EMPIRICAL RESEARCH

Sometimes Less is More: Switching Influence of Social Support on Posttraumatic Growth over Time after a Natural Disaster

Rui Sun[1] · Xima Yang[1] · Xinchun Wu[2] · Xiao Zhou [1]

Abstract

Few studies have investigated the causal link between social support and posttraumatic growth. Using a four-wave longitudinal design, the present study examined the reciprocal relationship between posttraumatic growth and social support in family and school contexts. A total of 285 adolescents (61.3% female) were recruited to complete self-report questionnaires 12, 18, 24, and 30 months after the Wenchuan earthquake. The data were analyzed using a random intercept cross-lagged panel model. Results revealed a trend for total social support initially promoting posttraumatic growth, followed by no influence, and finally a hindering of growth. This pattern varied between different sources of support. Specifically, the influence of support from parents and peers was consistent with the pattern for total support, whereas that from teachers and others prevented posttraumatic growth during later stages. These results suggest that timing is an important issue in posttraumatic growth and that providing more support for a prolonged period following a traumatic event constrains adolescents' autonomy and thus inhibits posttraumatic growth.

Keywords Social support · Posttraumatic growth · Random intercept cross-lagged panel model · Causal relationship

Introduction

Decades of research have indicated that, following traumatic events, social support buffers negative outcomes and improves posttraumatic growth (Ponnamperuma & Nicolson, 2018). Other studies found that adolescents who experience a higher level of posttraumatic growth may perceive more support (Ramos & Leal, 2013). Previous studies using a cross-sectional design have not disentangled the causal relation between social support and posttraumatic growth. The few longitudinal studies conducted using traditional cross-lagged panel models combined the between-individual and within-individual effects, which limited the accuracy of the model estimation. These studies also consider social support as a whole and overlooked the influence of different sources, which is essential for understanding the unique contributions of various interpersonal relationships. To address these knowledge gaps, this study used random-intercept cross-lagged models to investigate the causal relationship between social support and posttraumatic growth and explore the effects of different sources of support.

Posttraumatic growth is defined as positive psychological changes following a traumatic experience and includes personal strength, relating to others, new possibilities, appreciation of life, and spiritual changes (Tedischi & Calhoun, 2004). It is one of the common psychological reactions to a traumatic event, and the incidence of posttraumatic growth ranges from 3 to 90% (Linley & Joseph, 2004). Posttraumatic growth was prevalent in adolescents who experienced the Wenchuan earthquake, where the level of growth varied depending on the time frame. One year after the Wenchuan earthquake, 60.2% of adolescent survivors reported a moderate level of posttraumatic growth (Zhou et al., 2018a). At 8.5 years after the earthquake, 46.13% of adolescents were undergoing posttraumatic growth (Wu et al., 2018). Thus the level of posttraumatic

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growth remained high in adolescents for a prolonged period following the earthquake.

The relationship between social support and posttraumatic growth has attracted considerable research interest. However, whether social support enables adolescents to undergo posttraumatic growth and flourish over time following trauma remains unclear, and previous studies have reported inconsistent outcomes (Zhou et al., 2018b). According to the action theory of posttraumatic growth, individuals with posttraumatic growth are more positive during interpersonal interactions (Hobfoll et al., 2007), which is conducive to perceiving more support from others. This raises another question about the causal relationship between social support and posttraumatic growth. Addressing these issues may help to elucidate the relationship between social support and posttraumatic growth over time and inform the development of clinical interventions to enhance posttraumatic recovery and adjustment.

It is widely acknowledged that people rely on social support to cope with distress and make positive changes. A supportive environment can function as a safe haven that provides comfort, reassurance, and assistance for stressed individuals (Bowlby, 1982), which enables individuals to self-disclose freely (Pietrzak et al., 2009). Such disclosures not only allow individuals to deliberately ruminate on trauma cues (Calhoun & Tedeschi, 2004), but also offer new perspectives for reconstructing the trauma (Schaefer & Moos, 1992). This process integrates the traumatic event into previous beliefs and constructs the meaning of the event that promotes posttraumatic growth. This notion has been supported by empirical studies, in which adolescents with more social support have been shown to exhibit higher level of posttraumatic growth (Liu et al., 2021).

However, posttraumatic growth may also influence social support in a complex manner. The emergence of posttraumatic growth encourages adolescents to view themselves, others, and even the world positively, which contributes to their interpersonal relationships and improves their emotional support, such as the sense of intimacy (Ramos & Leal, 2013). According to the action model of posttraumatic growth (Hobfoll et al., 2007), individuals who achieve posttraumatic growth are not only able to mentally reconstruct the posttraumatic world but also take action to cope with the trauma. Because changes in interpersonal relationships are one of the core aspects of posttraumatic growth (Joseph & Linley, 2005), individuals are likely to attach greater value to interpersonal relationships, connect more closely with others, and consequently, perceive more social support (Kaniasty & Norris, 2008). In contrast, people who have achieved posttraumatic growth have undergone a period of a broken assumptive world and tend to be emotionally stable in certain conditions (Janoff-Bulman, 2004). Their interpersonal interaction pattern then

returns to or even exceeds its pre-adversity status (Boehm-Tabib & Gelkopf, 2021), they no longer feel that being supported is necessary, and excessive efforts to comfort these individuals are eventually withdrawn.

