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Social support and parenting self-efficacy in parents of children with ASD: The mediating role of post-traumatic growth and the moderating role of self-esteem

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Abstract
Parenting self-efficacy of parents of children with ASD has an important impact on their parenting behavior. Previous studies have found that social factors and parents' psychological factors are related to their parenting self-efficacy, but research on the internal mechanism of parenting self-efficacy with these factors is still limited. The present study aimed to explore the relationship among social support, post-traumatic growth, self-esteem and parenting self-efficacy of parents of children with ASD, and the mechanism behind these relationships. A total of 208 Chinese parents ($N_{father}=31$, $N_{mother}=177$) of children with ASD were selected to complete a self-report questionnaire measuring social support, parenting self-efficacy, post-traumatic growth and self-esteem. The results indicated that there were significant positive correlations among social support, parenting self-efficacy, post-traumatic growth and self-esteem. Additionally, it was found that post-traumatic growth of parents of children with ASD played a partial mediating role in the relationship between social support and parenting self-efficacy, which was moderated by the level of parental self-esteem. Specifically, the mediating role of post-traumatic growth was stronger for low self-esteem participants. These findings not only contribute to a better understanding of how social support increases parenting self-efficacy, but also remind us that some psychological factors should be considered in the exploration process, such as post-traumatic growth and self-esteem of individuals.

Keywords Social support · Parenting self-efficacy · Post-traumatic growth · Self-esteem · Parents of children with ASD

Introduction

Autism spectrum disorder (ASD) is a neurodevelopmental disorder characterized by social communication disorders and stereotyped repetitive behaviors, interests and activities (American Psychiatric Association, 2013). In recent years, the prevalence of ASD ranges from 1 to 2% worldwide (Maenner et al., 2020). Studies have found that parenting a child with autism spectrum disorder (ASD) is more demanding than parenting a normal child or a child with other developmental disorders (Hayes & Watson, 2013). For instance, the core obstacle of children with ASD is social disorder, so parents have difficulties in interacting with their children, and often feel failed and frustrated (Smart, 2016). Therefore, parents of ASD children bear more parenting stress than the parents of other children with other developmental disorders, which seriously affects their parenting self-efficacy (Frantz et al., 2018). Parenting self-efficacy refers to the caregivers' judgment and belief in their ability to successfully organize and complete various parental-related tasks (Jones & Prinz,

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2005). Based on Bandura's social cognitive theory, parenting self-efficacy is an internal cognitive resource for parents to deal with parenting stress (Bandura, 1997). Parents with high self-efficacy may adopt more active parental strategies, such as improving parental skills and experience, creating a warm and conducive environment to improve children's behavior, and compensating children for their inability to receive routine rehabilitation (Batool & Khurshid, 2015). On the contrary, parents with low self-efficacy may give up earlier and feel negative emotions about life and children, which may eventually lead to more unstable behavioral and emotional problems in children with ASD (Hill & Bush, 2001). Parents of children with ASD need more social support when facing many pressures of parenting their children (Zaidman-Zait et al., 2017). Pandya found that the acquisition of social support can effectively promote the parenting self-efficacy of mothers of children with ASD. Specifically, compared with the control group, Spiritual posts delivered via Whats App which is a kind of online social support were effective in relieving parenting stress and building parenting self-efficacy, self-confidence and resilience of mothers of children with ASD (Pandya, 2021), And previous research found that with more social support, parents tend to play more positive parental roles and show more adaptive behaviors related to parenting self-efficacy (Grindle et al., 2009). In China, the result that social support promotes parenting self-efficacy has been confirmed not only in parents of second-child families, but also in perinatal mothers (Gao et al., 2014; Hong & Liu, 2021).

Social Support and Parenting Self-Efficacy

Social support refers to the material, emotional, information and instrumental help that individuals get from their own social networks (Dunst et al., 1986). The theory of ABCX family crisis model developed by Reuben Hill (1949) is used for analyzing stress and coping within families. The model consists of (A) the stressor event, (B) the resources available to a family, (C) the family's perceptions of the stressor, and (X) the likelihood of crisis. Variables B and C determine whether the stressor event (A) results in crisis. According to the model, social support, as a part of family resources, can affect the psychological resilience of family members to stressful events (Mano, 2016). When receiving higher levels of social support, parents will be more confident in their parenting behaviors, then their parenting self-efficacy will be improved and they will adopt a more positive parenting style (Rosenblum-Fishman, 2013).

