

POSTTRAUMATIC GROWTH, POSITIVE CHANGES, AND NEGATIVE CHANGES IN MADRID RESIDENTS FOLLOWING THE MARCH 11, 2004, MADRID TRAIN BOMBINGS

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There is a small but growing body of evidence that documents the positive changes that may accrue following exposure to traumatic events. One hundred fifty-three Madrid residents completed measures of extraversion, neuroticism, depression, anxiety, posttraumatic growth, positive changes, negative changes, and demographics following the Madrid train bombings of March 11, 2004. Analyses revealed gender differences, such that women reported higher levels of positive changes and negative changes than did men. Posttraumatic growth and positive changes were significantly associated with extraversion, but not with depression or anxiety. Negative changes were significantly associated with neuroticism, depression, and anxiety. Discussion focuses on the further development of research into posttraumatic growth following indirect exposure to traumatic events.

A great deal of research evidence now testifies to the negative effects that may ensue following traumatic exposure, including posttraumatic stress disorder (PTSD), depression, and anxiety. However, there is also growing recognition that traumatic events may lead to positive outcomes. This phenomenon has become known as posttraumatic growth, and although it has only been investigated empirically within recent years, it has a long tradition that can be traced back to a number of ancient religions, philosophies, and works of literature (Linley, 2003; Tedeschi & Calhoun, 1995).

Survivors generally report posttraumatic growth across three broad themes (Tedeschi, Park, & Calhoun, 1998). First, survivors

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change their self-perception in some way. They may report increased personal strength and self-reliance and experience a greater acceptance of their vulnerabilities and limitations, typified by a heightened awareness of their own mortality and the preciousness and fragility of life. Second, they may report positive changes in their interpersonal relationships. They may value their friends and family more; they may feel increased compassion for others who experience life difficulties and altruism toward others. They may also experience greater openness and self-disclosure, and find themselves more comfortable with intimacy. The third theme is characterized by fundamental existential questions about purpose in life and death. There is a commonly reported change in life's priorities, an appreciation for the smaller things in life, a consideration for the inevitability of death and a spiritual development. Therefore, individuals who face trauma, particularly related to their own mortality or the mortality of others, can experience significant changes in the spiritual, existential, and religious elements of philosophy of life (Tedeschi & Calhoun, 2004a). Hence, "post-traumatic growth may lead to a more fulfilling and meaningful life, but it seems not to be the same as simply being carefree, happy or feeling good. Living a life at a deeper level of personal, interpersonal and spiritual awareness is not necessarily the same as feeling good" (Tedeschi & Calhoun, 2004a, p. 408). Although the concept and construct of posttraumatic growth has been criticized by some as being a coping mechanism rather than an outcome (e.g., McFarland & Alvaro, 2000), there is now an emerging view that the construct is valid (Linley & Joseph, 2004), and indications that retrospective self-reports following trauma exposure can be trusted (Bramson, Dirkzwager, van Esch, & van der Ploeg, 2001).

Posttraumatic growth has been reported following a wide variety of events, including sexual assault (Frazier, Conlon, & Glaser, 2001), breast cancer (Cordova, Cunningham, Carlson, & Andrykowski, 2001), road traffic accidents (Salter & Stallard, 2004), loss of a child (Polatinsky & Esprey, 2000), war (Powell, Rosner, Butollo, Tedeschi, & Calhoun, 2003), shipping disaster (Joseph, Williams, & Yule, 1993), and HIV infection (Updegraff, Taylor, Kemeny, & Wyatt, 2001; see Linley & Joseph, 2004, and Tedeschi & Calhoun, 2004b, for reviews).

Given this wide variety of events which have served as precipitants for growth, it appears that it is not the type of event per se

that influences posttraumatic growth, but rather the subjective experience of the event (Linley & Joseph, 2004). It is also the case that people need not be exposed to a traumatic event directly; posttraumatic growth and other positive and negative changes can occur following indirect traumatic exposure.

