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Abstract

The objective of the current study was to explore the relationship between resilience and psychological adjustment in Chinese adolescents who experienced the 2008 Sichuan earthquake. Study 1 compared the scores and factor structures on the Resilience Scale for Chinese Adolescents for 1436 adolescents, who were divided into a high-adversity group and a low-adversity group. The results showed that resilience following exposure to an earthquake included cognitive and emotive components. In Study 2, 311 Chinese adolescents who resided in the most severely affected areas were surveyed at 15 months (T1) and 20 months (T2) following the earthquake. The results revealed that resilience mediated the relationship between positive future expectations at T1 and adjustment at T2.

Keywords

adolescence, path analysis, protective factors, self-efficacy, social support

Introduction

A major earthquake measuring 8.0 on the Richter scale occurred in Sichuan Province, China, on 12 May 2008. Thousands of families were affected by the quake, leaving 69,225 people dead and 17,939 missing (Ministry of Civil Affairs, People's Republic of China, 2008). Many survivors lost their homes, loved ones, and all of their possessions. Exposure to such traumatic events following a major disaster is known to have both short- and long-term psychological, emotional, and behavioral consequences, particularly among children and adolescents (Mitchell et al., 2004). However, rather than suffering from symptoms of depression and anxiety, most people who survive

such disasters remain mentally healthy (Wang et al., 2012). The current study is interested in these mentally healthy trauma survivors, who have often been overlooked because they do not seek treatment (Bonanno, 2004). We examined

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the extent to which resilience mediates the relationship between postearthquake psychological adjustment and future expectations, self-efficacy, and family support among Chinese adolescents who experienced the effects of a major earthquake.

The construct of resilience

Currently, there are three theories or definitions of resilience: (1) resilience is a positive psychological outcome among high-risk individuals (Hopwood and Treloar, 2008); (2) resilience is a dynamic, interactive process that involves stress, pressure, and other negative life events (Luthar et al., 2000); and (3) resilience is the ability of an individual to cope with stress, frustration, trauma, and other negative life events (Bonanno et al., 2010).

Compared to the other two perspectives, the theory of resilience as ability is largely measurable and is most directly amenable to therapeutic intervention. Moreover, this view suggests that resilience is an ordinary trait that usually arises from the normative functions of adaptive systems (Bonanno et al., 2010; Masten, 2001). With this perspective, the present study conceptualizes resilience as an individual's opportunity and capacity to cope well in the face of adversity and as the possession of psychological, social, and/or cultural resources, which buffer one from harm in the aftermath of negative life events. Hu and Gan (2008) provide a useful conceptualization of resilience in Chinese adolescents who suffered traumatic events, which reflects cultural sensitivities of Chinese youth. Their exploration of the psychometric properties of the Resilience Scale for Chinese Adolescents (RSCA) revealed the following four factors: a positive view of adversity, problem orientation, affect control, and venting. The first factor, positive evaluation of adversity, reflected Confucianism in Chinese culture, whereas the third factor, affect control, was derived from Taoism.

Protective factors of resilience

The model of resilience that was proposed by Kumpfer (1999) provided a comprehensive theoretical framework that includes three aspects: the first aspect is a protective or risk factor, such as self-efficacy, positive future expectations, and family/social support, which serves as an antecedent variable; the second aspect is the mediating capacity of an individual's resilience, which explains the mechanism of the protective factors; and the final aspect involves the outcome variables, namely, the manner in which individuals adjust following a traumatic event.

Protective factors are the attributes that assist individuals in utilizing resources, support, or coping strategies, which enable individuals to function effectively even in stressful situations (Pollard et al., 1999). A number of studies suggest that a favorable balance between psychosocial "protective" and "risk" factors is essential for psychosocial resilience (e.g. Hart et al., 2006). It is noteworthy that our definition of resilience was limited to the aforementioned four factors of the RSCA. We define other external or internal processes related to resilience, such as social support, as protective factors of resilience. To minimize the overlap between resilience and its protective factors. As such, we conceptualize self-efficacy, positive future expectation, and family/social support as protective factors of resilience in this study.

