On the Banks of the River Styx

New Perspectives on Terminal Lucidity and Other Near-Death Phenomena

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Chapter Six

Near-Death Experiences: A Glance Beyond the River Styx

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Abstract

This chapter explores the phenomenology, impact, and broader implications of near-death experiences (NDEs). These are subjective experiences that individuals sometimes report while they are close to death or in critical medical condition. We survey relevant literature from decades of academic research on these experiences, including explanatory models for their occurrence. In particular, we consider whether these experiences challenge strictly physicalist interpretations of consciousness, including the assumption that consciousness is solely a product of brain activity and ceases entirely at death. NDEs hold the potential not only to transform individuals who experience them, but also to influence societal perspectives on life and death, as well as our understanding of the nature of human consciousness.

Introduction

One of the most intriguing phenomena on the spectrum of end-of-life experiences is the near-death experience (NDE). NDEs have captivated scientists, philosophers, and popular audiences alike with their potential to reveal transcendent aspects of death and what may lie beyond it, as well as profound lessons on how to live a meaningful life. Importantly, along with other phenomena explored in this collection, NDEs may offer evidence for the potential independence of consciousness from the brain and its continuity beyond bodily death. These subjective and often mystical experiences are reported by some individuals who were physiologically (or sometimes only psychologically) close to death, including clinical death and subsequent resuscitation (Holden et al., 2009; Moody, 1975; Parnia et al., 2001; van Lommel et al., 2001). As indicated in the Introduction of this book, they therefore offer a glance

beyond the River Styx, the Greek mythological boundary between the lands of the living and of the dead.

While there is currently no clinical definition of NDEs, these experiences commonly feature feelings of peace and unconditional love, though some may be distressing (Greyson, 2023). Other typical features include a sensation of existing outside of one's body, heightened sensory perception, and an apparent awareness beyond physical circumstances, including encounters with deceased spirits, a sense of visiting a mystical realm, a review life, or witnessing events displaced in space and time (Greyson, 1983b; Moody, 1975; Zingrone & Alvarado, 2009). Certain features of these experiences—particularly corroborated reports of events and deceased individuals unknown to the experiencer—challenge prevailing materialist views that reduce consciousness solely to physical processes (Greyson, 2010a; Kelly et al., 2007).

Research interest in NDEs has burgeoned in the past five decades (Sleutjes et al., 2014), but reports of this phenomenon date back to antiquity, for example in the writings of Ancient Greek philosophers. An early autobiographical description of an NDE, along with a collection of similar accounts, was published by Swiss geologist Albert Heim in 1892 (translated into English by Noyes & Kletti, 1972). The English term "near-death experience" was introduced by psychiatrist Raymond Moody (1975), who identified 15 prominent characteristics commonly reported by more than 100 individuals he interviewed about episodes of proximity to death.

Universality of the Experience

NDEs appear to be universal experiences, occurring across a wide range of individuals who come close to death (Holden et al., 2009; Moody, 1975), with reports documented in diverse cultures across the world (Kellehear, 2009). Those who experience and report NDEs represent a diverse cohort with respect to age (Britton & Bootzin, 2004; van Lommel et al., 2001; for NDEs of children see Morse, 1994), sex (Greyson, 2003; Parnia et al., 2007), race (Greyson, 2003; McClenon, 2005), education or socio-economic status (Greyson, 1997), religion (McClenon, 2006), or sexual orientation (Dale, 2006). Although most NDE research has been conducted in Western populations (Greyson, 2003; Holden et al., 2009; Martial et al., 2024; Parnia et al., 2007; van Lommel et al., 2001), a growing number of studies from other cultures indicates that NDEs occur across cultures and often share common phenomenological features and psychological outcomes (Álvarez

et al., 2024; Fracasso et al., 2010; Nahm & Nicolay, 2010; Kellehear, 2009; Tassell-Matamua et al., 2018). Notably, there can also be subtle differences in the perception and interpretation of specific NDE features, and even impacts that may be influenced by culture, including religion and language (Belanti et al., 2008; Jahromi & Long, 2020; Tassell-Matamua et al., 2018). For example, in Iranian NDEs, the common element of encounters with religious spirits is preserved, but these figures are more likely to be culturally specific, such as Shia Imams (Jahromi & Long, 2020).

