Current Psychology (2023) 42:28242–28252
https://doi.org/10.1007/s12144-022-03843-z

Perceived social support and post-traumatic growth 12 years after the Wenchuan earthquake: a moderated mediation of belief in a just world and gender

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Accepted: 30 September 2022 / Published online: 7 November 2022

Abstract
The current study sought to explore the mediating effect of belief in a just world (BJW) in the link between perceived social support (PSS) and post-traumatic growth (PTG) and analyzed the moderating effect of gender among child and adolescent survivors 12 years after the Chinese Wenchuan earthquake. In a span of five months, 515 participants aged 18 to 30 (96.5% of the 561 participants surveyed) were selected and measured using the following scales: Multidimensional Scale of Perceived Social Support, Just World Belief Scale, and Post-traumatic Growth Inventory. Correlation analysis showed that PSS was positively correlated with PTG. Mediation analysis suggested that BJW partially mediated the association between PSS and PTG. Moderated mediation analysis indicated that gender moderated the link between PSS and BJW. Specifically, the link between PSS and BJW was stronger for male survivors compared to female peers. Overall, child and adolescent survivors with high PSS experienced higher levels of PTG. The moderated mediation model provides a better understanding of how PSS, BJW, and gender work together to affect PTG. The findings of this study highlight the long-term psychological consequences of severe traumatic events for child and adolescent survivors. Furthermore, we discuss the relevance of PSS to those psychological consequences and their implications for survivors following a natural disaster in early life.

Keywords Perceived social support · Belief in a just world · Post-traumatic growth · Gender variation · Moderated mediation

Introduction

Children and adolescents undergo critical developmental periods characterized by physical, psychological, and social developments (Bundy et al., 2018). A natural disaster, such as an earthquake, may obstruct or interfere with these natural developmental assignments and present them with physical, psychological, and social challenges, resulting in impaired well-being (Tang et al., 2018). Research has shown that the deleterious influence of life-threatening events in the early stage of life can persist for decades and cast a critical role in child and adolescent survivors' personality development (Maclean et al., 2016). Compared to adults, children and adolescents are less resistant and more vulnerable to the detrimental effects of natural disasters due to the lack of life experience, resources, and skills to solve problems independently (Liu et al., 2021). For example, in terms of socially related problems, in the aftermath of the Wenchuan earthquake in China, child and adolescent survivors had to cope with considerable life and academic challenges, such as damaged buildings, school closures or relocation, academic burnout, and weakened support from family (Ying et al., 2016; Zhou, Zhen & Wu, 2017). Concerning psychological issues, numerous studies have found that after an earthquake, a high proportion of child and adolescent survivors display various psychological problems, such as anxiety

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symptoms, depression, PTSD, and suicidality (Andrades et al., 2018; Shi et al., 2016, 2018; Tang et al., 2018).

However, as a fast-growing group with high plasticity, children and adolescents can also respond to natural disasters with remarkable resilience and exhibit positive changes, such as an increased sense of personal strength, increased appreciation for life, and more meaningful relationships (Jayawickreme & Blackie, 2014). Such positive changes can be described as *post-traumatic growth* (PTG). PTG refers to a "positive psychological change experienced by individuals as a consequence of highly stressful circumstances or a major life crisis" (Tedeschi & Calhoun, 2004). PTG has been widely observed in children and adolescents who survived catastrophic and traumatic events such as cancer (Vogel et al., 2018), earthquakes (Zhou et al., 2019b), and armed conflicts (Shah & Mishra, 2021). Studies have indicated that PTG was a pivotal resource for the development of human beings in their life course (Infurna & Grimm, 2018; Jayawickreme et al., 2021). Consequently, we need to urgently investigate the long-term impact of natural disasters to formulate suitable interventional plans to advance the transformation of suffering to PTG among children and adolescents.

