

How Resilience and Social Support Promote Post-Traumatic Growth after Wenchuan Earthquake: An Integrated Perspective

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Abstract

People could recover and obtain growth after traumatic experience. Two vital protective factors for post-traumatic growth (PTG) are resilience and social support. However, it remains unclear how the two factors affect PTG. Some research demonstrated that resilience could indirectly promote PTG through social support, while other researchers found that social support could indirectly promote PTG through resilience. Integratively considering, the present study tested whether these two perspectives simultaneously tenable. We recruited 2336 high school students from the Wenchuan earthquake-stricken area to participate in our survey. Scales of Connor-Davidson Resilience, Perceived Social Support and Post-traumatic Growth were joined in one questionnaire. After filtering the invalid questionnaires, 2150 samples (aged 15–18 years old, $M = 16.21$, $SD = .79$; 844 females) remained for further analyses. The results demonstrate that resilience, social support and PTG are significantly correlated with each other. Resilience partly mediates the relationship between social support and PTG, meanwhile social support partly mediates the relationship between resilience and PTG. It supports the integrated perspective that resilience and social support can directly promote PTG and indirectly promote PTG through each other. Therefore, in the psychological assistance of people endured adversity, we can cultivate their internal resilience and help them reconstruct their external social support resources, so that they would integrate internal and external resources to achieve more post-traumatic growth.

Introduction

About thirteen years ago, a big earthquake hit Wenchuan, resulting in over eighty-seven thousand people's deaths or missing. Years later, with the experience of this adversity, the induced post-traumatic stress disorder symptoms could be transformed into post-traumatic growth (PTG) based on the time effect (Goenjian et al., 2000). PTG refers to the positive psychological changes of individuals after experiencing traumatic events (Jayawickreme & Blackie, 2014). The positive psychological changes mainly include improved self-awareness, life values, interpersonal experiences in addition to other positive outcomes (Tedeschi & Calhoun, 1996). Many protective factors have been found in promoting PTG, such as personality traits (e.g., optimism, Bozo, Gundogdu, & Buyukasik-Colak, 2009; Prati & Pietrantonio, 2009; Zoellner, Rabe, Karl, & Maercker, 2008), coping style (e.g., positive coping, Perez-San-Gregorio et al., 2017; Prati & Pietrantonio, 2009), and rumination (Chan, Ho, Tedeschi, & Leung, 2011; Zhou, Wu, An, & Chen, 2014). Among the antecedents, resilience and social support are two vital factors that have been often discussed. Plenty of evidence has implied that resilience and social support can promote PTG (Yu et al., 2014; Yuan, Xu, Liu, & An, 2018; Zhou, Wu, & Zhen, 2017). However, the specific function mechanism remains unclear.

Plenty of evidence revealed that resilience is positively associated with PTG (Coifman, Bonanno, & Rafaeli, 2007; Kilmer, 2006; Nishi, Matsuoka, & Kim, 2010). It is commonly acknowledged that resilience is an individual's capability to cope with and adapt to difficult situations. When an individual is dealing with pressure or depression, the recovery capability will be promoted (Pidgeon, Ford, & Klaassen, 2014). How does resilience promote PTG? Firstly, when the level of individual resilience is high, it is usually

accompanied by optimism and positive countermeasures. These characteristics can help individuals to deal with negative life events in a successful way so as to maintain their good mental and physical health (Connor & Davidson, 2003). Secondly, resilience can help individuals identify the significance of the predicament with positive experience of the past to alleviate psychological pressure, encouraging individuals to positively construct their lives and ultimately achieve PTG (Prati & Pietrantonio, 2009). Finally, they are more optimistic in their expectations for the future, with employing a positive method to solve problems (Burton, Pakenham, & Brown, 2010). In conclusion, individuals with high resilience show more positive and optimistic attitudes towards past negative events and future affairs, thus contributing to PTG. Based on the evidence provided, resilience is hypothesized as a protective factor in promoting PTG.