Medical Circumstances

In addition to the demographic diversity among individuals reporting NDEs, the medical circumstances that can lead to an NDE are also wide-ranging. These include surgery, cardiac arrest, childbirth, accidents or injuries, acute or chronic illness, drowning, suicide, violence (including military combat), among others (Greyson, 1986, 2001, 2003; Greyson et al., 2009; Moody, 1975; Parnia et al., 2001; van Lommel et al., 2001; Zingrone & Alvarado, 2009). In some cases, individuals have been pronounced clinically dead and were subsequently resuscitated, with the likelihood of an NDE increasing with proximity to death (Greyson, 2003). While there are typical NDE features, each experience is an idiosyncratic blend unique to the individual and their circumstances. Notably, research suggests that the nature of the medical event that led to the NDE may be linked to particular features. For example, NDEs resulting from sudden or unexpected events, compared to anticipated medical conditions, are more likely to include so-called "cognitive" features, such as a life review and distortion of time perception (Greyson, 1985).

Incidence

Estimates of how common NDEs are vary depending on medical circumstances and method of assessment, but these experiences are not rare and occur consistently in certain contexts. Prospective observational studies with cardiac arrest patients indicate that between 10% and 23% of these patient cohorts report an NDE (Greyson, 2003; Klemenc-Ketis et al., 2010; Parnia et al., 2001; Schwaninger et al., 2002; van Lommel et al., 2001). Two prospective multi-center studies of cardiac arrest found NDEs in 9% and 21% of survivors (Parnia et al., 2014, 2023; and a recent study with survivors of prolonged critical illness in the ICU estimated the incidence of NDEs in this population at 15% (Rousseau et al., 2023). Data from prospective studies in other con-

texts reveal even higher rates; for example, 26% among survivors of suicide attempts (Greyson, 1986).

Impact

Regardless of the scientific explanations of these fascinating experiences, some of which we will briefly explore later in this chapter, near-death experiencers (NDErs) tend to consider these experiences as real, deeply meaningful, and vividly memorable even decades after they happen (Greyson, 2007, 2022; Moore & Greyson, 2017). NDEs can lead to profound transformations in values, spirituality, relationships, and outlook on life (Greyson, 1983a; Greyson & Khanna, 2014; Long & Woollacott, 2024; Noyes et al., 2009; van Lommel et al., 2001; Woollacott, 2024). Specifically, NDErs report a greater sense of purpose, appreciation of life, self-esteem, compassion for others, desire to serve others, a focus on spirituality, as well as decreased materialistic attitudes (Noyes et al., 2009).

While many of the profound transformations reported by NDErs relate to how they live in the present and how they engage with their environments, some changes concern their perception of the boundary between life and death. One of the most prominent NDE impacts is a decrease in the fear of death, occurring in almost all cases described by Moody (1975), and subsequently documented in various studies using validated psychometric assessments (Greyson, 1992; Pehlivanova et al., 2023; Sabom, 1982). This decrease in fear of death seems to intensify over time (van Lommel et al., 2001), and is positively associated with the intensity/depth of the NDE (Bianco et al., 2024).

In addition to their association with a reduction of negative death-related attitudes, NDEs have also been shown to stimulate positive death-related attitudes, such as death acceptance and particularly the tendency to view death as a gateway to a pleasant afterlife. Among individuals who have had a near-death episode, those who experienced an NDE showed higher death acceptance than those who did not (Greyson, 2003; Pehlivanova et al., 2023). This effect may be attributable to the creation of a psychological association between death and positive feelings, which could be elicited by pleasant NDE aspects (Pehlivanova et al., 2023). Relatedly, many NDErs report a strongly heightened belief in life after death and the continuation of consciousness beyond death (van Lommel et al., 2001), and this shift has been hypothesized as a potential mediator in the relationship between NDEs and reduced fear of death (Moody, 1975).