Perceived social support and post-traumatic growth

Perceived social support (PSS) has been heralded as a critical interpersonal factor of PTG (Rzeszutek, 2017; Wang et al., 2018). PSS is defined as the belief that naturally occurring helping behaviors (e.g., love, care, and attachment) are provided when needed, generally by family, friends, or other sources of significant support (Zimet et al., 1988). The social-cognitive processing model posed by Tedeschi and Calhoun (2004) emphasized that PSS can facilitate the successful confrontation of psychological difficulties following a traumatic event and assist with the cognitive adaptation processes of children and adolescents, thereby promoting PTG. Specifically, studies regarding survivors who encountered traumatic events at an early life stage have found that enhanced PTG was positively correlated to high levels of PSS from family (Schaefer et al., 2018), friends (Tillery et al., 2017), and social network (Tsai et al., 2015) An et al. (2015) analyzed the PTG structure of nine survivors of the Wenchuan earthquake through qualitative interviews, and found that compared with Western adolescents, Chinese adolescents attach greater importance to moral character and a strong sense of responsibility, and social support has a positive effect on their PTG. Further, recent Chinese studies have also demonstrated that PSS cast a critical role in promoting PTG among child and adolescent survivors after the earthquake (Du et al., 2018; Wu et al., 2016; Zhou, Wu & Zhen, 2017). Given the specific vulnerability of children and adolescents to earthquakes, more studies are warranted to elucidate internal and external mechanisms between PSS and PTG among child and adolescent survivors after the event.

Belief in a just world as the mediator

The link between PSS and PTG may be influenced by belief in a just world (BJW) during child and adolescent survivors' responses to trauma. BJW is defined by Lerner (1978) as a perception that the world is a just place where individuals receive what they deserve and may be conceptualized as a positive illusion that encourages people to see their world as orderly, meaningful, and predictable. From this perspective, BJW is likely to contribute to child and adolescent survivors' PTG through mechanisms such as increasing one's sense of competence and control, foreseeing a positive future, or taking their living situation for granted and hence, considered fair (Yu et al., 2020). Indeed, studies have found a significant link between BJW and positive changes (e.g., psychological well-being and life satisfaction) after traumatic events (Dzuka & Dalbert, 2007; Wang et al., 2019), which indicate that individuals with a stronger BJW cope better with traumatic experiences, reduce deleterious effects, and report more positive changes than those with a weaker BJW. More directly, Zhou et al. (2019a) found that BJW aided adolescent survivors nine years after the Wenchuan earthquake to more easily justify their troubles and make sense of events, further facilitating PTG. In line with the arguments above, BJW may be a crucial factor that can positively correlate with PTG.

From a cognitive perspective, some individuals who experience traumatic events are more likely to have cognitive distortion, which broadly impacts their beliefs about themselves, other people, and the world (Haven et al., 2021). Nevertheless, the shattered assumptions theory posed by Janoff-Bulman (1992) points out that PSS reliably protects men from the latent detrimental influence of catastrophic traumatic incidents. Thus, following trauma, traumatized individuals receive more substantial support from others (Wang et al., 2018), which can serve as a buffer against traumatic events (Cohen & Wills, 1985) and induces individuals to recover and form BJW (You & Ju, 2020). Accordingly, BJW might be a mediator between PSS and PTG among child and adolescent survivors after an earthquake.

Gender as the moderator

The relationship between PSS and BJW may differ according to gender. The socialization process of children and adolescents varies by gender, and their socialization development is inseparable from the development, maintenance, composition, and functions of social networks (Troll, 1987). Therefore, gender differences may appear in the perception and utilization of social support (Tifferet, 2020). Several studies found that the role of PSS varied regarding gender, and the effect of social support was greater in females than in males (Rueger et al., 2008; Uhing et al., 2021), whereas other studies have found that the effect of PSS was stronger in males than in females (Gao et al., 2022; Song et al., in press). The inconsistent results highlight the need to continue exploring gender differences, especially within traumatic psychology domains.

In addition, stress theory pointed out that females are more vulnerable to the stressors they experience due to the combination of high exposure to stress and a relative lack of stress-buffering resources compared to males (Lazarus & Susan, 1984). Specifically, after suffering from a major traumatic event, females are more susceptible to a stronger passive focus on their internal thoughts and emotions and constantly relive their painful experiences compared to males (Cao et al., 2020). This tendency may contribute to greater subjective distress and negative thoughts that life is unfair and meaningless (e.g., low BJW). By contrast, men endorsed greater resilience than women when confronting traumatic events (Xue et al., 2022), making them more capable of handling stressors related to suffering, and seeking the necessary social support from family members or friends. In this case, individuals who perceive sufficient social support would increase their positive perception of the world as fair, which could serve as a coping mechanism in the face of harsh realities (Wu et al., 2011) and thus promote PTG. Empirical research has also found that males had higher levels of general and personal BJW than females (Karadag, 2020). The findings of previous research may encourage incorporating the factor of gender into studies. Therefore, the present study seeks to examine the relationship between PSS and BJW among child and adolescent survivors with the hypothesis that, compared to females, the association between PSS and BJW may be stronger among male child and adolescent survivors who have suffered major traumatic events such as an earthquake.