A child's diagnosis of ASD is considered a traumatic experience for mothers (Aguiar and Pond´e, 2020; Zhang et al., 2015). Specifically, when mothers learn that their children are diagnosed with autism spectrum disorders, they may experience sadness, stress reactions (e.g., shock, trauma, negation, fear, guilt and anger), health problems (Fernandez-Alcantara et al., 2016) and depression and anxiety (Weiss et al., 2014). When the diagnosis was confirmed, some mothers described the feeling was a devastating moment that their world seemed to be falling apart (Sidener, 2019), or that it was the worst experience of their lives (Aguiar and Pond´e, 2020). Research has found that some mothers are unable to manage the traumatic event, while others can accept them or even benefit from them by making positive life modifications, and therefore achieve their own post-traumatic growth (Sidener, 2019). According to the model of thriving through relationships presented by Feeney and Collins, social support can provide supportive relationships for traumatized individuals and encourage them to challenge or expand themselves to achieve individual post-traumatic growth (Feeney & Collins, 2015). When an individual achieves post-traumatic growth, it means that he or she will experience a stronger sense of strength and self-efficacy for possible problems in the future (Tedeschi & Calhoun, 1996). In addition, as a key aspect of self-system, self-esteem plays a key role in mental health adaptation (Moksnes & Espnes, 2012). Self esteem comes from the support and positive evaluation from others (Doré, 2017), which can strengthen the use of positive coping strategies by traumatized individuals. It can make people pay more attention to the positive changes after trauma (Goodday et al., 2019) and have a high sense of self-efficacy in coping with difficulties, setbacks and failures (Mikula et al., 2018). Therefore, the roles of post-traumatic growth and self-esteem in social support and parenting self-efficacy of parents of children with ASD need further analysis and validation.

The Mediating Role of Post-traumatic Growth

Post-traumatic growth (PTG) is defined as positive psychological changes and develop through struggles with life challenges after a traumatic event (Tedeschi & Calhoun, 1996). Despite the pressures and challenges of parenting children with autism, caregivers have reported enrichment and growth in some aspects of their lives (Tiba et al., 2012). This means that parents who have achieved post-traumatic growth are able to reconstruct their experiences and perceive potential benefits from life trauma, thereby improving relationships with others, creating new possibilities while enhancing personal strength, and bringing about spiritual change or increasing appreciation of life (Jin et al., 2014).

It has been shown that social support, as a resource used to deal with difficult life experiences, is an important predictor for individuals to achieve PTG (Tedeschi & Calhoun, 1996). For example, a study of 297 Chinese aid workers has shown that social support plays an important positive role

in predicting their post-traumatic growth (Zhao et al., 2020). Social support can help people rebuild their life experiences, reduce stress, optimize their lives, and achieve post-traumatic growth (Ooi et al., 2016).

Previous studies have shown a positive correlation between post-traumatic growth and self-efficacy (Barskova, & Oesterreich, 2009; Zeng et al., 2021). For example, 881 Chinese college students were tested on the relationship between post-traumatic growth and self-efficacy. The results show that the higher the level of post-traumatic growth, the higher the self-efficacy of college students (Zeng et al., 2021). Individuals who have experienced post-traumatic growth are able to obtain positive changes in self-cognition (Tedeschi & Calhoun, 1996) and enhance their personal sense of strength (Prati & Pietrantoni, 2009). Specifically, they will have a greater sense of strength and self-efficacy about possible problems in the future (Jin et al., 2014), and therefore it is reasonable to assume that parents of children with ASD will also gain more confidence and parenting self-efficacy after achieving post-traumatic growth. Based on a comprehensive study of the relevant literature, we hypothesized that the post-traumatic growth of parents of children with ASD has a potential mediating role between social support and parenting self-efficacy.

The Moderating Role of Self-Esteem

Although social support may influence post-traumatic growth and parenting self-efficacy, the effects on individuals with high and low self-esteem may be different. Self-esteem refers to a positive or negative evaluation of oneself (Smith et al., 2014). Previous studies have shown that self-esteem is positively associated with post-traumatic growth (Han & Choi, 2016; Yan et al., 2021a, 2021b). As an important personal trait, self-esteem is an essential resource for individuals to deal with adverse life events (Linley & Joseph, 2004). People with high self-esteem are more likely to deal with stress positively and tend to positively reinterpret traumatic events and therefore achieve post-traumatic growth (Dolbier et al., 2010), while individuals with low self-esteem are more likely to fall into painful emotions (Linley & Joseph, 2004). In addition, some studies have found that an individual's self-esteem can regulate their subjective perception of social support, to seek more and more positive coping styles. Specifically, individuals with low self-esteem think they are not cute and unworthy of concern, and this negative self-concept, put into subjective experience, may struggle to feel the existence of social support (Zuo et al., 2016). Thus, compared with individuals with high self-esteem, individuals with low self-esteem need more social support to successfully deal with traumatic events and achieve certain growth. Therefore, we propose that self-esteem moderate the effect of social support on post-traumatic growth of parents of children with ASD, specifically, individuals with low self-esteem are more strongly influenced by social support than individuals with high self-esteem.

