



Development of the Italian Version of the Near-Death Experience Scale

Francesca Pistoia^{1*}, Giulia Mattiacci¹, Marco Sarà², Luca Padua^{3,4}, Claudio Macchi^{5,6} and Simona Sacco¹

¹ Neurological Institute, Department of Biotechnological and Applied Clinical Sciences, University of L'Aquila, L'Aquila, Italy, ² Post-Coma Intensive and Rehabilitation Care Unit, San Raffaele Hospital, Cassino, Italy, ³ Don Carlo Gnocchi Onlus Foundation, Milan, Italy, ⁴ Department of Geriatrics, Neurosciences and Orthopaedics, Università Cattolica del Sacro Cuore, Rome, Italy, ⁵ Don Carlo Gnocchi Foundation, Istituto di Ricovero e Cura a Carattere Scientifico, Florence, Italy, ⁶ Department of Experimental and Clinical Medicine, University of Florence, Florence, Italy

Near-death experiences (NDEs) have been defined as any conscious perceptual experience occurring in individuals pronounced clinically dead or who came very close to physical death. They are frequently reported by patients surviving a critical injury and, intriguingly, they show common features across different populations. The tool traditionally used to assess NDEs is the NDE Scale, which is available in the original English version. The aim of this study was to develop the Italian version of the NDE Scale and to assess its reliability in a specific clinical setting. A process of translation of the original scale was performed in different stages in order to obtain a fully comprehensible and accurate Italian translation. Later, the scale was administered to a convenience sample of patients who had experienced a condition of coma and were, at the time of assessment, fully conscious and able to provide information as requested by the scale. Inter-rater and test–retest reliability, assessed by the weighted Cohen's kappa (K_w), were estimated. A convenience sample of 20 subjects [mean age \pm standard deviation (SD) 51.6 \pm 17.1, median time from injury 3.5 months, interquartile range (IQR) 2–10] was included in the study. Inter-rater [K_w 0.77 (95% CI 0.67–0.87)] and test–retest reliability [K_w 0.96 (95% CI 0.91–1.00)] showed good to excellent values for the total scores of the Italian NDE Scale and for subanalyses of each single cluster of the scale. An Italian Version of the NDE Scale is now available to investigate the frequency of NDE, the causes for NDE heterogeneity across different life-threatening conditions, and the possible neural mechanisms underlying NDE phenomenology.

Keywords: near-death experiences, coma, vegetative state, minimally conscious state, locked-in syndrome

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*Correspondence:

Francesca Pistoia
francesca.pistoia@univaq.it

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INTRODUCTION

The near-death experiences (NDEs) have been traditionally defined as “any conscious perceptual experience occurring in individuals pronounced clinically dead or who came very close to physical death” (Moody, 1975). More recently, NDEs have been better characterized as “a profound psychological event including transcendental and mystical elements, typically occurring to individuals close to death or in situations of intense physical or emotional danger” (Greyson, 2000). Almost one in four persons who survive a critical injury and between 4 and 9% of the general population experienced an NDE (Cant et al., 2012). Main features of the NDEs include out-of-body experiences, peaceful feelings, and transcendental or mystical experiences. Specifically, out-of-body

experiences are characterized by a sensation of self-visualization from a position of height while transcendental or mystical experiences imply an apparent passage of the consciousness into a foreign dimension. The phenomenology of NDEs has been reported with sufficient consistency to consider them not as a cultural phenomenon but as a phenomenon with specific scientific features and underlying neural mechanisms. In fact, although no specific features have been universally described by all NDE experiencers, there are numerous cases of apparent correlations between specific NDEs features and circumstances in which the NDEs occur (Lake, 2017). All these observations prompted the diffusion of several studies investigating the frequency and relevance of NDEs, the causes for NDEs heterogeneity across different life-threatening conditions, and the possible neural mechanisms underlying NDEs phenomenology (Charland-Verville et al., 2014; Lake, 2017). Biological, psychological, and transpersonal models have been proposed to explain NDEs contents but there is still no consensus on a single unifying model (Lake, 2017).

The most widely used tool to assess NDEs as a unitary phenomenon is the Greyson NDE Scale (Greyson, 1983). However, it is available in the original English version only, which cannot be used in Italian patients because of intercultural differences and possible misunderstandings.

