practically, these effects become observable through the adoption of more inclusive language and a reduction in the use of third-person singular language among individuals who have undergone such experiences (Yaden et al., 2016).

## 4. From ego dissolution to oneness and empathy

The profound impact of an OBE likely stems from a key phenomenological characteristic that names the experience, *i.e.*, the disembodiment feeling. This sensation of disembodiment characterizing OBEs is likely at the root of the experience of loss of self, or ego dissolution (Chirban, 2000), which is a fundamental aspect of OBEs (Shaw et al., 2023; de Boer, 2020). In this sense, an OBE represents an exceptionally intense form of physical self-loss, as individuals feel literally severed from their physical selves (de Boer, 2020), and are suddenly faced with the remarkable feeling of existing without the constraints of their body.

Ego dissolution, in essence, denotes a phenomenological state described by those who have undergone a profound sense of losing their physical self, akin to a form of psychological death where one relinquishes their sense of identity. It is often vividly depicted in OBE testimonies such as ‘I couldn’t perceive any boundary whatsoever’ (de Foe et al., 2017), or ‘I awakened from the asleep egoic version of myself’ (Shaw et al., 2023). Notably, research indicates a direct relationship between the intensity of OBEs and the intensity of the ego dissolution experience (Martial et al., 2021).

Although no authors have yet articulated the probable mechanism by which OBEs exert notable effects on prosocial behaviors like empathy, we can draw parallels from the literature in the psychedelic and exceptional human experiences domain (Watts et al., 2017; Yaden et al., 2017). Researchers from these fields have suggested that the process through which an ‘anomalous’ or psychedelic experience leads to an enhanced connection with others involves different stages. The first one, termed ‘annihilational’, encompasses the dissolution of the bodily sense of self coupled with diminished self-boundaries and self-salience (Yaden et al., 2017). This component delineates the subjective sensation of bodily self-loss or the temporary dissolution of self-boundaries during such experiences. This shift in the sense of the physical self coincides with a decentering from or broadening of one’s identity, transitioning from perceiving oneself as primarily a separate, distinct individual to embracing a broader sense of self intrinsically linked to others and belonging to a larger collective entity (Vieten, Amorok and Schlitz, 2006).

The phenomenon of ego dissolution, known as drug-induced ego dissolution, has been extensively documented within the realm of psychedelic research (Blatchford, Bright and Engel, 2021; van Mulukom, Patterson and van Elk, 2020; Letheby and Gerrans, 2017; Stoliker et al., 2022). Drug-induced ego dissolution has been proposed to involve the disruption of subpersonal processes associated with the ‘minimal’ or ‘embodied’ self (Millière, 2017). ‘Minimal’ self refers to the fundamental experience of self, rooted in the integration of self-related stimuli across various sensory modalities. In other words, the ‘embodied’ self corresponds to the most basic sense of self, the pre-reflective representation that emerges from concrete sensorimotor experience, an individual’s immediate and direct experience of acting and perceiving in the present moment (Hafner et al., 2022). (This is to be contrasted with the ‘narrative’ self, which involves personal identity and continuity across time, through autobiographical memories and self-oriented cognition (Gallagher, 2000).) Key aspects of the ‘embodied’ self include body ownership, self-location, the first-person perspective, and the feeling of embodiment itself (Gallagher, 2000; Seghezzi, Giannini and Zapparoli, 2019), which, when disrupted, give rise to the phenomenon of ego dissolution often characterized by perceptual abnormalities, diminished bodily awareness, and disturbances in self-location within space and time (Millière, 2017). Notably, these phenomenological features closely resemble those of OBEs, and OBEs have also been related to a ‘failure’ in the interaction between lower-level (movement and balance) and higher-level self-processing (such as egocentric visuospatial perspective taking, agency, and self-location) (Blanke and Arzy, 2005). Not surprisingly, OBEs are commonly reported in psychedelic experiences (Fadiman and Kornfeld, 2013; Hashimoto, 2020; Juszczak, 2017), providing further evidence of the link between ego dissolution and OBEs.