Can (Neuro-)Physiological Explanations Adequately Account for NDEs?

From both psychological and spiritual perspectives, NDEs are powerful experiences due to their potential to deeply transform experiencers' lives and worldviews. Beyond their personal impact, NDEs also potentially hold significant implications for our scientific understanding of the mind-brain relationship and the nature of human consciousness, including the provocative possibility of the continuation of consciousness beyond death. As a result, various models have been proposed to explain the occurrence and features of NDEs in physiological terms, which is a reasonable approach given that NDEs are most commonly triggered by physiological events, such as severe illness or trauma. However, due to the wide range or proposed explanatory models, it is impossible to explore each in depth within the scope of this chapter.

Some authors have attempted to combine multiple physiological models to support the argument that NDEs are simply "the manifestation of normal brain function gone awry" (Mobbs & Watt, 2011, p. 447). This perspective, however, has been criticized for ignoring aspects of NDEs—such as veridical perceptions without sensory input or encounters with deceased individuals whose deaths were previously unknown to the experiencer—that cannot be explained by the mechanisms proposed (Greyson et al., 2012).

As research in this area evolves, new studies have proposed additional physiological explanations for NDEs (Chawla et al., 2009; Vicente et al., 2022). Notably, a recent review article that has garnered considerable attention attempts to integrate disparate evidence from various physiological models into a unified neuroscientific theory (Martial et al., 2025). In their synthesis, Martial et al. (2025, p. 2) specifically take a materialist perspective, stating "We have excluded dualistic theories from our discussion owing to the lack of empirical neuroscientific evidence and the fact that a fundamental tenet of neuroscience asserts that human experience arises from the brain."

Such initiatives are valuable, as scientists continue to investigate the (likely multifactorial) causes and implications of these experiences. However, we would like to raise concerns about the validity and completeness of Martial et al.'s (2025) proposed theory, focusing on several salient mechanisms they propose, while acknowledging that space constraints prevent us from addressing all of them and in depth. Many such concerns have been raised previously, and we encourage readers to consult with other book chapters

for a comprehensive treatment of this material, including perspectives that extend beyond materialism (Greyson, 2021; Kelly et al., 2007).

Theories related to changes in blood gases—specifically reduced oxygen levels and increased carbon dioxide levels—are among the earliest physiological models of NDEs. These theories are generally grounded in the association between cardiac arrest (a common circumstance of NDEs) and such physiological changes, or in the purported similarities of their impact with the phenomenology of NDEs. This reasoning is also endorsed by Martial and colleagues (2025) and these neurobiological changes constitute an initial stage in their cascade of physiological events proposed to trigger NDEs. However, empirical studies, including in cardiac arrest patients, show that patients who report NDEs tend to have either decreased or comparable carbon dioxide levels compared to comparison patients (Parnia et al., 2001; Sabom, 1982).

Some explanatory models have attempted to link NDEs to specific anatomical brain structures. Martial et al. (2025) argued that a preponderance of the evidence implicates the temporal lobe in the production of NDEs, citing studies involving electrical stimulation of the temporal lobe and those with patients with temporal lobe seizures. The authors referenced two studies to support the claim that activation of the temporoparietal junction (TPJ) may be responsible for OBEs (Arzy et al., 2006; De Ridder et al., 2007).

However, the purported OBEs reported in these studies differ significantly from OBEs commonly described in NDEs. In cases of TPJ activation, the center of consciousness remains inside the physical body, and perception of the environment occurs from the normal, internal-to-the-body visual perspective, rather than from the external vantage as reported in NDE-related OBEs. In addition, in TPJ activation, there is a sense of disembodiment without actually seeing a disembodied image, or, if seen, the disembodied image is static and does not move. In contrast, NDE-related OBEs often involve a mobile, disembodied center of consciousness that appears to move independently of the physical body (Greyson et al., 2008). Patients experiencing TPJ activation perceive the event as illusory, whereas those reporting NDEs describe the event as profoundly real (Greyson et al., 2008). Further challenging the claim that electrically induced bodily illusions are similar to spontaneous OBEs during NDEs are NDE cases in which individuals report veridical perceptions of events occurring at a distance, and later corroborated by external sources (Holden, 2009; Rivas et al., 2023).

