

Near-Death Experiences and Posttraumatic Growth

Surbhi Khanna, MD and Bruce Greyson, MD

Abstract: Posttraumatic growth denotes positive psychological change after a traumatic experience that is an improvement over the state before the trauma. Inasmuch as it involves existential reevaluation, posttraumatic growth overlaps with spiritual change, although it also encompasses other domains of positive outcome. This study investigated posttraumatic growth and presence and depth of near-death experience at the time of the close brush with death among 251 survivors of a close brush with death, using the Posttraumatic Growth Inventory and the Near-Death Experience (NDE) Scale. Near-death experiences were associated with greater posttraumatic growth than were close brushes with death in the absence of such an experience, and scores on the NDE Scale were significantly correlated with scores on the Posttraumatic Growth Inventory. To the extent that NDEs are interpreted as spiritual events, these findings support prior research suggesting that spiritual factors make a significant contribution to posttraumatic growth and are consistent with the model that posits challenges to the assumptive worldview as a major stimulus to posttraumatic growth.

Key Words: Near-death experience, posttraumatic growth, spiritual change, psychological crisis

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More than half of all Americans are exposed to a life-threatening traumatic event at least once in their lives, and one quarter of Americans more than once (Kessler et al., 1995). Traumatic experiences can lead to a variety of distressing psychological and biological responses, including depressive and anxiety disorders, as well the particular avoidance and hyperarousal pattern of posttraumatic stress disorder (Kessler et al., 1995). However, Western culture has long harbored the premise that adversity can also lead to personal growth and wisdom and that stressful encounters may generate greater opportunities for growth (Tennen and Affleck, 2009) that can coexist with the residual distress of the trauma (Tedeschi and Calhoun, 2004). Indeed, the idea that suffering and distress can lead to positive change is thousands of years old (Tedeschi and Calhoun, 2004) and is echoed in the teachings of the early Hebrews, Christians, and Greeks, as well as of Hinduism, Buddhism, and Islam (Janoff-Bulman, 2004; Linley, 2003; Tedeschi and Calhoun, 1995).

In the past 20 years, the term *posttraumatic growth* has been used to denote positive psychological change experienced as a result of the struggle with highly challenging life circumstances (Calhoun and Tedeschi, 1999; Calhoun and Tedeschi, 2001). Posttraumatic growth describes the experiences of individuals who have not merely returned to baseline but have experienced improvements beyond their pretrauma state that for some persons are deeply profound (Tedeschi and Calhoun, 2004). There is a consistent pattern of personal transformation that follows a similar process, regardless of the type of trauma, which typically includes changes in perception of self, philosophy of life, and relationships (Tedeschi, 1999). Growth does not occur as a direct result of trauma itself; rather, it is the individual's response to the new reality

in the aftermath of trauma that determines the extent to which posttraumatic growth occurs (Tedeschi and Calhoun, 2004).

This consistent process of posttraumatic growth is set in motion by the occurrence of a major life crisis that severely threatens and seems to invalidate an individual's understanding of the world and the worldview that guides the individual's understanding, decision making, and meaningfulness (Calhoun and Tedeschi, 1999; Janoff-Bulman, 1992; Tedeschi and Calhoun, 2004). The process involves the individuals' attempts to assimilate the stressful experience with their pretrauma beliefs, such as beliefs in a fair or just world and beliefs in their own vulnerability to harm (Park and Folkman, 1997).

Janoff-Bulman (2004) has proposed 3 mechanisms of posttraumatic growth, which are not mutually exclusive: strength through suffering, psychological preparedness, and existential reevaluation. *Strength through suffering* entails new evaluations of the self in the aftermath of extreme events. *Psychological preparedness* posits that by virtue of coping successfully with their experience, survivors are not only better prepared for subsequent tragedies but, as a consequence, are apt to be less traumatized by them as well. *Existential reevaluation* involves the rebuilding of the survivor's inner world, engaging in meaning making in the face of loss, and recognizing the preciousness of life.

Meaning making is generally believed to be a critical aspect of recovery and growth after stressful events or experiences (Park and Folkman, 1997). Recognizing meaning may allow a person to experience emotional relief and lead to a new philosophy of life that alters basic assumptions people hold about life (Tedeschi, 1999). Part of this paradigm shift involves changing cultural expectations, creating awareness that out of trauma comes not only pain and suffering but sometimes the possibility of transformation and growth as well (Park, 1998).