In addition to resilience, a large number of studies have found that social support as an interpersonal factor can promote PTG (Jia, Ying, Zhou, Wu, & Lin, 2015; Mason, Holden, Adams, & Ed., 2015; Nenova, DuHamel, Zemon, Rini, & Redd, 2013; Ray, 2015; Senol-Durak & Belgin Ayvasik, 2010; Zhou et al., 2017). Perceived social support refers to the emotional experience and satisfaction of individuals in social relations, including being respected, supported and understood (Sarason, et al., 1991). Social support can improve interpersonal relationships and enhance intimacy with others, which also helps to increase the possibility of emotional sharing and cognitive reassessment and plays a key role in influencing the development of patients to actively respond to trauma (Nenova et al., 2013; Rime, 2009). Previous studies have shown that individuals obtained more social support to achieve more PTG (Jia et al., 2015; Zhou et al., 2017). Encountering adversity, individuals can get material and spiritual assistance from their families and peers and experience a sense of security and belonging (Greup et al., 2018). In this way, they gain positive psychological power, thus promoting the realization of PTG (Guay, Billette, & Marchand, 2006). Social support, therefore, is widely known as an interpersonal promoting factor for PTG.

It is easy to understand that resilience and social support could promote PTG. However, the real question is what the relationship between resilience and social support is. On the one hand, previous studies found that the higher the level of individual resilience is, the higher the degree of perceived social support will be (Swanson, Geller, DeMartini, Fernandez, & Fehon, 2018). Individuals with high resilience have a sense of tenacity and control in the face of difficulties. In addition, they tend to have more positive cognitive outlooks and experience more positive emotions, thus getting more social support (Connor & Davidson, 2003; Fredrickson, Cohn, Coffey, Pek, & Finkel, 2008). Furthermore, social support could mediate the relationship between resilience and PTG (Yuan et al., 2018), as shown in Fig. 1A. In this effect pattern, resilience is an independent variable and social support is a mediating variable in the relationship between resilience and PTG.

On the other hand, social support can also better promote resilience. When encountering adversity, individuals could get assistance from their families, schoolmates, and friends. These social supports serve as social resources for developing resilience (Gilligan, 2000). Previous research proposed a dynamic perspective (Freitas & Downey, 1998) and developmental perspective (Aldwin & Sutton, 1998) for resilience trajectories, both of which emphasized social support's function on resilience. Our previous

study also verified the mediating role of resilience in the relationship between social support and PTG (Xin, Bai, Chen, Zhu, & Liu, 2019), as shown in Fig. 1B. In this effect pattern, social support is an independent variable and resilience is a mediating variable in the relationship between social support and PTG.

Given that both mediating models (Fig. 1A and Fig. 1B) have considerable evidence, the attention is drawn to whether the two mediating models are simultaneously tenable in the sampling population in Wenchuan earthquake-stricken areas, especially the adolescents. For adolescents who are in the critical period of physical and mental development, the plasticity of cognitive development is high, which provides a great opportunity to achieve PTG. When the earthquake happened, they were children about six or seven years old. After twelve years, they might have formed better resilience, got more social support, and achieved greater PTG. Thus, we attempt to test whether these two mediating models could simultaneously tenable in this population and this may provide a reference to psychological assistance intervention for people hit by adversity.

Method

Participants

With a cluster sampling strategy, 2336 students from two high schools in Wenchuan earthquake-stricken areas were selected for this survey. The research project was approved by the Institutional Review Board of Psychology Department of Southwest University of Science and Technology. The study conforms to the provisions of the Declaration of Helsinki. All the participants gave informed consent to participate in the study. The participants would be excluded for a further analysis if they satisfy one of the three criteria: over a half of the questionnaire is unfinished; one or more of the scales are filled with the same answer; the hometown of the participant is not located in Wenchuan earthquake-stricken areas. Having gone through a screening process, 2150 participants (aged 15–18 years old, $M = 16.21$, $SD = .79$, 844 females and 1306 males, 1108 senior first grade and 1042 senior second grade) were included for further analyses.

Materials and Measurements

Resilience Scale.

Using the three-factor scoring method of Yu and Zhang (2007), the scores are divided into three factors: tenacity, strength, and optimism. There are 25 question items (e.g., “When things are changed, I can adapt myself”) with a five-point scale (0 = not at all, 4 = almost always). The higher the total score is, the higher the level of resilience will be. The original internal consistency coefficient of the English version is .89 and the retest reliability coefficient is .87, while the internal consistency coefficient of the Chinese version is .91. The Cronbach's α in present study is .91.