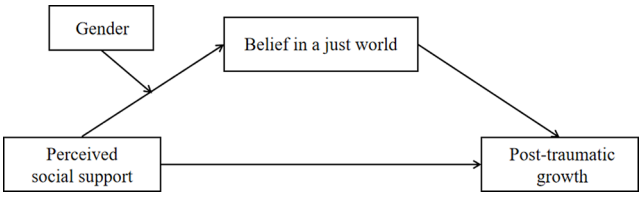

Fig. 1 The proposed moderated mediation model

The current study

On May 12, 2008, a 7.9 magnitude earthquake struck Wenchuan County in Sichuan Province, China. Research from *Science* (Stone, 2008) indicates that 69,142 people died, and 17,551 were missing after the Wenchuan earthquake. Although researchers have conducted fruitful discussions on the influence of the Wenchuan earthquake on survivors' PTG (e.g., Du et al., 2018; Wu et al., 2016; Zhou et al., 2019b), no study has examined whether BJW and gender (internal and external status) may account for the link between PSS and PTG among child and adolescent survivors. Therefore, this study sought to investigate a moderated mediation model of the PTG of child and adolescent survivors 12 years after the Wenchuan earthquake. Specifically, we hypothesized that types of PSS (i.e., family and friends) are positively associated with PTG. Additionally, the BJW of child and adolescent survivors plays a mediating role in the link between PSS and PTG. Furthermore, we explored whether the indirect path between PSS and PTG is moderated by their gender (See Fig. 1).

Methods

Participants and procedure

The cross-sectional survey was conducted between March and July in 2020. This study focused on Dujiangyan city in Sichuan province, one of the worst-hit areas by the Wenchuan earthquake and resulted in 3,091 deaths and 141 missing (Xu et al., 2012), while few studies have investigated the long-term effect of earthquake on child and adolescent survivors in this area (Xu et al., 2022; Zhou et al., 2019a). We collected data using two methods. Firstly, the Chinese questionnaire were posted on a professional survey website Wenjuanxing, then a hyperlink and a two-dimensional code generated by the system were transferred in the QQ/WeChat groups and Baidu Post-Bar of Dujiangyan city themes. The design and objectives of the study were explained in the cover page of the questionnaire. Before accomplishing the questionnaire, respondents were informed of their voluntary participation and were told that the study was anonymous and used only for scientific study. Upon completion,

eligible participants received 15 CNY as compensation by leaving their Alipay account number. In addition, we visited large shopping malls in Dujiangyan city, and distributed the questionnaires to people nearby. The eligibility criteria were in Dujiangyan city when the earthquake occurred, willing to provide informed consent, and 18–30 years old. This project was approved by the Ethics Committee of Sichuan university.

Out of 561 replies, 46 questionnaires were excluded from further analyses due to the incomplete psychometric instruments or failure to meet eligibility criteria, leaving a sample of 515 respondents and a valid response rate of 96.5%. Mean age of respondents was 24.3 years ($SD = 3.95$), with a range of 18 to 30 years; 297 respondents (57.7%) were male and 218 (42.3%) were female. Most (77.9%) respondents had at least a college degree. For marital status, 41.2% of them were single, 28.3% were currently in a romantic relationship, 30.1% were married, and 0.4% divorced. The homes of 30.6% of participants were seriously damaged or destroyed in the earthquake. Finally, 56.1% of participants reported that family members, relatives, friends, teachers, or classmates were injured in the earthquake, and 39.4% reported that family members, relatives, friends, teachers, or classmates died due to the earthquake.

Measures

PSS. We assessed PSS using the Chinese version of the Multidimensional Scale of PSS (Zimet et al., 1988). The subscales of 8-item family support and 8-item friend support were applied in current study. Items are rated on a seven-point scale from 1 (*strongly disagree*) to 7 (*strongly agree*). A sample item of family support is "When I encounter difficulties, my family will appear beside me", and a sample item of friend support is "I can count on my friends when things go wrong". The Chinese version has demonstrated good psychometric properties in Chinese samples (Chen et al., 2021). Cronbach's α on the total scale of this study was 0.96, and on subscales of family support and friend support were 0.95 and 0.93, respectively. Furthermore, confirmatory factor analysis (CFA) indices showed a reasonable fit: $\chi^2/df = 3.32$, CFI = 0.97, TLI = 0.96, SRMR = 0.03, RMSEA = 0.07.