Numerous previous studies have used cross-sectional designs to examine the association between social support and posttraumatic growth; thus, identifying a causal relation has been difficult. To address this issue, the traditional cross-lagged panel model (CLPM) was used in a longitudinal study, which revealed that social support positively predicts later posttraumatic growth but not vice versa (Jia et al., 2017). Using the same method, another study found that although posttraumatic growth and social support did not predict each other from 6 to 12 months after the Ya'an earthquake, there was a significant mutual influence from 12 to 18 months (Zhou et al., 2017a). The CLPM has been widely used to delineate the direction and temporal precedence of two related variables. Granger causality can be determined by estimating cross-lagged effects after controlling for the concurrent association and stability. In traditional CLPMs, the cross-lagged effect captures the predictive effect of the deviation on the average level of a specific population, which contains the baseline differences between individuals (i.e., the inter-individual factor) and each individual's deviation from the baseline (i.e., the intra-individual factor) (Rindermann, 2008). As a result, the within-subject and between-subject effects are mixed. The random intercept CLPM (RI-CLPM) was proposed as a compensatory method for distinguishing the within- and between-subject effects (Oh et al., 2020). The inclusion of time-invariant trait-like components enables trait-like and moment-to-moment stability to be isolated (Hamaker et al., 2015). RI-CLPM can estimate the causal relation more accurately because it excludes these time-invariant confounding variables (e.g., personality and demographic characteristics) at the within-subject level, which enables the analysis to be focused on the research question of interest. Based on the above advantages, the first aim of the current study was to use RI-CLPM to assess the association between social support and posttraumatic growth.

Another issue that is worth considering is the role of the distinct types of social support in posttraumatic reactions. In adolescents' lives, there are three main sources of social support that are considered important: parental support, teachers' support, and peers' support. In previous studies, support from teachers has typically fallen into the scope of academic support and is thus information-oriented (Chang et al., 2018). In contrast, support from parents and peers tends to be emotion-oriented and helpful for adolescents' development and adjustment (Finan et al., 2018). For instance, adolescents spend most of their time in the family context, with parents acting as the predominant source of support. This support provides adolescents with comfort

and guidance (Hafstad et al., 2010), which limits the use of negative coping strategies (Tian et al., 2020) and is conducive to posttraumatic growth. During adolescence, peers gradually replace parents as the main source of social support and intimacy owing to their increased desire for autonomy and independence (Scholte et al. 2001). When adolescents experience adversity, they may seek support, help, and understanding from their friends (Sokol et al., 2020), which facilitates posttraumatic growth (e.g., Yu et al., 2010). Although different types of support may play distinct roles in posttraumatic growth, these roles have not yet been examined and may have biased previous findings. Because previous studies only used cross-sectional designs, the causal relation between different types of support and posttraumatic growth remains unclear.

Current Study

Given the inconsistent findings in regard to the causal relationship between social support and posttraumatic growth, this study aimed to clarify the directional relationship between the two variables by addressing two major questions. First, the RI-CLPM was used to investigate the causal relationship at both the between- and within-individual levels. According to the action and cognition models of posttraumatic growth, it was hypothesized that the correlation at the between-individual level would be positive. At the within-individual level, it was hypothesized that social support and posttraumatic growth would influence each other. Second, by distinguishing between different sources of support, the unique contributions of various interpersonal relations were investigated. On the basis of previous studies, it was hypothesized that social support from parents and peers would be most strongly positively correlated with posttraumatic growth.

Methods

Participants and Procedures

This study examined responses to the Wenchuan earthquake as a traumatic event, which had a magnitude of 8.0 on the Richter scale. The Wenchuan earthquake occurred on May 12, 2008, and caused more than 69,000 deaths and 3,700,000 injuries. The present study focused on the Wenchuan and Miaoxian counties in Sichuan Province, which were severely affected by the earthquake. This study was approved by the Research Ethics Committee of Beijing Normal University. Researchers first contacted the local education authorities to inform them of the aims and methods of the survey and obtain their assistance. With their

assistance, several classes comprising approximately 45 students from a middle school and a high school were selected. All students in the selected classes agreed to participate in the study and completed the self-report questionnaires. Researchers explained the purpose and voluntary nature of the study and obtained written informed consent from their guardians before the assessment. Participants were free to withdraw from the survey at any time. Trained postgraduate psychology students supervised the assessment by reading the instructions to the participants and answering questions to ensure that each participant understood the rating method.

The survey was conducted at four-time points: 1 (T1; May 2009), 1.5 (T2; November 2009), 2 (T3; May 2010), and 2.5 (T4; November 2010) years after the earthquake. For the first wave of assessments, 619 students were recruited. Because of participant dropout and graduation, 451 (72.9%), 332 (53.6%), and 170 (27.5%) participants from the original sample completed the subsequent three waves of assessment, respectively. Those who had graduated were not invited to complete subsequent assessments because they could not be contacted. Since the dropout rates for the third and fourth assessments exceeded 50%, the analytic sample for the current study comprised 285 students who had completed at least three of the four waves of the assessment to ensure the accuracy of the longitudinal study. The final sample included 285 participants at T1, 285 at T2, 266 at T3, and 119 at T4.