The term *spirituality* denotes a relationship with or quest to find transcendental meaning, whereas *religion* signifies an institutionally patterned system of beliefs, values, and rituals (Morris et al., 2005). Spirituality involves the search for meaning and purpose that may include both transcendence (the experience of existence beyond the physical and psychological) and immanence (discovery of transcendent within the physical and psychological), regardless of religious affiliation (Decker, 1993). The progression along a spiritual path is often viewed through modern eyes as a fulfilling and constantly enriching experience, yet historically, it has been strongly linked with struggle and “dark nights of the soul,” a lonely journey where difficult and painful situations are often the most profound providers of spiritual wisdom (Bush, 2012).

Trauma often leads to an increase in spirituality, which may help survivors find personal meaning in the traumatic experience, and in their lives (Walker et al., 2009). Although spirituality has considerable overlap with posttraumatic growth in that they both involve the search for meaning and existential reevaluation, it does not figure prominently in most measures of posttraumatic change (O'Rourke et al., 2008). Nevertheless, there is some evidence that spiritual variables are among the highest contributors to positive outcome in posttraumatic growth (Werdel et al., 2014). Trauma survivors whose posttraumatic cognitive processing includes significant thinking about the event's personal meaning and significance report greater posttraumatic growth (Calhoun et al., 2000; Tedeschi and Calhoun, 1995). Tedeschi and Calhoun (2004) noted that even nonreligious people and atheists can experience posttraumatic growth in the domain of spirituality, in a greater engagement with fundamental existential questions. The spiritual changes that arise after trauma are not necessarily directed toward a deity and may include

Department of Psychiatry and Neurobehavioral Sciences, University of Virginia School of Medicine, Charlottesville, VA.

Send reprint requests to Bruce Greyson, MD, Department of Psychiatry and Neurobehavioral Sciences, University of Virginia Health System, 210 10th St NE, Suite 100, Charlottesville, VA 22902-4754. E-mail: cbg4d@virginia.edu.

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nontheistic spiritual growth (Shaw et al., 2005; Sodergren et al., 2002). Weiss (2013) conceptualized posttraumatic growth as part of the normative development to actualize human potential and move toward self-transcendence to a nondualistic level of consciousness and recognition of cosmic coherence and the universal unity of being.

Yalom and Lieberman (1991) noted that existential issues of the meaning and purpose of life and the inevitability of personal death are likely to arise especially when traumatic events involve death. Shiri et al. (2008) reported that immediacy and proximity to violence were associated with increased posttraumatic growth. Tsai et al. (2015) found that the traumatic event most strongly associated with posttraumatic growth was life-threatening illness or injury. They also found that several psychosocial factors, namely, social connectedness, intrinsic religiosity, and purpose in life, were independently related to posttraumatic growth (Tsai et al., 2015).

Those close encounters with death that are accompanied by profound spiritual experiences, so-called *near-death experiences (NDEs)*, may be particularly likely to precipitate posttraumatic growth. Near-death experiences, reported by approximately 17% of critically ill patients, typically include spiritual or mystical elements such as ineffability, profound feelings of peace, leaving the body, meeting spiritual beings and deceased loved ones, encountering a bright light, a panoramic life review, and a border or a boundary between life and death (Zingrone and Alvarado, 2009). In the past 40 years, NDEs have been described extensively in mainstream scientific journals (Sleutjes et al., 2014). Although these experiences seem to be influenced by both individual psychodynamics (Greyson, 1983b) and sociological factors (Kellehear, 1993), their core phenomenological features seem to be independent of cultural models (Athappilly and Greyson, 2006; Belanti et al., 2008; Kellehear, 2009).

In the largest prospective study of cardiac arrest survivors, which included follow-up evaluations 2 and 8 years after the event, Van Lommel et al. (2001) found that all survivors of a cardiac arrest at follow-up were more self-assured, socially aware, and religious than before the event; but that those survivors who had reported NDEs, unlike the other survivors, also showed increased empathy and intuition, greater interest in spirituality, and less fear of death. A comprehensive review of 30 years of research on aftereffects of NDEs documented that the changes most commonly reported after NDEs are compatible with posttraumatic growth, including a greater appreciation of and zest for life, increased focus on the present, interest in self-understanding, sense of meaning and purpose in life, compassion for others, heightened self-esteem, reduced fear of death, and reduced concern for material gain or status (Noyes et al., 2009).