BJW. We assessed BJW using the Chinese version of the Just World Belief Scale (Dalbert, 1999). It contains 13 items belonging to two factors: personal BJW (7 items) and general BJW (6 items). A sample item on personal BJW is, "I am usually treated fairly", and a sample item on general BJW is, "I think basically the world is a just place". Responses to each item were provided on a 4-point Likert scale from 1 (*strongly disagree*) to 4 (*strongly agree*). Total scores were computed, with higher scores indicating greater BJW. The Chinese version of the scale has been testified to have a good reliability and construct validity in Chinese adolescent samples (Xiong & Zou, in press). Cronbach's α on this scale of this study was 0.92. The CFA indices showed a satisfactory fit: $\chi^2/df = 2.88$, CFI = 0.97, TLI = 0.96, SRMR = 0.04, RMSEA = 0.06.

PTG. We assessed PTG using the Chinese version of the PTG Inventory (Tedeschi & Calhoun, 1996), which asked participants the extent to which individuals felt the following changes compared with before the Wenchuan earthquake. It contains 21 items belonging to five factors: spiritual change (2 items), relating to others (7 items), new possibilities (5 items), personal strength (4 items), and appreciation of life (3 items). Sample items were "I know more about priorities in life.", and "I feel more positive about the value of my life." Responses to each item were provided on a six-point scale ranging from 0 (*strongly disagree*) to 5 (*strongly agree*), with higher scores indicating greater PTG. The PTG inventory has good internal consistency and good construct, convergent, and discriminate validities (Tedeschi & Calhoun, 1996). The scale was translated into Chinese and then back-translated by three English professionals (Liu et al., 2014). Previous research indicated that the Chinese version of this scale had good psychometric properties among Chinese earthquake survivors (Xu et al., 2022). Cronbach' s α on this scale in the current study was 0.97. The CFA indices hence showed a reasonable fit: $\chi^2/df = 2.99$, CFI = 0.97, TLI = 0.96, SRMR = 0.03, RMSEA = 0.06.

Covariate. Given previous study demonstrating that trauma exposure was related to PTG (An et al., 2011), this variable was included as a covariate in data analyses. Trauma exposure was assessed using the trauma exposure questionnaire developed in the Chinese context (Wu et al., 2013). It contains six items and asks participants to indicate whether they have directly seen or indirectly heard about the death, or injury of family members, relatives, friends, teachers, or classmates. A representative item was "A family member(s) died in the Wenchuan earthquake." Responses to each item were provided on a three-point scale, where 0 represents "*this is not the case*," 1 represents "*knew afterwards*," and 2 represents "*witnessed*." Cronbach' s α on this scale in the current study was 0.82.

Data analysis

All the statistical analyses were performed using SPSS 22.0. There were no missing data in the current study as individual's information was not obtained if a respondent did not complete or submit the questionnaire. Multicollinearity was not a problem according to the variance inflation factors. The Skewness and kurtosis of participants' PSS, BJW, and

Table 1 Descriptive statistics and correlations for all variables ($N = 515$)

	M	SD	1	2	3	4	5	6
1. Gender	-	-	1					
2. Trauma exposure	8.76	2.68	-0.19**	1				
3. Family support	44.77	9.46	-0.06	0.14**	1			
4. Friend support	38.61	6.83	0.02	0.15**	0.70**	1		
5. BJW	38.21	6.47	-0.15**	0.30**	0.48**	0.41**	1	
6. PTG	70.03	22.46	-0.17**	0.32**	0.37**	0.36**	0.51**	1

Note: BJW, Belief in a just world; PTG, Post-traumatic growth. $^{**}p < 0.01$

PTG fell within the acceptable range (Skewness ranged from − 1.07 to 1.13 and kurtosis ranged from 1.03 to 1.49; Curran et al., 1996). First, descriptive statistics and Pearson's correlations were calculated to examine the relationships among study variables. Pearson's correlations or *b* coefficient around 0.10 indicates a minimum effect size, 0.30 means a moderate effect, and higher 0.50 reflects a strong effect (Cohen, 1992). Chi-square test was used to detect gender difference in PSS, BJW, and PTG among participants.