Self-efficacy. Studies on resilience in adolescents have found that self-efficacy contributes positively to resilience. Dispositional self-efficacy refers to an optimistic and confident view of oneself and one's future. Retrospective and prospective research suggests that having an internal locus of control predicts resilience (Horner, 1998). Self-efficacy has been proven to be related to post-adversity psychological adjustment. After a traumatic life event, people with stronger self-efficacy are more likely to have a better sense of well-being (Pakenham et al., 2004).

Family/social support. The protective function of family/social support for psychological adjustment to adversity in adolescents has been demonstrated in numerous studies. Perceived social support systems may refer to engaging, cooperative learning environments; successful school experiences; and/or good student–teacher relationships. Many studies have found that parental and family support is related to fewer negative outcomes and psychological problems (e.g. Myers and Taylor, 1998).

Positive future expectations. In addition to self-efficacy, positive future expectations constitute a cognitive construct that is closely related to resilience. Positive future expectations require the capacity to anticipate future events, imagine diverse possible outcomes, and act according to those anticipations. The literature consistently demonstrates that positive future expectations are characteristic of resilient children and suggests that positive future expectations influence later psychological adjustment (Wyman et al., 1993). Therefore, we hypothesize that positive future expectations are also protective factors for resilience and contribute to the long-term psychological well-being of individuals.

The present studies

One purpose of designing the present two studies was to answer the following important research question: What are the differences in resilience between individuals experiencing high-stress exposures and low-stress exposures? We first compared the scores on the RSCA of a trauma group (earthquake victims) of adolescents to those of an adversity group (e.g. bereavement) of adolescents. Second, we compared correlation patterns of adolescents in a “casualty group,” who experienced casualties in their families, to those of adolescents in a “noncasualty group,” who did not have casualties in their immediate families. This distinction of trauma exposure was based on the classification criteria set by the Ministry of Civil Affairs, People’s Republic of China (2008).

Research has identified several protective factors from individual, familial, and social perspectives, but few studies have attempted to integrate these factors into one theoretical model. In the second study, we adopted Kumpfer’s (1999) model, which proposed that resilience functions as a mediator, augmenting the positive functions of protective factors (self-efficacy, positive future expectation, and family/social support) on the postearthquake adjustment status of Chinese adolescents. We employed a longitudinal design to assess the relationship between these protective factors and resilience and the psychological outcomes at 15 months and 20 months following exposure to the earthquake.

Study I

Study 1 aimed to compare the scores and factor structures on the RSCAs (Hu and Gan, 2008) for a high-versus low-adversity group of adolescents.

Methods

Participants. There were two groups of participants, a low-stress exposure group and a high-stress exposure group. The Beijing participants belonged to the low-stress exposure group, which comprised 811 high school students (344 males, 461 females, and 6 with unidentified gender) from 8 high schools located in Beijing. The mean age of these students was 14.97 years (standard deviation (SD) = 1.83; age ranging from 12 to 19 years).

The Mianzhu participants included 625 high school students (298 males, 325 females, and 2 with unidentified gender) from two high schools located in Mianzhu, Sichuan Province, which was among the most severely affected areas according to the Ministry of Civil Affairs, People’s Republic of China (2009). They were defined as the high-stress exposure group. The mean age of these students was 16.34 years (SD = .60), age ranging from 15 to 18 years.

Measures

RSCA. The RSCA, developed by Hu and Gan (2008), contains 27 items that measure the process of coping with stress and adversity. The respondents rated each item on a 5-point scale ranging from "strongly disagree" to "strongly agree." Higher scores represented higher levels of resilience. An exploratory factor analysis (EFA) revealed four first-order factors: affect control, venting, problem orientation, and a positive view of adversity. The following are examples of the items: "The experience of frustration made me more mature" and "I believe adversity can inspire people." The Cronbach's α values in the current study for the first-order factors were .83, .87, .73, and .82, respectively. Criterion validity was verified by a significant correlation with quality of life (Hu and Gan, 2008).

Procedures

All the participants were selected through convenience sampling. The students from schools from both Beijing and Mianzhu were invited to participate in this study. All students from both schools participated in the survey. The questionnaires were distributed and collected during class time. All participants completed the questionnaires anonymously and were assured of the confidentiality of their answers. Each participant signed an informed consent form, and the survey was approved by the local ethics committee.