Early empirical research supported this contention, and demonstrated some level of posttraumatic growth and positive and negative changes in British citizens vicariously exposed to the September 11, 2001, terrorist attacks through television viewing (Linley, Joseph, Cooper, Harris, & Meyer, 2003); in trauma therapists who were vicariously exposed to the suffering of their clients (Linley, Joseph, & Loumidis, 2005); and in funeral directors (Linley & Joseph, 2005) and disaster response workers (Linley & Joseph, 2006) as a result of occupational death exposure.

These exposures were deemed to be vicarious, or indirect, because the person was exposed to the threat, or the suffering of another person, at a step removed from first-hand experience of the actual event. The *Diagnostic and Statistical Manual of Mental Disorders* (American Psychiatric Association, 2000), defining what constitutes traumatic exposure in relation to a diagnosis of PTSD, allows for direct traumatic exposure through the direct, first-hand witnessing of other people as they experience a traumatic event (as well as, of course, through one's own direct experience of a traumatic event).

However, the growing literature on vicarious traumatization (and also posttraumatic growth following vicarious exposure, reviewed above) has led to a reconceptualization of the breadth of impact of major traumatic events. For example, following the September 11, 2001, terrorist attacks in the United States, psychological reactions were documented specifically in New York City residents (Vlahov et al., 2002), more broadly across residents of the United States in general (Schuster et al., 2001), and even in British residents who had seen the events on television (Linley et al., 2003). As such, in this study we sought to assess the broader psychological effects of the Madrid train bombings on a sample of Madrid residents who had not been directly exposed to the train bombings (by virtue of being injured by them, witnessing them, or knowing people who had been injured or killed by them), but who had been indirectly exposed to the bombings by virtue of their being a resident of Madrid (cf. Vlahov et al., 2002).

In this study we were interested in examining posttraumatic growth and positive and negative changes in Madrid residents following the March 11, 2004, train bombings in Madrid, Spain. There is very little evidence pertaining to the variables that might be associated with posttraumatic growth and positive and negative changes following indirect traumatic exposure to an event such as the Madrid train bombings. Hence, we drew from the posttraumatic growth literature dealing with direct exposure in formulating our study questions and hypotheses.

First, gender differences have sometimes been found, with women reporting higher levels of posttraumatic growth than men. However, this finding is not consistent, in that some studies have not found gender differences (see Linley & Joseph, 2004). Hence, we sought to explore possible gender differences following indirect traumatic exposure, and predicted that women would report higher levels of growth, positive changes, and negative changes than men.

Second, psychological distress has often been investigated in relation to posttraumatic growth, but again with mixed findings. In those studies where associations have been found, it has typically been shown that depression and anxiety were negatively associated with growth (Linley & Joseph, 2004). In this study, we sought to test these associations with posttraumatic growth following indirect traumatic exposure. Given the absence of consistent findings in the literature to date, we did not make directional predictions.

Third, personality dimensions have been consistently related to posttraumatic growth, although only reported in two studies. However, in each case, extraversion was positively associated with growth, and neuroticism was negatively associated (Linley & Joseph, 2004). We sought to test whether the same findings would hold for associations with posttraumatic growth following indirect traumatic exposure.

Finally, there has been much debate over the associations of positive and negative aspects of experience following traumatic exposure (Linley & Joseph, 2004). It is not yet clearly established whether positive and negative aspects of experience following trauma are bipolar (being opposite ends of a continuum) or bivariate (having a range of possible associations). It has been suggested that positive and negative changes experienced as a result of

exposure to trauma are separate, independent dimensions that can coexist and can be experienced simultaneously (Joseph, Linley, Andrews et al., 2005). However, it is still unknown whether positive and negative effects following indirect traumatic exposure are related in some way or whether they are separate and distinct entities. Hence, we sought to explore this issue in the present study.