Perceived Social Support Scale.

Social support was measured by the Perceived Social Support Scale (Blumenthal et al., 1987). Considering that the participants of the present study were high school students, "leaders and colleagues" in the sub-scale of the other support were changed into "teachers and classmates". Thus, the scale consists of three sub-scales: family support, friend support and other support (teachers, classmates, relatives). Each sub-scale has four questions and a total of 12 items, e.g., "when I encounter problems, some people (teachers, classmates, relatives) will accompany me". Participants rated on a 7-point scale (1 = disagree, 7 = agree). The total score for perceived social support is aggregated based on the data collected. The higher the score is, the more social support s/he perceives. The original Cronbach's α for the total scale is .88 and it is .92 in the present study.

Post-traumatic Growth Scale.

The Post-traumatic Growth Inventory (Tedeschi & Calhoun, 1996) was adopted to measure PTG. The scale is divided into five dimensions: relationship with others, new possibilities, personal strength, spiritual change and appreciation of life. There are 20 questions, e.g., "I have more appreciation of my own life value". A six-grade scale was provided (0 = Not at all, 5 = A lot of). The higher score indicates that individuals could achieve greater PTG. The original Cronbach's α of the total scale is .87, and it is .93 in the present study.

Tools and Data Processing

SPSS 21.0 was used for descriptive statistics and correlative analysis. The SPSS PROCESS 3.1 plug-in compiled by Hayes (2013) was used to test the mediation models. The bias-corrected bootstrap confidence interval (CI) method was applied to the indirect effect test in mediation analysis because it is the most trustworthy test when power is taken into concern (Hayes & Scharkow, 2013). Previous studies have shown that gender and age are the influence factors for PTG (Champion et al., 2014; Vishnevsky, Cann, Calhoun, Tedeschi, & Demakis, 2010). In this study, gender and age were significantly correlated with PTG (Table 1). Therefore, when examining the mediation model, gender and age were controlled. Moreover, we also retested the mediation models with Mplus 7.4 so that we can compare the model fit indices between mediation models.

Table 1
Descriptive Statistics and Correlations between Variables

Variables	<i>M</i>	<i>SD</i>	1	2	3	4
1 Gender	1.39	0.49				
2 Age	16.21	0.79	-0.12**			
3 Resilience	3.21	0.55	-0.04	0.01		
4 Social support	4.70	1.01	0.08**	-0.05*	0.39**	
5 PTG	3.59	0.91	-0.00	0.02	0.28**	0.23**

*Note: N = 2150, * P < .05, ** P < .01. For Gender, 1 = male, 2 = female.*

Results

Common Method Bias Test

As the main method of data acquisition relies on self-reporting scales, it may lead to common method bias. In the process of data collection, the corresponding control was carried out, such as an anonymous test, reversed narrative questions and different response sentences. To examine common method bias, Harman's single factor test was used (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). All items relevant to the study were subjected to an exploratory factor analysis. The results show that 8 factors can be obtained, while no single factor accounts for the majority of the covariance among the variables (the biggest factor loads value is 22.35%, less than the critical value of 40%). Therefore, no significant common method bias exists in the current study.

Correlations between the Measures

Resilience is positively correlated with social support ($r = 0.39, P < .01$) and PTG ($r = 0.28, P < .01$); social support is also positively correlated with PTG ($r = 0.23, P < .01$), as shown in Table 1.

Test of the Mediating Models

Regression analysis showed that resilience had a significant effect on PTG (Eq. 1, Table 2) and on social support (Eq. 3, Table 2). Social support also had a significant effect on PTG (Eq. 2, Table 2). When the effects of both resilience and social support on PTG were simultaneously considered, the coefficients of resilience and social support were also significant (Eq. 5, Table 2). Thus, social support could partly mediate the relationship between resilience and PTG. A bootstrap analysis with PROCESS 3.1 (model 4, 5000 bootstrap samples) was used to test the mediating model and the results showed that both the direct effect (95%CI [0.291, 0.435]) and the completely standardized indirect effect (95%CI [0.037, 0.077]) were significant (Table 3), confirming that social support could partly mediate the relationship between resilience and PTG. Furthermore, we used the mediation command of Mplus with 5000 bootstraps and

confirmed the mediation model again, and the Bayesian Information Criteria for the model fit is 11352.015.