Of the 285 participants, 61.3% ($n = 174$) were girls, 38.7% ($n = 110$) were boys, and one participant did not report gender. The mean age of the final sample at T1 was 14.48 years (standard deviation = 1.51 years) with a range of 12 to 18 years. All students had experienced the earthquake, 17.9% of the participants had been injured or trapped during the earthquake, and parents of 77 (27.0%) students had been injured or trapped. Nine (3.2%) students had lost one of their parents after the earthquake. The injury and death rates among the students were 41.8 and 25.3%. During wave 1, 49.8% of participants were living in temporary houses. Comparisons between the original and analytic samples showed no significant differences in gender ($\chi^2 = 0.43$, $df = 1$, $p = 0.51$), posttraumatic growth ($t = -0.61$, $df = 1$, $p = 0.55$), or social support ($t = -1.75$, $df = 1$, $p = 0.08$).

Measures

Posttraumatic Growth

Posttraumatic growth was assessed using a modified version of the posttraumatic growth Inventory (PTGI) (Zhou et al., 2015), which has been shown to have good applicability to Chinese adolescents (e.g., Wang et al., 2020). The original

version of the PTGI is a 21-item self-report scale developed by Tedeschi and Calhoun (1996). The items were rated on a six-point Likert scale ranging from 0 (no change) to 5 (a very great degree of change) and captured five dimensions: personal strength, new possibilities, relating to others, appreciation of life, and spiritual change. The modified version comprised 22 items in three subscales: perceived positive change in self (e.g., "After the Wenchuan earthquake, I appreciate the value of my own life more"), relation with others (e.g., "After the Wenchuan earthquake, I feel closer to others"), and life philosophy (e.g., "After the Wenchuan earthquake, I have a better understanding of what is important to me in life".). Students were instructed to respond according to their perceived changes following the Wenchuan earthquake. Cronbach's alpha values for the overall scale across the four waves ranged from 0.93 to 0.95, indicating good internal consistency.

Social Support

The social support scale (Zhou et al., 2014) was modified from the social net questionnaire (Zou, 1999) and was used to measure social support. Each of the 20 items was scored on a four-point scale that ranged from 0 (completely disagree) to 3 (completely agree). The scale measured support from parents, teachers, peers, and others (e.g., "The person [parents, teachers, peers, and others] would give me advice on how to solve the problem"). Support from others indicated support that adolescents perceived from anyone other than their parents, peers, and teachers, such as other adults in the family and professionals. The total score reflected the level of general social support. The reliability of the total score of social support and the score of support from different resources were evaluated respectively. The internal consistency of the scale was good, with Cronbach's alpha values ranging from 0.97 to 0.98.

Data Analyses

Descriptive statistics were analyzed using *SPSS 26.0*, and all other analyses were performed using *Mplus 8.0* (Muthén & Muthén, 2017). Missingness comprised two parts: loss of participants and omissions in the paper-based survey. Missing values were handled by full information maximum likelihood estimation. In addition to the RI-CLPM, the CLPM was examined for comparison purposes using the same model-building procedures. Before building the two cross-lagged models, a measurement invariance test was conducted to ensure that the constructs of social support and posttraumatic growth were stable across time. A baseline model with no invariance constraints was compared with a series of restrictive models, of which the intercepts, factor loadings, and residual variances were fixed to be equal

sequentially (Cheung & Rensvold, 2002). The absence of a significant difference between these models indicated that the construct had equal meaning during each wave (van de Schoot et al., 2012).

Several competing nested models were tested to validate the appropriateness of the CLPM and RI-CLPM. First, the most parsimonious model (Model 0) was built, which only included the auto-regressive paths within social support and posttraumatic growth over time. Second, Models 1 (posttraumatic growth-social support) and 2 (social support-posttraumatic growth) were constructed to represent the unidirectional pathways between the two variables. Third, the most comprehensive Model 3 was built, which included the bidirectional pathways. Good model fit was indicated by low or non-significant chi-square results, >0.90 for the comparative fit index (CFI) and Tucker-Lewis index (TLI), and <0.06 for the root mean square error of approximation (RMSEA) (Browne & Cudeck, 1992). The most parsimonious model should be selected when the models had equal fit.

The traditional CLPM and RI-CLPM were estimated to investigate the reciprocal relation between posttraumatic growth and social support, including the total score and support from different sources. Although the RI-CLPM was the main focus, the traditional CLPM was evaluated as a basic model to compare its results with previous findings and the results of the RI-CLPM model. Because the factor loadings of the observed scores at each time point were fixed to 1 in the RI-CLPM, the random intercepts represented the time-invariant differences at the between-individual level. The correlation between the intercepts reflected the association between the stable inter-individual differences in social support and posttraumatic growth. At the within-individual level, each observed score was regressed onto its corresponding latent factors, and the factor loadings were fixed to 1. The variances of the observed variables were constrained to 0. In this model, an apriori cross-wave equality constraint was not imposed on the structural coefficients because it was hypothesized that the relationship between social support and posttraumatic growth would change over time. Age and gender were entered as covariates for the observed variable because they may affect the measurement of each wave.