In supporting the implication of the temporal lobe, Martial et al. (2025) also cited a study by Britton & Bootzin (2004), reporting that NDErs tend to have more subclinical temporal lobe epileptiform EEG activity and report more temporal lobe epileptic symptoms than matched controls without NDEs. However, a study with 100 epileptic patients with partial complex temporal lobe seizures show that none of the patients' experiences met standard criteria for a mystical experience, nor were they associated with the TPJ or any specific brain lobe (Greyson et al., 2015). Mysticism Scale scores were not significantly associated with seizure characteristics, including localization and type of seizures.

In the same sample, seven patients reported at least one seizure-associated experience involving a vague sense of being unaware of their bodies (Greyson et al., 2014). However, these patients did not differ from others in terms of seizure type or location. The one patient who reported a sense of exiting her body and visualizing her body from a disembodied perspective had a lesion that did not involve the TPJ.

Taken together, the conflicting evidence regarding temporal lobe involvement, including the phenomenological differences between disembodiment as reported by NDErs and that produced by temporal lobe stimulation or dysfunction, weakens the hypothesis that the temporal lobe may produce NDEs (Greyson et al., 2008; Greyson, 2021).

One of the more recent categories of physiological explanatory models relates to reports of brief spikes of electrical activity near or at the time of death. An early study proposed to support this theory, and cited by Martial et al. (2025), is a case series of seven patients whose life support was withdrawn as a result of serious illness (Chawla et al., 2009). None of the patients in this and other recent studies (Vicente et al., 2022; Xu et al., 2023) were reported to have any subjective conscious experience or behavioral observations suggestive of such—much less so the often hypervivid perceptions during of an NDE—that would correspond to these brief surges of electrical activity.

Martial and colleagues argue that the evidence presented in Vicente et al. (2022) and Xu et al. (2023) suggests an increase in functional activity across the brain in the human dying brain. Notably, neither of these studies involved patients whose hearts had actually stopped. Xu et al. (2023) monitored comatose patients after the withdrawal of mechanical ventilation, but cardiac activity persisted throughout the EEG monitoring period, and no signs of consciousness were observed (van Lommel & Greyson, 2023). Vicente et al. (2022)

reported a single case study of an elderly patient with severe brain damage, in whom cardiac activity also persisted for the entire duration of the cerebral electrical activity monitored via EEG. Furthermore, the patient had a number of confounding conditions that could have affected the EEG, including a recent traumatic brain injury and subdural hematoma. Importantly, there was no comparison recording of the patient's normal brain activity prior to his brain injury and unconsciousness, making it difficult to interpret the findings in context. Most critically, despite Vicente et al.'s (2022) claim that they were monitoring electrical activity "in the dying brain," the patient's heart was still showing normal cardiac activity at the time of the reported EEG changes. Although such studies provide food for speculation, they fall short of providing convincing evidence of coordinated brain activity after cardiac arrest (Greyson et al., 2022). As such, the hypothesis that such brain activity could explain NDEs remains highly speculative, if not implausible.

Veridical Perceptions During the Out-of-Body State

Regardless of their merits, these physiological explanations cannot adequately account for certain NDE features. Notably, many NDErs describe observing their bodies from a vantage point outside of them, during periods of unconsciousness, including under general anesthesia. These accounts sometimes involve witnessing events happening around their bodies or even at a distance. Examples include describing the actions, statements, or distinguishing features of medical personnel (including emergency resuscitation efforts; for a recent example see Woollacott & Peyton, 2021) or relatives waiting elsewhere in the hospital (for an overview, see Rivas et al., 2023).