Table 2
Regression Analysis of Variable Relations in Mediating Model

Equation	Dependent Variables	Variables	<i>R</i>	<i>R</i> ²	<i>F</i>	<i>β</i>	<i>t</i>
1	PTG	Resilience	0.277	0.077	59.401 ^{***}	0.276	13.302 ^{***}
		Gender				0.010	0.468
		Age				0.021	1.015
2	PTG	Social support	0.232	0.054	40.772 ^{***}	0.232	11.004 ^{***}
		Gender				-0.017	-0.808
		Age				0.033	1.578
3	Social support	Resilience	0.405	0.164	140.103 ^{***}	0.395	20.004 ^{***}
		Gender				0.087	4.355 ^{***}
		Age				-0.047	-2.351 [*]
4	Resilience	Social support	0.398	0.158	134.639 ^{***}	0.398	20.004 ^{***}
		Gender				-0.066	-3.279 ^{***}
		Age				0.025	1.240
5	PTG	Social support	0.307	0.094	55.791 ^{***}	0.145	6.449 ^{***}
		Resilience				0.219	9.770 ^{***}
		Gender				-0.003	-0.134
		Age				0.028	1.350

*Note: N = 2150, * P < .05, ** P < .01, *** P < .001.*

Table 3
Path Analysis Results

		Effect	SE	95% CI	
				Lower	Upper
Total Effect	Resilience → PTG	0.220	0.037	0.291	0.435
Total Effect	Social support → PTG	0.143	0.020	0.089	0.168
Indirect Effect	Resilience → Social support → PTG	0.056	0.010	0.037	0.077
Indirect Effect	Social support → Resilience → PTG	0.086	0.012	0.062	0.111

Similarly, comprehensively considering the results of Eq. 2, Eq. 4, Eq. 1 and Eq. 5 in Table 2, resilience also partly mediated the relationship between social support and PTG. The results of bootstrap analysis with PROCESS 3.1 (model 4, 5000 bootstrap samples) also showed that both the direct effect (95%CI [0.089, 0.168]) and the completely-standardized indirect effect (95%CI [0.062, 0.111]) were significant (Table 3), confirming that resilience could partly mediate the relationship between social support and PTG. Thus, the hypothesized mediating models were simultaneously demonstrated (Fig. 2). Furthermore, we used the mediation command of Mplus with 5000 bootstraps and confirmed the mediation model again, and the Bayesian Information Criteria for the model fit is 8754.942.

Discussion

The results of this study show that both resilience and social support can positively predict PTG. Meanwhile, social support had a significant mediating effect on the relationship between resilience and PTG, and resilience also had a significant mediating effect on the relationship between social support and PTG. The results demonstrated that resilience and social support could promote PTG directly and indirectly through each other. If we take the model fit indices into account, the model of resilience as mediator is better than the model of social support as mediator.

Integrative Perspectives of PTG

The present study has identified an integrated way of both intrapersonal and interpersonal perspectives of PTG. Intrapersonally, individuals actively adjust themselves with their own resilience when facing adversity, and then directly achieve PTG. Interpersonally, individuals receive social support from the external environment, such as their families, friends and schoolmates, and passively achieve PTG with social support. Circulatively, the intrapersonal impetus of resilience could indirectly promote PTG through the interpersonal motive of social support; the interpersonal motive of social support also could indirectly promote PTG through intrapersonal impetus of resilience.