Results

Preliminary Analyses

Descriptive statistics and bivariate correlation analyses between social support and posttraumatic growth at each time point are shown in Table 1. The correlation analysis results revealed a significant positive pairwise correlation

Table 1 Bivariate correlation matrix for posttraumatic growth and social support

|	M	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1. T1 PTG	68.25	22.85	1																							
2. T2 PTG	66.40	21.06	0.50**	1																						
3. T3 PTG	66.40	22.72	0.48**	0.49**	1																					
4. T4 PTG	70.01	18.78	0.28**	0.37**	0.41**	1																				
5. T1 social support (total)	181.49	63.79	0.46**	0.38**	0.22**	−0.09	1																			
6. T2 social support(total)	176.22	69.57	0.30**	0.47**	0.17**	−0.07	0.52**	1																		
7. T3 social support(total)	187.21	67.79	0.25**	0.31**	0.23**	−0.22*	0.38**	0.49**	1																	
8. T4 social support(total)	187.93	52.13	0.27**	0.39**	0.25*	0.27**	0.38**	0.28**	0.43**	1																
9. T1 social support(parents)	52.81	19.50	0.39**	0.35**	0.16*	0.07	0.83**	0.45**	0.37**	0.41**	1															
10. T2 social support(parents)	50.37	21.75	0.27**	0.42**	0.12	−0.04	0.47**	0.86**	0.38**	0.25**	0.56**	1														
11. T3 social support(parents)	53.15	20.82	0.17**	0.23**	0.17**	−0.20*	0.32**	0.38**	0.85**	0.42**	0.44**	0.44**	1													
12. T4 social support(parents)	51.83	17.26	0.19**	0.34**	0.19	0.26**	0.31**	0.12	0.27**	0.79**	0.46**	0.24**	0.42**	1												
13. T1 social support(peers)	51.96	17.47	0.40**	0.36**	0.23**	0.06	0.80**	0.44**	0.31**	0.30**	0.55**	0.33**	0.23**	0.21*	1											
14. T2 social support(peers)	51.61	18.82	0.29**	0.45**	0.18**	−0.03	0.52**	0.81**	0.40**	0.20**	0.41**	0.60**	0.25**	0.06	0.60**	1										
15. T3 social support(peers)	54.78	17.38	0.27**	0.36**	0.25**	−0.10	0.38**	0.46**	0.77**	0.46**	0.31**	0.28**	0.56**	0.28**	0.47**	0.56**	1									
16. T4 social support(peers)	55.71	15.16	0.16	0.23*	0.17	0.15	0.33**	0.27**	0.39**	0.75**	0.35**	0.20**	0.34**	0.50**	0.36**	0.30**	0.65**	1								
17. T1 social support(teachers)	41.30	19.29	0.38**	0.27**	0.20**	0.07	0.88**	0.45**	0.30**	0.29**	0.72**	0.38**	0.23**	0.24**	0.63**	0.41**	0.30**	0.30**	1							
18. T2 social support(teachers)	38.23	20.42	0.24**	0.35**	0.15*	−0.08	0.49**	0.89**	0.45**	0.23**	0.41**	0.72**	0.32**	0.12	0.38**	0.66**	0.40**	0.23**	0.57**	1						
19. T3 social support(teachers)	40.76	20.30	0.22**	0.17**	0.17**	−0.20*	0.33**	0.36**	0.87**	0.34**	0.31**	0.22**	0.70**	0.22**	0.24**	0.25**	0.60**	0.28**	0.37**	0.46**	1					
20. T4 social support(teachers)	39.36	17.39	0.12	0.30**	0.16	0.22*	0.27**	0.19**	0.26**	0.82**	0.26**	0.13	0.26**	0.66**	0.20**	0.06	0.29**	0.53**	0.32**	0.28**	0.31**	1				
21. T1 social support(others)	35.42	21.56	0.34**	0.27**	0.15*	0.08	0.78**	0.37**	0.28**	0.27**	0.45**	0.29**	0.18**	0.14	0.51**	0.31**	0.21**	0.11	0.54**	0.28**	0.19**	0.12	1			
22. T2 social support(others)	36.00	22.32	0.19**	0.36**	0.12	−0.07	0.28**	0.79**	0.43**	0.28**	0.14*	0.53**	0.24**	−0.22	0.21**	0.48**	0.31**	0.21**	0.18**	0.59**	0.28**	0.15	0.36**	1		
23. T3 social support(others)	38.52	23.92	0.19**	0.27**	0.17*	−0.22*	0.24**	0.43**	0.80**	0.30**	0.17*	0.29**	0.53**	0.04	0.13*	0.31**	0.45**	0.20**	0.11	0.30**	0.56**	0.08	0.34**	0.54**	1	
24. T4 social support(others)	41.18	20.07	0.31**	0.28**	0.23**	0.14	0.24**	0.27**	0.38**	0.64**	0.19*	0.18**	0.25**	0.24**	0.15	0.18**	0.25**	0.29**	0.03	0.09	0.21**	0.28**	0.40**	0.45**	0.53**	1