Second, the mediating effect of BJW in the relationship between PSS and PTG were examined using PROCESS Model 4 (Hayes, 2017). Finally, we introduced the proposed moderator variable (gender) into the model and tested for moderated mediation. Specifically, we tested whether gender would moderate the relationship between PSS and BJW. To examine this hypothesis, we used Hayes's PCOCESS macro (Model 7) to test the moderating role of gender (Hayes, 2017). In all analyses, we used trauma exposure as a covariate into regression equation. The bootstrap method (5,000 bootstrap samples) with 95% confidence intervals (CIs) was conducted to detect significance of effects, with CIs excluding zero indicating significant effects (Hayes, 2017). All study variables except gender were standardized in moderated mediation model.

Results

Preliminary analyses

Table 1 presented the results of descriptive information and Pearson's correlations. Correlation analysis showed that family support was positively correlated to BJW ($r = 0.48$, $p < 0.01$) as well as PTG ($r = 0.37, p < 0.01$). Similarly, friend support was positively correlated to BJW ($r = 0.41, p < 0.01$) and PTG ($r = 0.36, p < 0.01$). BJW was positively correlated with PTG ($r = 0.51$, $p < 0.01$) but negatively correlated to gender (r = -0.15, $p < 0.01$). Gender was negatively correlated to PTG (r = -0.17, $p < 0.01$).

Descriptive information of the variables by gender were calculated. *T*-test indicated that no significant gender differences in PSS, while male reported more BJW ($t = 3.60$, $p < 0.001$) and PTG ($t = 3.94, p < 0.001$) than female.

Table 2 Mediation role of BJW in the link between PSS and PTG ($N = 515$)

PSS→BJW→PTG	Effect	*SE*	*p*	95% CI
Family support (X)→BJW (M)→PTG (Y)				
Total effect of X on Y	0.79	0.09	< 0.001	[0.60, 0.97]
Direct effect of X on Y	0.39	0.10	< 0.001	[0.20, 0.59]
Indirect effect of X on Y	0.40	0.06	< 0.001	[0.28, 0.52]
X→M	0.30	0.03	< 0.001	[0.25, 0.36]
M→Y	1.30	0.15	< 0.001	[1.01, 1.60]
Friend support (X)→BJW (M)→PTG (Y)				
Total effect of X on Y	1.03	0.13	< 0.001	[0.77, 1.29]
Direct effect of X on Y	0.56	0.13	< 0.001	[0.30, 0.81]
Indirect effect of X on Y	0.48	0.08	< 0.001	[0.33, 0.64]
X→M	0.36	0.04	< 0.001	[0.28, 0.43]
M→Y	1.34	0.14	< 0.001	[1.06, 1.62]

Note: PSS, Perceived social support; BJW, Belief in a just world; PTG, Post-traumatic growth

Mediating role of belief in a just world

Mediating role of BJW in the link between PSS and PTG was texted and shown in Table 2. In the first mediation model, after controlling for trauma exposure, BJW partially mediated the link between family support and PTG. Specifically, family support significantly affected BJW ($\beta = 0.30$, $SE = 0.03$, $p < 0.001$). BJW significantly affected PTG ($\beta = 1.30$, $SE = 0.15$, $p < 0.001$). Total effect of model was statistically significant ($\beta = 0.79$, $SE = 0.09$, $p < 0.001$). The direct effect of mediation model was statistically significant ($\beta = 0.39$, $SE = 0.10$, $p < 0.001$), and the indirect effect was statistically significant ($\beta = 0.40$, $SE = 0.06$, $p < 0.001$). Mediation effect accounts for 51% total effect of family support on PTG.

Similarly, BJW partially mediated the link between friend support and PTG. Unique indirect effects were exhibited by BJW ($\beta = 0.48$, $SE = 0.08$, $p < 0.001$). Mediation effect accounts for 47% total effect of friend support on PTG.