The integrative perspective of both intrapersonal and interpersonal functions is quite suggestive for assisting victims in achieving PTG. Previous studies addressed the functions of resilience training and social support on PTG, and on social adaptation and psychological well-being in the further stage (Burton et al., 2010; Coifman et al., 2007; Jia et al., 2015; Kilmer, 2006; Lee, Martin, Tu, Palmer, & Jeste, 2018; Mason et al., 2015; Nenova et al., 2013; Nishi et al., 2010; Ray, 2015; Scignaro, Barni, & Magrin, 2011; Senol-Durak & Belgin Ayvasik, 2010; Zhou et al., 2017). Furthermore, a few studies respectively reported that resilience and social support mediated their relationships with PTG (Xin et al., 2019; Yuan et al., 2018). However, there was no previous research that examined the two mediating models simultaneously in the same sampling population as shown in Fig. 2. It suggested that we should arrange resilience training and construct effective social support together, rather than focusing on only one of them. In this way, the intrapersonal and interpersonal perspectives could coordinate with each other and circulatively promote PTG.

Although the results support the integrative perspective of resilience and social support in promoting PTG, we still want to underline that resilience as a mediator is better than independent variable according to the model fit indices. It is more likely that the participants developed PTG through social support and partly mediated by resilience. That is to say, intrapersonal resilience might be activated by social support and further promoting PTG. This realizing path of PTG might be the mainstream while resilience as an independent variable on PTG is the tributary. Therefore, reconstructing the social support system is more important and effective than directly cultivating an individual's resilience in the psychological assistance of adversity victims.

Contributions and Limitations

The main contribution of the present study is that it enables a simultaneously test on the two mediating models that resilience and social support could mediate their relationships with PTG. Specifically, resilience as an intrapersonal impetus and social support as an interpersonal resource will co-function on PTG, and the function may be indirectly realized through reciprocal action. It provides an integrated way of both intrapersonal and interpersonal perspectives to further improve the mental health of adolescents in disaster areas. That is, it is necessary to pay more attention to the cultivation of positive psychological quality (e.g., resilience) and also reconstructing social support (such as parental support, teacher assistance, students' mutual assistance). In this way, when encountering stress, adolescents can not only make it through with the help of external support, but also make use of the positive psychological quality to help themselves.

However, future studies still can overcome some limitations in this study. Firstly, future studies can be expanded to a larger population to reexamine the two mediating models simultaneously. Although the models with a large sample of over two thousand were tested, the participants were mainly Grade One or Grade Two high school students. The sampling objects are relatively centralized. Therefore, the future study could reexamine the model in a larger population of a wider age range. Secondly, longitudinal studies would be helpful to check the causality of the model. The present study validated the model in

cross-sectional data, and the causality might not be so stable and effective and could be further tested in a longitudinal study.

Conclusion

With a large sampling pool of adolescents in the Wenchuan earthquake-stricken area, two mediating models were tested, in which resilience and social support partly mediated their relationships with PTG. The results demonstrated an integrated way of both intrapersonal and interpersonal perspectives of PTG. It encourages efforts in cultivating resilience and reconstructing social support simultaneously so as to promote PTG for the victims of adversity.

Declarations

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Disclosure Statement

The authors declare no conflict of interest.

Author Contributions

Yong Xin and Chuanjun Liu developed the conception and design of the study together; Yong Xin, Xiaoyan Peng and Haojie Fu acquired and analyzed the data; Chuanjun Liu and Xiaoyan Peng drafted the manuscript. All the authors discussed and revised the manuscript together.

References

1. Aldwin CM, Sutton KJ (1998) A developmental perspective on posttraumatic growth. In: Tedeschi RG, Park CL, Calhoun LG (eds) *The LEA series in personality and clinical psychology. Posttraumatic growth: Positive changes in the aftermath of crisis*. Lawrence Erlbaum Associates Publishers, Mahwah, pp 43–63
2. Blumenthal JA, Burg MM, Barefoot J, Williams RB, Haney T, Zimet G (1987) Social support, type A behavior, and coronary artery disease. *Psychosom Med* 49(4):331–340
3. Bozo O, Gundogdu E, Buyukasik-Colak C (2009) The moderating role of different sources of perceived social support on the dispositional optimism– posttraumatic growth relationship in postoperative breast cancer patients. *Journal of Health Psychology* 14(7):1009–1020
4. Burton NW, Pakenham KI, Brown WJ (2010) Feasibility and effectiveness of psychosocial resilience training: a pilot study of the READY program. *Psychology Health Medicine* 15(3):266–277