Following the ‘annihilational’ stage, the decentralization of the self through ego dissolution gives rise to the second component of an exceptional human experience: the ‘relational’ component (Yaden et al., 2017). This facet pertains to the decreased feeling of isolation and alienation (Vieten et al., 2006) resulting from a profound sense of connectedness—sometimes extending to the point of experiencing oneness—with entities beyond the self, typically including other individuals and facets of one’s environment (Yaden et al., 2017; Garfield et al., 2014). This feeling of oneness, a measure of self-other overlap, leads in turn to empathic behavior because individuals feel more at one with the

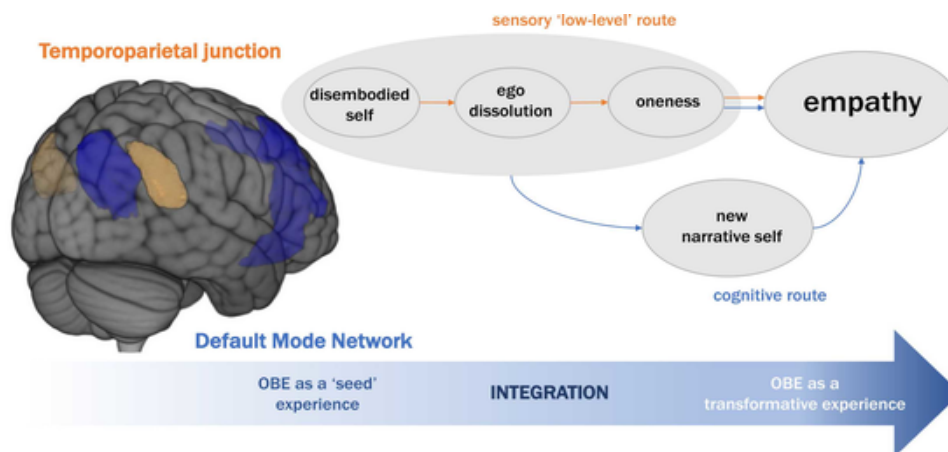
other and perceive more of themselves in the other (Cialdini et al., 1997). To have the capacity for empathy seems to require a certain amount of shared experience, and to adopt an empathetic perspective, one needs to try to view the world from the experienced perspective of the other (Paul, 2017). Empathizing entails using one’s imagination to fully engage with the circumstances of another, mentally stepping into their shoes (Bailey, 2022). For example, when empathizing with a recent widower, one might envision experiencing the loss of a spouse or loved one. The extent to which an empathizer recreates the other’s situation can vary, from a more superficial understanding to a deeper, more comprehensive one. Being empathetic entails not only merely picturing oneself in the other’s situation, but fully immersing oneself in the widower’s physical, historical, and psychological attributes (Bailey, 2022). In this context, it is important to put aside or inhibit one’s perspective, mental or affective state, and enhance that of the interacting other (Sowden and Shah, 2014). Undergoing a dissolution of one’s ego creates space to mentally inhabit someone else’s perspective. This shedding of one’s ego boundaries allows one to more fully immerse oneself in the experiences of others, facilitating a deeper understanding and empathy towards their situation.

Importantly, recent research has revealed that a crucial aspect of the transformation in behavior following an OBE also depends on making sense of the experience. De Boer et al. (2020) demonstrated that individuals who could make sense of the OBE through emotional processing, reading about OBEs, and discussing them with others, exhibited reduced levels of self-concept unclarity and anxiety (de Boer, 2020). Self-clarity is crucial for adapting to a new orientation in the world, serving as a center from which individuals perceive reality, define their beliefs, and establish their values. Therefore, it appears that the potential effects of OBEs on prosocial behavior are highly dependent on the subject’s ability to integrate the experience into a new framework of reality.