Research also shows that an individual's self-esteem is closely related to parenting self-efficacy. For example, the self-esteem of infertility patients before their cure positively predicts parenting self-efficacy after their infertility is cured (Cox et al., 2006). Individuals with higher self-esteem are more confident in life, braver in the face of difficulties (Rosenberg, 1965), and show more self-confidence in their efforts (Baumeister, 1997a, 1997b), that is, compared with individuals with low self-esteem, individuals with high self-esteem have higher parenting self-efficacy. Therefore, there is a reason to make assumption that self-esteem may play a moderating role in the effect of post-traumatic growth on parental self-efficacy, especially if individuals with low self-esteem want to achieve a certain level of parenting self-efficacy, they will be more strongly affected by their own post-traumatic growth than those with high self-esteem.

In conclusion, it can be inferred that self-esteem may also play a positive role in the relationship between social support and parenting self-efficacy. In other words, both the effect of social support on post-traumatic growth and the relationship between post-traumatic growth and parenting self-efficacy may be moderated by self-esteem. Specifically, the mediating role of post-traumatic growth was stronger for low self-esteem participants.

The present study

As an important internal factor in the process of parental caregiving, parenting self-efficacy is not only considered as an important predictor of caregivers' quality of life and mental health (Guillamón et al., 2013), but also considered to play a vital role in maximizing the effect of early intervention (Schertz et al., 2020). Therefore, improving parents' parenting self-efficacy is conducive to improving parents' physical and mental health, besides that it is also beneficial to the rehabilitation training of children with autism. Research shows that parents who receive more social support will have a higher level of post-traumatic growth (Ooi et al., 2016), and then improve their sense of parenting self-efficacy (Mikula et al., 2018). Self-esteem is a key aspect of the self-system, which has been studied in many mental and mental health studies (Moksnes & Espnes, 2012), and plays a vital role in mental health adaptation (Leary & Baumeister, 2000). According to the Anxiety Buffering Hypothesis (ABH; Greenberg et al., 1992), by reconnecting the individual with an enlarged universe of meanings and values, self-esteem could act as a protecting shield (buffer)

against the detrimental psychological effects of life-threats and stressors. Especially when faced with challenging living environments, people with higher self-esteem are considered to have better-coping resources and are therefore protected from the harmful consequences of stressful life events, while those with relatively low self-esteem are more vulnerable to negative impacts (Orth et al., 2009). Therefore, it is reasonable to speculate that as one of the important psychological determinants for individuals to achieve post-traumatic growth (Ma et al., 2019), self-esteem may play an important moderating role in the face of the traumatic event that children are diagnosed with autism.

The purpose of the present study is to explore whether post-traumatic growth mediates the relationship between social support and parenting self-efficacy of parents of children with ASD, and whether self-esteem plays a moderating role in this process. Based on the previous literature and based on the post-traumatic growth model, Bandura's self-efficacy theory and the Anxiety Buffering Hypothesis, the present study puts forward the following hypotheses:

Hypothesis 1. There are significant positive correlations among social support, parenting self-efficacy, post-traumatic growth and self-esteem.
Hypothesis 2. The relationship between social support and parenting self-efficacy is mediated by post-traumatic growth.
Hypothesis 3. The mediating role of post-traumatic growth on the relationship between social support and parenting self-efficacy is also moderated by self-esteem regardless of the level of self-esteem and the mediating role of post-traumatic growth was stronger for low self-esteem participants.

These findings can be beneficial in improving guidance for preventing and intervening in the damage of low parenting self-efficacy among Chinese parents of children with ASD. The present study follows these hypotheses and uses the proposed model shown in Fig. 1 to investigate the relationship among the four key variables.

Methods

Participants and Procedures

Participants were recruited by convenient sampling at local rehabilitation training centers for children with ASD in Jiangxi, Guangdong and Shandong provinces in China. This approach was used because the centers provided access to parents who have a child diagnosed with autism and also users of specialist services. According to the DSM-5 (American Psychiatric Association, 2013), parents must have at least one biological child over 1 year of age being officially diagnosed with autism to be included in the present study. Parents will be excluded if they have received or are receiving mental health services or any psychological treatment. And then qualified participants were briefed about the purpose of the present study and asked if they would like to participate. After providing written consent, participants were asked to complete a comprehensive questionnaire to collect demographic information and data on social support, post-traumatic growth, self-esteem, and parenting self-efficacy. Recruitment and data collection procedures were approved by the ethics committee of the authors' university. The initial sample included 212 parents. Considering that the purpose of the present study was to investigate parents of children with ASD, we excluded the questionnaires filled out by other families of children with ASD (such as their grandparents). The final sample included the parents of 208 children with ASD. Each parent was from a different family. The vast majority of parents had a partner status (90.9%). The details of the sample are shown in Table 1.