Results

Descriptive statistics of high school students in the nonquake area and earthquake survivors. An independent t -test was used to compare the results of high school students who were not exposed to the earthquake to those of the students who were earthquake survivors. Significant between-group differences were found in three of the four dimensions: for problem orientation, $M_{quake} = 17.29$ (SD = 4.14) versus $M_{non-quake} = 13.40$ (SD = 2.71), $t = 20.81$; for positive

view of adversity, $M_{quake} = 15.74$ (SD = 3.14) versus $M_{nonquake} = 10.76$ (SD = 2.23), $t = 33.65$; and for venting, $M_{quake} = 19.87$ (SD = 6.17) versus $M_{nonquake} = 15.53$ (SD = 2.47), $t = 16.59$. The earthquake survivors scored much higher than the high school students in the nonquake area, with all significance values below .0001.

Second-order structure of resilience in high school students who were and were not exposed to the earthquake. For both the Beijing and the Mianzhu participants, separate second-order structures of resilience were computed using an EFA and a confirmatory factor analysis (CFA). The EFA that was conducted for half of the Beijing sample yielded only one factor, which explained 41.9 percent of the variance.

In contrast, among the Mianzhu participants, two factors were extracted as higher-order dimensions of resilience, specifically emotive and cognitive components. The emotive component includes affect control and venting, with promax-rotated loading of .88 and .84, respectively. The cognitive component includes problem orientation and a positive view of adversity, with promax-rotated loading of .83 and .78, respectively. These two factors accounted for 73.44 percent of the variance. The correlation between these two factors was .57.

A CFA using the other halves of the two samples was conducted to compare three models. Model A proposed a single-factor structure; Model B proposed a structure consisting of two unrelated factors, with affect control and venting loaded on the first factor, and problem orientation and a positive view of adversity loaded on the second factor; Model C proposed a structure consisting of two-related factors, with affect control and venting loaded on the first factor, and problem orientation and a positive view of adversity loaded on the second factor.

For the Beijing participants, Model A yielded the model of best-fit ($\chi^2 = 6.51$, $df = 2$, $p < .05$, comparative fit index (CFI) = .96, and root mean square error of approximation (RMSEA) = .078) and was significantly better than Models

B and C. For the Mianzhu participants, however, Model C resulted in the best-fit ($\chi^2 = 2.22$, $df = 1$, $p > .05$, CFI = .99, RMSEA = .044, which was significantly better than the other two models). The fit indices of the three models are presented in Table 1.

Discussion

The results of the EFA and the CFA provided further support for the construct validity of the RSCA, which is an endemic measure of adolescent resilience that is based on the Chinese cultural and theoretical perspective of resilience as a process. Of note among the results are the significant between-group differences in problem orientation, venting, and a positive view of adversity, such that adolescents who experienced traumatic stress scored much higher than those living under ordinary circumstances. These results are consistent with the challenge model of resilience (Garmezy et al., 1984), in which a higher prevalence of stress was correlated with greater competence in coping with this stress among adolescents.

The results also showed that the second-order structure of resilience for adolescents who experienced traumatic stress was different from that of adolescents living under ordinary circumstances. Under ordinary circumstances, the secondary structure of resilience was unidimensional; in other words, the cognitive and

emotive factors of resilience occurred simultaneously. However, among adolescents who survived the earthquake, resilience appeared to be represented by two separate dimensions (i.e. the cognitive and emotive components) with moderate correlation.

Study 2

The objective of this study was to build upon previous research and test a mediation model of resilience proposed by Kumpfer (1999) in the context of postearthquake adjustment. In particular, the following hypotheses were examined:

- Hypothesis 1 (H1).* Future thinking, self-efficacy, and perceived social support will be the major protective factors of resilience.
H2. The cognitive dimension of resilience will act as a mediator between future thinking and psychological outcomes, whereas the emotive dimension of resilience will act as a mediator in the relationship among self-efficacy, perceived social support, and psychological outcomes.

