Adversity does not always lead to psychopathology:cognitive reactivity is related to longitudinal changes in resilience

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A substantial majority of individuals who are exposed to a traumatic event do not develop any persistent trauma-related psychological symptoms, a phenomenon referred to as resilience. Relying on a sample of undergraduate students (n = 79), the present study investigated whether positive and negative affect and cognitive reactivity to emotional challenges serve as predictors of longitudinal changes in resilience as measured by the Connor-Davidson Resilience Scale. While at initial testing both positive affect and cognitive reactivity were related to resilience, only higher levels of cognitive reactivity predicted a reduction in resilience four months later. These results highlight the relevance of cognitive reactivity for the study of resilience. (*Netherlands Journal of Psychology*, 65, 62-68.)

Keywords: resilience; cognitive reactivity; positive affect; negative affect; trauma; posttraumatic stress disorder

The incidence of trauma is high, with half of the adult population experiencing at least one traumatic event (i.e., violent or life-threatening occurrences or the death of a close friend or relative) during their life. Traditionally, the trauma literature has been dominated by the idea that trauma usually produces adverse outcomes such as posttraumatic stress disorder (PTSD) and depression (Bonanno, 2004). Only more recently, researchers have become interested in the phenomenon that many individuals and usually even the majority of victims survive horrific events (e.g., the 9/11 terrorist attacks; Bonanno, Papa, Lalande, Westphal, & Coifman, 2004; train disasters; Engelhard, van den Hout, Arntz, & McNally, 2002) without significant disruptions in their everyday functioning. This capacity has been coined resilience, which pertains to 'the ability of adults in otherwise normal circumstances who are exposed to an isolated and potentially highly disruptive event, such as the death of a close relation or a violent or life-threatening situation, to maintain relatively stable, healthy levels of psychological and physical functioning' (Bonanno, 2004, p. 20). Resilience is different from recovery in that resilient individuals do *not* develop any psychopathology after trauma exposure rather than simply recovering more quickly. In line with Bonanno's (2004) assumption that resilience is common, the prevalence of lifetime PTSD is relatively low (7.9 %), while trauma ex-

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posure is much more frequent (50 to 60%; Ozer, Best, Lipsey, & Weiss, 2003).

One factor that may contribute to psychological problems after trauma exposure is heightened emotionality during and in the immediate aftermath of trauma. Interestingly, individuals differ widely in their response to standardised emotional stimuli (Davidson, 2000). Taylor and Ingram (1999) have termed these individual differences in reactivity to emotional challenges *cognitive reactivity*. This term suggests that 'negative cognitive factors emerge during stressful situations' (p. 488; Scher, Ingram, & Segal, 2005). Cognitive reactivity is thought to be involved in the onset and maintenance of depression. Moreover, it has been shown to be predictive of relapse in depressive patients (Segal, Kennedy, Gemar, Hood, Pedersen, & Buis, 2006). The definition of PTSD in the Diagnostic and Statistical Manual of Mental Disorders' (DSM IV; American Psychiatric Association, 1994), also emphasises the individual's subjective reaction to the trauma. Accordingly, different persons may experience the same event as more or less traumatic. Thus, individual differences in cognitive reactivity to a given stressor may (partially) determine whether an individual is able to cope with a traumatic event and can be considered resilient.

Positive emotions constitute a potentially protective factor to the harmful effects of aversive life events (Mancini & Bonanno, 2006). Indirect evidence for this comes from Fredrickson's (2001) work on the *broaden-and-build theory* of positive emotions. This theory assumes that certain positive emotions (e.g., joy, contentment, love) not only feel good, but also broaden people's thought-action repertoire (i.e., widen the array of thoughts and actions that come to mind). It is worthy of note that the effect of negative emotions is completely opposite, notably narrowing people's thought-action repertoire through an urge to act in a certain way (e.g., escape). Fredrickson (2001) hypothesised that in contrast to negative emotions that carry immediate benefits in life-threatening situations, positive emotions yield indirect long-term benefits by fostering durable intellectual and psychological resources inherent to human growth. In accordance with the broaden-and-build theory, Fredrickson and Joiner (2002) found that positive, but not negative, affect predicted broad-minded problem solving. Moreover, broad-minded problem solving was related to positive mood at five-week follow-up (see, for a similar finding, Burns, Brown, Sachs Ericsson, Plant, Curtis, Fredrickson et al., 2008). Thus, resilience may be fostered by positive mood.