Many of these reported aftereffects of NDEs echo the changes seen in posttraumatic growth. Cozzolino (2006) noted that both NDE aftereffects and posttraumatic growth involve positive psychological and existential development in self-perception, connection to others, and philosophy of life as a result of facing extremely challenging life situations. Both posttraumatic growth and NDE aftereffects often involve renouncing of extrinsic life values such as power, fame, and possessions, and endorsing intrinsic life values as meaningful (Cozzolino, 2006).

Wren-Lewis (2004), a psychologist who had an NDE after being poisoned, wrote that as a result of his NDE, he experienced a revelation that required a profound reorientation to life. He noted that the aftereffects of that experience echoed many of the features of posttraumatic growth, such as an enhanced appreciation for life, new skills in coping with difficulties, and feeling greater warmth toward others. Near-death experiencers' (NDErs') descriptions of their life changes after their experience parallel Janoff-Bulman's 3 mechanisms of strength through suffering, psychological preparedness, and existential reevaluation (Janoff-Bulman, 2004). A key correlate of greater posttraumatic growth is the degree to which the traumatic event challenges core beliefs (Lindstrom et al., 2013; Triplett et al., 2012); and few experiences challenge core existential beliefs as do NDEs (Noyes et al., 2009).

However, as Cozzolino (2006) noted, not all aftereffects of NDEs are positive, and these experiences may also be associated with sadness, anger, and symptoms of posttraumatic stress (Greyson, 2001) or other psychological disorder (Greyson, 1997).

Despite the anecdotal reports of similarities between posttraumatic growth and NDE aftereffects, there has been no systematic empirical study of posttraumatic growth after NDEs. The question remains, therefore, to what extent NDEs typically lead to posttraumatic growth, particularly when contrasted with other close brushes with death not accompanied by NDEs. The goal of this study was to explore the relationship between NDEs and posttraumatic growth by contrasting the magnitude of posttraumatic growth features among survivors of close brushes with death who did and did not report NDEs, using standardized quantitative measures. We hypothesized that occurrence and depth of NDE would be positively associated with posttraumatic growth. If so, that finding may help explain why some life-threatening crises may lead not only to posttraumatic stress but also to posttraumatic growth.

METHODS

Participants

Participants were all individuals who had spontaneously contacted the authors between 2005 and 2014 to share their accounts of their experiences when they had come close to death. The only proposed exclusionary criterion was communication that seemed so incoherent, disjointed, or irrational as to suggest unreliability; but none of the 251 individuals in this sample met that criterion. No effort was made to solicit or recruit participants for this study.

The participants included 78 men (31%) and 173 women (69%); there were 216 self-reported whites (86%) and 35 (14%) of other or mixed ethnicity. With regard to religious identification, 72 (29%) identified themselves as Protestant, 34 (14%) as Catholic, 89 (36%) as some other religious denomination or a combination, 36 (14%) as spiritual but not religious, and 20 (8%) as atheists or agnostics. Their mean (SD) age at the time of their close brush with death was 29.4 (13.7) years, and the mean (SD) years elapsed since that event was 34.6 (15.7). Closeness to death during that event, as classified retrospectively by the participants' subjective report, was described by 95 participants (38%) as involving loss of vital signs, by 81 (32%) as involving a serious injury or illness without loss of vital signs, and by 75 (30%) as not serious in retrospect.

Although all 251 participants contacted us to report experiences they wished to share related to a brush with death, retrospective analysis of their responses showed that only 227 (90%) reported experiences that qualified as NDEs by scoring 7 or higher on the NDE Scale (see the "Near-death Experience subsection" below), whereas 24 (10%) reported experiences that did not. The latter 24 participants were retrospectively designated as the non-NDEr comparison group.

Procedure

Participants were mailed or e-mailed a brief questionnaire about their demographic background and details of their close brush with death, and 2 standardized, self-rated questionnaires: the NDE Scale and the Posttraumatic Growth Inventory (PTGI). Participants completed these questionnaires at a time and place of their choosing and returned them by mail or e-mail. The study protocol was approved by the University of Virginia's Institutional Review Board for Social and Behavioral Sciences.

