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ORIGINAL PAPER

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The Role of Self-Compassion in the Relationship between Post-Traumatic Growth and Psychological Distress in Caregivers of Children with Autism

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Abstract

Objectives Caregivers of children with Autism Spectrum Disorder (ASD) may experience varying degrees of both psychopathological symptoms and enriched personal growth. The mechanisms underlying these associations are not well understood. The aim of the current study was to explore the relationships between post-traumatic growth (PTG) and psychological distress, namely depression, anxiety and stress among caregivers of autistic children in China, with self-compassion as a potential relating factor.

Methods One hundred and twenty-one caregivers of children with ASD, ranged in age from 26 to 53, completed the questionnaires. The instruments utilized include a socio demographic questionnaire, Posttraumatic Growth Inventory (PTGI), the Chinese version of the Short Form Depression Anxiety Stress Scales (DASS-21) and the Chinese version of the Short Form Self-Compassion Scale (SCS-SF).

Results The results showed that there was no significant linear or curvilinear relationship between PTG and psychological distress. PTG indirectly correlated with psychological distress through self-compassion. The positive and negative components of self-compassion uniquely correlated with PTG and psychological distress respectively.

Conclusions The findings of this study suggested that PTG may play a protective role of mental health among Chinese caregivers of children with ASD through enhancing self-compassion. More importantly, the current study suggested that self-compassion should be better conceptualized in order to move the relevant research forward.

Keywords Self-compassion · Post-traumatic growth · Psychological distress · Autism · Caregivers

Raising children with Autism Spectrum Disorder (ASD) is a highly challenging life event. The families and caregivers of children with ASD may encounter many stressors, including the financial burdens of treating and educating their children, difficulty managing children's emotional or behavioral problems, and inadequate social support (Osborne and Reed 2009; Vohra et al. 2014). These stressors can have detrimental effects on the mental health of parents and caregivers. Previous group comparison studies have consistently revealed that the caregivers of children with ASD reported higher levels of depression, anxiety (Bitsika et al. 2013; Giallo et al. 2011) and stress (Hayes and Watson 2013; Hoffman et al. 2009) than the caregivers of typically developing children, which could inevitably lead to a lower quality of life for the former population (Allik et al. 2006). Although there is evidence that populations of parents/caregivers of children with ASD experience heightened psychological distress, extensive qualitative and quantitative

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research has found positive changes among these populations, such as personal growth and enrichment (Ooi et al. 2016; Phelps et al. 2009; Zhang et al. 2015). For example, Bayat (2007) found that some caregivers of children with Autism might experience spiritual growth, closer family relationships and a greater appreciation of life. In addition, evidence from a longitudinal study showed that some mothers of children with ASD were able to improve their capacity for transformative psychological adjustment by using pro-active coping strategies (Benson 2014). These promising positive phenomena are identified as post-traumatic growth (PTG), which refers to positive psychological experiences that can occur as a result of struggling with highly difficult life crises and also include more meaningful interpersonal relationships, an increased sense of personal strength, a recognition of new possibilities and spiritual growth (Tedeschi and Calhoun 1996). While the entire process from suspecting a child has a developmental disability to the eventual ASD diagnosis can be very traumatic for caregivers (Waizbard-Bartov et al. 2018), the process may also lead them to discover new, positive insights into life and to develop a greater sense of spirituality and strength (Phelps et al. 2009).

Although studies have revealed that growth subsequent to trauma is common to various populations, it is unclear whether such growth protects people from post-traumatic distress. Early correlational studies failed to find a direct correlation between PTG and psychological distress as manifest in PTSD (Larocca et al. 2018; Powell et al. 2003; Zhou et al. 2016), anxiety and global distress (for a meta-analytic review, see Helgeson et al. 2006). However, more recent studies that employed regression analyses found that psychological distress could have a linear or quadratic effect on PTG (Colville and Cream 2009; Rodríguez-Rey and Alonso-Tapia 2017), while PTG could have a quadratic effect on PTSD and depression (Kleim and Ehlers 2009). These findings were in line with the theory of post-traumatic growth, which postulates that PTG and psychological distress often coexist and interact with each other (Tedeschi and Calhoun 2004). Therefore, both the direct relationship between PTG and psychological distress and the indirect relationships between other variables that mediate this relationship could merit investigation.