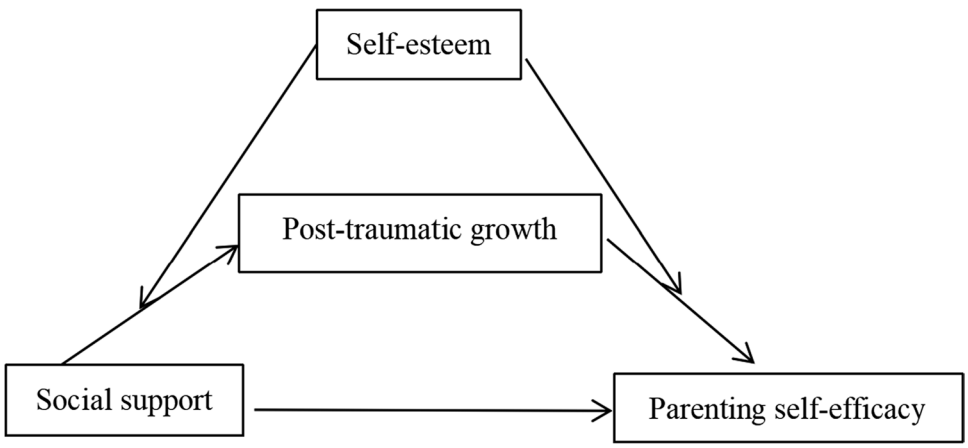

Fig. 1 Proposed Model

Table 1 Demographic information and analysis of variance

Variable	*N*	Social Support	Parenting self-efficacy	Post-traumatic growth	Self-esteem
		Mean (*SD*)	Mean (*SD*)	Mean (*SD*)	Mean (*SD*)
Gender					
Male	31	2.28 (0.54)	6.17 (1.46)	3.05 (0.79)	2.98 (0.45)
Female	177	2.21 (0.58)	6.42 (1.39)	3.15 (0.73)	2.91 (0.50)
t		0.61	-0.91	-0.66	0.76
Age					
Not more than 30 years old	14	2.14 (0.82)	6.57 (1.17)	2.79 (1.05)	2.45 (0.51)
31–40 Years old	107	2.24 (0.52)	6.31 (1.42)	3.12 (0.70)	2.97 (0.48)
41–50 Years old	69	2.19 (0.57)	6.39 (1.32)	3.20 (0.71)	2.96 (0.45)
Over 50 years old	18	2.29 (0.64)	6.57 (1.73)	3.24 (0.72)	2.79 (0.59)
F		0.33	0.28	1.34	5.44**
LSD					①<②③④
Gender of child with ASD					
Male	163	2.25 (0.57)	6.38 (1.38)	3.15 (0.73)	2.94 (0.50)
Female	45	2.11 (0.57)	6.38 (1.47)	3.04 (0.76)	2.85 (0.49)
t					
Number of children					
1	105	2.30 (0.62)	6.62 (1.33)	3.26 (0.73)	2.95 (0.52)
2	91	2.16 (0.53)	6.13 (1.46)	3.02 (0.73)	2.90 (0.50)
3 or more	12	2.04 (0.40)	6.16 (1.15)	2.88 (0.63)	2.73 (0.32)
F		2.14	3.30*	3.56*	1.10
LSD			①>②	①>②	
Highest education					
Not completed high school	30	2.04 (0.49)	6.20 (1.76)	2.90 (0.42)	2.64 (0.43)
completed high school	38	2.15 (0.64)	6.63 (1.32)	3.03 (0.85)	2.82 (0.49)
Bachelor's degree	121	2.24 (0.54)	6.28 (1.38)	3.18 (0.76)	2.98 (0.51)
Postgraduate degree	19	2.51 (0.62)	6.79 (0.84)	3.40 (0.65)	3.17 (0.34)
F		3.01*	1.32	2.24	6.14**
LSD		①②<④			①<③④ ②<④
Marital status					
Partnered	189	2.24 (0.57)	6.35 (1.40)	3.12 (0.73)	2.92 (0.50)
Not partnered	19	2.05 (0.53)	6.71 (1.33)	3.23 (0.84)	2.95 (0.48)
t		1.38	-1.09	-0.58	-0.27
Monthly household income(CNY)					
Below 5,000	52	1.98 (0.54)	6.38 (1.65)	3.02 (0.82)	2.77 (0.44)
5,000 ~ 10,000	87	2.21 (0.60)	6.40 (1.44)	3.09 (0.72)	2.85 (0.50)
10,000 ~ 20,000	44	2.34 (0.42)	6.06 (1.15)	3.14 (0.62)	3.08 (0.50)
Above 20,000	25	2.56 (0.57)	6.88 (0.87)	3.51 (0.72)	3.17 (0.46)
F		7.24***	1.85	2.72*	6.15**
LSD		①<②③④ ②<④		①②③<④	①②<③④
Type of family residence					
Countryside	27	1.96 (0.63)	6.53 (1.41)	3.24 (0.87)	2.77 (0.55)
City	181	2.26 (0.55)	6.36 (1.40)	3.12 (0.71)	2.94 (0.49)
t		-2.60**	0.61	0.77	-1.66
Type of family structure					
Nuclear family	147	2.17 (0.60)	6.36 (1.44)	3.16 (0.76)	2.88 (0.50)
Extended family	61	2.34 (0.48)	6.42 (1.30)	3.07 (0.67)	3.00 (0.49)
t		-2.05*	-0.25	0.78	-1.59