## 5. Potential neural mechanisms of prosocial behavior in OBEs

As noted above, embodiment, body ownership, self-location, and first-person perspective serve as fundamental pillars of bodily self-consciousness (Gallagher, 2000; Seghezzi, Giannini and Zapparoli, 2019). A substantial body of evidence has correlated the sensation of embodiment (Arzy et al., 2006), self-location, and first-person perspective (Ionta et al., 2011; Ionta et al., 2014), as well as body ownership (Limanowski and Blankenburg, 2016) with a specific brain region known as the temporoparietal junction (TPJ). The TPJ is a polysensory cortical area that converges somatosensory, auditory, and visual stimuli (Matsushashi et al., 2004; Grüsser, Pause and Schreiter, 1990; Bremner et al., 2002) and is involved in detecting intersensory conflict (Papeo et al., 2010). In addition, this brain area is associated with representing bodily spatial boundaries, including the distinction that separates one’s sense of self from the outside world (Newberg et al., 2001) and is implicated in mental own-body transformations (Blanke et al., 2005).

OBEs are experiences that ‘disrupt’ embodiment, body ownership, self-location, and first-person perspective (Blanke, 2012; Blanke and Arzy, 2005; Blanke and Metzinger, 2009). Not surprisingly, a significant body of evidence has linked the occurrence of OBEs to the TPJ. For instance, Blanke et al (Blanke et al., 2004) reported four neurological patients that had OBEs and damage or brain dysfunction at the TPJ, suggesting that OBEs stem from a ‘failure’ in this region to integrate multisensory information from one’s own body (Blanke et al., 2005; Blanke and Arzy, 2005; Lopez, Halje and Blanke, 2008). Furthermore, repeated induction of OBEs was achieved by focal electrical stimulation of the TPJ in a patient who was undergoing evaluation for epilepsy treatment (Blanke et al., 2002). Collectively, these findings may suggest that the TPJ plays a key role in representing bodily boundaries, distinguishing between self and nonself, and mediating the subjective sense of self-loss (Farrer and Frith, 2002), being critically involved in transformative experiences such as OBEs (Yaden et al., 2017) (Fig. 1).



**Fig. 1.** Schematic representation of the possible mechanisms involved in increased empathy following an out-of-body experience. The first pathway (in orange) involves the direct involvement of the temporoparietal junction (TPJ), a brain region implicated in OBE-like experiences. Alongside the posterior cingulate cortex and the medial prefrontal cortex, the TPJ is also part of a larger brain network called the Default Mode Network (DMN). The involvement of the DMN may play a pivotal role in the integration of the OBE, particularly in its cognitive aspect (in blue).

One of the aftereffects of OBEs is the feeling of being like a ‘sponge’ and having very ‘thin boundaries’ with others, which leads to empathetic and intuitive thoughts (Rabeyron and Loose, 2015). Findings in neuroscience research shed light on the concept of empathic behavior by underlining that mirror neurons, localized in many areas of the brain including the TPJ, are activated when humans attribute to one another mental states—when we reason about others, interpret, and predict their behavior (Saxe and Wexler, 2005; Saxe and Kanwisher, 2013; Van der Meer et al., 2011; Scholz et al., 2009). This high-level cognitive process is known as the theory of mind and is a necessary condition for empathy (Goldstein, Wu and Winner, 2009). In this context, it has been hypothesized that exceptional human experiences such as OBEs may be related to a hyper-activation of the mirror neurons, which leads to a higher degree of sensitivity and the feeling of being able to automatically detect the emotional states of others (Rabeyron and Loose, 2015). Within this framework, undergoing ego dissolution creates further space to mentally inhabit someone else’s perspective, enabling a fuller immersion in the experiences of others. Interestingly, fMRI experiments with psychedelic compounds have shown that the functional connectivity of TPJ also correlates with the intensity of the ego dissolution phenomenon (Tagliazucchi et al., 2016).