There are many qualities that support personal growth and psychological wellbeing subsequent to experiencing trauma. Self-compassion may be one of the potential underlying mechanisms of PTG. Originally derived from the ancient Buddhist tradition, self-compassion is a caring and compassionate attitude toward oneself in the face of adversity (Neff 2003a, 2003b). According to Neff (2003b), self-compassion is characterized by three interacting components: (1) self-kindness (versus self-judgment), which refers to treating oneself with care and understanding rather than criticism when encountering difficulties, (2) common humanity (versus isolation), which refers to realizing that all people make mistakes and have painful experiences, and (3) mindfulness (versus over-identification), which refers to having a balanced perspective of one's current experiences, including negative thoughts and feelings.

Over the past decade, plenty of research has demonstrated the beneficial effects of self-compassion on psychopathology outcomes (for a review, see Macbeth and Gumley 2012). For example, self-compassion is found to be significantly associated with lower levels of perceived stress (Neff and Faso 2015), anxiety (Wong et al. 2016) and depression (Neff and Faso 2015; Wong et al. 2016) among parents of children with ASD. Furthermore, several intervention studies that investigated mindfulness self-compassion programs have reported that these programs had the positive effects of reducing depression, anxiety and stress and fostering self-compassion among caregivers of children with ASD and related disabilities (Benn et al. 2012; Jones et al. 2017).

The above findings indicate that PTG may promote self-compassion. According to the explanatory model of *post-traumatic growth-strength through suffering* proposed by Janoff-Bulman (2004), people with accelerated spiritual growth and personal strength in the aftermath of negative life events are more likely to report greater self-respect and self-care. To our knowledge, there has only been one study that empirically examined the relationship between PTG and self-compassion. This study was conducted among 601 undergraduate students who were exposed to stressful life events (Wong and Yeung 2017). The researchers found that the positive component of self-compassion (indicated by the total score of self-kindness, common humanity, and mindfulness) was significantly correlated with PTG, while the negative component of self-compassion (indicated by the total score of self-judgment, isolation, and rumination) was not. However, this finding cannot be generalized due to the relatively homogenous sample of college students. More empirical studies are needed to explore the association between PTG and self-compassion in populations that have experienced various traumas.

Holding the same opinion as Wong and Yeung (2017), some researchers argued that the positive aspects of self-compassion (indicated by self-kindness, common humanity, and mindfulness) and negative aspects of self-compassion (indicated by self-judgment, isolation, and over-identification) should be regarded as separate traits, rather than sub-dimensions of self-compassion (Hayes et al. 2016; López et al. 2015; Muris and Petrocchi 2017). Meta-analyses further demonstrated that positive self-compassion was correlated to positive mental health outcomes while negative self-compassion was correlated to psychopathology outcomes (for a review, see Macbeth and Gumley 2012;

Muris and Petrocchi 2017). Therefore, in the field of self-compassion, some studies chose to use the total score as the indicator of the construct of self-compassion (Neff et al. 2018b; Neff and Faso 2015; Torbet et al. 2019), while others chose to explore the two opposite components separately (Brenner et al. 2017; Brophy et al. 2019; López et al. 2015). This controversy reflects the different conceptualization of self-compassion and may lead to different study results. Therefore, the current study would explore the role of self-compassion in PTG and its emotional outcomes based on the total score, as well as the two components of self-compassion separately.