The objective of the present study was to develop and validate an Italian version of the NDE Scale in order to make it available for NDEs research.

MATERIALS AND METHODS

Description of the NDE Scale

The NDE Scale has been derived by a previous questionnaire including 80 manifestations commonly described in the phenomenological literature of NDEs. Among these 80 manifestations, the 40 items most commonly reported were selected. A later analysis led to the exclusion of further seven items because of their redundancy or ambiguity, with the remaining 33 items being reworded into questions with 3-point-scaled answers, to allow the scoring of each item as definitely present, questionable or atypical, and definitively absent (Greyson, 1983). This preliminary 33-item questionnaire was administered to 67 subjects in two times in order to assess internal consistency and test–retest reliability. The final NDE Scale resulting from this process included 16 questions grouped into four psychologically meaningful clusters: the cognitive cluster, the affective cluster, the paranormal cluster, and the transcendental cluster. For each item, the scores are arranged on an ordinal scale ranging from 0 to 2 (i.e., 0 = “not present,” 1 = “mildly or ambiguously present,” and 2 = “definitively present”) (Greyson, 1983; Lange et al., 2004). The final English scale is shown in **Table 1**.

This scale has been used in several studies investigating the prevalence of NDE in different populations. No studies have been carried out in the Italian population probably due to the lack of an Italian version of the scale.

Development of the Italian Version of the NDE Scale

The following protocol was used to develop an Italian version of the NDE Scale:

- (a) Three authors belonging to the research group completed three separate translations of the scale.
- (b) A back translation of a selected version was made to check for any errors occurred during the original translation.
- (c) The most accurate Italian translation was selected within a consensus meeting, with special attention being paid to the consistency of the new scale to the original one.
- (d) A final back translation of the agreed Italian version was made as a further check.

The final Italian scale is shown in **Table 2**.

Assessment of Reliability of the Italian Version of the NDE Scale

A convenience sample of 20 patients was included in this study. Patients were recruited from Acute Inpatient Rehabilitation Units of the San Raffaele Hospital, Cassino, Italy and Don Gnocchi Foundation, Firenze, Italy. Inclusion criteria were the following: age > 18 years; Italian nationality; experience of a condition of coma in the last 5 years as a result of a severe brain injury; and good cognitive status at the time of the assessment as established by the Level of Cognitive Functioning Scale (Level 8) (Gouvier et al., 1987). Patients with previous/concurrent severe neurological or psychiatric diseases or taking Central Nervous System acting drugs at the time of the interview were excluded from the study. Diagnostic reliability across raters (inter-rater reliability) and ratings (intra-rater reliability) was investigated as follows: the Italian Version was administered to all the included patients by two health care professionals in the same day. The two raters independently assessed each patient and recorded both total scores and single-item subscores. Each rater was blinded with respect to the information collected by the other rater. After 2 weeks, a second evaluation by the first rater was made in order to estimate test–retest reliability. In the case of patients with locked-in syndrome (LIS), in whom the only movements preserved are blinking and vertical eye movements, the clinical interview was made by means of an eye-coded channel as usually it occurs in these patients. Main anagraphical and clinical data of all the patients were also collected. This study was approved by the Internal Review Board of the University of L'Aquila (Approval number 01/2018) and carried out in accordance with its recommendations.

Statistical Analysis

Descriptive statistics were reported as mean \pm standard deviation (SD) or median with interquartile range (IQR) for quantitative variables and as counts and proportions (%) for categorical variables. Inter-rater and test–retest reliability were assessed by the weighted Cohen's kappa (K). κ -values were interpreted as follows: >0.80 excellent agreement, 0.61–0.80 good agreement, 0.41–0.60 moderate agreement, 0.21–0.40 fair agreement, and <0.21 poor agreement (Altman, 1991). Data analysis was

TABLE 1 | Original version of the NDE scale.