5. Champion VL, Wagner LI, Monahan PO, Daggy J, Smith L, Cohee A, . . Sledge GW Jr (2014) Comparison of younger and older breast cancer survivors and age-matched controls on specific and overall quality of life domains. *Cancer* 120(15):2237–2246
6. Chan MW, Ho SM, Tedeschi RG, Leung CW (2011) The valence of attentional bias and cancer-related rumination in posttraumatic stress and posttraumatic growth among women with breast cancer. *Psycho-Oncology* 20(5):544–552
7. Coifman KG, Bonanno GA, Rafaeli E (2007) Affect dynamics, bereavement and resilience to loss. *J Happiness Stud* 8(3):371–392
8. Connor KM, Davidson JR (2003) Development of a new resilience scale: the Connor-Davidson Resilience Scale (CD-RISC). *Depress Anxiety* 18(2):76–82
9. Fredrickson BL, Cohn MA, Coffey KA, Pek J, Finkel SM (2008) Open hearts build lives: positive emotions, induced through loving-kindness meditation, build consequential personal resources. *J Pers Soc Psychol* 95(5):1045–1062
10. Freitas AL, Downey G (1998) Resilience: A Dynamic Perspective. *Int J Behav Dev* 22(2):263–285
11. Gilligan R (2000) Adversity, resilience and young people: the protective value of positive school and spare time experiences. *Children Society* 14(1):37–47
12. Goenjian AK, Steinberg AM, Najarian LM, Fairbanks LA, Tashjian M, Pynoos RS (2000) Prospective study of posttraumatic stress, anxiety, and depressive reactions after earthquake and political violence. *Am J Psychiatry* 157(6):911–916
13. Greup SR, Kaal SEJ, Jansen R, Manten-Horst E, Thong MSY, van der Graaf WTA, . . Husson O (2018) Post-Traumatic Growth and Resilience in Adolescent and Young Adult Cancer Patients: An Overview. *Journal of Adolescent Young Adult Oncology* 7(1):1–14
14. Guay S, Billette V, Marchand A (2006) Exploring the links between posttraumatic stress disorder and social support: processes and potential research avenues. *J Trauma Stress* 19(3):327–338
15. Hayes AF (2013) Introduction to mediation, moderation, and conditional process analysis: A regression-based approach. Guilford Press, New York
16. Hayes AF, Scharkow M (2013) The Relative Trustworthiness of Inferential Tests of the Indirect Effect in Statistical Mediation Analysis: Does Method Really Matter? *Psychol Sci* 24(10):1918–1927
17. Jayawickreme E, Blackie LER (2014) Post-traumatic Growth as Positive Personality Change: Evidence, Controversies and Future Directions. *Eur J Pers* 28(4):312–331
18. Jia X, Ying L, Zhou X, Wu X, Lin C (2015) The effects of extraversion, social support on the posttraumatic stress disorder and posttraumatic growth of adolescent survivors of the Wenchuan earthquake. *PLoS One* 10(3):e0121480
19. Kilmer RP (2006) Resilience and Posttraumatic Growth in Children. In: Calhoun LG, Tedeschi RG (eds) *Handbook of posttraumatic growth: Research & practice*. Lawrence Erlbaum, Mahwah, pp 264–288
20. Lee EE, Martin AS, Tu X, Palmer BW, Jeste DV (2018) Childhood Adversity and Schizophrenia: The Protective Role of Resilience in Mental and Physical Health and Metabolic Markers. *J Clin Psychiatry*