The primary goal of the current study was to explore the relations between PTG, self-compassion, and psychological distress among Chinese caregivers of children with ASD. Special attention was paid to the different roles of total self-compassion and the two aspects of it. Thus, we specifically hypothesized that: (1) treating as a unified construct, self-compassion would be positively connected with PTG and negatively connected with depression, anxiety and stress, and (2) PTG could have had an indirect effect on psychological distress through the mediation of self-compassion. Besides, further analyses were also conducted to explore (3) whether the positive and negative components of self-compassion may have distinctive associations with PTG and with psychological distress.

Method

Participants

A total of 121 caregivers responded to the recruitment notices electronically during the enrollment process. Inclusion criteria were: (a) respondents must have (or be the primary caregiver of) at least one child with a formal diagnosis of ASD according to the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision (DSM-IV-TR) or Fifth Edition (DSM-V); (b) the child must be between 2 and 12 years old, and; (c) respondents must provide a completed and signed consent form. There were no exclusion criteria for participants. Participants consisted mostly of mothers (85.12%), followed by fathers (11.57%) and others (3.31%). Caregivers ranged in age from 26 to 53 (mean age of mothers = 34.70, $SD = 4.26$; mean age of fathers = 36.98, $SD = 5.02$). More detailed demographic information about the sample is shown in Table 1.

Table 1 Demographic characteristics of the sample

Variables	Description n (%) or $M \pm SD$	
Child age	5.94 ± 2.21	
Child gender		
Male	107 (88.43%)	
Female	9 (7.44%)	
Length of treatment		
No treatment-6 months	17 (14. 05%)	
6–12 months	19 (15.70%)	
12–24 months	30 (24.79%)	
More than 24 months	55 (45.45%)	
Monthly family income		
0–3000RMB	14 (11.57%)	
3000–6000RMB	32 (26.45%)	
6000–10,000RMB	24 (19.83%)	
10,000–20,000RMB	33 (27.27%)	
More than 20,000RMB	18 (14.88%)	
Mother respondents	103 (85.12%)	
Father respondents	14 (11.57%)	
Other respondents	4 (3.31%)	
Mother age	34.70 ± 4.26	
Father age	36.98 ± 5.02	
Education	Mother	Father
Elementary school and below	0	1 (0.83%)
High school	28 (23.14%)	22 (18.18%)
Bachelor degree	79 (65.29%)	76 (62.81%)
Master degree and above	14 (11.57%)	22 (18.18%)

Values do not add up to 100% when there is missing data

Procedure

Participants (the primary caregivers of children with ASD) were recruited through two channels: (1) special schools for children with ASD and pertinent communities in Beijing (northern China) and Changsha (southern China), and (2) a notice on WeChat®, the primary communication platform/app in Asia. Questionnaires were available both electronically and in paper form.

Measures

Caregivers of children diagnosed with ASD were asked to complete a demographic survey, the Posttraumatic Growth Inventory (PTGI), the Chinese version of the Short Form Depression Anxiety Stress Scales (DASS-21) and the Chinese version of the Short Form Self-Compassion Scale (SCS-SF). The PTGI was translated into simplified Chinese and went through a reverse translation procedure.

Demographic Questionnaire

The demographic information collected about participants included: (1) parents' ages, education levels, and monthly

family incomes, and (2) children's age, gender, and length of treatment.

Posttraumatic Growth Inventory (PTGI)

This is a 21-item scale that assesses positive outcomes reported by individuals who have experienced highly stressful and traumatic life events (Tedeschi and Calhoun 1996). Overall, the scale has a high internal consistency ($\alpha = 0.90$) and a good rest-retest reliability of 0.71 (Tedeschi and Calhoun 1996). Respondents were asked to report on the degree to which they had experienced positive changes in five domains of growth: (a) relating to others; (b) new possibilities; (c) personal strength; (d) spiritual change, and (e) appreciation of life. Each item was rated on a six-point Likert scale ranging from 0 (*I did not experience this change as a result of my crisis*) to 5 (*I experienced this change as a result of my crisis*). The sum of all items generated a final total score, with a higher score indicating a higher level of PTG. The Cronbach's α coefficient for the sample was 0.95.