Nevertheless, there are occasions in social situations where individuals need to distance themselves from others, to control the tendency to imitate others’ actions and generate their independent actions (Sowden and Shah, 2014). These varying demands to inhibit or enhance the representation of self versus other for successful social interaction underscore the pivotal role of the ability to regulate or transition between neural representations attributed to oneself and others—referred to as ‘self-other’ control, which is also mediated by the TPJ (Sowden and Shah, 2014; Farrer and Frith, 2002). Pro-social behavior therefore depends on a delicate balance between maintaining a distinct sense of self and immersing in others’ perspectives.

Moreover, an extensive body of literature highlights the role of the TPJ in empathy itself. In an fMRI study testing the interaction between intergroup empathy and cross-cultural reactions to emotional pain, Korean participants displayed heightened empathy, exhibiting increased activity in the left TPJ compared to their Caucasian-American counterparts, particularly when observing emotional scenes involving racial in-group members (Cheon et al., 2011). Another investigation focused on participants viewing fearful and neutral human faces, with results indicating notable TPJ activation during their rating of emotional responses (Knight et al., 2019). Additionally, in a study where participants as-

sessed their clarity of emotions towards the main character in a cartoon, activations were found in areas such as the medial prefrontal cortex, TPJ, and temporal poles (Völlm et al., 2006). Remarkably, studies have also demonstrated that the responses to another person’s pain can be modulated by brain stimulation of the TPJ (Miller, Xia and Hastings, 2020; Coll, Tremblay and Jackson, 2017; Mai et al., 2016; Young et al., 2010). Lastly, the distinctive role of the TPJ has been observed in neuropsychiatric conditions that are known to present deficits in empathy, such as autism spectrum conditions and schizophrenia (Lombardo et al., 2011; Karpouzian-Rogers et al., 2021).

Taken together, these findings suggest that the TPJ appears to underpin functions that contribute to our sensory experiences of the material world—the physical aspects of the self, and our appreciation of internal mental and motivational states—the mental aspects of the self (Eddy, 2016). Given its unique position in these processes, the TPJ stands out as a candidate for mediating the effects of OBEs on ego dissolution and prosocial behaviors, such as empathy.

However, the TPJ model for empathy in OBEs should be cautiously approached for many reasons. Firstly, while virtual reality and brain stimulation experiments have provided insights into the neural mechanisms of OBEs, a significant limitation of these techniques is that they create experiences that are not realistic, fragmentary, distorted, and illusionary (Holden, Long and MacLurg, 2006; Neppe, 2002; Nicholls, 2012; Greyson, Parnia and Fenwick, 2008; Giesler-Peterson, 2008). Laboratories that induce OBEs artificially through brain stimulation (Blanke et al., 2002; Yu et al., 2018; De Ridder et al., 2007; Bos et al., 2016) and virtual reality (Martial et al., 2023; van Heugten-van der Kloet et al., 2018; Blanke, 2012) typically use the term ‘OBE’ to refer to any aberration regarding bodily perception, including the center of awareness being confined to a fixed location, an unsettling sense of confusion regarding body boundaries, and body ownership illusions rather than specifically indicating a sense of disembodiment characteristic of a ‘real’ OBE. In addition, experiences induced by such techniques are described as confusing and alarming, and perhaps most significantly, experiencers perceive the event as hallucinatory rather than veridical. In contrast, ‘real’ OBEs are experienced as exceptionally lucid, comforting, and profoundly real. Therefore (although research has shown that embodied virtual reality or full body ownership illusion can increase empathy (Bertrand et al., 2018)), it is also possible that OBEs induced by such techniques do not induce ego dissolution and prosocial behavior as effectively as ‘real’ OBEs.