21. Mason D, Holden BE, Adams P, Ed. D (2015) Social Support and Post Traumatic Growth (PTG) among OEF-OIF and American Korean War Veterans: A Mixed Research Study. *International Journal of Humanities Social Science* 5(8):154–165
22. Nenova M, DuHamel K, Zemon V, Rini C, Redd WH (2013) Posttraumatic growth, social support, and social constraint in hematopoietic stem cell transplant survivors. *Psycho-Oncology* 22(1):195–202
23. Nishi D, Matsuoka Y, Kim Y (2010) Posttraumatic growth, posttraumatic stress disorder and resilience of motor vehicle accident survivors. *BioPsychoSocial Medicine* 4:7
24. Perez-San-Gregorio MA, Martin-Rodriguez A, Borda-Mas M, Avargues-Navarro ML, Perez-Bernal J, Gomez-Bravo MA (2017) Coping Strategies in Liver Transplant Recipients and Caregivers According to Patient Posttraumatic Growth. *Front Psychol* 8:18
25. Pidgeon AM, Ford L, Klaassen F (2014) Evaluating the effectiveness of enhancing resilience in human service professionals using a retreat-based Mindfulness with Metta Training Program: a randomised control trial. *Psychology Health Medicine* 19(3):355–364
26. Podsakoff PM, MacKenzie SB, Lee JY, Podsakoff NP (2003) Common method biases in behavioral research: a critical review of the literature and recommended remedies. *J Appl Psychol* 88(5):879–903
27. Prati G, Pietrantonio L (2009) Optimism, Social Support, and Coping Strategies as Factors Contributing to Posttraumatic Growth: A Meta-Analysis. *Journal of Loss Trauma* 14(5):364–388
28. Ray S (2015) The role of event centrality, coping and social support in resilience and posttraumatic growth among women and men. *International Journal of Mental Health Promotion* 17(2):78–96
29. Rimé B (2009) Emotion Elicits the Social Sharing of Emotion: Theory and Empirical Review. *Emot Rev* 1(1):60–85
30. Sarason BR, Pierce GR, Shearin EN, Sarason IG, Waltz JA, Poppe L (1991) Perceived social support and working models of self and actual others. *J Pers Soc Psychol* 60(2):273–287
31. Scrignaro M, Barni S, Magrin ME (2011) The combined contribution of social support and coping strategies in predicting post-traumatic growth: a longitudinal study on cancer patients. *Psycho-Oncology* 20(8):823–831
32. Senol-Durak E, Belgin Ayvasik H (2010) Factors associated with posttraumatic growth among the spouses of myocardial infarction patients. *Journal of Health Psychology* 15(1):85–95
33. Swanson A, Geller J, DeMartini K, Fernandez A, Fehon D (2018) Active Coping and Perceived Social Support Mediate the Relationship Between Physical Health and Resilience in Liver Transplant Candidates. *J Clin Psychol Med Settings* 25(4):485–496
34. Tedeschi RG, Calhoun LG (1996) The Posttraumatic Growth Inventory: measuring the positive legacy of trauma. *J Trauma Stress* 9(3):455–471
35. Vishnevsky T, Cann A, Calhoun LG, Tedeschi RG, Demakis GJ (2010) Gender Differences in Self-Reported Posttraumatic Growth: A Meta-Analysis. *Psychology of Women Quarterly* 34(1):110–120

36. Xin Y, Bai K, Chen X, Zhu D, Liu C (2019) The Effect of Social Support on Posttraumatic Growth of Adolescents: The Mediating Role of Resilience. *Studies of Psychology Behavior* 17(6):817–823 [Chinese]
37. Yu X, Zhang J (2007) Factor Analysis and Psychometric Evaluation of the Connor-Davidson Resilience Scale (Cd-Risc) with Chinese People. *Social Behavior Personality: an international journal* 35(1):19–30
38. Yu Y, Peng L, Chen L, Long L, He W, Li M, Wang T (2014) Resilience and social support promote posttraumatic growth of women with infertility: the mediating role of positive coping. *Psychiatry Res* 215(2):401–405
39. Yuan G, Xu W, Liu Z, An Y (2018) Resilience, Posttraumatic Stress Symptoms, and Posttraumatic Growth in Chinese Adolescents After a Tornado: The Role of Mediation Through Perceived Social Support. *Journal of Nervous Mental Disease* 206(2):130
40. Zhou X, Wu X, Zhen R (2017) Understanding the relationship between social support and posttraumatic stress disorder/posttraumatic growth among adolescents after Ya'an earthquake: The role of emotion regulation. *Psychological Trauma* 9(2):214–221
41. Zhou X, Wu X, An Y, Chen J (2014) The Roles of Rumination and Social Support in the Associations between Core Belief Challenge and Post-traumatic Growth among Adolescent Survivors after the Wenchuan Earthquake. *Acta Psychologica Sinica* 46(10):1509–1520
42. Zoellner T, Rabe S, Karl A, Maercker A (2008) Posttraumatic growth in accident survivors: openness and optimism as predictors of its constructive or illusory sides. *J Clin Psychol* 64(3):245–263

