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Review Article

Endless Consciousness

Zoey Dolsen-Groh[a], Kathy Sexton-Radek[a]

For decades, researchers have looked at the phenomenon of near-death experiences, or NDEs for short. These experiences have been reported by individuals all over the world, happening at a time when conscious thought and sensation should not be able to happen. This paper reviews the history of NDEs and attempts to explain them using the most prevalent theories in the field today. By understanding NDEs, researchers and scientists would have the opportunity to understand human consciousness and what truly happens when we take our last breath.

Keywords: Consciousness; Near-Death Experiences

A woman's heart stops on the operating table due to an allergic reaction to the anesthetic. Rather than having no experiences she finds herself floating up toward the ceiling, seeing everything below, even her own body. She rises to another realm, and there she sees people who have long since passed away. She didn't want to go back, but was told that she hadn't completed what she needed to with her life, and with a sudden lurch she was back inside her body (Long, 2010). This is a true account of what someone experienced while they were pronounced dead. What this woman and many others have experienced is known as a near-death experience, or NDE for short. During these experiences consciousness seems to live on, at least for a little bit, after the body ceases to function. With thousands of testimonies and recent studies, many researchers are becoming convinced of life after death. The study of NDEs truly challenges what is known about death, and with an understanding of these unique experiences, scientists and researchers alike might have to fundamentally change the way we think about consciousness.

The term *near-death experience* was first coined in a book called *Life after Life* by Raymond Moody in 1975. Moody was first introduced to the idea of NDEs in 1965 when he heard the professor of psychiatry talking about how he was declared dead, but was resuscitated only to recall having experienced continued consciousness. Moody thought little of this until after he had received his Ph.D. and a student came up to him to tell him what his grandmother had experienced when she "died" during an operation. The story the grandmother told was very similar to that of his professor's years before (Moody, 1975). Moody set the foundation for future research of NDEs by examining the accounts of 150 individuals who reported similar experiences. NDEs are defined as a recollection of events that took place when someone was clinically dead (van lommel, 2010). Pim van Lommel, a cardiologist who has studied NDEs extensively, explains that NDEs take place during a special state of consciousness. No one has recalled the exact same experience, but a pattern of elements can be seen throughout the many different accounts that have been gathered. Usually an individual only experiences a couple of these elements, rarely all of them (see appendix A for the list of elements commonly seen in NDEs).

People from all around the world have reported NDEs (van Lommel, 2001). NDEs are not limited to people of a certain religion, social class, race, gender, profession, age, hometown or marital status. Prior knowledge of NDEs also is not a factor. However, cultural and religious backgrounds are important in understanding how people interpret and share what they experienced. In 1982, a Gallup poll concluded that about 5% of the U.S population has had a NDE (van Lommel, 2001). However, these numbers seem to fluctuate greatly throughout different studies, and since not all NDEs are reported it is hard to get an accurate percent. Current literature estimates that between 4-9% of the general population has experienced an NDE, while 5-23% of cardiac arrest survivors have reported one (Tassell-Matamua, 2014**)**. NDEs are experienced under extremely diverse circumstances, from cardiac arrests to meditation (a full list of circumstances appears in Appendix B). They have been reported both in people where brain functions are severely impaired and people where their brains were not impaired at all. As of right now, there is no explanation as to why some people have an NDE and others do not (van Lommel, 2001). The only clear correlation that has been drawn is that people who are younger are more likely to experience an NDE, yet anyone can have them at any age.

Elements of a Near-Death Experience

One of the most looked-at elements of NDEs is known as the out-of-body experience (OBE), where people perceive the world from outside their lifeless body. In a recent analysis of several hundred cases of NDEs, 48% of people reported seeing their physical bodies from a different perspective than usual (Greyson, 2010). The most common point from which people see their own body is on the ceiling. During this time it is impossible to communicate with others present in the room. Their range of vision can extend 360 degrees and is oftentimes described as being very detailed. Usually what is experienced is something verifiable (van Lommel, 2010). In a review of 93 reports, 43% were corroborated by doctors, nursing staff, or relatives. Another 43% were also corroborated, but these individuals were unable to be questioned. Only 14% of the cases were uncorroborated and relied only on the report of the individual who experienced the OBE. The reports were then determined accurate, containing some error, or completely inaccurate. It was found that 92% were accurate, 6% contained some error and only 1% were completely inaccurate.