Method

The Event

On March 11, 2004, 10 bombs exploded in four trains, in three different railway stations, in Madrid, Spain. As a result, 191 people lost their lives, and almost 2,000 were injured. This was the worst attack in Spanish history, and was believed to be an act of terrorism perpetrated by terrorists associated with the Al-Qaeda network.

Participants

A total of 167 participants were recruited for the study. However, 14 participants were excluded from further analysis because they indicated that they knew someone who was injured, or who had died, as a result of the train bombings, thus not meeting the criterion of indirect rather than direct exposure to the event (cf. Linley et al., 2003). The final sample consisted of 153 participants (70 males, 81 females, 2 missing data; M age-37.46 years, $SD = 13.65$ years). The vast majority of participants were Spaniards (94.8%), and all were residents of the Madrid area. Half of the participants were married or cohabiting, whereas 37.3% were single. Over half (56.2%) were Catholic, and over a third (36.6%) did not hold religious views. One third (32%) had completed secondary education; a further 37.9% held a university degree.

These data compare with the following statistics of the Madrid population (Instituto Nacional de Estadística, 2001). The total population of Madrid is 5,718,942 (48.28% male, 51.72% female). People younger than 16 years old represent 14.75% of the population, people aged 16–64 years represent 70.72% of the population, and people aged 65 years or more represent 14.53%. With regard to marital status, 45.67% are single and 45.45% are married. Half (50.08%) have completed high school, and 20.73%

hold a university degree or above. Hence, the sample obtained is broadly comparable with the general population of Madrid with regard to gender, age, and marital status, but is slightly better educated.

Measures

All measures were originally in English but were translated into Spanish by the first author (a native Spaniard who is a fluent English speaker). The measures were then back translated into English by a second person (also a native Spaniard but fluent English speaker), and any discrepancies were resolved between the two translators. The measures were administered in four different orderings to control for possible response bias. To reduce participant burden, especially given the number of measures administered, we used short forms of the study measures where possible.

ADJECTIVE MARKERS OF PERSONALITY: EXTRAVERSION AND NEUROTICISM (SHELDON, RYAN, RAWSTHORNE, & ILARDI, 1997)

This scale consisted of 12 adjective markers of personality, six each for extraversion (e.g., talkative, active) and neuroticism (e.g., insecure, moody). Three extraversion items and two neuroticism items were reverse scored. Participants responded using a 5-point Likert-format scale ranging from *not at all like me* (1) to *very much like me* (5) giving a potential range of 6 to 30 for each construct. In the current study, the internal consistency reliabilities were .76 for extraversion and .60 for neuroticism.

SHORT DEPRESSION-HAPPINESS SCALE (JOSEPH, LINLEY, HARWOOD, LEWIS, & McCOLLAM, 2004)

This is a six-item scale containing three items concerned with positive thoughts and feelings and three items concerning negative thoughts and feelings, to which individuals are asked to respond by rating the frequency of each item on a 4-point Likert-format scale (0 = *never*, 1 = *rarely*, 2 = *sometimes*, 3 = *often*). It can be scored to yield a measure of happiness (depression items reversed) or depression (happiness items reversed). In the present study, we reversed the happiness items to yield a measure of depression, with a potential range of 0 to 18. The scale has been shown to have good convergent validity with the Beck Depression Inventory

(Joseph et al., 2004). Internal consistency reliability for the current study was .68.

PROFILE OF MOOD STATES: ANXIETY SUBSCALE (McNAIR, LORR, & DROPPLEMAN, 1971)

This anxiety subscale consists of nine adjectives (e.g., tense, uneasy, nervous) scored using a 5-point Likert scale (0 = *not at all*, 4 = *extremely*), giving a potential range of 0 to 36. Internal consistency reliability for the current study was .91.