Most studies on resilience relied on samples of traumatised individuals and examined who develops trauma-related psychological problems (Bonanno, Colak, Keltner, Shiota, Papa, Noll et al., 2007; Bonanno et al., 2004; Engelhard & van den Hout, 2007; Engelhard, van den Hout, & Schouten, 2006). The present study followed an alternative approach. Specifically, we employed a well-validated measure of resilience (Connor-Davidson Resilience Scale; Connor & Davidson, 2003) and investigated changes in resilience in response to potentially traumatic life events using a longitudinal approach. In line with the broaden-and-build theory of positive emotion, we expected positive emotions to foster higher levels of resilience. Moreover, we hypothesised that cognitive reactivity rather than negative mood per se would undermine resilience.

Method

Participants and procedure

Participants were 79 undergraduate students (62 women) enrolled at Maastricht University. Their mean age was 19.57 years (*SD* = 1.58; range: 18 to 24 years). Participants gave written informed consent and received € 10 for participation. Participants were tested on two occasions (i.e., T1 and T2), separated by a four-month interval. At T1, participants completed all questionnaires, while at T2, they completed only the Connor-Davidson Resilience Scale and the Impact of Event Scale. The study was approved by the standing ethics committee of the Faculty of Psychology, Maastricht University.

Self-report measures

Connor-Davidson Resilience Scale (CD-RISC; Connor & Davidson, 2003): The CD-RISC is a 25-item self-report measure that was specifically developed as a brief way to quantify resilience. The English version of the CD-RISC has been shown to be sensitive to treatment responses (Davidson, Payne, Connor, Foa, Rothbaum, Hertzberg et al., 2005). CD-RISC items are rated on five-point scales (anchors: 0 = not true at all, 4 = true nearly all of the time). Internal consistency was good at T1 and T2, with Cronbach's alpha's being 0.87 and 0.85, respectively. A sample item is: 'I tend to bounce back after illness or hardship.'

Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988): The PANAS consists of 20 items that refer to certain feelings and emotions. Respondents indicate on five-point scales (anchors: 1 = very slightly or not at all, 5 = extremely) to what extent these feelings and emotions applied to them in the last week. The PANAS contains two subscales that quantify positive (PA; Cronbach's alpha = 0.85; e.g., 'excited' or 'proud') and negative affect (NA; Cronbach's alpha = 0.85; e.g., 'afraid' or 'hostile') relatively independent of each other. Watson et al. (1988) reported sound psychometric properties for the PANAS.

Leiden Index of Depression Sensitivity-Revised (LEIDS-R; Van der Does & Williams, 2003): The LEIDS-R (Cronbach's alpha = 0.86) is a self-report instru-

ment consisting of 34 items that measure cognitive reactivity to sad mood on five-point scales (anchors: 0 = not at all, 4 = very strongly). The LEIDS-R is a slightly modified version of the LEIDS. The LEIDS has been found to correlate with cognitive reactivity to mood induction procedures (Van der Does, 2002b). The LEIDS-R consists of eight additional items as compared with the LEIDS and has been used extensively in prior research (Merens, Booij, Markus, Zitman, Onkenhout, & Van der Does, 2005; Moulds, Kandris, Williams, Lang, Yap, & Hoffmeister, 2008; Williams, Van der Does, Barnhofer, Crane, & Segal, 2008). Van der Does (2002a) reported adequate internal consistency and concurrent validity for the LEIDS. A sample item is: 'When I feel down, I am busier keeping images and thoughts at bay.'