Measures

Near-Death Experience

The NDE Scale (Greyson, 1983a), a self-rated, 16-item, multiple-choice questionnaire, was used to assess NDEs. It has been shown to

differentiate NDEs from other close brushes with death (Greyson, 1990) and to have high internal consistency (Cronbach $\alpha = 0.88$), split-half reliability ($r = 0.84$; $p < 0.001$), and test-retest reliability over a short-term period of 6 months ($r = 0.92$; $p < 0.001$; Greyson, 1983a) and over a long-term period of 20 years ($r = 0.83$; $p < 0.001$; Greyson, 2007). A Rasch rating scale analysis established that the NDE Scale yields a unidimensional measure, invariant across sex, age, intensity of experience, or time elapsed since the experience (Lange et al., 2004). Although the NDE Scale was developed as an ordinal scale without quantified anchor points, the fact that it satisfactorily fits the Rasch model suggests that for all practical purposes, there appear to be equal distances between the points of measurement that give the scale interval-level measurement properties (Wright and Masters, 1982).

The 16 items on the NDE Scale explore cognitive changes during the experience, such as an altered sense of time; affective changes, such as intense feelings of peace; purportedly paranormal experiences, such as a sense of separation from the physical body; and purportedly transcendental experiences, such as an encounter with a mystical being or presence. Scores on the NDE Scale can range from 0 to 32; a score of 7, one SD below the mean of 15, is used as the criterion for considering an experience to be a NDE (Greyson, 1983a).

Posttraumatic Growth

The PTGI measures the extent to which survivors of traumatic events perceive personal benefits, including changes in perceptions of self, relationships with others, and philosophy of life, accruing from their attempts to cope with trauma and its aftermaths (Tedeschi and Calhoun, 1996). It quantifies 5 domains of psychological change representing the breadth of growth that people can experience after a traumatic event (Tedeschi and Calhoun, 2004).

The PTGI consists of 21 questions using a 6-point Likert response format, ranging from "I did not experience this change as a result of my crisis" (scored 0), to "I experienced this change to a very great degree as a result of my crisis" (scored 5) (Tedeschi and Calhoun, 1996). Five factors have emerged as a result of principal component analysis: (1) *new possibilities* includes items describing positive new directions in life; (2) *relating to others* describes positive change in interpersonal relationships; (3) *personal strength* contains items such as "I discovered I am stronger than I thought I was"; (4) *appreciation for life* contains items such as "an appreciation for the value of my own life"; and (5) *spiritual change* is reflected in items such as "a better understanding of spiritual matters" (Calhoun and Tedeschi, 1998; Tedeschi and Calhoun, 1996).

Scores on the PTGI are approximately normally distributed among persons reporting a variety of life difficulties; and the scale has high internal consistency (Cronbach $\alpha = 0.90$) and the test-retest reliability over 2 months ($r = 0.71$) (Tedeschi and Calhoun, 1996). The 5 factors also show substantial internal consistency, and the correlations of the factors with the full-scale PTGI indicate overlap but some separate contribution from these factors (Tedeschi and Calhoun, 1996). A confirmatory factor analysis has validated this 5-factor model as the best underlying structure of the PTGI, and there is some evidence that the 5 factors may reflect different underlying psychological processes (Taku et al., 2008).

Statistical Analysis

Planned statistical analyses included using Pearson correlation coefficients to assess the associations of PTGI scores with age at the time of the NDE and time elapsed since the NDE; and analyses of variance to assess differences between groups defined by sex, ethnicity, and closeness to death. A *t* test was used to assess the difference in PTGI scores between participants who did and did not have NDEs during the close brush with death; and a Pearson correlation coefficient

was used to assess the association of PTGI scores with the depth of the NDE as measured by raw score on the NDE Scale.

In addition to the planned analyses, we performed 3 post hoc analyses. Because participants with different religious preferences had significantly different PTGI scores, we performed an analysis using the Scheffé method to reveal homogeneous subsets of the religious preference data. Because sex, religious preference, and proximity to death significantly predicted PTGI scores in the entire sample, we performed a multifactor analysis of variance of PTGI scores by NDEr status, examining the interactions with those 3 potentially confounding variables, and a partial correlation between NDE Scale and PTGI scores with sex, religious preference, and proximity to death as control variables.

All data analyses were performed using SPSS 20 (IBM, Armonk, NY).