Moderated mediation model

Next, we text the moderated mediation model regarding moderating role of gender on the link between PSS and BJW (detailed information presented in Table 3). The main

Table 3 Moderated mediation effect of PSS on PTG ($N = 515$)

Predictors	BJW		
	β	SE	t
1. Family support	0.65	0.12	5.55***
Trauma exposure	0.21	0.04	5.58***
Gender	-0.18	0.08	-2.28*
Family support × gender	-0.14	0.07	-1.89
R^2	0.29		
F	53.01***		
2. Friend support	0.60	0.12	5.08***
Trauma exposure	0.22	0.04	5.43***
Gender	-0.22	0.08	-2.72**
Friend support × gender	-0.16	0.08	-1.99*
R^2	0.24		
F	40.67***		

Note: Gender is encoded as a dummy variable in moderated mediation model: 1 = male, 0 = female. BJW, Belief in a just world; $^{*}p < 0.05$; $^{**}p < 0.01$; $^{***}p < 0.001$

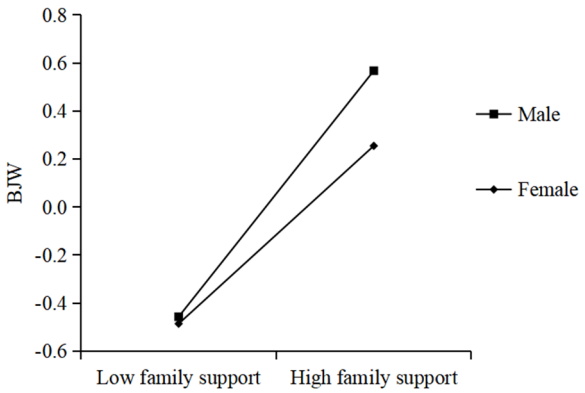

Fig. 2 Gender moderated the relationship between family support and BJW

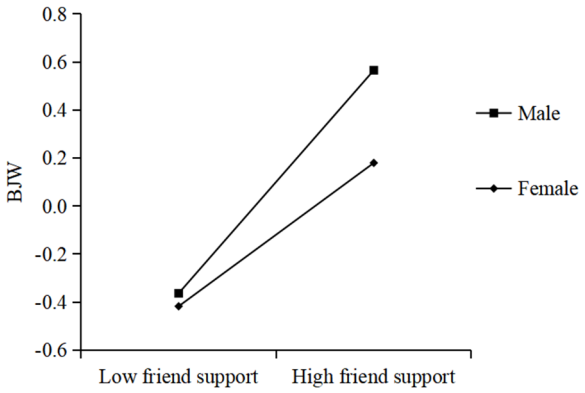

Fig. 3 Gender moderated the relationship between friend support and BJW

effect of family support on BJW was marginally significantly moderated by gender (β = -0.14, $p = 0.06$). We also plotted the prediction of family support on PTG, separately for male and female participants (Fig. 2). Simple slope texts showed that the link between family support and BJW was stronger for male ($\beta_{simple} = 0.51$, $p < 0.001$) than for female ($\beta_{simple} = 0.37$, $p < 0.001$). Thus, we separated gender to see its difference on mediation model and presented in supplementary materials, results showed that in male group, mediation model of family support to BJW to PTG explained 43% of variance of PTG ($R^2 = 0.43$, $p < 0.001$). In female group, mediation model of family support to BJW to PTG explained 16% of variance of PTG ($R^2 = 0.16$, $p < 0.001$).

Similarly, the main effect of friend support on BJW was significant ($\beta = 0.60$, $p < 0.001$), and this effect was moderated by gender (β = -0.16, $p < 0.05$). Coefficients for the simple mediation model are shown in Fig. 3; Table 3. Simple slope texts showed that the link between friend support and BJW was stronger for male ($\beta_{simple} = 0.44$, $p < 0.001$) than for female ($\beta_{simple} = 0.28$, $p < 0.001$). In male group, mediation model of friend support to BJW to PTG explained 27% of variance of PTG ($R^2 = 0.27$, $p < 0.001$). In female group, mediation model of friend support to BJW to PTG explained 13% of variance of PTG ($R^2 = 0.13$, $p < 0.001$).

Discussion

The current study examined the mediation effect of BJW (internal factor) on the PSS–PTG relationship in a sample of child and adolescent survivors after the Wenchuan earthquake and the function of gender (external factor) on the examined mediation models. Findings suggest that PSS positively predicted their PTG. Additionally, BJW partially mediated the relationship between PSS and PTG. Most importantly, when gender was added to the mediation model as a moderator, the results revealed that the magnitude of the mediation effects of BJW on PSS–PTG varied depending on gender.