There have been accounts of blind individuals having an NDE (Long, 2010). Not only do these individuals experienced the same elements that others do, but they also experience OBEs with vivid visual elements. It should be medically

a. Department of Psychology, Elmhurst College, Elmhurst, IL, 60126

impossible for these individuals to see, but there have been accounts of people experiencing sight for the first time during an NDE. Many individuals who are blind never have the opportunity to see the world. Some conditions are correctable by surgery, but oftentimes it takes individuals a while to become accustomed to sight. Those who have vision in their NDEs are able to understand the visual scene almost immediately. There is no medical explanation available for these accounts, yet these people report accounts of them seeing clearly. By looking at all accounts of NDEs, vision seems to be more vivid, "unearthly," comprehensive and more nonphysical. In fact, an increased function of all five senses has been reported when someone has an NDE. This is during a time where individuals should not have any sensory function at all. The fact that there is evidence of some people who have been blind their whole life finally being able to see puts forth strong evidence to show that maybe NDEs are not entirely produced by the brain.

Out of body experiences and other elements of NDEs raise some very interesting questions related to death and consciousness. By medical definition, patients having no cardiac activity, no respiration, and fixed dilated pupils are considered clinically dead, but, as pointed out by Christain Agrillo (2011), the definite moment of biological death is something that cannot be exactly determined. It is hard to mark the line between life and death and at exactly what point between them NDEs occur (Agrillo, 2011). Given that NDEs most likely occur during a time that physiological function is seriously compromised or even non-functional, NDEs challenge our idea what should normally happen if someone is dying or actually dead (Tassell-Matamua, 2014). In most states where NDEs occur, accurate, verifiable, and detailed descriptions of what was happening as they were dying should not be possible by any means. This leads many researchers to conclude that a lucid consciousness along with self-identity may be able to exist, temporarily, in the absence of detectable physiological activity in the body (Tassell-Matamua, 2014).

Events that Lead to a Near-Death Experience

Scientists and researchers currently believe that Electroencephalographs (EEGs) can be used to detect conscious experience. The two most common ways people experience NDEs are under general anesthesia or during cardiac arrest. EEG findings have shown that during anesthesia, all sorts of brain waves are compromised (Greyson, 2010). This means that any conscious awareness should be impossible. For example, specific gamma-type EEG rhythms that usually accompany conscious experience lost strength and became separated across the brain when the patients lost consciousness. Neurons stop responding to auditory or other stimuli (Greyson, 2010). In other words, the brain changes so drastically that vivid experience should not be able to take place.

When cardiac arrest happens, cerebral function shuts down within seconds. Even if the heart doesn't completely stop, blood flow and oxygen uptake in the brain plummets to near zero. Full cardiac arrest involves three major clinical signs of death including absence of cardiac output, absence of respiration, and finally absence of brainstem reflexes (Greyson, 2010). NDEs have been reported under these conditions, with no EEG activity indicating consciousness. The hippocampus, which is thought to be very important for memory formation, is vulnerable to the effects of hypoxia. Despite this, individuals who have an NDE during cardiac arrest are still able to form memories of the experience (Greyson, 2010). In fact, during an NDE, people's mental processes are described as being exceptionally clear and their sensory experiences are vivid, sometimes even surpassing those of their normal conscious state.

Scientific research has shown that NDEs are not exclusive to adults (Long, 2010). The most common events that lead to an NDE in children are near-drowning and a coma following head trauma. There have also been cases of children who received anesthesia for a tonsillectomy experiencing an NDE. The content of a child's NDE is very similar to that of an adult; however, it usually contains fewer elements. The experience is a positive one for many, with individuals reporting a loving environment, an encounter with a kind being or angel, a sense of peace, and often an out-of-body experience (Long, 2010). Some children even report seeing deceased grandparents. Radiation oncologist Jeffrey Long, creator of the Near Death Experience Research Foundation, has gathered hundreds of accounts of NDEs. His research is largely based on the testimony of adults, but he has found about 26 accounts from children age 5 and below. Long was able to conclude that age does not affect the content of NDEs. NDEs of children seem to show that NDEs are not influenced by pre-existing cultural influences, beliefs or life experiences which shows that they are not just made up. Long and many others have concluded that NDEs are real, and worth studying.