RESULTS

Near-Death Experiences and Potentially Confounding Variables

Scores for all participants on the NDE Scale ranged from 0 to 32, with a mean (SD) of 15.7 (SD); and the scale showed good internal consistency (Cronbach $\alpha = 0.84$). The mean (SD) NDE Scale score was 16.7 (6.1) among the NDErs, with a range of 7 to 32; and 4.4 (1.9) among the non-NDErs, with a range of 0 to 6. Consistent with the definition of the 2 groups, their mean scores were significantly different ($t = 9.41$, $df = 249$; $p < 0.001$). As shown in Table 1, NDErs were statistically indistinguishable from non-NDErs (i.e., those who scored less than 7 on the NDE Scale) on age at the time of the close brush with death, years elapsed since that event, sex, ethnicity, religious identification, and self-reported closeness to death.

Posttraumatic Growth and Potentially Confounding Variables

The mean (SD) score for all participants on the PTGI was 76.3 (19.1). Mean (SD) scores were 23.4 (7.2) for relating to others, 17.7 (5.6) for new possibilities, 15.3 (5.6) for personal strength, 8.1 (2.5) for spiritual change, and 12.1 (3.0) for appreciation of life.

As shown in Table 2, posttraumatic growth was not statistically associated with age at the time of the event or with years elapsed since that time; and there was no significant difference between whites and nonwhites. There was, however, a sex difference, with women showing more growth than men, and a difference among those with differing religious identifications. A post hoc analysis using the Scheffé method revealed 2 homogeneous subsets of the religious identification data: participants who self-identified as atheist or agnostic scored significantly lower than did those who self-identified as Catholics, Protestants, or "other," the latter 3 of which did not differ significantly from each other.

Participants who reported having lost vital signs or been pronounced dead reported significantly more posttraumatic growth than did those who reported a serious injury or illness without loss of vital signs, and both groups reported more growth than did those who reported that in retrospect, they did not regard their illness or injury as serious.

Posttraumatic Growth and the Close Brush With Death

As shown in Table 3, the mean scores of NDErs were significantly higher than those of non-NDErs on the full-scale PTGI and on the 5 factors of the scale. Because PTGI scores differed according to the participants' sex, religious preference, and subjective report of proximity to death, we performed a multifactor analysis of variance of PTGI scores by NDEr status examining the interactions of those 3 potentially confounding variables. The estimated marginal means for the PTGI

TABLE 1. Near-Death Experiences and Potentially Confounding Variables

Variable	NDErs	Non-NDErs	Statistic	p
Age at near-death event	28.8 (±13.2)	35.6 (±17.4)	$t = -2.22, df = 245$	NS
Years elapsed since near-death event	34.5 (±15.7)	35.5 (±15.8)	$t = -0.27, df = 239$	NS
Sex			$\chi^2 = 0.28, df = 1$	NS
Male	70 (31%)	8 (33%)		
Female	157 (69%)	16 (67%)		
Ethnicity			$\chi^2 = 1.70, df = 1$	NS
White	194 (85%)	22 (92%)		
Other	33 (15%)	2 (8%)		
Religious identification			$\chi^2 = 6.36, df = 4$	NS
Protestant	66 (29%)	6 (25%)		
Catholic	31 (14%)	3 (13%)		
Other denomination/combination	81 (36%)	8 (33%)		
Spiritual but not religious	34 (15%)	2 (8%)		
Atheist/agnostic	15 (7%)	5 (21%)		
Proximity to death			$\chi^2 = 3.95, df = 2$	NS
Loss of vital signs	89 (39%)	6 (25%)		
Serious illness/injury	69 (30%)	12 (50%)		
Not serious	69 (30%)	6 (25%)		

were 76.1 for the NDErs and 57.2 for the non-NDErs, which remained significant after accounting for the effects of the confounding variables ($F = 18.44, df = 1, 237; p < 0.001$).

Among the entire sample, NDE Scale scores were positively correlated with scores on the full-scale PTGI ($r = 0.45, N = 251; p < 0.001$), as well as on all 5 factors: *relating to others* ($r = 0.34; p < 0.001$), *new possibilities* ($r = 0.45; p < 0.001$), *personal strength* ($r = 0.36; p < 0.001$), *spiritual change* ($r = 0.40; p < 0.001$), and *appreciation of life* ($r = 0.46; p < 0.001$). Again, because PGTI scores differed according to the participants' sex, religious preference, and subjective

report of proximity to death, we calculated a partial correlation between NDE Scale and PTGI scores with those 3 potentially confounding variables as control variables. The resultant partial correlation was 0.43, which remained significant at $p < 0.001$.