While most of these accounts remain subjective, there are well-documented cases in which such reports have been corroborated by independent sources and witnesses (Rivas et al., 2023). Importantly, perceptions of events are reported as occurring in the absence of sensory input (e.g., visual, auditory) that could conventionally account for the perceptions, and the information could not have been deduced through inference—therefore precluding brain mediation and challenging purely brain-based explanations. Holden (2009) analyzed 93 published accounts containing such potentially verifiable reports of perceptions about events in the physical world perceived via non-conventional means. This detailed review revealed that 92% of the cases included evidence that the perceptions were accurate, and of those, 41% (38% of total) were corroborated by independent sources, typically medical

personnel and/or medical records (Holden, 2009, p. 197). More recently, Rivas et al. (2023) published the most extensive collection to date of veridical NDE perceptions. Strikingly, veridical visually-based perceptions have even been reported among blind individuals who have had NDEs (Ring & Cooper, 1997).

Holden (2009, p. 196) acknowledged that there may be a "file drawer effect," whereby NDE perceptions that are inaccurate are less likely to be published. Nonetheless, the existence of any corroborated accounts, especially those occurring during cardiac arrest and with concurrent EEG monitoring showing no cerebral electrical activity (Sabom, 1998), should cast serious doubt on interpretations that attribute the vivid and accurate perceptions during NDEs (or their occurrence) to residual electrical activity in the brain (Angeli-Faez et al., 2025; Greyson, 2010a; Kelly et al., 2007).

Some researchers have argued that the timing of NDEs cannot be ascertained, implying that they might occur either before or after cardiac arrest, rather than during it, when brain function is significantly compromised (Martial et al., 2025). However, corroborated reports of veridical perceptions occurring during a complete loss of consciousness serve as "time anchors," allowing researchers to infer the exact time of the NDE (Greyson, 2010a; Kelly et al., 2007, p. 419; van Lommel et al., 2001). This kind of "real time model" for NDEs is supported by additional arguments building on empirical findings and theory (Nahm & Weibel, 2020). Overall, such accounts provide evidence for the possibility that consciousness may function independently of the brain, violating a key tenet of physicalism (Greyson, 2010a; Kelly et al., 2007).

Veridical Perceptions Suggesting Continuity of Consciousness Beyond Death

Another intriguing NDE feature that poses a challenge to physicalist explanatory models is the occurrence of perceived encounters with deceased individuals, whose deaths were unknown to experiencers prior to the NDE, but were later confirmed (Greyson, 2010a, 2010b; Kelly et al., 2007; Nahm, 2011).

Reported encounters with deceased spirits are among the 16 core NDE features included in the NDE Scale (Greyson, 1983b), which is commonly used to characterize typical NDE features and provide a measure of NDE intensity. Approximately 40% of cases in the large NDE database maintained at the University of Virginia Division of Perceptual Studies include perceived encounters with deceased individuals, with published estimates ranging from 32% (van Lommel et al., 2001) to 52% (Greyson, 2003). These encounters with

deceased spirits are intriguing because they typically involve deceased relatives (Kelly, 2001), and are often perceived as emotionally significant—offering comfort, reconciliation, the chance to say goodbye or hello (after a long period of physical separation), or even warnings not to proceed further into the experience if one wishes to "come back" to life.

Because of the comfort these encounters may provide, along with religious or cultural influences and the hope of being reunited with deceased loves around or after death, this NDE feature has often been interpreted as a hallucination shaped by prior expectations. When examining different characteristics of these encounters and the NDEs that include them, such explanations may not be satisfactory (Kelly, 2001). Kelly analyzed a collection of NDEs including encounters with deceased spirits (detailing how this feature typically manifests) and compared them to NDEs without it. She concluded that some aspects of these cases may be consistent with both the expectation hypothesis and the hypothesis of the continuation of consciousness beyond death. For example, one notable finding was that individuals who are physiologically closer to death are more likely to report encounters with deceased persons. However, a significant portion of these encounters are unexpected—experiencers may meet deceased individuals they did not anticipate or hope to see, or even with unidentified deceased persons. Kelly interpreted these findings as evidence challenging the expectation hypothesis, suggesting that not all encounters with deceased spirits can be explained by prior beliefs or desires.