Self-Compassion Scale-Short Form (SCS-SF)

The SCS-SF is a self-reported, 12-item measure that captures individuals' responses to personal hardships and stressful events (Hu et al. 2018; Raes et al. 2011). Respondents were asked to rate the frequency of each response on a scale ranging from 1(*almost never*) to 5 (*almost always*). The SCS-SF represents a reliable and valid alternative to the long form SCS (Raes et al. 2011) and has demonstrated acceptable internal consistency in clinical and non-clinical samples of Cronbach's $\alpha = 0.86$ and 0.89, respectively (Castilho et al. 2015; Raes et al. 2011). It was used instead of the original 26-item version (Neff 2003a) to minimize respondent fatigue. The total score was calculated, with higher scores indicating higher levels of self-compassion. The Cronbach's α coefficient for the sample was 0.73. The Cronbach's α coefficient of positive and negative self-compassion components were 0.84 and 0.80, respectively.

Depression Anxiety Stress Scales-Short Form (DASS-21)

The Chinese version of the DASS-21 was used to measure the magnitude of distress caregivers had experienced over the previous week via a four-point severity scale (Gong et al. 2010; Lovibond and Lovibond 1995). The DASS-21 was employed in order to minimize respondent fatigue. It consists of three subscales which assess respondents' levels of depression, anxiety, and stress, and each subscale contains seven items from the full DASS version. Participants were asked to rate each item on a four-point Likert scale ranging from 0 (*did not apply to me at all*) to 3 (*applied to me very much of the time, or most of the time*). The total scores of the three subscales were calculated, with higher scores indicating higher levels of depression, anxiety and stress. The Cronbach's α coefficients for the depression, anxiety and stress subscales were 0.92, 0.89 and 0.88, respectively.

Data Analyses

SPSS 21.0 and Mplus 7.4 were used to analyze the data. Descriptive statistics were provided to characterize the sample. Independent-sample t-tests and one-way ANOVAs were utilized to test for significant demographic differences in the study variables. Correlations between the study variables were examined. To examine the hypothesized models, path analyses were conducted with Mplus to investigate how self-compassion mediated the associations between PTG and psychological distress, including depression, anxiety and stress. Five thousand bootstrap samples were used to test the indirect effects of the hypothesized model (Preacher and Hayes 2008). If the 95% bias-corrected confidence intervals do not include zero, the indirect effects are statistically significant.

Results

Demographic Characteristics and Study Variables

The results of the descriptive statistics and the demographic differences among study variables are presented in Table 2. There was no statistically significant difference between

Table 2 Demographic differences in all study variables

	PTG	Self-compassion	Depression	Anxiety	Stress
Length of treatment[a]					
$F(3, 117)$	1.28	3.58**	3.00*	4.21**	3.93*
Monthly family income[b]					
$F(4, 116)$	0.76	1.60	1.04	1.03	0.19
Mothers' educational levels[c]					
$F(2, 118)$	1.14	0.72	1.95	1.98	0.27
Fathers' educational levels[c]					
$F(3, 117)$	0.36	0.77	0.47	2.89	0.53

PTG post-traumatic growth

*$p < 0.05$; **$p < 0.01$

[a](1) 0–6 months (2) 6–12 months (3) 12–24 months (4) More than 24 months

[b](1) 0–3000RMB (2) 3000–6000RMB (3) 6000–10,000RMB (4) 10,000–20,000RMB (5) More than 20,000RMB

[c](1) Elementary school and below (2) Junior college (3) Bachelor degree (4) Master degree and above

Table 3 Pearson correlation coefficients between PTG, self-compassion, and psychological distress