POSTTRAUMATIC GROWTH INVENTORY-SHORT FORM (PTGI-S; CALHOUN & TEDESCHI, 1999)

This is a 13-item scale that measures the degree of positive outcomes experienced after a traumatic event. It uses a 6-point Likert-format scale ranging from *I did not experience this change as a result of my crisis* (0) to *I experienced this change to a very great degree as a result of my crisis* (5) “My crisis” was modified to “the March 11 terrorist attacks” for this study. The PTGI-S yields a total score as well as scores for perceptions of trauma-related positive changes on five factors. However, for the purposes of this study we focused our analyses on the total PTGI-S score, because other research has indicated that posttraumatic growth may be legitimately understood as a single construct (Joseph, Linley, & Harris, 2005). The measure had an internal consistency reliability of .91, and potential scores of 0 to 65.

CHANGES IN OUTLOOK QUESTIONNAIRE (JOSEPH, LINLEY, ANDREWS ET AL., 1993, 2005)

This scale consists of 26 items that measure positive changes (11 items) and negative changes (15 items) experienced after a traumatic event. It is scored using a 6-point Likert-format scale ranging from *strongly disagree* (1) to *strongly agree* (6), and gives potential scores of 11 to 66 for positive changes and 15 to 90 for negative changes. The internal consistency reliability was .86 for the positive changes scale and .76 for the negative changes scale.

DEMOGRAPHIC INFORMATION

This section included questions about gender, age, education, marital status, religion, nationality, place of residence, place where the participant was when the terrorist attacks took place, and

whether the participant knew someone who had been injured or who had died as a result of the train bombings.

Procedure

Questionnaire packs were distributed using a snowball sampling methodology to allow us access to as wide a range of participants as possible (consistent with Linley et al., 2003). Questionnaire packs were distributed through a range of people known to the first author between 4 and 7 months following the terrorist attacks of March 11, 2004, in Madrid. Participants were asked to pass on questionnaire packs to their friends, families, and colleagues, and to return them to the first author via the route they had received them. Two hundred fifty questionnaire packs were distributed and 167 returned, giving a response rate of 67% for the study.

Data Analyses

The data were screened for violation of assumptions, and no transformations were deemed necessary. Gender differences were examined using *t* tests, with gender as the independent variable and all other study variables treated as dependent variables. Tests of association were examined using Pearson's correlation.

Results

Descriptive Statistics

The total mean PTGI-S score for the sample as a whole was 16.23 ($SD = 13.39$). The means for positive and negative changes were 30.57 ($SD = 11.27$) and 26.94 ($SD = 7.79$), respectively. It is difficult to compare the PTGI-S score with other studies, since previous researchers have not used the short form. The positive and negative changes reported by our sample were higher than those reported by British citizens who had vicariously experienced the terrorist attacks of September 11, 2001 (positive changes: $M = 28.09$, $SD = 10.29$; negative changes: $M = 23.97$, $SD = 7.97$; Linley et al., 2003). Our sample reported lower positive changes than those reported by funeral directors ($M = 47.73$, $SD = 8.60$; Linley & Joseph, 2005) and trauma therapists ($M = 44.77$,

TABLE 1 Gender Differences in Study Variables

Variable	Male <i>M (SD)</i>	Female <i>M (SD)</i>	<i>t</i>	<i>df</i>
Extraversion	20.07 (4.63)	21.73 (4.49)	-2.21*	147
Neuroticism	12.06 (2.99)	13.27 (3.43)	-2.27*	146
Depression	4.64 (2.62)	5.29 (3.06)	-1.38	147
Anxiety	12.01 (7.66)	12.48 (7.85)	-.36	146
Posttraumatic growth	14.02 (12.33)	18.10 (14.03)	-1.84†	142
Positive changes	27.29 (11.68)	33.40 (10.15)	-3.42***	147
Negative changes	25.16 (7.91)	28.54 (7.37)	-2.69**	146

† $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$.