NDEs in which experiencers encounter a recently deceased person of whose death neither they nor anyone around them had any knowledge exclude the possibility that the vision was a hallucination related to the experiencer's expectations, and may bear most directly on the question of postmortem continuity of consciousness. Such NDEs include those in which the deceased person seen had died some time before the vision, although that death was unknown to the experiencer; those in which the deceased person seen had died at the time of, or immediately before, the NDE, thus not allowing any possibility for the experiencer to have learned of the death; and those in which the deceased person seen was someone whom the experiencer had never known. In some of these NDEs, the encounter suggests strong motivation on the part of the deceased individual to communicate a message, providing additional evidence for the ontological reality of deceased spirits (Greyson, 2010b; Kelly, 2001).

Among the varied phenomenology of NDEs, the most compelling evidence for a reality transcending materialism comes from reported veridical features of NDEs, such as perceptions without sensory input and information received from or about individuals perceived as deceased. While not every NDE features such potentially verifiable components, and corroboration can be difficult or even impossible, due to availability of witnesses, or the nature and timing of the reports (Holden, 2009), the existence of well-documented cases and the convergence of multiple lines of evidence remain significant and should not be dismissed (Holden, 2009; Kelly et al., 2007; Rivas et al., 2023). Although a post-materialist explanation of the full range of NDE phenomenology remains provocative and challenges prevailing scientific consensus—and the commonly proposed psychological and physiological theories—it warrants serious consideration in light of the accumulated research.

Does NDE Phenomenology Reflect the Dying Process?

Although NDEs occur in a variety of medical crises, many are reported in close proximity to death or even in documented cases of clinical death followed by successful resuscitation. This raises the intriguing question of whether these experiences may be intrinsic to the dying process itself. Although some physiological explanations attribute NDEs to electrical surges in the dying brain (Martial et al., 2025; Vicente et al., 2022; Xu et al., 2023), in our view, the evidence supporting this interpretation is strongly overstated, and fails to account for the full range of NDE phenomenology, including hypervivid cognition and veridical perceptions.

Regardless of potential physiological processes that may be associated with NDEs, it is intriguing that the well-documented phenomenology of NDEs parallels perceptual features reported in other end-of-life experiences. Among those are so-called "near-death visions," a phenomenon less thoroughly researched, primarily because it occurs shortly before death and with individuals who are actively dying (Kerr et al., 2014; see also Chapter 9 of this book). In these visions, which become more common as death approaches, the dying appear to see or interact with entities not physically present, typically deceased relatives, or to visit another realm—features also commonly reported in NDEs. Similarly to NDEs, these visions sometimes include deceased individuals whose death had not been known to the dying (Greyson, 2010b; Nahm, 2011).

However, a related class of experiences bears phenomenological resemblance to NDEs and occurs in cognitively healthy individuals at the time of another's death. In "shared-death experiences" (SDEs), individuals report a subjective experience of accompanying a dying person on their transition to death, whether in physical proximity to them (e.g., in the same room) or from a great distance (Shared Crossing Research Initiative, 2021; see also Chapter 10 of this book).

Academic research on SDEs is only in its infancy, and public awareness of their occurrence and phenomenology remains limited compared to widely known NDEs. Therefore, it is unlikely that individuals merely experience and report SDEs based on preconceived expectations about the dying process.

Implications

Why do NDEs matter? NDEs can change our understanding of human consciousness and even suggest the possibility that consciousness may continue beyond death. While this proposition is profound in science and humanity's ongoing search for the truth of our existence, it is also powerful in shaping how we live our lives. NDEs—especially intense ones—can redirect experiencers toward a more compassionate, less materialistic, and more spiritually-focused way of life. But what if NDEs can also impact society as a whole, especially in today's world in profound need of healing?

Merely learning about NDEs without having one can help individuals embrace more compassion and reduce fear of death (Foster et al., 2009). NDEs may also impact how we die, perhaps encouraging us to value quality of life over its mere prolongation, and to approach death not with fear, but with openness to the insights offered by these fascinating experiences at the boundary between life and death.

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