	M	*SD*	1	2	3	4	5	6
1. PTG	60.46	20.75	–					
2. Self-compassion	36.64	5.93	0.32**	–				
3. Positive self-compassion	20.38	4.17	0.32**	0.67**	–			
4. Negative self-compassion	19.74	4.39	−0.13	−0.71**	0.04	–		
5. Depression	7.81	5.28	−0.16	−0.53**	−0.15	0.58**	–	
6. Anxiety	6.93	4.98	0.001	−0.37**	−0.02	0.47**	0.78**	–
7. Stress	9.93	4.96	−0.004	−0.49**	−0.09	0.59**	0.79**	0.77**

Positive self-compassion = composite of the positive subscales (self-kindness, mindfulness, common humanity) of the SCS-SF. Negative self-compassion = composite of the negative subscales (self-judgment, isolation, over-identification) of the SCS-SF

PTG post-traumatic growth

*$p < 0.05$; **$p < 0.01$

caregivers of boys and girls with regard to PTG, $t(114) = 0.85$, $p = 0.396$, Cohen's $d = 0.28$; self-compassion, $t(114) = 1.64$, $p = 0.105$, Cohen's $d = 0.59$; depression, $t(114) = -0.25$, $p = 0.806$, Cohen's $d = 0.09$; anxiety, $t(114) = -0.56$, $p = 0.574$, Cohen's $d = 0.21$; and stress, $t(114) = -1.01$, $p = 0.316$, Cohen's $d = -0.38$. None of the demographic variables significantly differed on the bases of monthly family incomes and parents' educational levels, all $ps > 0.05$. However, length of treatment had significant effects on the mediator and outcome variables: $F(3, 117) = 3.58$, $p = 0.016$, $\eta^2 = 0.08$ for self-compassion; $F(3, 117) = 3.00$, $p = 0.033$, $\eta^2 = 0.07$ for depression; $F(3, 117) = 4.21$, $p = 0.007$, $\eta^2 = 0.10$ for anxiety; and $F(3, 117) = 3.93$, $p = 0.010$, $\eta^2 = 0.09$ for stress. Therefore, the length of treatment was controlled in the corresponding pathway models.

Post-Traumatic Growth and Psychological Distress Variables

The means, standard deviations and correlations for PTG, the total score of self-compassion, positive self-compassion, negative self-compassion and psychological distress were presented in Table 3. The demographic variables, including children's ages and parents' ages, were not correlated with any of the key study variables. In line with our hypotheses, higher self-compassion was significantly correlated with higher PTG, $r(121) = 0.32$, $p < 0.01$, lower depression, $r(121) = -0.53$, $p < 0.01$, lower anxiety, $r(121) = -0.37$, $p < 0.01$, and lower stress, $r(121) = -0.49$, $p < 0.01$. Depression, anxiety and stress were positively correlated with each other, all $ps < 0.01$. PTG was not significantly and linearly correlated with any of the dependent variables: $r(121) = -0.16$ for depression, $r(121) = 0.001$ for anxiety and $r(121) = -0.004$ for stress, all $ps > 0.05$. Furthermore, the quadratic effects of PTGI scores on the prediction of depression, $R^2 = 0.03$, $F(2, 118) = 1.60$, $p = 0.206$, anxiety, $R^2 = 0.001$, $F(2, 118) = 0.05$, $p = 0.949$, and stress, $R^2 = 0.002$, $F(2, 118) = 0.14$, $p = 0.873$, were also not significant, suggesting that there were no curvilinear relationships between PTG and the psychological distress variables of depression, anxiety and stress.

Furthermore, as expected, the positive and negative components of self-compassion did have different relationships with PTG and with psychological distress. Specifically, the positive component of self-compassion was significantly correlated with PTG, $r(121) = 0.32$, $p < 0.01$, whereas the negative component of self-compassion was significantly correlated with depression, $r(121) = 0.58$, $p < 0.01$, anxiety, $r(121) = 0.47$, $p < 0.01$, and stress, $r(121) = 0.59$, $p < 0.01$.