Removing from the analysis the non-NDErs (i.e., those participants who scored 6 or lower on the NDE Scale) did not reduce the significance of these correlations, indicating that the correlations between NDE Scale and PTGI scores reflected more than just a dichotomous distinction between the NDErs and the non-NDErs.

DISCUSSION

The NDE Scale scores among both NDErs and non-NDErs in this study were comparable to those found in prior research comparing NDErs with non-NDErs (Greyson, 1990). The PTGI scores in this study among both NDErs and non-NDErs were comparable to those reported in prior research of trauma survivors (Shakespeare-Finch and Barrington, 2012; Shakespeare-Finch and Enders, 2008; Taku et al., 2008; Tedeschi and Calhoun, 1996). Nevertheless, although both experiencers and non-experiencers fell within the normative range of posttraumatic growth, the NDErs scored significantly higher on the PTGI; and among the NDErs, posttraumatic growth was positively correlated with depth of NDE.

The data from this study suggest therefore that NDEs are associated with increased posttraumatic growth and that the “deeper” the NDE, the more profound is the posttraumatic growth reported. This association held for the full-scale PTGI and for each of the 5 component factors. These findings are consistent with the model of posttraumatic growth that hypothesizes challenges to the assumptive worldview as a major stimulus to posttraumatic growth (Lindstrom et al., 2013; Triplett et al., 2012).

Most NDErs interpret their experience as an encounter with the divine (Ring, 1984). Experiences of divine interaction are thought to enhance well-being in a variety of ways: it provides a resource for resolving problems, reshapes the experiencers' sense of self as empowered by divine support, and expands the experiencers' sense of coherence, comprehensibility, and meaningfulness of life (Pollner, 1984). A recent study found that spiritual growth after a close brush with death is associated not only with surviving trauma but also with the occurrence and depth of NDEs during the triggering event (Greyson and

TABLE 2. Posttraumatic Growth and Potentially Confounding Variables

Variable	Posttraumatic Growth	Statistic	p
Age at near-death event		$r = -0.06; N = 249$	NS
Years elapsed since near-death event		$r = -0.06; N = 249$	NS
Sex		$t = -2.16; df = 249$	0.032
Male	69.9 (±20.6)		
Female	76.0 (±21.1)		
Ethnicity		$t = -0.86; df = 250$	NS
White	73.4 (±21.4)		
Other	76.7 (±22.5)		
Religious identification		$F = 3.04; df = 3, 239$	0.030
Protestant	77.0 (±20.6)		
Catholic	76.1 (±21.2)		
Other denomination	73.3 (±19.9)		
Atheist/agnostic	60.5 (±60.5)		
Proximity to death		$F = 5.00; df = 2, 219$	0.008
Loss of vital signs	78.5 (±17.3)		
Serious illness/injury	73.5 (±18.3)		
Not serious	68.3 (±24.9)		

TABLE 3. Posttraumatic Growth and NDEs

Posttraumatic Growth Variable	NDErs	Non-NDErs	Statistic	<i>p</i>
Posttraumatic Growth Inventory	76.2 (±19.1)	53.9 (±27.8)	$t = 5.19; df = 249$	<0.001
Relating to others	23.4 (±7.2)	17.7 (±9.9)	$t = 3.56; df = 249$	<0.001
New possibilities	17.7 (±5.6)	12.0 (±7.6)	$t = 4.57; df = 249$	<0.001
Personal strength	15.3 (±3.7)	10.8 (±5.6)	$t = 5.30; df = 249$	<0.001
Spiritual change	8.1 (±2.5)	4.9 (±3.8)	$t = 5.61; df = 249$	<0.001
Appreciation of life	12.1 (±3.0)	7.7 (±4.5)	$t = 6.56; df = 249$	<0.001

Khanna, 2014). Given the psychospiritual nature of some features of NDEs and the implications of some NDEs for an altered relationship with the divine, it is perhaps surprising that in this study, the *spiritual change* factor did not seem to be favored by the NDErs more than the other 4 domains of posttraumatic growth.