$* p < 0.05$; $** p < 0.01$
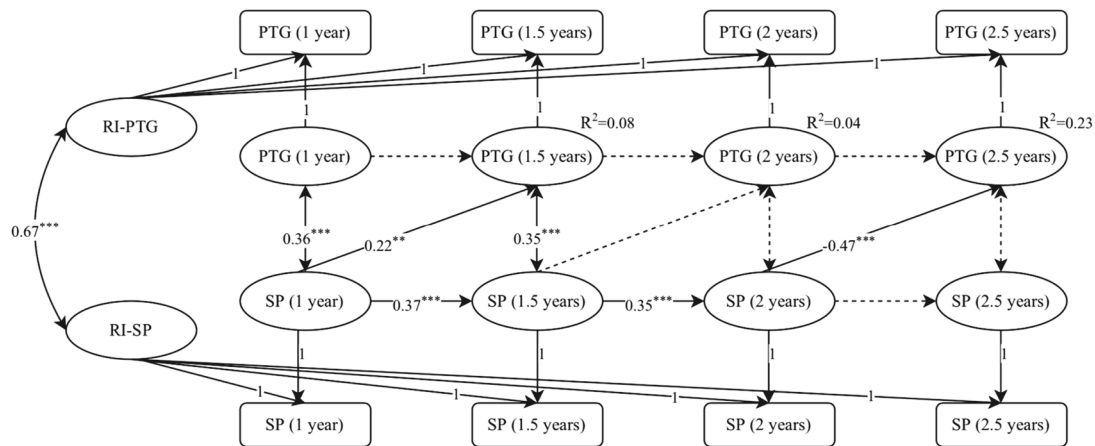
Fig. 1 The RI-CLPM for total social support. All coefficients are standardized estimates. SP social support; PTG posttraumatic growth. $\chi^2(12) = 17.44$, $p = 0.13$, $CFI = 0.99$, $TLI = 0.93$, $RMSEA = 0.04$, $SRMR = 0.06$. $^{**}p < 0.01$; $^{***}p < 0.001$

between posttraumatic growth and social support within the same wave, except for the association between social support from peers and others and posttraumatic growth at T4. In terms of the association across different waves, posttraumatic growth at T4 was not correlated with social support at T1 or T2 but was negatively correlated with social support at T3. Other associations between the two were significant and positive.

Associations between Social Support and Posttraumatic Growth

For the measurement invariance test, acceptable metric invariance was supported ($|\Delta CFI| < 0.01$, $|\Delta TLI| < 0.01$), which indicated that the constructs of posttraumatic growth and social support were stable across the four waves. Detailed results are provided in Tables S1 and S2. Before performing the formal cross-lagged analysis, nested models were generated for CLPM and RI-CLPM. The analysis for the CLPM and RI-CLPM for total support and posttraumatic growth were first conducted, followed by the analysis for the relation between the support from different sources and posttraumatic growth. Of all the CLPMs, the full model had the best fit. The model fits were partially acceptable: $\chi^2 = 53.73-86.03$, $df = 14$, CFIs = 0.86–0.93, TLIs = 0.57–0.79, RMSEAs = 0.11–0.14. The detailed results of the fit indices and model comparisons for the CLPMs are shown in Tables S3–S7. For the RI-CLPM, because the bidirectional model did not increase the model fit, Model 2 (social support-posttraumatic growth) was selected as the final model based on parsimony (see Tables S8–S12 for details). The model fits of the RI-CLPMs were good: $\chi^2 = 12.15-30.80$, $df = 12$, CFIs = 0.97–1, TLIs = 0.87–0.999, RMSEAs = 0.01–0.08. Notably, all RI-CLPMs exhibited better fit than the corresponding CLPMs.

The RI-CLPM for total support and posttraumatic growth is shown in Fig. 1. After controlling for gender and age, the random intercepts of the two variables were positively correlated ($r = 0.67$, $p < 0.001$). At the between-individual level, the more support adolescents received, the higher their level of posttraumatic growth. No predictive effect of posttraumatic growth on total support was found at the within-individual level, but there was a switching effect of social support on posttraumatic growth over time. Social support at T1 positively predicted posttraumatic growth at T2 ($\beta = 0.22$, $p < 0.01$). From T2 to T3, there was no significant cross-lagged effect. Social support at T3 prevented subsequent posttraumatic growth at the within-individual level ($\beta = -0.47$, $p < 0.001$). This suggested that, after ruling out the between-individual effect, more support exerts a three-stage influence (positive–no influence–negative) on posttraumatic growth.

For the variation in different sources of support, the results are shown in Figs. 2–5. At the between-individual level, the random intercepts of social support from different sources and posttraumatic growth were all positively correlated ($rs = 0.45-0.56$, $p < 0.001$). At the within-individual level, the patterns of support from parents and peers were similar to those of the total score, with support exhibiting a positive predictive effect from T1 to T2 (parents: $\beta = 0.26$, $p < 0.01$; peers: $\beta = 0.22$, $p < 0.05$) and a negative predictive effect from T3 to T4 (parents: $\beta = -0.44$, $p < 0.001$; peers: $\beta = -0.39$, $p < 0.01$). Regarding support from teachers and others, the cross-lagged effect was only found from support at T3 to posttraumatic growth at T4, which was negative (teachers: $\beta = -0.42$, $p < 0.01$; others: $\beta = -0.44$, $p < 0.001$).