Impact of Event Scale (IES; Horowitz, Wilner, & Alvarez, 1979): The IES (*Cronbach's alpha* = 0.90) is not a retrospective self-report measure of trauma or of post-traumatic stress symptoms, but rather taps current intrusions and avoidance associated with the experience of an aversive event. In the current study, participants were instructed to briefly write down the most aversive life event they had ever experienced and when this had happened. Next, they were requested to complete the IES items with reference to this event. A sample item is: 'Pictures about it popped into my mind.' Most studies provide separate scores for the eight-item avoidance factor (Cronbach's alpha = 0.83) and the seven-item intrusion factor of the IES (Cronbach's alpha = 0.87). Participants were also asked to indicate when the event occurred. Eleven participants did not provide a date.

All questionnaires were in Dutch and all of them except the CD-RISC have been extensively used during prior research, which yielded results highly similar to studies relying on the original English versions (e.g., Boon & Peters, 1999; Merckelbach & Giesbrecht, 2006). Participants completed all questionnaires in a set order (T1: CD-RISC, PANAS, LEIDS-R, IES; T2: CD-RISC, IES).

Results

Table 1 presents CD-RSIC mean scores, as well as PANAS scores, LEIDS-R scores, IES scores, and Pearson correlations between these measures. As can be seen, CD-RISC scores at both T1 and T2 correlated significantly positively with each other and with PANAS PA scores, indicating that positive affect is indeed related to resilience. A negative correlation was found between CD-RISC scores and LEIDS-R scores at both T1 and T2, indicating that the lower cognitive reactivity, the higher resilience. However, only CD-RISC scores at T1 correlated significantly with PANAS NA scores. CD-RISC scores remained relatively stable across sessions [$t(78) = 0.07$, *ns*]. This was expected as the sampled period would be too short to tap any possible systematic age-related changes for the group as a whole. However, resilience is a dynamic trait that is subject to systematic fluctuations. This was demonstrated by the correlation between the CD-RISC at T1 and T2, which was far from perfect ($r = 0.68$). Predictors of these fluctuations are investigated below.

Table 1 **Mean scores of and Pearson product-moment correlations between self-report measures**

				CD-RISC		*PANAS*		*LEIDS-R*	*IES*	*intrusion*
		M	SD	T1	T2	PA	NA		Total	
CD-RISC	T1	66.42	10.77	-						
	T2	66.35	9.82	0.68*	-					
PANAS	PA	32.51	6.63	0.33*	0.24*	-				
	NA	17.18	5.82	-0.30*	-0.20	-0.35*	-			
LEIDS-R		39.45	15.48	-0.34*	-0.39*	-0.24*	0.48*			
IES	Total	10.95	12.61	-0.20	-0.19	-0.01	0.09	0.43		
	Intrusion	4.63	6.40	-0.16	-0.17	-0.02	0.07	0.36*	0.94*	-
	Avoidance	6.32	7.07	-0.22*	-0.20	0.00	0.10	0.44*	0.93*	0.75*

$p < 0.05$ (two-tailed). CD-RISC = Connor-Davidson Resilience Scale, PANAS PA = Positive and Negative Affect Schedule Positive Affect, PANAS NA = Positive and Negative Affect Schedule Negative Affect, LEIDS-R = Leiden Index of Depression Sensitivity-Revised.

Table 2	Summary of stepwise multiple regression on Connor-Davidson Resilience Scale scores at T1				
Step		*B*	*SE*	β	*t*
1	LEIDS-R	-0.23	0.08	-0.34	-3.12*
2	LEIDS-R	-0.19	0.07	-0.27	-2.54*
	PANAS PA	0.44	0.17	0.27	2.52*

* $p < 0.05$ (two-tailed).

To examine the unique cross-sectional contribution of PANAS subscales, IES, and LEIDS scores to CD-RISC scores at T1, a multiple stepwise regression analysis was conducted with age, gender, PANAS PA and NA, and LEIDS scores as predictors (Table 2). LEIDS-R and PANAS PA scores explained 11% and 7% of the variance in CD-RISC scores at T1, respectively. All other predictors failed to reach conventional levels of significance.