Figures

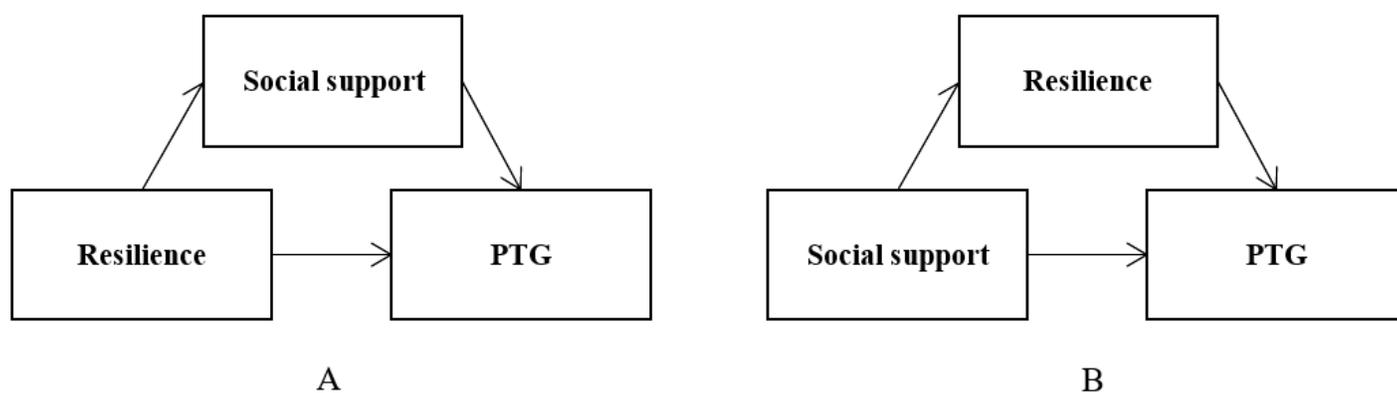


Figure 1

The hypothesized mediating models, PTG represents post-traumatic growth.

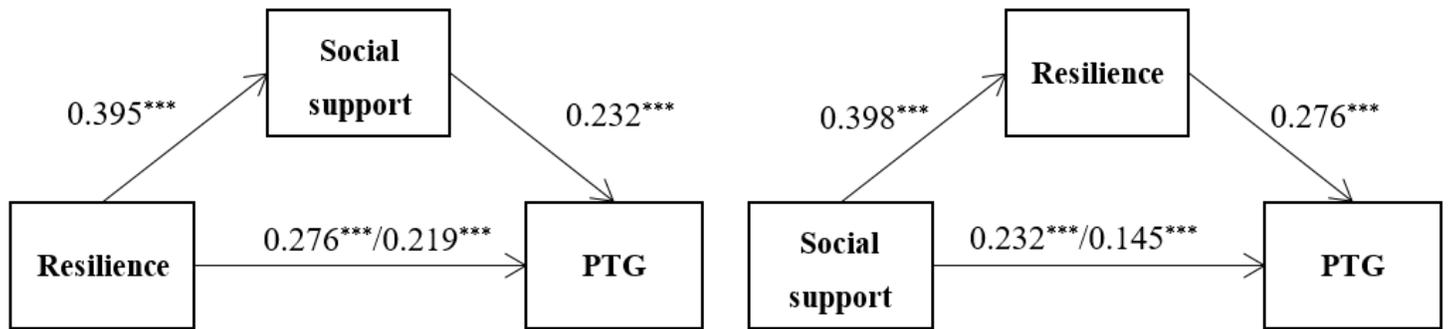


Figure 2

The mediating models obtained from the survey dataset, the estimates of the path coefficients were standardized, PTG represents post-traumatic growth. Both gender and age were controlled in the models.

Supplementary Files

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