As hypothesized, PSS from families and friends is correlated with higher levels of PTG; results of PSS and PTG showed a strong positive link, suggesting that PSS is crucial to the psychological adjustment of Wenchuan earthquake survivors with trauma. This finding confirms the applicability of the social-cognitive processing model of adjustment to traumatic events and is consistent with previous research that demonstrates that PSS positively relates to PTG among child and adolescent survivors (Du et al., 2018; Wu et al., 2016; Zhou, Wu & Zhen, 2017). China's collectivistic culture prioritizes interpersonal harmony, cooperation, and a sense of belonging rather than individualism, suggesting that social support may play a central role in forming external help structures (Wen et al., 2021). During and after the earthquake, the Chinese population provided various types of support to their family members and friends and worked

together to overcome any difficulties (Xu et al., 2022). Thus, high PSS from families and friends can provide child and adolescent survivors with the resources they need to cope with traumatic events, such as senses of safety and belonging, which helps them rethink themselves, others, and the world, thereby generating positive perceptions that promote PTG (Tedeschi & Calhoun, 2004; Zhou, Wu & Zhen, 2017). Although the relationship between these two variables has been proved by a host of studies, this study provides an alternative explanation with evidence from a collectivistic culture.

Additionally, this study explores BJW as a mediator of the PSS and PTG links. Initial mediation results indicate that BJW partially mediates the link between PSS and PTG and provides empirical support for the long-term effect of BJW on the relationship of PSS to PTG in child and adolescent survivors. These results suggested that PSS from family and friends provides a safe environment for the growth of child and adolescent survivors, which protects them from the possible adverse effects of traumatic events, building trust about the world, and gradually promoting their PTG over time. Specifically, the mediating model indicated that PSS is positively correlated to higher levels of BJW, which was corroborate with the results of one study (You & Ju, 2020). As Cohen and Wills (1985) suggested, social support can buffer the stress caused by traumatic events by providing a solution to the problem or re-evaluating the stressful events. Following the earthquake, child and adolescent survivors with a high level of PSS are more likely to acquire various coping skills, positively re-evaluate the traumatic event, and feel that they "get what they deserve", thus believing that the world is just.

Furthermore, the present study confirms that BJW has a strong positive association with PTG after traumatic events, a finding that extends previous studies testing the association of BJW with positive changes (Dzuka & Dalbert, 2007; Wang et al., 2019). That is, BJW serves vital adaptive functions that help individuals cope with threatening and unforeseeable disasters (e.g., an earthquake), feel less personally vulnerable, and increase personal control over their destiny, thus reporting more positive affect, including PTG (Zhou et al., 2019a). Moreover, the ancient Chinese philosophy emphasizes the acceptance of the outside world and the present transcending of adversity through the reconciliation of the opposite sides (Wu et al., 2011). For example, Chinese Taoism recommends that people should not change the natural order but follow it. Taoists believe there is a blessing in adversity (Zhang & Veenhoven, 2008). This cultural strategy encourages people who experience suffering to believe that "social arrangements are fair and legitimate" to buffer stress responses and achieve personal growth (Wu et al., 2011). This result contributes to understanding how PSS and BJW interact to support PTG from a long-term perspective. Strategies to promote reflection can be outlined to help them overcome the trauma they have experienced.

Our findings provide initial evidence for the unique effect of gender in the observed differential PSS among different gender groups. Findings revealed that when moderating for gender, the association between PSS from family and friends and BJW, and the indirect effects of PSS on PTG, is stronger for males than females. It means that when in situations where males feel more PSS from family or friends, they would have a stronger sense of trust in others than females and consequently experience more PTG. As mentioned in the introduction, previous studies have shown inconsistencies in the effect of PSS. This finding is consistent with previous studies that have shown that the effect of social support was stronger in males than in females (Gao et al., 2022; Song et al., in press). Possible explanations are as follows. First, most previous studies have been conducted in individualistic or non-traumatic contexts, which limit the potential to generalize the findings to communities experiencing major disasters. Based on the stress theory, males and females cope with and respond to traumatic events differently, that is females are more psychologically and physiologically reactive to stressors than males (Lazarus & Susan, 1984). Thus, after the Wenchuan earthquake, females may be more prone to passively focus on negative emotions caused by the traumatic events and be lacking the ability and cognitive resources to perceive positive feelings. In contrast, males show higher resilience (Xue et al., 2022), which sets the stage for them to actively seek outside support to cope with the pain of a traumatic event and develop a higher BJW. In addition, Chinese males face more pressure to make money and raise a family due to the traditional Confucian culture. Occupational and culturally related stressors may also be superimposed on Chinese male role expectations, making males need more social support than females. In such an unfavorable context, when males perceive more social support, they may develop a higher level of BJW than females. It is notable that gender difference results between family support and BJW might fluctuate. This instability may be attributed to the unconditional love and attention of their families to children, making gender discrimination almost invisible. Our results fill the gap in understanding gender differences between PSS and BJW. We hope our findings will inspire future research to distinguish its moderating role in different domains.