Life Changes After a Near-Death Experience

Having experienced a NDE, many people are reluctant to tell others about what happened to them. This often stems from a belief that their stories won't be believed. There have been accounts of individuals telling their doctors about their experience only to have the doctors say they should seek psychiatric help (Long, 2010). Individuals do eventually tell their story to very close family members or loved ones. The great majority of people report that their life changed significantly from the experience, usually in a positive way. For example, people have reported becoming more religious or spiritual, having a belief in the sacredness of life, and becoming more aware to the needs of others (Long, 2010). Changes in employment and life goals are also reported. Some other things many individuals experience are a greater appreciation for life, less general anxiety and have a greater "thirst" for knowledge (Tassell-Matamua, 2014). Often, people report that the experience has given them new insight into the meaning of life. Right after the experience, others question their own sanity and often feel confused about what happened, especially after no one validates what they went through as being true. These more negative emotions can stay with an individual for some time after the initial experience. The NDE itself seems to be critical in effecting these psychological changes, since studies have shown more psychological changes being reported by those who have a life-threatening encounter accompanied by an NDE compared to those who just have a life-threatening encounter (Tassell-Matamua, 2014).

Explaining Near-Death Experiences

Many theories have come up to try to explain NDEs, but they can generally be separated into two camps (Agrillo, 2011). In-brain theories which state that NDEs occur in the brain seem to support monism, or the idea that there is no division between the mind and the brain. Out-of-brain theories support a dualist argument, in which the mind is separate from the brain. The key point to consider is not whether something can survive biological death, but whether NDEs can be explained by processes that occur in the brain (Agrillo, 2011). According to some scientists, NDEs can be explained by physiological changes in the brain. Others, however, state that the physiological factors alone cannot explain the phenomena.

The processes in the brain, to a certain extent, may play a role in NDEs. NDE-like experiences can be induced through an increase in carbon dioxide levels, or, in those who have epilepsy, electrical stimulation of some parts of the cortex. Experiences like that of an NDE have also been reported after the use of drugs like ketamine, LSD, or mushrooms. Most of the time, these induced experiences result in a period of unconsciousness, but they can also sometimes include the perception of light, sound, or recollections from the past. However, these experiences are very different from those of an NDE. An element that is often included in an NDE is the panoramic life-review, in which a person sees a review of their personal history.The recollections experienced by the use of drugs, or electrical stimulation, are fragmented and random memories. These induced experiences also do not make an individual more positive, or have other life-changing feelings nearly as often as an actual NDE (van Lommel, 2006).

Dean Mobbs and Caroline Watt (2011) are two researchers who believe that all elements of an NDE can all be explained by physiological changes in the brain because many of them can be reproduced some other way. Many medicinal and recreational drugs can mirror the emotions felt during an NDE by interacting with opioid and NMDA receptors in the brain, and it has been shown that these systems become active naturally when animals are in extreme danger (Mobb & Watt, 2011). Out-of-body experiences can be reproduced by stimulating the right temporoparietal junction in the brain, but Mobb and Watt also related them to sleep paralysis which is associated with vivid auditory, visual, or tactile hallucinations (Mobb & Watt, 2011). In sum, out-of-body experiences and disconnection with the physical body could arise because of a breakdown in multisensory processes. Expectations and false memories could play a role in how people interpret what happened during an extremely stressful and difficult-to-process event. To Mobb, Watt, and many others who believe in an in-brain explanation for NDEs, the discussion about NDEs needs to move beyond theological dialogue and into the realm of testable neurobiology.

There are other researchers who believe that NDEs cannot be fully explained by the processes that occur in the brain (Agrillo, 2011). Some of the biggest pieces of evidence for this theory are the mental clarity and vivid imagery that occur when any form of consciousness should be impossible according to EEGs, and the clear memories that follow this state. Moreover, expectation alone doesn't explain what people experience (Agrillo, 2011), as people who are dying would surely want to imagine themselves with their family or people they know. However, a majority of people who had visions of seeing other people in their NDE report seeing people that they are merely acquainted to, or people they don't even know (Greyson, 2010).

It can be concluded from both of these theories that NDEs have scientific, theological and philosophical implications. The incidence of this phenomenon across all age groups and many different cultures has raised questions regarding the biological and psychological nature of these experiences (Agrillo, 2011). From looking at out-of-brain theories related to NDEs, a new way of looking at consciousness emerges (refer to Appendix C for a summary of the theories). Continued debate about NDEs and the mind has paved the way for some researchers and scientists to come up with a manifesto for a post-materialist science (Beauregard et al., 2014). Materialism is the idea that matter is the only reality. Many of these individuals believe that the materialistic focus in science today cannot account for the increasing amount of empirical evidence that has surfaced in the domains of consciousness and spirituality. The studies of NDEs fall into these domains, and directly show that the mind might not necessarily be produced by the brain (Beauregard et al., 2014), making it very hard to explain NDEs with a strictly materialistic view of the world.