This study was intended to expand the exploration of posttraumatic positive change beyond spiritual growth alone; we chose to administer the PTGI because in addition to a *spiritual change* factor, it also measures positive change in terms of *new possibilities, relating to others, personal strength, and appreciation of life*. In fact, the 21-item PTGI includes only 2 items comprising the *spiritual change* factor: (1) “I developed a better understanding of spiritual matters,” and (2) “I have a stronger religious or spiritual faith.” In a qualitative study to validate the PTGI, the latter item was generally taken to refer to a denominational indoctrinated religious faith and was not in fact related to spirituality (Shakespeare-Finch et al., 2013). There is evidence that these 2 items, one tapping spirituality and the other religious faith, may have distinct correlates, and their combination in one factor is problematic (Shaw et al., 2005).

In addition to the confounding of religiosity and spirituality in that item, it has been argued that it is desirable to have a minimum of 3 items to give each factor acceptable strength (Tabachnick and Fidell, 1996). For that reason, Morris et al. (2005) added 3 additional items designed to encompass both spiritual and religious constructs: (1) “I have a deeper commitment to my religious beliefs,” (2) “I find a more spiritual meaningfulness in life,” and (3) “I accepted myself as a spiritual being.” A principal components analysis with the modified PTGI including items designed to measure spiritual change yielded a comparable 5-factor solution to a confirmatory analysis of the original PTGI (Taku et al., 2008). The 5-item *spiritual change* factor showed greater internal consistency (Cronbach $\alpha = 0.93$) than did the original 2-item factor ($\alpha = 0.85$; Tedeschi and Calhoun, 1996).

Nevertheless, we chose not to use this expanded *spiritual change* factor because no other researchers have replicated its use, and it is unclear whether its more favorable psychometric properties are limited to the Australian population on which it was developed. We chose instead to use the standardized PTGI to facilitate comparison with other studies using this instrument. However, it is plausible that NDErs may endorse the expanded *spiritual change* factor, incorporating a wider range of spiritual expressions, more strongly than they did the original 2-item factor; and it would be interesting in future studies to use the enhanced version of Morris et al. (2005).

Keith et al. (2015) have recently reported that cognitive flexibility is associated with increased posttraumatic growth. Near-death experiencers have been reported to increase flexibility of worldviews, enabling the survivors to find meaning in life-threatening trauma and modify belief systems to include greater purpose and renewed faith (Noyes et al., 2009). This enhanced ability to integrate seemingly discrepant elements and tolerate paradox may be one mechanism fostering posttraumatic growth after NDEs. To assess this possibility, it may be fruitful for future research on the aftermath of NDEs to include measures of cognitive flexibility.

Limitations

Our confidence in and interpretation of the findings of this study must be tempered by certain weaknesses inherent in any retrospective cross-sectional study. The self-selection of participants and the reliance on retrospective self-reports of experiences may have limited the generalizability of these findings.

The cross-sectional design of the study does not permit conclusions of causality or temporal sequence. The association between reports of NDEs and posttraumatic growth may reflect an influence of the NDE on subsequent posttraumatic growth; or it may reflect an influence of posttraumatic growth on retrospective interpretations and reports of NDEs; or it may reflect the influence of an underlying personality trait on reports of both NDEs and posttraumatic growth.

Because our sample of participants who had come close to death was self-selected, we do not know whether (or how) they may differ from other survivors of close brushes with death who chose not to participate in the study. It is conceivable that survivors of near-death events who have greater subsequent posttraumatic growth may be more willing to participate in research than those who do not. However, we think that unlikely, as participants within the study sample had a wide range of scores on the PTGI.

In addition, the comparison group of non-NDErs was identified from persons who had contacted us to share experiences during a brush with death that they considered relevant to our research group's focus on NDEs. It is likely that many (if not all) of these comparison participants believed they had had NDEs, or had had experiences that had affected them. It is unknown whether their responses on the PTGI may differ from those of other survivors of a close brush with death whose experiences did not motivate them to contact us.

The predominance of whites and Christians among our sample limits our interpretation of the implications of these data for other ethnic or faith groups; the small numbers of nonwhites and followers of any particular faith other than Christianity precluded statistical analysis of the influence of those factors on posttraumatic growth. Because NDErs from different cultural or faith backgrounds may differ in their response to traumatic events, it would be helpful to extend this research to include samples beyond the predominantly Christian white population in the current study.