Table 1 (continued)

Variable	*N*	Social Support	Parenting self-efficacy	Post-traumatic growth	Self-esteem
The time since the child was diagnosed with autism					
Within half a year	8	2.31 (0.62)	6.41 (1.24)	2.71 (1.14)	2.96 (0.48)
Half a year to one year	7	2.23 (0.47)	6.37 (1.71)	3.01 (0.58)	2.88 (0.16)
One to two years	18	2.10 (0.52)	6.08 (1.21)	2.92 (0.64)	2.74 (0.60)
More than two years	175	2.23 (0.58)	6.41 (1.42)	3.18 (0.72)	2.94 (0.50)
F		0.35	0.30	1.72	0.88

SD standard deviation

F One-way ANOVA, *t* Independent-Sample T Test, *LSD* Least Significant Difference

1 CNY = 0.14 US dollars. *N* = 208

$^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$

Measures

Brief Demographic Questionnaire

Questions were asked about the age and sex both of parents and children with ASD; the education level of parents, marital status; the monthly family income; the number of children in the family, the type of family structure and the type of family residence.

Social Support

The Social Support Scale (SSS; Zhang, 2007) was used to measure the social support received by parents. The Chinese mainland version of the Social Support Scale has been revised and verified in the literature (Yuan et al., 2021). The scale consists of 13 items and is scored according to a 4-point Likert scale (from 1 = not to 4 = very many). It has three subscales: personal psychological support (e.g., "When I encounter setbacks, someone will encourage me."), family parental support (e.g., "Someone will help me to take care of my kids.") and social welfare support (e.g., "I have the opportunity to apply for relevant economic subsidies for children with ASD."). The total score ranges from 13 to 52, and the higher the score, the greater the social support. In the present study, Cronbach's alpha for the overall scale was 0.92.

Post-traumatic Growth

The Post-traumatic Growth Inventory (PTGI) was used to evaluate the post-traumatic growth of parents, which is a scale of 20 items developed by Tedeschi and Calhoun (1996). The Chinese version of PTGI has been fully verified in the literature (Wang et al., 2011). The scale is used in parents of children with ASD in many countries, including China, aiming to measure their growth status after experiencing the traumatic event of their children were diagnosed with autism, and it shows good validity and reliability (Ebrahim & Alothman, 2021; Li et al., 2015). It includes five dimensions: personal strength (e.g., "I know I can handle difficulties better."), interpersonal relationships (e.g., "I have a feeling of being closer to others."), other possibilities (e.g., "This incident has brought me new opportunities."), self-change (e.g., "I prefer to change things that need to be changed.") and life perception (e.g., "I have a better understanding of the spiritual level."). To accurately assess the participants' post-traumatic growth after the event of the child's diagnosis with autism, we prepared a guide in the survey to guide the participants. That is,"This scale is designed to evaluate some of your personal changes after the child is diagnosed with autism." Parents rated the 20 items on a 6-point Likert scale (from 0 = none at all to 5 = many). After summarizing the scores of these items, we can get the overall post-traumatic growth from 0 to 100. The higher the score, the higher the level of post-traumatic growth. In the present study, Cronbach's alpha for the overall scale was 0.93.

Parenting self-efficacy

The Parenting Self-efficacy Measurement Tool (TOPSE; Kendall & Bloomfield, 2005) was used to measure parents' parenting self-efficacy. The Chinese version of TOPSE has been revised and verified the reliability and validity by domestic scholars (Zhou, 2017). The assessment tool is a self-report scale with 48 items divided into eight dimensions: emotion (e.g., "I can detect whether my kids are happy or sad."), play (e.g., "I can have fun with my kids."), empathy (e.g., "I can listen to my kids."), control (e.g., "As a parent, I think I have my kids under control."), discipline/rule-making (e.g., "I am able to get through the day without battles."), stress (e.g., "I can raise objections when I

disagree with others."), self-acceptance (e.g., "I do as well as other parents in dealing with parenting."), and learning self-efficacy (e.g., "I can learn and use new methods to educate my kids."). This scale was rated on a 10-point Likert scale (from 0 = very strongly disagree to 10 = very strongly agree)with higher scores of each dimension and total scores indicating greater self-efficacy in this dimension and overall parenting self-efficacy of the caregivers. In the present study, Cronbach's alpha for the overall TOPSE was 0.96.