Major Studies

There have been two major studies that looked at NDEs within the last 20 years. Pim von Lommel, Ruud van Wees, Vincent Meyers and Ingrid Elfferich (2001) conducted a study between the years of 1988 to 1992. They looked at patients who were successfully resuscitated in ten Dutch hospitals. In order to code individuals' experiences, the weighted core experience index was used to code for the different elements people experienced. The score ranged from no memory of the experience to very deep NDEs. Different aspects of the individual were also recorded such as sex, age, religion, and if they have ever heard of NDEs. There was also a two-year follow up from when the individuals received CPR, which included a taped interview and a life-change inventory. The control group consisted of individuals who were also resuscitated, but did not experience an NDE. In total there were 344 people who participated in the study, who altogether had 509 resuscitations. Out of all these individuals, 18% had experiences ranging from recollection of the time of clinical death to very deep NDEs. It was found that no medical, pharmaceutical, or psychological factor affected the frequency of NDEs. Those who had experienced an NDE had positive life changes, while those without an NDE did not report any.

Another more recent study was conducted by Sam Parnia and colleagues in 2014. Parnia et al. (2014) recruited 15 US, UK, and Austrian hospitals. Between July of 2008 and December of 2012, the researchers enrolled the first group into the study. They were specifically looking at NDEs in people who had cardiac arrest. They defined cardiac arrest as the cessation of the heartbeat and respiration. The interviews took place before the individual was discharged from the hospital, which ranged from a couple days to a few weeks after their NDE. To assess the accuracy of the claims of visual awareness, each hospital installed between 50 to 100 shelves in areas where cardiac arrest resuscitation seemed the most likely. On these shelves there were pictures of objects that could only be seen from above. There were three stages of

interviews. In the first stage, people were asked demographic questions and general questions relating to their awareness of the resuscitation. Stage two evaluated the participants' experiences and were either labeled NDEs or not. Only some individuals were asked to complete a stage three interview, in which the interviewer asked more in-depth questions about the auditory and visual recollections they had. There were 330 survivors of cardiac arrest that were interviewed for this study. Out of these individuals only 140 were deemed eligible to participate in the study. From the 140 individuals, 101 went on to complete stage two interviews. 55 of the 101 patients said they had awareness or memories of their resuscitation. However, 46 of the described memories were not compatible with an NDE. Nine out of the 101 patients did have an experience compatible with NDEs.

Parnia and colleagues concluded that about 10% of the patients their interviewed had a NDE. Over 78% of the cardiac arrests took place in the rooms they had not added the shelves and the images. 22% did take place in the rooms that had the shelves and images, but no one recalled any NDEs. One patient was able to give an account of a visual experience that was later corroborated by the individuals in his room at the time. This is evidence that these accounts are not hallucinatory or illusory in nature. From these two studies, people have been interviewed about their experiences and what they might have saw at a time where they were very close to death. By studying NDEs, it is shown that many individuals have had very similar experiences at a time where consciousness should either be seriously impaired or nonexistent.

Near-Death Experiences and Consciousness

Much more research needs to be done in studying NDEs. The current research is showing that NDEs are not fabrications and should be taken seriously by the scientific community. Future research should definitely focus more on the precise nature of death and what that means for the brain. Once the nature of death is understood more, scientists will be able to use specific markers that could potentially show that there really is no brain activity that could account for NDEs. As more research is conducted, hopefully more scientists and researchers will begin to see that these studies of NDEs *do* show something that is beyond the current, accepted views of materialism. In his book, *Consciousness Beyond Life*, Pim van Lommel (2001) proposes a theory that states that NDEs are evidence for endless or nonlocal consciousness. This means that our brain facilitates, rather than produces, our experience of consciousness. The experience of this special state of consciousness is very different from that of waking consciousness, which is just one part of nonlocal consciousness. Waking consciousness is experienced via the body, but nonlocal consciousness does not have a biological basis. Instead, nonlocal consciousness has its roots in nonlocal space. With this theory, consciousness not only transcends the body, but it also transcends time. During our life, we have a body and we are conscious. Free from our body, at the time of death, we are still capable of having conscious experiences. The research that has been done on NDEs show that consciousness can be experienced independently of the body and also without any brain function. There are way more questions than answers relating to NDEs, but by looking at the current research, scientists must seriously consider the idea that maybe death is a mere passing from one state of consciousness into another (van Lommel, 2001).