A second limitation of adopting the TPJ as the neurobiological basis for OBEs is that others have failed to replicate the induction of OBEs following stimulation of this region. When applying repetitive transcranial magnetic stimulation over the right TPJ, [Daltrozzo et al. \(2016\)](#) found that none of the stimulation sessions induced OBE in any participant (the participants felt somatosensory tingling sensations in their arms or legs, twitching sensations in their body parts, and complete illusory movements of body parts) implying that there is no direct causal relationship between the right TPJ and OBE ([Daltrozzo et al., 2016](#)). Relatedly, lesions in the right TPJ do not consistently result in OBEs ([Fang et al., 2014](#)).

Relatedly, some studies suggested that other brain regions might be implicated in OBEs. [Smith and Messier \(2014\)](#), for instance, identified activations in regions such as the left supplementary motor area, supramarginal and posterior superior temporal gyri, the cerebellum, left middle and superior orbital frontal gyri when a participant induced OBE-like experiences at will inside the MRI ([Smith and Messier, 2014](#)). Likewise, [Hiromitsu et al. \(2020\)](#) found other brain regions associated with OBE-like experiences. In their study, they report a case of a 46-year-old patient who started to have such experiences after the development of a brain tumor in the posterior cingulate cortex ([Hiromitsu et al., 2020](#)). However, similar to studies using virtual reality and brain stimulation techniques, such studies should be approached cautiously, for their experiences exhibit phenomenological features distinct from ‘real’ OBEs. Specifically, in [Smith and Messier’s \(2014\)](#) study, the participant did not report feeling any specific emotions linked to the experience, nor did she experience a duality of body and mind (*i.e.*, disembodiment); instead, she was hyper-sensitive to her body, contrary to the usual experience in ‘real’ OBEs. Similarly, in [Hiromitsu et al.’s \(2020\)](#) study, the patient reported that she could not see her feet in the physical body, and the ‘parasomatic’ body could not move—once again, features not typically present in ‘real’ OBEs. Comparable findings were observed from studies of patients with epilepsy. In a study of OBE-like experiences associated with epileptic seizures, for instance, [Greyson, et al. \(2014\)](#) found that various patients reporting such experiences had predominant left temporal discharges, left central, bilateral temporal, bilateral frontal, and bilateral multifocal with left frontal predominance ([Greyson, B., Fountain, N. B., Derr, L. L. and Broshek, D. K. \(2014\) ‘Out-of-body experiences associated with seizures’, \*Front Hum Neurosci\*, 8, pp. 65..\)](#)

Another factor that challenges the role of the TPJ model for empathy in OBEs is the discovery that other types of experiences, which do not necessarily entail feelings of disembodiment, also enhance empathic behavior. Awe, for instance, an emotion elicited when individuals encounter vast and powerful stimuli beyond their understanding, fosters a sense of connectedness ([Jiao and Luo, 2022](#)). This, in turn, enhances empathic concern and prosociality ([Luo et al., 2023](#)). Therefore, while the sensation of disembodiment can contribute to feelings of connectedness and oneness, it is not the sole determinant of empathy; it appears that feelings of connectedness and oneness are crucial aspects of empathy.

Furthermore, research has also shown that the Default Mode Network (DMN), which includes the TPJ along with the medial prefrontal and posterior cingulate cortices, is diminished during exceptional human experiences, suggesting a potential involvement of this network in the subsequent effects of these experiences ([Woollacott, Shumway-Cook and Renesch, 2023; Woollacott and Shumway-Cook, 2020; Carhart-Harris et al., 2014](#)). The DMN is generally considered a distributed system for self-related processing activated when a person is left undisturbed, not focused on activities directed to the external environment ([Raichle et al., 2001](#)). During these ‘passive’ states, individuals engage in spontaneous cognition and experience mainly monitoring of the external environment and body state ([Gusnard and Raichle, 2001](#)), stimulus-independent thought ([Buckner et al., 2008](#)), problem-solving ([Binder et al., 1999](#)), retrieval and consolidation of past experiences,