Self-esteem

The Rosenberg Self–Esteem Scale (RSES; Rosenberg, 1965) was used to measure self-esteem of parents. The psychometric characteristics of RSES have been shown to be suitable for Chinese groups and culture (Yan, Xie, Gai, Chen, & Wang, 2021a, 2021b). RSES consists of 10 items (e.g., "I feel that I have a number of good qualities"; "On the whole, I am satisfied with myself"; "I am able to do things as well as most other people"), which are scored on a 4-point scale (from 1 = very strongly disagree to 4 = very strongly agree). Item 3, 5, 8, 9 and 10 were reverse-scored. Some studies pointed out that project 8 "I hope I can win more respect for myself" has cultural differences between China and the West, which should be changed to positive scoring or deletion (Tian, 2006). Therefore, this item was scored positively in the present study. The scores of these items are summarized, and the total score is between 10 and 40. The higher the score, the higher the level of self-esteem. In the present study, Cronbach's alpha for the overall SES was 0.90.

Statistical analyses

The statistical analyses were conducted using the Statistical Package for the Social Sciences (SPSS, version 26.0). First of all, the demographic differences of the main variables were inspected. Then descriptive statistics and correlations among variables were inspected. Finally, the proposed model (see Fig. 1) was tested via simple and moderated mediation analyses using the SPSS macro PROCESS, developed by Hayes (2013). Firstly, model 4 of SPSS macro PROCESS was used to test the mediating role of post-traumatic growth in the relationship between social support and parenting self-efficacy by bootstrapping method, calculating the 95 confidence intervals (CIs) with 5000 resamples. Indirect path coefficients, of which the 95 CIs does not include zero, are considered statistically significant. Secondly, the moderated mediation model was tested with model 58 by using the same method and software as described for model 4. Thirdly, to further reveal the nature of the interaction effects, a simple slopes method was used to illustrate the moderating effect of self-esteem (Jose, 2013).

Results

Common Method bias

All data were based on the self-reports of parents on questionnaires. We addressed potential common method bias with Harman's single-factor analysis (Podsakoff et al., 2003).The results found that 18 factors were extracted, which explained 72.9% of the total variance. The largest factor explained 29.4% of the variance, with the critical value being less than 40%. This indicates little evidence of common method bias in the present study.

Descriptive statistics and correlation analyses

Means, standard deviations, and Pearson correlations coefficients for all study variables are shown in Table 2. As the results showed, among the social support received by the participants, the level of personal psychological support is the highest, followed by family parenting support, and social welfare support. The total social support and the three dimensions of social support (personal psychological support, family parenting support and social welfare support) were positively correlated with parenting self-efficacy,

Table 2 Descriptive statistics and correlations of the main study variables

Variables	*M*	*SD*	1	2	3	4	5	6	7
Personal psychological support	2.36	0.67	—						
Family parental support	2.19	0.76	0.57**	—					
Social welfare support	2.13	0.62	0.55**	0.56**	—				
Social support	2.22	0.57	0.83**	0.85**	0.85**	—			
Parenting self-efficacy	6.38	1.40	0.33**	0.27**	0.38**	0.39**	—		
Post-traumatic growth	3.13	0.74	0.54**	0.31**	0.43**	0.50**	0.50**	—	
Self-esteem	2.92	0.50	0.30**	0.26**	0.20**	0.29**	0.30**	0.51**	—

SD standard deviation. $N = 208$. $^{**}p < .01$

post-traumatic growth and self-esteem. Specifically, the total social support and the three dimensions of social support were positively associated with parenting self-efficacy ($r = 0.27$–0.39, $ps < 0.01$), post-traumatic growth ($r = 0.31$–0.54, $ps < 0.01$) and self-esteem ($r = 0.20$–0.30, $ps < 0.01$), respectively. Parenting self-efficacy was positively correlated with post-traumatic growth ($r = 0.50$, $p < 0.01$), self-esteem ($r = 0.30$, $p < 0.01$), as well. And post-traumatic growth was positively associated with self-esteem ($r = 0.51$, $p < 0.01$). Thus, hypothesis 1 was supported.

Testing for simple mediation

In Hypothesis 2, we predicted that post-traumatic growth mediated the relationship between social support and parenting self-efficacy. So we used the Model 4 of the PROCESS macro (Hayes, 2013) to test this hypothesis. From the results of the analysis of variance in Table 1, it can be seen that the participants' parenting self-efficacy was significantly different in the demographic variable of the number of children. The participants' social support was significantly different in four demographic variables: highest education, monthly household income, family residence type and family structure type. These results mean that the above five demographic variables may be important factors affecting the internal relationship between social support and parenting self-efficacy of parents of children with ASD, so these variables were put into the model test together as covariates. As is shown in Table 3, when we controlled the five demographic variables, the results showed that social support significantly positively predicted parenting self-efficacy ($\beta = 1.01$, $p < 0.001$) and post-traumatic growth ($\beta = 0.65$, $p < 0.001$). When the mediation variable was added, the positive predictor of social support on parenting self-efficacy was still significant ($\beta = 0.51$, $p < 0.01$), that is, the direct effect of social support on parenting self-efficacy was significant, and the positive predictive effect of post-traumatic growth on parenting self-efficacy was also significant ($\beta = 0.78$, $p < 0.001$). In addition, the upper and lower limits of the bootstrap 95% confidence interval of the mediating effect of post-traumatic growth do not contain zero. These results indicated that post-traumatic growth played a partial mediating role between social support and parenting self-efficacy, accounting for 50.20% of the total effect. And the mediation of post-traumatic growth was directly shown in Fig. 2. Thus, Hypothesis 2 was supported.