Conclusion

The modern scientific worldview is based on the assumptions of classical physics. During the 19th century, a belief system known as "scientific materialism" emerged (Beauregard et al., 2014). This belief system implies that the mind is nothing more than the physical activities of the brain. This way of thinking has been seen greatly in academia, some claiming it is the only rational way to look at the world. However, this way of thinking has hindered our ability to study the mind and spirituality (Beauregard et al., 2014). Those leading this manifesto made the claim that science is supposed to be all inclusive. It should be an open-minded method used to acquire knowledge. The methodology that should be used is not synonymous to materialism, and should not be tied to a particular belief pattern as it is now. Data that does not fit into the popular theory should not be forgotten, or dismissed because of its ambiguous nature. A post-materialist science seeks to expand the human capacity for understanding things that are fundamental to human existence, such as the mind and consciousness. Abnormal findings in the field of science offer us the chance to modifying theories or replace them with new insights that can potentially offer an explanation (van Lommel, 2001). The empirical studies of NDEs currently challenge the scientific views of consciousness. It goes against a lot of science and literature to accept that consciousness continues after death. However, the possibility could fundamentally change our view of death, because maybe instead of marking the end of life, it could simply be a new beginning.

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Appendix A

Table 1
Recurring Features of NDEs in the Literature

No.	Feature	Example from *Life After Life* By Raymond Moody
1.	Ineffability	"Now, there is a real problem for me as I'm trying to tell you this , because all the words I know are three -dimensional."
2.	Hearing the News	" I heard a woman who was there say, 'Is he dead?' and someone else said, 'Yeah, he's dead.'"
3.	Feelings of Peace and Quiet	"The day was bitterly cold, yet while I was in that blackness all I felt was warmth and the most extreme comfort I have ever experienced. "
4.	The Noise	" I began to hear music of some sort , a majestic, really beautiful sort of music."
5.	The Dark Tunnel	" I felt like I was riding on a roller coaster train at an amusement park, going through this tunnel at tremendous speeds. "
6.	Out of Body	" I couldn't understand it, but I looked at my own body lying there on the bed."
7.	Meeting Others	"Several weeks before I nearly died, a good friend of mine, Bob, had been killed. Now the moment I got out of my body I had the feeling that Bob was standing there, right next to me."
8.	The Being of Light	"Everything was very black, except that, way off from me, I could see this light. It was a very, very brilliant light, but not too large at first."
9.	The Review	"And that is when all these flashbacks started... all of a sudden, I back in my early childhood."
10.	Border or Limit	" I was asked if I wanted to die. I didn't know, since I knew nothing about death. Then the light said, 'Come over this line and you will learn.'"
11.	The Effect on Life	" But after this thing happened to me, I wanted to learn more." or " Following this experience, it almost seemed as if I were filled with a new spirit."

Appendix B

Table 2
Circumstances that Promote an NDE (van Lommel, 2001)

Brain Function Seriously Impaired	Brain Function Unimpaired
1. Cardiac Arrest 2. Coma cause by brain damage after a traffic accident or brain hemorrhage 3. Coma caused by near drowning 4. Coma cause by diabetes, asphyxia or apnea 5. Coma caused by failed suicide attempt or intoxication 6. Unconsciousness caused by low blood pressure during or after a surgery, an allergic reaction, or a serious infection 7. Under general anesthesia 8. Electric Shock	1. Serious, but not life-threatening illness, with a high fever 2. Isolation, extreme dehydration or hypothermia 3. Depression 4. Meditation 5. Almost having an accident (ie a car accident)

Appendix C

Table 3
Theories trying to explain NDEs (Agrillo, 2011)

"In-brain" Theories	"Out-of-brain" Theories
1. NDEs are a result of a dying brain 2. Deepers structure of the brain may still be active even though the EEG is flat 3. Similar experiences can be found with brain stimulation or use of drugs 4. If people are able to recall the experience, then some structures of the brain must be active 5. People could be having false memories about what they actually experienced 6. People are having hallucinations	1. There is no brain activity that is specific to having conscious experiences 2. There seems to be more to the actual NDE than the events that can be stimulated (ie how the people feel) 3. Some people have visions with people they do not know 4. There have been cases of blind people having NDEs and reporting visual experiences 5. Cardiac arrest often leaves people with memory impairment about the event 6. Enhanced mental clarifty when there is serious cerebral impairment