The traditional CLPMs for total social support and support from different sources for comparison confirmed the similar switching influence of social support on posttraumatic growth,
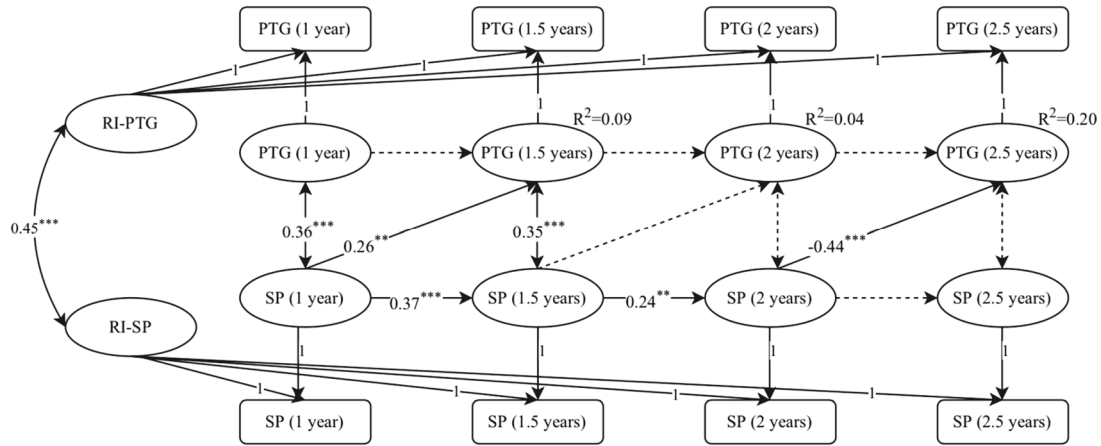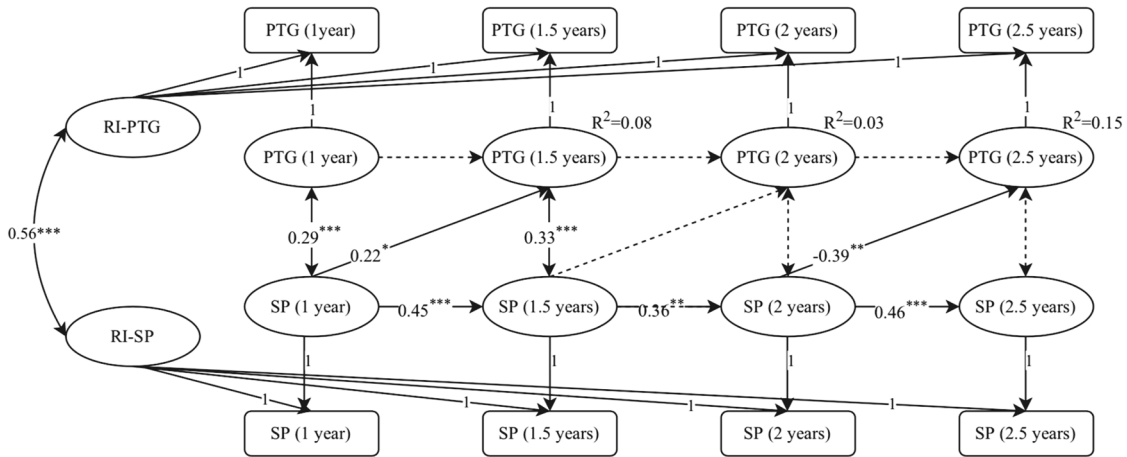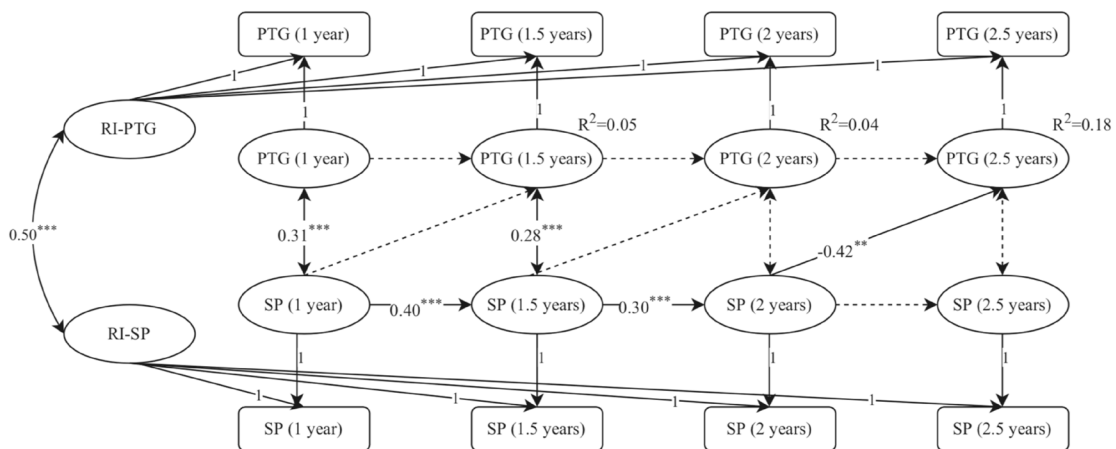
Fig. 2 The RI-CLPM for social support from parents. All coefficients are standardized estimates. SP social support; PTG posttraumatic growth. $\chi^2(12) = 30.80$, $p < 0.05$, $CFI = 0.97$, $TLI = 0.87$, $RMSEA = 0.08$, $SRMR = 0.06$. $^{**}p < 0.01$; $^{***}p < 0.001$