$SD = 8.30$; Linley et al., 2005), but negative changes were reported at a similar level to both funeral directors ($M = 26.62$, $SD = 8.60$; Linley & Joseph, 2005) and trauma therapists ($M = 23.31$, $SD = 7.24$; Linley et al., 2005).

Gender Differences

To test our first hypothesis, t tests were performed to investigate gender differences. There were statistically significant differences between males and females on extraversion, neuroticism, positive changes, and negative changes and a nonsignificant trend toward differences on posttraumatic growth. In each case, women scored higher than men. There were no significant gender differences in relation to anxiety or depression (see Table 1). Our first hypothesis was supported, in that women scored higher than men on measures of posttraumatic growth, positive changes, and negative changes.

Associations With Anxiety and Depression

Posttraumatic growth and positive changes were not associated with either anxiety or depression, whereas negative changes were significantly associated with both anxiety and depression (see Table 2). This is consistent with some previous research with participants following direct trauma exposure, as noted above, and extends these findings to an indirectly exposed population.

TABLE 2 Intercorrelations Between Study Variables

Variable	1	2	3	4	5	6	7
1. Positive changes	—						
2. Negative changes	.58**	—					
3. Posttraumatic growth	.58**	.28**	—				
4. Depression	.03	.18*	.05	—			
5. Anxiety	.13	.29*	.12	.32**	—		
6. Extraversion	.01	-.12	.19*	-.20*	-.14	—	
7. Neuroticism	.12	.27**	-.03	-.42**	.21*	-.36**	—

* $p < .05$; ** $p < .01$.

Associations With Extraversion and Neuroticism

Posttraumatic growth and positive changes were significantly associated with extraversion, supporting our third hypothesis, but not with neuroticism. Negative changes were significantly associated with neuroticism.

Associations Between Posttraumatic Growth, Positive Changes, and Negative Changes

Posttraumatic growth was positively associated with both positive changes and negative changes, and positive and negative changes were significantly associated (see Table 2). This suggests that positive and negative changes are not bipolar dimensions of experience (i.e., opposite ends of a single continuum) but rather can be experienced simultaneously as people grapple with the consequences of traumatic exposure (Joseph, Linley, Andrews et al., 2005).

Comparisons of Direct and Indirect Exposure

Given the presence of participants in our original sample who were excluded from our main analyses by virtue of their direct rather than indirect exposure to the train bombings, we took the opportunity to compare the direct and indirect exposure groups in relation to their posttraumatic growth scores. An independent samples t test was carried out in order to examine if people differed in their PTGI-S scores according to whether they were directly exposed to the terrorist attacks (e.g., people who knew someone

who was injured or killed as a result) or whether they were indirectly exposed. The mean posttraumatic growth score for people directly exposed ($N = 14$) was 24.54 ($SD = 13.77$), and for people indirectly exposed ($N = 153$) it was 16.15 ($SD = 13.38$). The groups differed significantly, $t(156) = 2.16$, $p < .05$, indicating that people directly exposed to the terrorist attacks and their aftermath experienced higher levels of posttraumatic growth.

Discussion

The present study set out to examine the variables associated with posttraumatic growth, positive changes, and negative changes following indirect exposure to the March 11, 2004, terrorist attacks in Madrid, Spain. The main objective was to investigate if those variables that had been associated with posttraumatic growth as a result of direct experience of trauma would be also related to it following indirect exposure.