and planning and preparing for the future ([Andreasen et al., 1995; Buckner and Vincent, 2007](#)). Such mental states are characterized by a substantial amount of self-referential thought, giving the DMN a special role in autobiographical memory and the feeling of being continuous in time ([Weiler et al., 2016](#)). For these reasons, the DMN is considered by many researchers the source of the ego ([Carhart-Harris and Friston, 2010](#)). However, in contrast to the ‘embodied’ or ‘minimal’ self, the DMN is thought to be involved in a ‘narrative’ self, which is shaped by the past and future in the diverse stories that we and others narrate about ourselves ([Gallagher, 2000](#)). With that in mind, researchers have argued that alteration of neural activity of the DMN is consistent with the decreases in self-referential processing (*i.e.* dissolution of a sense of self, likely related to an experience of unity) that accompanies exceptional human experiences ([Barrett and Griffiths, 2018](#)). With that in mind, the engagement of the DMN and its role in self-referential cognition would explain [de Boer’s \(2020\)](#) findings about the importance of integrating and making sense of the experience in the observed prosocial effects of OBEs ([Fig. 1](#)).

Finally, other mechanisms are likely to contribute to the prosocial effects of OBEs. [Yaden et al. \(Yaden et al., 2017\)](#) have suggested, for example, that neuropeptides such as oxytocin and vasopressin, along with changes in parasympathetic activity and vagal tone, could also be involved in the heightened self/other overlap seen following exceptional human experiences.

Taken together, this body of evidence suggests that the TPJ may play a role in ego dissolution and empathic behavior following OBEs, although the precise mechanisms remain unclear due to the simplistic phenomenology of experiences induced by brain stimulation and virtual reality. OBEs are phenomenologically complex experiences that likely involve other brain regions and networks. Further experiments are necessary to elucidate the brain signatures of OBEs and the loss of the ‘minimal’ or ‘narrative’ ego during such experiences.

## 6. Conclusion and future directions

Research suggests that OBEs can enhance pro-social behavior and empathy. We propose that this occurs through the process of ego dissolution, which follows the intrinsic feeling of disembodiment experienced in OBEs. The detachment from the physical body often leads to a sense of interconnectedness with all life and a deepened emotional connection with others during the experience. These sensations of interconnectedness can persist beyond the experience itself, reshaping the individual’s perception and fostering increased empathy, thereby influencing personal relationships and societal harmony. Importantly, however, we should emphasize that our conclusions are drawn from anecdotal evidence, as no study has investigated third-party corroboration of the OBEs’ self-report of the relationship between OBEs, ego dissolution, feelings of oneness, and interpersonal relationships. Future studies should prioritize addressing this question.

Given the implication of the TPJ in both empathy and OBEs, we suggest that this region may play a role (though not exclusively) in the connection between OBEs and empathy. However, on the one hand, the distinct phenomenology of OBEs induced by virtual reality and brain stimulation precludes us from fully understanding the mechanisms underlying all the aspects involved in such a phenomenon. On the other hand, working with spontaneous OBEs is also problematic for they occur randomly or are associated with uncontrolled conditions, hampering our ability to study the brain mechanisms underpinning them. Thus, an alternative way to explore the neural correlates of OBEs and their possible association with prosocial behavior would be to facilitate OBE occurrence in selected participants who can self-induce these experiences. Studying such individuals in an experimental context could be a valuable approach to gaining deeper insights into the phenomenology of these experiences, their neural mechanisms, and their after-effects such as increased empathy.

Interest in cultivating empathy and other prosocial emotions and behaviors is widespread worldwide. Understanding how virtues related to consideration for others can be nurtured is a goal with personal, societal, and potentially global implications. The exploration, refinement, and application of methods to enhance empathy in individuals—whether through OBE-related ego dissolution or other approaches—is an exciting avenue with potentially profound implications for individuals and society at large.

## Declarations of interest

none

## Uncited references

(Weiler, M., de Almeida, A. M. and Monti, M. M. 'Distinguishing Out-of-Body Experiences from Lucid Dreaming: a phenomenological analysis'<https://doi.org/10.31234/osf.io/9f78v>; White (1994))

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