Table 3 The mediation effect of post-traumatic growth

Outcome variables	Independent variables	R^2	F	β	SE	t	LLCI	ULCI
Parenting self-efficacy	constant	0.18	7.41***	5.65***	0.68	8.32	4.31	6.99
	Number of children			-0.25	0.15	-1.63	-0.56	0.05
	Highest education			0.04	0.13	0.27	-0.22	0.29
	Monthly household income			-0.08	0.11	-0.73	-0.31	0.14
	Family residence type			-0.51	0.29	-1.77	-1.08	0.06
	Family structure type			-0.05	0.20	-0.27	-0.45	0.35
	Social support			1.01***	0.17	5.98	0.67	1.34
Post-traumatic growth	constant	0.32	16.00***	2.66	0.33	8.17	2.01	3.30
	Number of children			-0.14	0.07	-1.86	-0.28	0.01
	Highest education			0.14*	0.06	2.33	0.02	0.27
	Monthly household income			0.02	0.05	0.37	-0.09	0.13
	Family residence type			-0.47***	0.14	-3.36	-0.74	-0.19
	Family structure type			-0.23*	0.10	-2.34	-0.42	-0.04
	Social support			0.65***	0.08	8.01	0.49	0.80
Parenting self-efficacy	constant	0.29	11.90***	3.59	0.73	4.92	2.15	5.03
	Number of children			-0.14	0.15	-1.00	-0.43	0.14
	Highest education			-0.08	0.12	-0.63	-0.32	0.16
	Monthly household income			-0.10	0.11	-0.93	-0.31	0.11
	Family residence type			-0.15	0.28	-0.54	-0.70	0.40
	Family structure type			0.12	0.19	0.64	-0.25	0.50
	Social support			0.51**	0.18	2.81	0.15	0.86
	Post-traumatic growth			0.78***	0.14	5.65	0.51	1.05

$N = 208$. SE = standard error, LLCI = lower limit of the 95% confidence interval, ULCI = upper limit of the 95% confidence interval. $^{**}p < .01$, $^{***}p < .001$

Testing for moderated mediation

In Hypothesis 3, the present study assumed that self-esteem would moderate the indirect relation between social support and parenting self-efficacy. In order to test the moderating effect, we performed a moderated mediation analysis (Model 58) of PROCESS macro (Hayes, 2013). As is shown in Table 4, the main effect of social support on post-traumatic

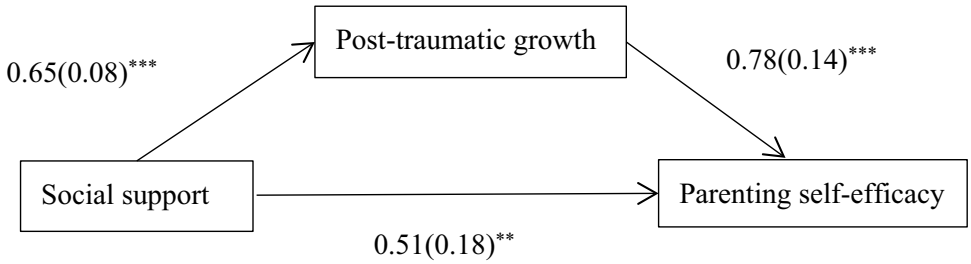

Fig. 2 The mediation model. *Note*. Path values are the path coefficients (standard errors). ** $p < .01$, *** $p < .001$

Table 4 Coefficients for the moderated mediation model

Outcome variables	Independent variables	R^2	F	β	SE	t	LLCI	ULCI
Post-traumatic growth	constant	0.48	23.32***	1.18***	0.26	4.46	0.66	1.70
	Number of children			-0.11	0.07	-1.66	-0.24	0.02
	Highest education			0.07	0.06	1.28	-0.04	0.18
	Monthly household income			-0.02	0.05	-0.35	-0.11	0.08
	Family residence type			-0.44***	0.12	-3.60	-0.68	-0.20
	Family structure type			-0.24**	0.09	-2.83	-0.41	-0.07
	Social support			0.53***	0.07	7.31	0.39	0.67
	Self-esteem			0.60***	0.08	7.27	0.43	0.76
	Social support × Self-esteem			-0.31**	0.10	-3.08	-0.51	-0.11
Parenting self-efficacy	constant	0.31	10.11***	7.41***	0.61	12.23	6.21	8.60
	Number of children			-0.14	0.14	-1.00	-0.43	0.14
	Highest education			-0.08	0.12	-0.65	-0.32	0.16
	Monthly household income			-0.12	0.11	-1.10	-0.32	0.09
	Family residence type			-0.22	0.28	-0.78	-0.76	0.33
	Family structure type			0.10	0.19	0.53	-0.27	0.48
	Social support			0.47**	0.18	2.61	0.11	0.82
	Post-traumatic growth			0.65***	0.15	4.22	0.35	0.95
	Self-esteem			0.34	0.21	1.67	-0.06	0.75
	Post-traumatic growth × Self-esteem			-0.35*	0.16	-2.11	-0.67	-0.02