Post-Traumatic Growth, Psychological Distress and Self-Compassion Mediation

We hypothesized indirect associations between PTG and depression, anxiety, and stress, with self-compassion as the mediator. In order to test this hypothesis, we first examined the indirect effect of PTG on depression as mediated by self-compassion. As expected, after controlling for length of treatment, PTG significantly predicted self-compassion ($a = 0.34$, $p < 0.001$), and self-compassion negatively predicted depression ($b = -0.54$, $p < 0.001$). The indirect effect was then tested using the bias-corrected bootstrap. The results indicated a significant indirect coefficient ($a \times b = -0.18$, bootstrap $SE = 0.05$, 95% CI [−0.28, −0.08]). The final model explained 29.0% of the variances in depression and 11.2% of the variances in self-compassion (see Fig. 1a). PTG did not directly predict depression ($c = -0.17$, $p = 0.140$).

Similarly, PTG did not directly predict anxiety ($c = -0.01$, $p = 0.963$). However, the bias-corrected bootstrap of 95% CI indicated that self-compassion indirectly and significantly mediated the pathway between PTG and anxiety ($a \times b = -0.13$, bootstrap $SE = 0.04$, 95% CI [−0.21, −0.05]). The final model explained 14.0% of the variances

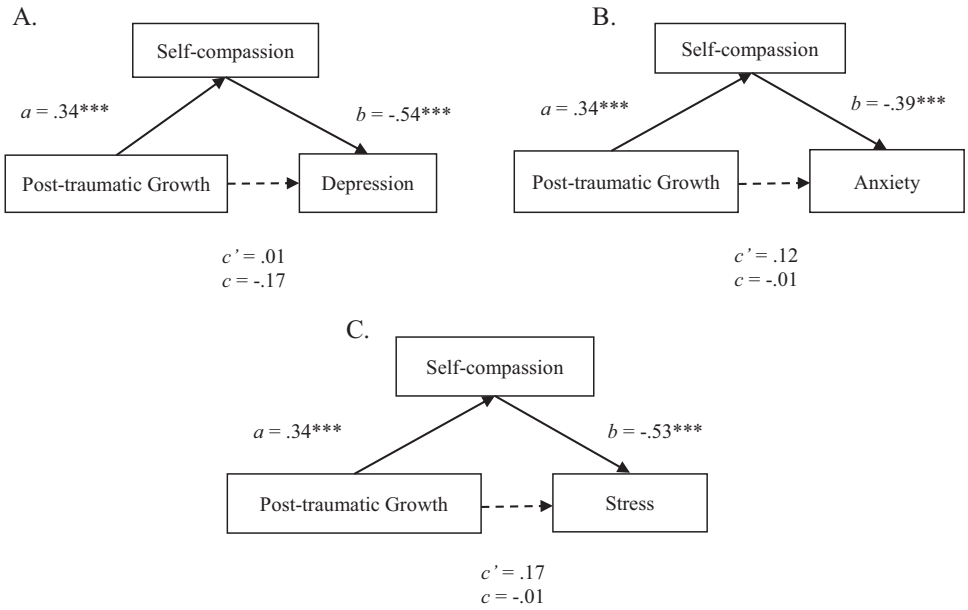

Fig. 1 Path models of the indirect effects of PTG on depression (**a**), anxiety (**b**), and stress (**c**) via self-compassion, respectively. c' = direct effect; c = total effect. Standardized path coefficients are shown. *** $p < 0.001$

in anxiety and 11.2% of the variances in self-compassion (see Fig. 1b).

Consistent with the two models mentioned above, the result of the bias-corrected bootstrap of 95% CI showed that self-compassion also significantly mediated the association between PTG and stress when length of treatment was controlled for ($a \times b = -0.18$, bootstrap $SE = 0.05$, 95% CI [−0.28, −0.08]). The final model explained 25.8% of the variances in stress and 11.2% of the variances in self-compassion (see Fig. 1c). There was no direct association between PTG and stress ($c = -0.01$, $p = 0.925$).