Fig. 3 The RI-CLPM for social support from peers. All coefficients are standardized estimates. SP social support; PTG posttraumatic growth. $\chi^2(12) = 12.15$, $p = 0.43$, $CFI = 1.00$, $TLI = 0.999$, $RMSEA = 0.01$, $SRMR = 0.07$. $^{*}p < 0.05$; $^{**}p < 0.01$; $^{***}p < 0.001$
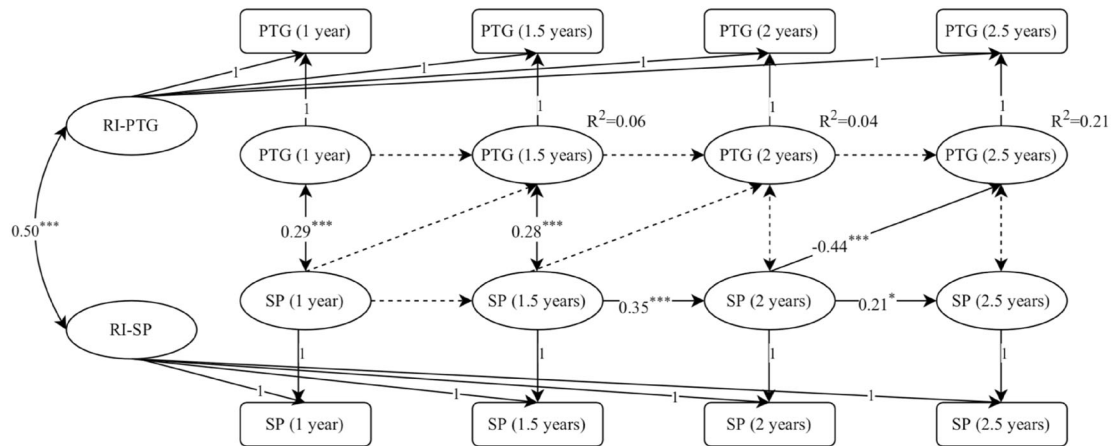

Fig. 4 The RI-CLPM for social support from teachers. All coefficients are standardized estimates. SP social support; PTG posttraumatic growth. $\chi^2(12) = 21.03$, $p = 0.05$, $CFI = 0.98$, $TLI = 0.93$, $RMSEA = 0.05$, $SRMR = 0.06$. $^{**}p < 0.01$; $^{***}p < 0.001$

Fig. 5 The RI-CLPM for social support from others. All coefficients are standardized estimates. SP social support; PTG posttraumatic growth. $\chi^2(12) = 13.41$, $p = 0.34$, $CFI = 0.997$, $TLI = 0.99$, $RMSEA = 0.02$, $SRMR = 0.07$. $^*p < 0.05$; $^{***}p < 0.001$

except for support from teachers. Detailed path coefficients and model fits are presented in Figures S1–S5. The predictive effect of posttraumatic growth on social support was found from T2 to T3 (peers: $\beta = 0.12$, $p < 0.05$; teachers: $\beta = 0.12$, $p < 0.05$) and from T3 to T4 (total: $\beta = 0.19$, $p < 0.05$; others: $\beta = 0.22$, $p < 0.01$).

Discussion

Longitudinal studies reporting mixed effects at between- and within-person levels for the causal relation between social support and posttraumatic growth may be reporting mixed findings due to variations in sources of support. By using RI-CLPMs, this study suggested that the effect of social support on posttraumatic growth at the within-person level changes over time. In terms of the type of support, the promoting effect of support in the short term was only exhibited for support from parents and peers. However, a preventive effect of support on posttraumatic growth in the long term was found for all forms of support.

At the within-person level, the overall pattern exhibited a promoting–no influence–hindering trend. Regarding the variation in different sources of support, only support from parents and peers was found to facilitate posttraumatic growth during the early stage, which indicated that the role of parents and peers was more important than that of teachers. According to the optimal matching theory of social support (Cutrona & Russell, 1990), the effectiveness of social support is optimized only when the provided social support matches the individual's preferences. Adolescents receive the most emotional support from parents and peers and the most informational support from teachers (Malecki & Demaray, 2003). Because adolescents often experience substantial psychological distress following a natural disaster (Forresi et al., 2020), emotional comfort from parents and peers can serve as a safe haven that is

appropriate to the individual's situation, and this can help adolescents to move beyond the traumatic event and achieve posttraumatic growth within a short period. Regarding teachers, the emphasis on education in China may result in their support being focused on academic studies (Chang et al., 2018), which would have been incongruent with adolescents' needs shortly after the earthquake and hindered the positive effects of this type of support. In fact, adolescents who experienced the earthquake may seek support after experiencing a negative psychological response and recognizing their need for help. As parents and peers spend much time with adolescents, they are more aware of adolescents' needs, which enabled support from parents and peers to be more timely and helpful shortly after the earthquake.