Component and question	Weighted response
Cognitive	
1. Did time seem to speed up?	2 = Everything seemed to be happening all at once 1 = Time seemed to go faster than usual 0 = Neither
2. Were your thoughts speeded up?	2 = Incredibly fast 1 = Faster than usual 0 = Neither
3. Did scenes from your past come back to you?	2 = Past flashed before me, out of my control 1 = Remembered many past events 0 = Neither
4. Did you suddenly think to understand everything?	2 = About the universe 1 = About myself or others 0 = Neither
Affective	
5. Did you have a feeling of peace or pleasantness?	2 = Incredible peace or pleasantness 1 = Relief or calmness 0 = Neither
6. Did you have a feeling of joy?	2 = Incredible joy 1 = Happiness 0 = Neither
7. Did you feel a sense of harmony or unity with the universe?	2 = United, one with the word 1 = No longer in conflict with nature 0 = Neither
8. Did you see or feel surrounded by a brilliant light?	2 = Light clearly of mystical or other-worldly origin 1 = Unusually bright light 0 = Neither
Paranormal	
9. Were your senses more vivid than usual?	2 = Incredibly more so 1 = More so than usual 0 = Neither
10. Did you seem to be aware of things going on elsewhere, as if by extrasensory perception?	2 = Yes, and facts later corroborated 1 = Yes, but facts not yet corroborated 0 = Neither
11. Did scenes from the future come to you?	2 = From the word's future 1 = From personal future 0 = Neither
12. Did you feel separated from your physical body?	2 = Clearly left the body and existed outside it 1 = Lost awareness of the body 0 = Neither
Transcendental	
13. Did you seem to enter some other, unearthly world?	2 = Clearly mystical or unearthly realm 1 = Unfamiliar, strange place 0 = Neither
14. Did you seem to encounter a mystical being or presence?	2 = Definite being, or voice clearly of mystical or other-worldly origin 1 = Unidentifiable voice 0 = Neither
15. Did you see deceased spirits or religious figures?	2 = Saw them 1 = Sensed their presence 0 = Neither
16. Did you come to a border or point of no return?	2 = A barrier I was not permitted to cross; or "sent back" to life involuntarily 1 = A conscious decision to "return" to life 0 = Neither

TABLE 2 | Italian version of the NDE scale.

Componente e domanda	Risposta ponderata
Cognitiva	
1. Il tempo sembrava scorrere più velocemente?	2 = Sembrava che le cose accadesse tutte in una volta 1 = Il tempo sembrava scorrere più velocemente del solito 0 = Nessuna delle due
2. I tuoi pensieri fluivano più velocemente?	2 = In maniera incredibilmente veloce 1 = Più velocemente del solito 0 = Nessuna delle due
3. Ti sono tornate in mente scene del tuo passato?	2 = Il passato si è palesato davanti a me, fuori dal mio controllo 1 = Ho ricordato molti eventi passati 0 = Nessuna delle due
4. Ti è sembrato di comprendere improvvisamente ogni cosa?	2 = Sì, a proposito dell'Universo 1 = Sì, riguardo me stesso e gli altri 0 = Nessuna delle due
Affettiva	
5. Hai provato una sensazione di pace o appagamento?	2 = Un'incredibile sensazione di pace o appagamento 1 = Una sensazione di sollievo o quiete 0 = Nessuna delle due
6. Hai provato una sensazione di gioia?	2 = Una sensazione di gioia incredibile 1 = Felicità 0 = Nessuna delle due
7. Hai provato un senso di armonia o unità con l'universo?	2 = Mi sono sentito una cosa sola con il mondo 1 = Non mi sono più sentito in conflitto con la natura 0 = Nessuna delle due
8. Hai visto o ti sei sentito avvolto da una luce brillante?	2 = Una luce di origine chiaramente mistica o di un altro mondo 1 = Una luce insolitamente brillante 0 = Nessuna delle due
Paranormale	
9. I tuoi sensi sembravano essere più vividi del solito?	2 = Incredibilmente più vividi 1 = Più vividi del solito 0 = Nessuna delle due
10. Ti è sembrato di essere consapevole di cose che stavano accadendo altrove, come in un'esperienza extra-sensoriale?	2 = Sì, e, successivamente, i fatti lo hanno confermato 1 = Sì, ma i fatti non lo hanno confermato 0 = Nessuna delle due
11. Ti sono apparse scene dal futuro?	2 = Sì, relative al futuro del mondo 1 = Sì, relative al mio personale futuro 0 = Nessuna delle due
12. Hai avvertito una sensazione di separazione dal tuo corpo fisico?	2 = Sì, ho chiaramente abbandonato il corpo e ho percepito di esistere al di fuori di esso 1 = Ho perso la consapevolezza del mio corpo 0 = Nessuna delle due
Transcendentale	
13. Ti è sembrato di entrare in un mondo soprannaturale?	2 = Sì, in un regno chiaramente mistico o soprannaturale 1 = Sì, in un luogo estraneo, non familiare 0 = Nessuna delle due
14. Ti è sembrato di entrare in contatto con un essere o una presenza mistica?	2 = Sì, con un essere definito o una voce di origine chiaramente soprannaturale o mistica 1 = Sì, con una voce non identificabile 0 = Nessuna delle due
15. Hai visto lo spirito di persone decedute o figure religiose?	2 = Li ho visti 1 = Ho avvertito la loro presenza 0 = Nessuna delle due
16. Sei arrivato a un confine o ad un punto di non ritorno?	2 = Sì, a una barriera che non mi era permesso di oltrepassare/o sono stato rimandato indietro in vita involontariamente 1 = Ho preso la decisione conscia di ritornare alla vita 0 = Nessuna delle due