Methods

Participants. The participants were students from a high school located in Mianzhu, Sichuan Province, which was among the most severely affected areas. We collected data at two time

Table 1. The model fit indices for the CFA of the RSCA in the two samples

Model	Sample	χ^2	df	χ^2/df	RMSEA	90% CI RMSEA	TLI	CFI	AIC
A	Beijing (n = 687)	6.51	2	3.25	.078	.048–.108	.93	.96	202.51
B	Beijing (n = 687)	27.68	2	13.84	.13	.087–.17	.93	.93	43.68
C	Beijing (n = 687)	326.91	2	113.45	.37	.33–.40	.06	.05	340.91
A	Mianzhu (n = 493)	30.05	2	15.02	.17	.12–.22	.91	.91	46.05
B	Mianzhu (n = 493)	95.97	2	47.98	.31	.26–.36	.70	.70	153.58
C	Mianzhu (n = 493)	2.22	1	2.22	.044	.012–.076	.99	.99	23.15

RSCA: Residence Scale for Chinese Adolescents; CFA: confirmatory factor analysis; RMSEA: root mean square error of approximation; CFI: comparative fit index; TLI: Tucker–Lewis Index; AIC: Akaike information criterion; CI: confidence interval.

Model A: One factor.

Model B: Two-unrelated factors.

Model C: Two-related factors.

periods. At Time 1, which was approximately 5 months after the earthquake, the data were collected from 311 high school students. The time lapse between Time 1 and Time 2 was 5 months. Only 200 students remained in the second collection wave. Male participants constituted 45 percent of the sample. The mean age was 16.34 years ($SD = .60$, ranging from 15 to 18 years old). Of these participants, 55 individuals experienced casualties in their families and were labeled as the "casualty group"; the remaining 145 participants did not have casualties in their immediate families and were labeled as the "noncasualty group."

Measures

RSCA. This scale is identical to that used in Study 1.

Self-Rating Anxiety Scale. The Self-Rating Anxiety Scale (SAS) was developed by Zung (1971) and consists of 20 items that measure anxiety symptomatology. The respondents rate the frequency of symptoms from (1) "not at all" to (4) "most of the time or always." The Cronbach's α value in this study was .87.

Self-Rating Depression Scale. Constructed by Zung et al. (1965), the Self-Rating Depression Scale (SDS) is a 20-item self-administered measure of depressive symptomatology with a Likert scale that ranges from (1) "never or almost never" to (4) "most of the time." High scores indicate high levels of depression. The Cronbach's α value for this measure in the current study was .78.

Positive Future Expectation Scale. This instrument was originally developed by Zimbardo and Boyd (1999). The revised Chinese version of the Future Expectation Scale, which was used in the present study, consists of six statements regarding one's tendency to expect a good future, with a response format that ranges from 1 (completely disagree) to 5 (completely agree). Sample items include "I try to live my life as

fully as possible, one day at a time." To avoid construct overlap, we excluded items that approximated the factor "positive view to adversity" in meaning. The Cronbach's α value in this study was .70.

General self-efficacy. General self-efficacy is a 10-item measure of subjective self-efficacy (Schwarzer and Jerusalem, 1995). Items are rated on a 5-point scale from "strongly disagree" to "strongly agree." The Cronbach's α value in this study was .86.

Perceived Social Support Scale. The Perceived Social Support Scale (PSSS; Barrera et al., 1981) is a 13-item scale that measures a person's perceived social support. The respondents rate each item on a 5-point scale from "strongly disagree" to "strongly agree." Higher scores represent higher levels of perceived social support. The Cronbach's α value in this study was .84.

Procedures

The participants were selected through convenience sampling. All students were from the same school, and all the invited students participated in the survey. The questionnaires were distributed and collected during class time. All participants completed the questionnaires anonymously and were assured of the confidentiality of their answers. Each participant received a stationery gift as compensation.

Future expectation, self-efficacy, and perceived social support were measured in January 2009, 5 months after the Sichuan earthquake. Resilience and psychological symptomatology were measured 5 months later in June 2009. The students were required to provide their student ID numbers to ensure that their questionnaires could be matched. All participants signed an informed consent form, and the survey was approved by the local ethics committee.

The multilevel structural equation model that we used in our analyses was evaluated using Mplus 5.1. Missing data were treated with

a full information maximum likelihood (FIML) procedure.

Results

Attrition analysis. An attrition analysis revealed similar patterns across most variables between adolescents from the first wave and those who remained in the second wave.

Descriptive analyses and comparison of different stress exposure groups. The mean values and SDs for each variable are shown in Table 2.

An independent sample *t*-test indicated that there were no significant differences between the casualty and noncasualty groups for all of the variables. The Bonferroni correction was used for these independent *t*-tests.