Discussion

The current study examined the associations between PTG, self-compassion, and the psychopathological symptoms of depression, stress and anxiety among 121 caregivers of children with ASD in China. The results did not find a significant curvilinear or linear relationship between PTG and depression, stress and anxiety. However, the results further indicated that PTG could have negative associations with depression, anxiety and stress, indirectly through self-compassion only when self-compassion was treated as a unified construct.

Our study failed to find the direct linear or U-shaped association between PTG and psychological distress. This is consistent with the majority of previous studies, which revealed no statistically significant correlations between PTG and post-traumatic stress (Powell et al. 2003), depression and anxiety (Helgeson et al. 2006). However, some other studies did find a positive link between PTGI scores and stress scores and an inverted U-shape relationship between PTG and post-traumatic stress (Colville and Cream 2009; Kleim and Ehlers 2009). This controversy may be due to the fact that those studies specifically explored relationships between PTG and post-trauma related variables such as post-traumatic stress. However, the current study focused on the associations between PTG and more general symptoms, including depression, anxiety and stress. An alternative explanation for this controversy is that there are various patterns of the association between PTG and psychological distress among traumatize individuals. Chen and Wu (2017) used a person-centered approach instead of a variable-centered approach to investigate the trajectory patterns of PTG and psychological distress. For example, one study explored patterns of PTG and post-traumatic stress symptoms (PTSS) among children and adolescents who had experienced earthquakes. The result of a latent profile analysis showed that participants were clustered into three classes: *resilient* (low levels of PTG and PTSS), *thriving* (moderate PTG and low levels of PTSS), and *stressed and growth* (moderate PTG and high levels of PTSS). These results may indicate that the association of PTG with depression, anxiety and stress is not an obvious linear or converse U curve relationship. It is also worth noting that, due to previous studies' inconclusive findings regarding the non-convergent association between PTG and psychological distress (Colville and Cream 2009; Helgeson et al. 2006; Kleim and Ehlers 2009; Powell et al. 2003), the re-examination of this association in this study, to some extent, provided further evidence for the indirect relationship between PTG and psychological distress. Further, the current study was conducted among Chinese caregivers of children with ASD, which helps to generalize the findings to other populations that have experienced trauma.

The current study further explored the role of self-compassion between PTG and depression, anxiety and stress. However, the results largely depended on the conceptualization of self-compassion. According to the initial definition of self-compassion which was proposed by Neff (2003b), it should be treated as a unified construct which contains both positive components (i.e., self-kindness, common humanity, and mindfulness) and negative components (i.e., self-judgment, isolation, and over-identification). Based on this assumption, the total score of Self-Compassion Scale should be used. Therefore, we found self-compassion played a bridge role in the relation between PTG and psychological distress. Specifically, PTG was negatively and indirectly related to depression, anxiety, and stress through its association with self-compassion. This result was aligned with another longitudinal study showing that stress-related growth was related to increases in personal resources and better psychological adjustments over a six-month period (Park and Fenster 2004). Caregivers of children with ASD who achieve PTG may therefore construct a new self who embraces internal emotions and engages in mindfulness and self-kindness, thereby avoiding self-blame or self-criticism for their adverse experiences (Wang et al. 2019). Further, realizing that suffering and hardship are common, shared human experiences may psychologically bolster their capacity to care for children with ASD (Janoff-Bulman 2004). All of the aforementioned positive behaviors may in turn help them to improve their psychological adaptations to their circumstances. However, due to the cross-sectional nature of this study, we could not exclude other possible relationships between these variables (e.g. self-compassion may be the predictor of both PTG and psychological distress).