In a next step, factors that may contribute to longitudinal changes in CD-RISC scores were investigated. Thus, CD-RISC scores at T2 were predicted by means of a multiple stepwise regression analysis, with T1 CD-RISC scores, age, gender, PANAS PA and NA scores, and LEIDS scores serving as potential predictors. In a first step, we entered T1 CD-RISC scores to statistically control for individual differences in CD-RISC at T1. Next, we proceeded in a stepwise fashion with gender, PANAS PA and NA, and LEIDS scores as possible predictors. Table 3 shows the results of this analysis, which indicates that T1 CD-RISC scores accounted for 46% and LEIDS scores for another 3% of the variance in T2 CD-RISC scores. None of the other variables could further improve the prediction.

We hypothesised that changes in resilience may mainly be fuelled by the occurrence of life events between our two measurements while being moderated by cognitive reactivity to these events. Therefore, we predicted T2 CD-RISC scores from T1 CD-RISC, LEIDS-R, whether or not the IES event had occurred between the measurements, and the interaction between the latter and LEIDS-R scores. This critical interaction was significant ($B = -0.39$, $SE = 0.18$, $\beta = -0.65$, $p < 0.05$). Thus, in a next step, we predicted T2 CD-RISC scores from T1 CD-RISC and LEIDS-R scores for participants who had not experienced a traumatic event between T1 and T2 and those who had. Interestingly, in participants who had not experienced their most emotional life event between T1 and T2, LEIDS-R scores were not related to T2 CD-RISC scores ($B = -0.05$, $SE = 0.06$, $\beta = -0.08$, $p > 0.05$, $n = 59$), while there was a trend in individuals who experienced their most emotional life event between T1 and T2 ($B = -0.43$, $SE = 0.18$, $\beta = -0.50$, $p = 0.057$, $n = 9$). This relationship is presented in Figure 1, which also shows that this effect cannot be attributed to an outlier.

Discussion

The main findings of our study can be summarised as follows. Firstly, high levels of positive mood and lower levels of cognitive reactivity were related to resilience cross-sectionally. Yet, only levels of cognitive reactivity predicted a longitudinal change in resilience. This effect was carried by individuals who experienced their most emotional life event between T1 and T2.

The present findings concur with research that underscores the importance of individuals' ability to regulate their emotions. For example, Davidson (2000) reviews psychophysiological research which demonstrates that disruptions in emotion regulation rather than emotional intensity per se, contribute to the onset and maintenance of anxiety and depression. The importance of emotion regulation in resilience is also

Table 3	Summary of stepwise multiple regression on Connor-Davidson Resilience Scale scores at T2				
Step		*B*	*SE*	β	*t*
1	CD-RISC T1	0.62	0.08	0.68	8.03*
2	CD-RISC T1	0.56	0.08	0.62	7.04*
	LEIDS-R	-0.12	0.06	-0.18	-2.07*

* $p <$ two.05 (two-tailed).