The lower diagonal of Table 2 displays the correlations among the variables in the non-casualty group, and the upper diagonal of Table 2 displays the correlations among the variables in the casualty group. The correlation table demonstrates that the correlation between the resilience factors and the psychological adjustment outcomes of the casualty group were significantly higher than those of the noncasualty group.

Multilevel structural equation model of protective factors, resilience, and psychological adjustment. Future expectations, self-efficacy, perceived social support, and resilience factors

as measured at Time 1, and anxiety and depression as measured at Time 2 were used to build a longitudinal mediation model in which the resilience factors acted as mediators. The longitudinal mediation model of protective factors, the cognitive and emotive components of resilience, and psychological adjustment outcomes are shown in Figure 1. After the nonsignificant paths were deleted, the model provided a good fit for the data, $\chi^2 = 208.87, p < .001, df = 45, CFI = .96,$ and $RMSEA = .087.$ The indirect effect of future expectations on psychological adjustment was $-.15,$ Sobel's $z = 1.49 > .98,$ and $p < .05$ (MacKinnon et al., 2002). The indirect effect of self-efficacy on psychological adjustment was $.21,$ Sobel's $z = 1.85 > .98,$ and $p < .05.$ The indirect effect of social support on psychological adjustment was $.32,$ Sobel's $z = 2.64,$ and $p < .01.$

Figure 1 shows that the emotive component of resilience fully mediates the relationship between self-efficacy, perceived social support, and psychological adjustment. Furthermore, the cognitive and emotive components of resilience fully mediated the relationship between future expectations and psychological adjustment.

Discussion

Consistent with previous studies, self-efficacy and perceived social support were shown to be

Table 2. Mean values, standard deviations, and correlations among the variables in Study 2.

	M	SD	1. Problem orientation	2. Venting	3. Affect control	4. Positive View	5. Anxiety	6. Depression
1	17.50	3.67	1	.09	.23	.73**	-.51**	-.66**
2	19.51	5.59	.27**	1	.51**	.23	-.38*	-.35
3	18.71	4.92	.42**	.38**	1	.06	-.49**	-.55**
4	15.17	2.99	.60**	.22**	.27**	1	-.47*	-.46*
5	44.00	9.63	-.34**	-.21**	-.45**	-.30**	1	.70**
6	36.84	8.71	-.56**	-.32**	-.62**	-.42**	.70**	1

SD: standard deviation.

The correlation coefficients in the lower diagonal are for the participants of the noncasualty group (n = 204); the correlation coefficients in the upper diagonal are for the participants of the casualty group (n = 55).

* $p < .05,$ ** $p < .01.$

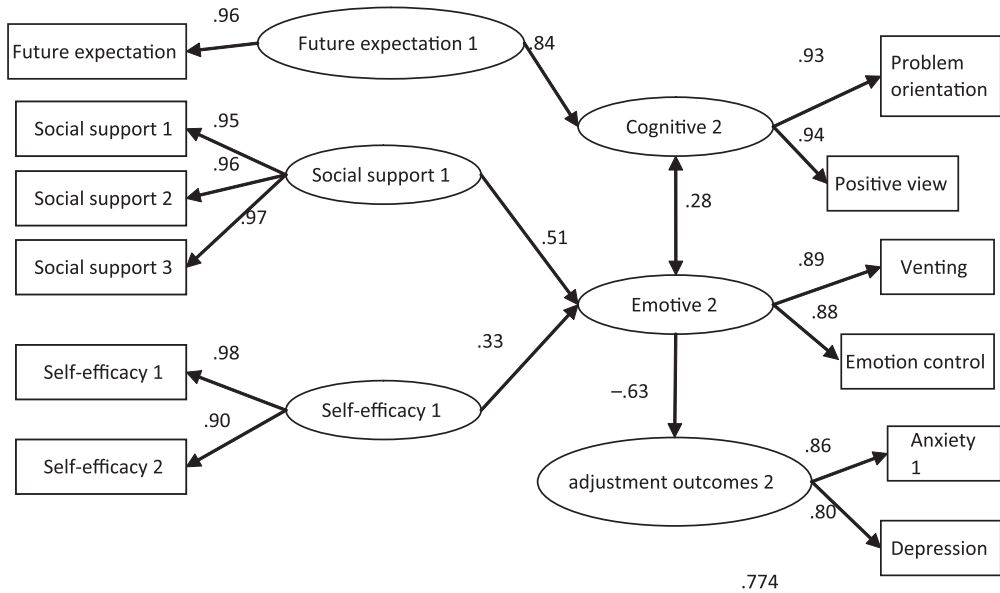


Figure 1. Longitudinal structural equation model of the protective factors of resilience in predicting psychological adjustment.

important protective factors and had long-term effects on adjustment through resilience (Pakenham et al., 2004). The current study found that both self-efficacy and perceived social support contribute to the emotive component of resilience, which was negatively correlated with psychological symptoms.