We relied on retrospective reports of experiences, which may theoretically be vulnerable to memory decay, distortion, or fabrication. A prior study of the consistency of NDE Scale scores over a period of decades suggested that passage of time did not materially influence memories of the experience itself (Greyson, 2007). However, we have no estimate of the reliability over time of ancillary features of the close brush with death, such as the subjective impression of proximity to death. Lacking objective documentation of details of the close brushes with death, retrospective reports of the severity of the event must be interpreted with caution.

Concerns have also been raised about the accuracy of retrospective judgments of posttraumatic growth, as there is little evidence that people can recall change accurately, particularly over long periods of

time (Tennen and Affleck, 2009). There is some evidence that people retrospectively overestimate causal relationships between memorable events and subsequent change, discounting the influence of intervening events that may be less dramatic but still potentially growth producing (Tennen and Affleck, 2009); although there is also contradictory evidence that estimates of posttraumatic growth may be underestimated because of reluctance to attribute change to a specific traumatic event (Smith and Cook, 2004). Recently, it has been suggested that people who report more distress and less life satisfaction after a traumatic event may be less accurate in rating posttraumatic growth than those who are less distressed and more satisfied (Guntly et al., 2011).

The potential bias through illusory (or exaggerated) correlation between perceived and actual growth may be enhanced by the belief prevalent in Western culture that people gain wisdom through trauma and that greater adversity can lead to greater growth (Tennen and Affleck, 2009). Indeed, in this study, PTGI scores were higher for those participants who self-rated their brushes with death to have been more serious. However, this effect would not explain the higher PTGI scores of NDErs compared to non-NDErs who did not differ in their perceptions of how close to death they had come.

We can therefore conclude that having an NDE during a close brush with death is associated with the subsequent *perception* of greater posttraumatic growth; but we do not have evidence bearing on differences in *actual* posttraumatic growth as measured by an objective assessment. Recent attempts to corroborate the accuracy of self-reports of posttraumatic growth by obtaining behavioral measures and ancillary assessments from significant others have validated the PTGI, suggesting that self-reports of posttraumatic growth are not illusory but can be confirmed by others (Shakespeare-Finch and Barrington, 2012; Shakespeare-Finch and Enders, 2008; Weiss, 2002). Despite this support for the validity of the PTGI, to mitigate the questions about retrospective judgments of posttraumatic growth, it would be helpful in future research to incorporate some objective measures such as observed behavioral change in addition to subjective reports of growth by the experiences and their significant others.

This study assumed that NDEs are unitary phenomena, and indeed a Rasch rating scale analysis of the NDE Scale lends statistical support to that unidimensional approach (Lange et al., 2004). However, it is conceivable that different types of NDE might be differentially associated with subsequent posttraumatic growth. The possibility of differential effects of different types of NDE might further limit generalizability of these findings, and suggest future research aimed at elucidating the particular NDE features that may be associated with subsequent posttraumatic growth. It may be helpful therefore in future research to distinguish between types of NDE, for example, between pleasurable and distressing experiences. In addition, further research is needed to ascertain whether (and how) posttraumatic growth may vary longitudinally and what individual and situational variables in the near-death event may predict posttraumatic growth.

CONCLUSION

The findings of this study suggest that NDEs lead to greater posttraumatic growth than do comparable close brushes with death that do not involve NDEs. Near-death experiences may offer insight into the psychology of dying and the nature of death and may also have clinical implications for both physical and psychological recovery from close brushes with death (Greyson, 1991). To the extent that NDEs are interpreted by the experiencers as spiritual events, these findings support previous evidence that spiritual factors play a significant role in posttraumatic growth (Calhoun et al., 2000; Tedeschi and Calhoun, 1995; Werdel et al., 2014). For many, rebuilding shattered assumptions (Janoff-Bulman, 1992), such as after an NDE, creates an enhanced sense of meaning in life and a greater existential awareness (Yalom

and Lieberman, 1991) that can lead to an enhanced spiritual or religious life. The relatively high incidence and clear phenomenology of NDEs calls for further research into the mechanisms of transformation after traumatic experiences, particularly those that are interpreted by the experiencer as having spiritual elements.

DISCLOSURES

The authors declare no conflict of interest.

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