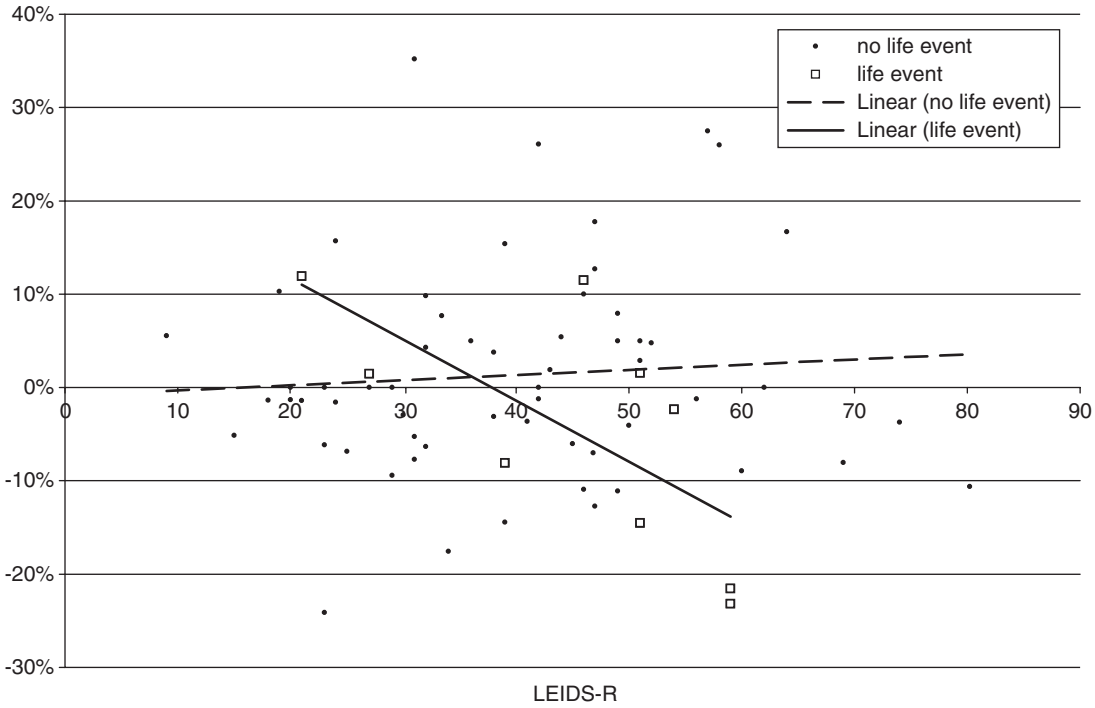

Figure 1
Proportional changes in CD-RISC scores from T1 to T2 as a function of LEIDS-R scores.

illustrated by Bonanno, et al. (2004). These authors found that resilience to the adverse effects of exposure to the World Trade Center attack was critically determined by the ability to express or suppress emotions. Similarly, Curtis and Cicchetti (2007) showed that emotion regulation capacity was related to resilience in a sample of maltreated children. However, and in contrast to prior findings relating positive emotions to an increase in coping capacity as measured by the Coping Responses Inventory (i.e., upward spiral of positive emotion; Burns et al., 2008; Fredrickson & Joiner, 2002), the present study found no support for the idea that positive emotions foster resilience in a longitudinal manner. The current findings suggest that a failure to be resilient to the adverse effects of traumatic events may perhaps best be explained by the downward spiral that is often associated with a failure to regulate negative affect (Davidson, 2000; Peterson & Seligman, 1984; Van der Does, 2005).

One important innovative aspect of the present study is its longitudinal design. The most important limitations, however, are its relatively small sample size and the low number of individuals who report that their most emotional life event occurred between T1 and T2, the relatively short interval between the two measurements, and the fact that we relied on a non-clinical sample. Moreover, one may object that the variance in changed resilience scores which was predicted longitudinally by the LEIDS-R may be of limited magnitude and consequently of little clinical relevance. Yet our findings have to be seen in perspective. Specifically, all our participants were healthy undergraduate students. Therefore, levels of cognitive reactivity should have been lower than one would expect in clinical samples. Together with the relatively low frequency of adverse events during the study period, one may speculate that our study yielded a very conservative estimate of the relationship between cognitive reactivity on resilience. Therefore, our study warrants replication in a clinical sample of individuals with depression or individuals who are at risk of being exposed to adverse events (e.g., police officers). Moreover, future studies should be directed at whether reducing cognitive reactivity also increases resilience. This could be leveraged to help reducing the risk of PTSD in high-risk groups.

In conclusion, the current study highlights that cognitive reactivity is related to resilience and, more importantly, that high levels of cognitive reactivity lead to a deterioration of resilience over time. While the present study is a long way from offering direct therapeutically relevant insights, it does highlight the importance of cognitive reactivity and possibly disruptions in emotion regulation. Yet in the long run, gaining knowledge on the underlying cognitive mechanisms that foster resilience might inform us about novel and potentially successful approaches to improve resilience in high-risk individuals such as police officers or ambulance personnel.

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