The present results suggest that positive future expectations act as a new protective factor. As predicted, positive future expectations was the most significant predictor among the protective factors and was positively correlated with the cognitive component of resilience. There are two lines of evidence indicating that positive anticipation regarding the future is closely related to the cognitive factor of resilience. First, adolescents who are less resilient demonstrate great difficulty in their ability to think positively about future personal events (Werner and Smith, 1992). Second, a person's future is not merely the result of his or her life circumstances; the future is also predicted by the manner in which a person thinks about it.

Overall discussion

One purpose of designing these two studies was to answer the following important question: Does one need to experience adversity in order to possess resilience? By integrating past studies (e.g. Masten, 2001) and the results of the present studies, our answer to this question is no. However, our results from the first study showed that the factor structure of resilience differs for low- and high-stress exposed groups, based on two large, distinct samples of adolescents. This difference of unidimensional versus multidimensional factor structures could be explained by adolescent cognitive processes and maturity. For the adolescents who were not exposed to major stress, specifically a severe earthquake, the cognitive and emotive components of resilience are synchronous, and they merged into one factor in our factor analysis. However, for the adolescents who were exposed to the earthquake, adversity caused them to become more mature in terms of their cognitive development. The adolescent earthquake

survivors were in the midst of their cognitive development and resource accumulation processes; therefore, their cognitive development had surpassed their emotive development (Piaget, 1972). The current results offer support for this argument because there were highly significant differences between the earthquake-exposed students and those who were not exposed to the earthquake in terms of problem orientation and positive views of adversity, whereas there was no significant between-group difference regarding affect control. This result offers a strong contribution to the existing literature because it provides further evidence of the criteria validity of the RSCA and describes a dynamic structure of adolescent resilience as evidenced by distinct factor structures for contexts both with and without traumatic events.

The current study attempted to compare the functions of protective factors and resilience in casualty versus noncasualty groups and found that protective factors and resilience played a more significant role for the individuals in the casualty group than they did for the individuals in the noncasualty group. These findings were consistent with previous research that suggested that the relationship between dispositional attributes and mental health may be stronger under extremely stressful conditions because such conditions allow for more opportunities for individual differences (Strelau, 2001).

The current study also tested the role of resilience in Kumpfer's (1999) framework. In this model, resilience shares some common elements with posttraumatic growth. However, as Tedeschi and Calhoun (1996) noted, resilience is the ability to successfully cope with adversity, with protective factors serving as antecedents, and posttraumatic growth is an outcome of resilience.

Implications

In the current study, we attempted to explore the relationship between resilience and its protective factors using longitudinal data. For the first

time, future expectations were identified as a protective factor for resilience and contributed to the cognitive dimension of resilience.

A longitudinal design enables the researchers to make more rigorous inferences regarding the causal relations that are implied by such models (Cole and Maxwell, 2003). In this study, the predictor and outcome variables were collected at different time points. Thus, the common method of cross-sectional research was eliminated, and the implications of the protective factors of resilience could be established with more certainty.

Our research has practical implications for psychotherapists who treat adolescent disaster victims. Given the important role of future expectations in resilience, training focused on strengthening positive future expectations could be integrated into group intervention efforts among disaster survivors to strengthen the cognitive aspect of resilience.

Our research has several limitations. One of the limitations is that to minimize the participants' work, there was no baseline measure of the outcome variables. Therefore, one may argue that this is not a true longitudinal study because each measure is only taken at one point in time. Future studies should take this design issue into account and use repeated measures. Second, individual differences in disaster outcomes are predicted by resilience and a number of protective and risk factors (Bonanno et al., 2010). Further studies should take into consideration the risk factors that may counteract resilience.

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