performed using the IBM SPSS Statistics 20.0. The level of significance was $\alpha = 0.05$.

RESULTS

All the included patients [14 males and 6 females, mean age \pm SD 51.6 ± 17.1 , median time from injury 3.5 months, interquartile range (IQR) 2–10] experienced a condition of coma in the acute phase of their disease. When entering the rehabilitation ward most of the patients were in a condition of minimally conscious state (MCS; $n = 15$; 75%). The remainder patients were fully conscious ($n = 4$; 20%) or showed a condition of emergence from MCS (EMCS; $n = 1$; 5%). Among patients with a normal consciousness at admission in the Acute Inpatient Rehabilitation Unit, one showed a condition of LIS. The primitive disease, being responsible for the loss of consciousness in the acute phase, was mainly represented by stroke ($n = 12$), followed by traumatic brain injury ($n = 7$) and infectious disease ($n = 1$). At the time of the interview all the included patients were fully conscious and cognitively preserved as established by the inclusion criteria.

The mean score of the NDE Scale in our sample was 3 ± 4.0 (range 0–13). The experiences most frequently reported by patients were those belonging to the cognitive component, being mainly represented by phenomena of time distortion ($n = 5$; 25%), life review ($n = 5$; 25%), and thought acceleration ($n = 4$; 20%). Experiences belonging to the transcendental component were also frequently recorded, especially those involving the view of deceased spirits or religious figures ($n = 4$; 20%). Only three patients reported a minimum score of 7 or higher, which is the cut-off of the original NDE Scale to establish the presence of a NDE as a unitary phenomenon (Greyson, 1983).

Inter-rater [K_w 0.77 (95% CI 0.67–0.87)] and test–retest reliability [K_w 0.96 (95% CI 0.91–1.00)] showed good to excellent values for the total scores of the Italian NDE Scale and for subanalyses of each single cluster of the scale as shown in **Table 3**.

DISCUSSION

Our findings provide support for the use of the Italian version of the NDE Scale in clinical research. To the best of our knowledge, there are no studies investigating the prevalence of NDEs in the Italian population. This is probably due to the lack of an Italian version of the scale, which is traditionally

used to assess NDEs. In this study we provided a reliable Italian Version of the NDE scale showing an excellent inter-rater and intra-rater agreement. This tool may be used to investigate NDEs in subjects who experienced a condition close to death (real NDE) or non-life-threatening events without any brain damage (NDE-like experiences) (Charland-Verville et al., 2014). Patients with a past history of coma are the ideal candidates to investigate real NDE, when residual cognitive dysfunctions do not interfere with the clinical interview (Teasdale and Jennett, 1974; Plum and Posner, 1983). They include patients who directly recovered consciousness after a transitory phase of coma or patients who entered intermediates states, such as VS or MCS, before recovering consciousness (Giacino et al., 2002; Pistoia and Sarà, 2012; Pistoia et al., 2013; Bayne et al., 2017). Patients with LIS, showing a condition of coma in the acute stage of their disease, are also frequently asked to report about NDE (Charland-Verville et al., 2015). Patients with LIS, although being traditionally described as cognitively intact, often show a series of non-motor symptoms that can be interpreted in the framework of an embodiment disorder (Sacco et al., 2008; Babiloni et al., 2010; Pistoia et al., 2010, 2017). Intriguingly, some of these symptoms seem to share common features and similar underlying neurophysiological mechanisms with some NDEs phenomena, especially those involving out-of-body perceptions and emotional engagement. This makes such patients deserving of special attention to these symptoms, whether they occur near death or in the later stage of their diseases, in order to gain a better understanding of NDEs and to select rehabilitative approaches tailored to the patients' specific characteristics (Conson et al., 2008, 2009, 2010).