These findings also have meaningful practical implications. Previous studies have demonstrated that interventions based on mindful self-compassion programs were efficient in fostering self-compassion among caregivers of children with ASD or special needs (Bazzano et al. 2013; Jones et al. 2017). Our study also provided evidence of the indirect association between PTG and psychological distress. This calls for an examination of the potential benefits of incorporating self-compassion in the implementation of intervention programs tailored to caregivers in the China. In light of the results of this study, it is necessary to explore whether practical training programs could heighten levels of self-compassion and thereby strengthen mental health among the Chinese caregivers of children with ASD and/or other developmental disabilities.

However, the above-mentioned conclusions were all based on the original definition of self-compassion that combined the positive and negative components (Neff 2003b). Recent argument believed that the negative components might constitute uncompassionate behaviors toward the self, which could be defined as "self-criticism" or "self-coldness" (Brenner et al. 2017; Muris et al. 2018). Our findings echo this argument by showing that only the positive components of self-compassion were associated with PTG, while only the negative components were associated with psychological distress. Positive and negative components were even not correlated with each other. These results indicated that individuals are likely to use two distinct systems in a process of adaptation to life changes. To be specific, self-compassion may activate the safeness system to promote people recovery from trauma, while self-criticism may active the threat-defense system to maintain a state of stress and anxiety (Gilbert 2005; Longe et al. 2010). This revealed an important unsettled question of the construct of self-compassion, since when using different conceptualization, our understanding to the underlying mechanism between PTG and distress could be different. This issue would make researchers difficult to synthesize the relevant findings. Therefore, it's of great importance to figure out whether self-compassion should be conceptualized as one construct or self-compassion and self-criticism should be defined as paralleled concepts and studied separately in future studies.

Limitations and Future Research

The current study has a few limitations. First, it is difficult to generalize the findings because our sample is relatively small. The robustness of the results would be improved if the proposed mechanism model could also be applied to caregivers of other ethnicities who have adult children with developmental or mental disorders other than ASD. Second, the observed relationships between PTG, self-compassion and psychological distress cannot be interpreted causally due to the correlational data and cross-sectional design. Future studies would benefit from setting time lags between these qualities or utilizing an experimental design to manipulate self-compassion (Leary et al. 2007). Other possibilities of the relationships between study variables need to be explored as well. Third, considering that this study was conducted among Chinese caregivers of children with ASD, any potential cultural differences in parenting, PTG, and self-compassion could affect the generalizability of our findings to caregivers in Western societies. It is recommended that future investigations emphasize other potential variables that affect the relationships between PTG, self-compassion, and psychological distress, such as culture, parenting style, personality, resiliency, mindfulness and other related transformative cognitive processes. Last, the current study asked participants to report on their perceived experiences for multiple constructs in the same survey, which may lead to results confounded by report biases (e.g., response style and/or social desirability) rather

than true associations (Podsakoff et al. 2003). Future studies could control the impacts of these biases by including more objective indicators of psychological distress, such as the assessment of caregivers' mental states by psychiatrists.

To conclude, our findings contribute to the existing body of literature on the caregivers of children with ASD in China by empirically showing that self-compassion could be a mediating process underlying PTG and its capacity to mitigate psychological distress as indicated by depression, anxiety and stress. Theoretically, our findings may help generate insights into the process by which PTG can bolster mental health among Chinese parents and caregivers of children with ASD. Besides, the current study provides suggestive evidence that positive components and negative components of self-compassion could play distinctive roles in the process of the adaptation to life challenges, which contributed to a more comprehensive understanding of self-compassion and its relations to well-beings and psychological symptoms.

Author' Contributions BSMC and JD co-designed the study, analyzed the data and wrote the manuscript. YL collaborated with the writing of the study. TL collaborated with the editing of the final manuscript. YS assisted with the data collection. YW and LY supervised the whole study and wrote the paper.

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Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the School of Psychological and Cognitive Science, Peking University (2017-06-02), and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

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

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