The switching influence from T3 to T4 is consistent with the interpersonal process of social support. Life contexts comprise adversity and the absence of adversity (Feeney & Collins, 2015), in which social support functions differently. In contrast to the early stage, 2 years after the earthquake, adolescents' lives gradually returned to normal. Paying excessive attention to surviving adolescents may damage their need for autonomy, which reduces their confidence in coping with traumatic events (Ryan & Deci, 2000). In the absence of adversity, providing more support makes adolescents feel weak and even burdensome, reducing their self-efficacy (Feeney & Collins, 2015), which may prevent them from exhibiting posttraumatic growth. Previous studies have reported that children who receive an excessive amount of support from their parents exhibit impaired self-efficacy and social inability (Kouros et al., 2017), which is detrimental to their growth. Regarding the relation between social support and posttraumatic growth during the period from T2 to T3, it was proposed that this period constitutes a transition period and that the two mechanisms operate in opposite directions to offset each other.

The predictive effect of posttraumatic growth on social support was confirmed by the CLPM and emerged 1.5 years

after the earthquake. Results indicated that growth develops gradually over time because re-understanding and reconstructing trauma is a slow and gradual process (Husson et al., 2017). The distinction between the CLPM and the RI-CLPM indicated that the influence of posttraumatic growth on social support is primarily focused on the between-person level. Although a significant cross-lagged effect of posttraumatic growth on social support was not found in the RI-CLPMs, the random intercepts of the two variables were positively correlated, regardless of the source of support. The divergent results may have been confounded by the between- and within-individual effects in the CLPMs. At the between-person level, there was a mutual influence between social support and posttraumatic growth. Adolescents with higher levels of posttraumatic growth may outperform others in terms of interpersonal relationship, promoting social support (Wu et al., 2016). Furthermore, perceived social support serves as a proximate context (Calhoun and Tedeschi, 2006) and promotes posttraumatic growth (Levi-Belz, 2019). At the within-person level, the results only revealed a one-way predictive relation between social support and growth. The discrepant results between the CLPM and RI-CLPM demonstrate the necessity of distinguishing between-individual effects from within-individual effects. The RI-CLPM provided a more accurate causal relation between the two factors. From the perspective of the sample as a whole, posttraumatic growth and social support predicted each other. From the individual's perspective, the predictive effect was only observed from social support to posttraumatic growth.

Despite the valuable insights gained in the current study, this study had several limitations. First, this study only examined the causal relation between social support and posttraumatic growth, but the underlying mechanism between them was not assessed in this study. Previous studies indicated that multiple factors (e.g., hope, coping strategies etc.) might play a mediating role between them (Zhou et al., 2017b, 2018b). Future studies should focus on these mediating factors and elucidate its underlying mechanism. Second, this study followed participants for only 2.5 years after the earthquake. Because posttraumatic growth develops over time, it is worth examining the association between posttraumatic growth and social support over a longer period. Third, because of the limited sample size, the influence of developmental stages and gender was not tested. In the future, this could be explored in a larger sample.

Despite these limitations, the current study expanded the dynamic model of social support in the context of a traumatic event (Monroe & Steiner, 1986). The relationship between social support and posttraumatic growth was not simply linear. Instead, both the direction and magnitude of social support were shown to change over time. The results indicated that a higher level of social support within individuals prevents the development of posttraumatic growth in the long term, although it did promote posttraumatic growth immediately after the earthquake. From a practical point of view, the results shed light on the issue of the timing of providing social support. Psychological interventions for adolescents shortly after the traumatic event should be focused more on parents and peers, whereby early interventions should target fostering a warm family atmosphere and high-quality peer relations.

Conclusion

Despite accumulating studies focused on the relationship between social support and posttraumatic growth, it remains unclear whether its causal relationship would change over time since trauma experiences. The importance of the timing of providing support in the relationship between social support and posttraumatic growth was highlighted in this study. At the between-individual level, social support and posttraumatic growth were positively correlated, whereas, at the within-individual level, the relationship varied depending on the sources of support. For support from parents and peers, there was a promoting–no influence–hindering pattern, which was consistent with the pattern of total support. For support from teachers and others, more support had a hindering effect on posttraumatic growth two years after the earthquake. This study underscores the need to examine the effects of social support over time. Shortly after traumatic events, parental and peer support rather than others' or teachers' support are helpful for adolescents to realize positive changes. "Less is more" in the long term, as providing social support no longer effects adolescents' positive growth, regardless of the sources of support. Social support is not always beneficial for traumatized adolescents; the timing and sources of support must be considered.

Authors' Contributions R.S. conceived the study, performed the statistical analyses, and drafted the manuscript; X.Y. conceived the study, participated in the design, and interpreted the data; X.W. participated in the design; X.Z. participated in the design and coordination and helped to draft the manuscript. All authors read and approved the final manuscript.

Data Sharing Declaration The datasets generated and analyzed during the current study are not publicly available but are available from the corresponding author upon reasonable request.

Compliance with Ethical Standards

Conflict of Interest The authors declare no competing interests.

Ethical Approval This study was approved by the Research Ethics Committee of Beijing Normal University.

Informed Consent Written informed consent was obtained from students' guardians.

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