Previous research on NDEs is extremely heterogeneous, depending on the clinical characteristics of the targeted research population. NDEs mainly include pleasant feelings such as peacefulness, painlessness, and joy. Less pleasant feelings have been reported in a minority of near-death experiencers, including patients with LIS (Charland-Verville et al., 2015). Brain injury-related mechanisms, which can influence the development of NDEs in coma survivors, include anoxic brain damage, hypoxia, hypercapnia, abnormal temporal lobe dysfunctions, and administration of sedatives (Charland-Verville et al., 2014). An interesting study recently investigated differences in NDEs characteristics depending on the brain injury etiology but it failed to detect any differences in intensity or contents across different brain diseases (Charland-Verville et al., 2014). However, it should be stressed that NDEs have been described non only in life-threatening events directly involving the brain but also in multiple other conditions including cardiac arrest, traumatic circumstances, and conditions of altered mental status under the influence of potentially psychoactive medications (Curran, 2000; Parnia et al., 2007). Moreover, a wide spectrum of NDE-like experiences after non-life-threatening events, not associated with real closeness to death or coma, has been described (Charland-Verville et al., 2014). This suggests that other mechanisms may be engaged in the development of NDE phenomenology (Facco and Agrillo, 2012).

TABLE 3 | Inter-rater and test–retest reliability as estimated by Cohen's kappa (K) values for total scores and individual clusters of the scale.

	Inter-rater reliability κ (95% CI)	Test–retest reliability κ (95% CI)
Cognitive cluster	0.80 (0.64–0.96)	0.92 (0.80–1.0)
Affective cluster	0.65 (0.28–1.0)	1.0 (–)
Paranormal cluster	0.78 (0.59–0.97)	1.0 (–)
Transcendental cluster	0.78 (0.57–0.99)	0.94 (0.83–1.0)
Total	0.77 (0.67–0.87)	0.96 (0.91–1.0)

The strengths of our study included the use of a standardized protocol in the process of translation and in the assessment of inter-rater and test–retest reliability, and the selection of a target population who experienced real life-threatening conditions as a result of a wide spectrum of brain injuries. Moreover, we included patients in whom consciousness recovery occurred in different times and modalities: some patients directly moved from coma to a condition of full consciousness while others experienced intermediate states such as VS and MCS.

A limitation of our study lies with the inclusion of a small sample, which avoided us to perform subgroup analyses in order to investigate NDEs consistency or heterogeneity across coma of different aetiologies and duration. However, this was beyond the aim of this study, which was mainly intended to provide a screening instrument to identify NDEs among unselected patients and to expand the research in this field.

The frequency of NDEs phenomena in our sample was low, with only three patients having shown a minimum score of 7 or higher, which is the cut-off of the original NDE Scale to establish the presence of a NDE as a unitary phenomenon. This finding is in line with previous incidence reports in post head injury patients (Hou et al., 2013). Further studies are necessary in order to better assess the frequency, intensity, and heterogeneity of NDEs across different diseases and conditions as well as their

impact on belief systems and emotions of patients experiencing them. Finally, studies based on larger samples of patients coming from different countries will also allow to identify any additional set of phenomena, not being clearly detected by the present tool, and to further expand the field of research across different cultural settings.

AUTHOR CONTRIBUTIONS

All authors (FP, GM, MS, LP, CM, and SS) provided their substantial contributions to the conception of the work, the acquisition, analysis, and interpretation of data and to the draft writing.

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Conflict of Interest Statement: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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