We found that women tended to report higher levels of posttraumatic growth and positive changes than did men, which is consistent with previous research that has found gender differences in directly exposed populations (Joseph, Linley, Andrews et al., 2005; Park, Cohen, & Murch, 1996; Tedeschi & Calhoun, 1996; Weiss, 2002). Posttraumatic growth and positive changes were not associated with either depression or anxiety, whereas negative changes were associated with both depression and anxiety. This is consistent with some of the findings from the posttraumatic growth literature following direct exposure and extends them to an indirectly exposed sample. We also found that that extraversion was associated with posttraumatic growth and positive changes, whereas neuroticism was associated with negative changes. Again, this is consistent with previous research conducted with participants following direct exposure (Evers et al., 2001; Tedeschi & Calhoun, 1996) and extends these findings to an indirectly exposed sample. However, it is notable that the effect sizes were typically small to moderate. Finally, we found that posttraumatic growth, positive changes, and negative changes were all associated with each other. This finding provides a replication and extension of other research (e.g., Joseph, Linley, Andrews et al., 2005; Linley et al., 2003, 2005) and points to important future considerations. As Tedeschi and Calhoun (2004a, p. 408) wrote:

It appears that the experience of posttraumatic growth and psychological distress and comfort may be essentially separate dimensions. This is relevant to the clinical context, because individuals who experience significant levels of posttraumatic growth will not necessarily experience a commensurate decrease in their levels of distress nor an increase in their levels of happiness.

As such, our findings and those of previous research suggest that positive and negative changes represent bivariate constructs that may have a range of possible associations (Joseph et al., 2005; Linley & Joseph, 2004). As Joseph, Linley, Andrews et al. (2005, p. 78) hypothesized:

An initial reaction to adversity consists of a breakdown and disorganization of schematic structures, and it is only over time, as the person emotionally processes their experience that changes in outlook become organized in a meaningful structure. Thus, positive and negative changes in outlook are likely to be positively associated in the more immediate aftermath of an event, but then become increasingly disassociated over time, eventually becoming negatively associated as the person cognitively accommodates their experiences in either a largely positive or negative direction.

An important direction for future research will therefore be to understand the associations between positive and negative changes over time, using finer-grained analyses (e.g., Frazier et al., 2001; Frazier, Tashiro, Berman, Steger, & Long, 2004) that allow the contours of positive and negative psychological change to be understood in dynamic relation to each other.

Several factors caution the interpretation of findings from this study. First, it was cross-sectional and relied on retrospective self-report data (albeit as does almost all posttraumatic growth research). While retrospective self-report is subject to potential cognitive biases, this is the only realistic methodology for posttraumatic growth research, because experimental research is precluded by the fact that traumatic events cannot be predicted and therefore prevent easy collection of pre-event measures. However, there is research that indicates that retrospective self-reports of trauma exposure are generally reliable (Bramson et al., 2001). Further, the time frames adopted in this study are consistent with previous research addressing the effects of vicarious exposure (Linley et al., 2003). Second, the measures were translated into Spanish, and while we do not see grounds to question their reliability and validity (all alphas were acceptable or good, and associations were

in the hypothesized directions), our findings should be interpreted cautiously. Third, data collection was carried out between 4 and 7 months following the train bombings. Hence, while we may have picked up on more established psychological responses, we will not have identified more transient and immediate reactions following the events (although we also note that this time frame is consistent with Linley et al., 2003). These issues remain an important consideration for future research.

This is one of only a handful of studies that have documented positive psychological changes, including posttraumatic growth, following indirect exposure to traumatic events. However, for real progress to be made in understanding the processes and mechanisms of posttraumatic growth and positive changes following indirect exposure, there is a need for longitudinal research underpinned by solid theoretical predictions. This will also allow the unpicking of the issue as to whether posttraumatic growth is a genuine outcome or, rather, more of a coping mechanism (McFarland & Alvaro, 2000). With international terrorism seemingly on the increase, understanding the factors that promote resilience and growth in people exposed, either directly or indirectly, to the traumas that are perpetrated appears a worthwhile priority.

In conclusion, the March 11, 2004, terrorist attacks had a profound effect on Spanish society. Without diminishing in any way the severe and sometimes chronic psychological difficulties that survivors may have experienced, this study demonstrates that people who were indirectly exposed also experienced some degree of posttraumatic growth and positive changes as a result of the attacks. Their fortitude and resilience stand as a testament to the strength of the human spirit.

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