Limitations, future research directions, and implications

This study is not without its limitations. The first concerns data collection. Since we used cross-sectional data, we cannot infer causal relationships among variables. Future longitudinal studies should explore how the link between PSS and PTG in adulthood and the mediating role of BJW develop over time. Second, the participants in this study may not be representative of Dujiangyan city. However, they can represent the victims in the areas seriously affected by the earthquake. Third, we only tested the potential mediating role of BJW in the link between PSS and PTG. Nevertheless, several other theoretically grounded mediators may likely account for these relationships. Some possible mediators may include (but are not limited to) self-efficacy, emotion regulation, and gratitude.

Notwithstanding these limitations, this study makes several theoretical and practical contributions. From the theoretical value perspective, this study revealed the significance of PSS with BJW in promoting child and adolescent survivors' PTG. This result enriches the content of the social-cognitive processing model (Tedeschi & Calhoun, 2004) and the study findings of positive changes related to PSS. In addition, the current model could help researchers comprehend gender differences in the relationship between PSS and BJW. Specifically, compared to females, the relationship between PSS and BJW was more significant for male survivors. These results can inspire future research to further elucidate the potential internal mechanism between PSS and PTG, such as elucidating the moderating role of other personal and cultural variables. From the perspective of practical value, our study may provide information on how to improve child and adolescent survivors' PSS, BJW and PTG. First, increasing social support for child and adolescent survivors, specifically from family and friends, is a crucial component of intervention programs aimed at improving child and adolescent survivors' PTG. Interventions could include steps such as creating a school atmosphere that promotes mutual assistance among peers (Gao et al., 2021), encouraging children and adolescents to participate in school- and community-based activities to obtain peer support, and organizing activities to promote parent-child communication. These strategies may be effective in facilitating the transformation of suffering into PTG. Second, given the indirect relationship between PSS and PTG via BJW, interventions should develop strategies to cultivate children's and adolescents' BJW. For example, teachers or parents should treat every child fairly and equally, cultivate their independence and ability to bear setbacks and hardships, and help them look positively upon themselves, interpersonal relationships, and the post-traumatic world. Third, the direct effect between PSS and BJW is more significant for male survivors, suggesting that interventions that focus on increasing PSS and BJW would be more effective for male survivors. On the other hand, the findings suggest that women are more vulnerable and less capable of recovering from major disasters, reminding us to attend more closely to the needs of female survivors of major traumatic events.

Conclusion

Overall, findings suggested that child and adolescent survivors who perceive greater social support experience higher levels of PTG. In addition, the relationship is mediated by BJW, and the link between PSS and BJW is moderated by their gender, which suggests that the PSS perspective is still an effective conceptualization framework in understanding what contributes to PTG of children and adolescents after traumatic events. These results complement the existing literature on PTG; till now, this is the first study to explore the effect of BJW as a mediator and gender as a moderator in the link between PSS and BJW. This study also had important practice implications for the intervention programs to advance the transformation from suffering to PTG among child and adolescent survivors after disasters.

Supplementary Information The online version contains supplementary material available at https://doi.org/10.1007/s12144-022-03843-z.

Acknowledgements The authors wish to thank all study participants and all research collaborators especially Pu Zhong from Sichuan University.

Author contributions Shuang Xue and Wenjian Xu contributed to the study conception and design. Material preparation, data collection and analysis were performed by Shuang Xue and Wenjian Xu. The draft of the manuscript was written by Shuang Xue and revised by Wenjian Xu. All authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

Funding This research was supported by the 2022 Project of Social Development and Social Risk Control Research Center of Sichuan Key Research Base of Philosophy and Social Sciences (SR22A14), Scientific Research Planning Project of Sichuan Psychological Association (SCSXLX H2021006), and Sichuan University (SKSYL202207).

Data Availability The datasets generated and/or analyzed during the present study are available upon reasonable request.

Declarations

Conflict of interest The authors have no relevant financial or non-financial interests to disclose.

Ethics approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the

institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. Ethics approval was obtained from the Ethics Committee of Sichuan University.

Informed consent Informed consent was obtained from all individual participants included in the study.

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