$N = 208$. SE = standard error, LLCI = lower limit of the 95% confidence interval, ULCI = upper limit of the 95% confidence interval. * $p < .05$, ** $p < .01$, *** $p < .001$

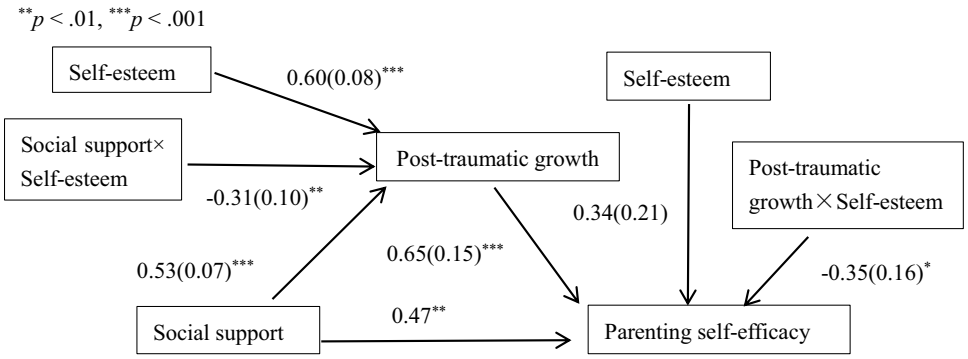

Fig. 3 The moderated mediation model. *Note*. Path values are the path coefficients (standard errors). $N = 208$. * $p < .05$, ** $p < .01$, *** $p < .001$

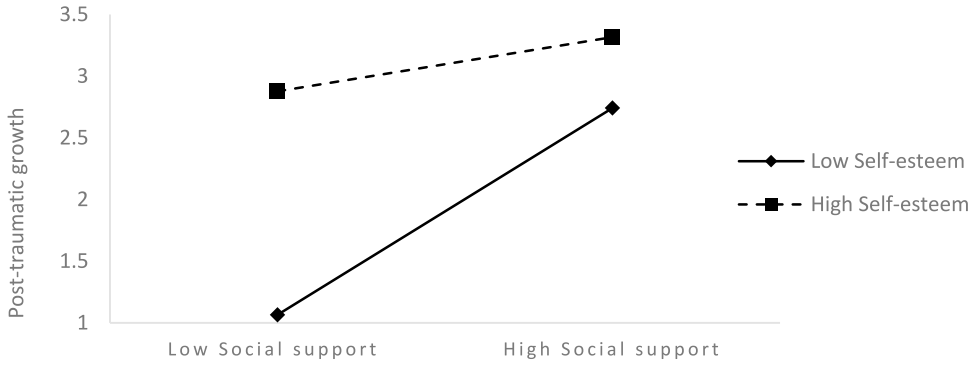

Fig.4 The moderated effect of self-esteem on the relationship between social support and post-traumatic growth

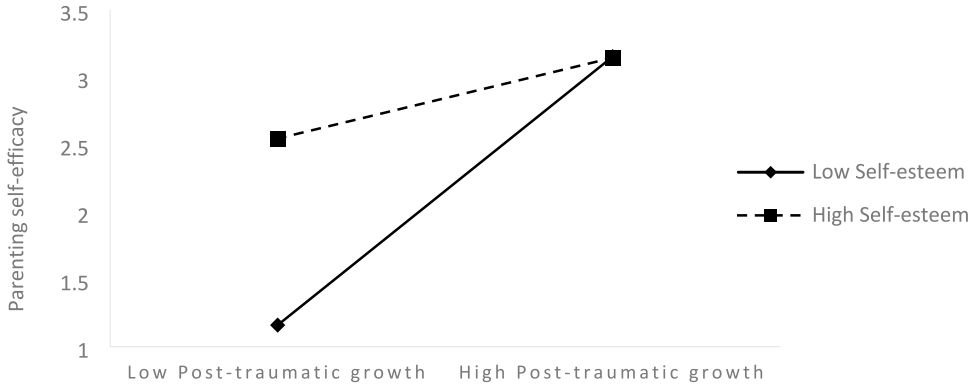

Fig.5 The moderated effect of self-esteem on the relationship between post-traumatic growth and parenting self-efficacy

growth was significant ($\beta = 0.53$, $p < 0.001$), and the interaction between social support and self-esteem on post-traumatic growth was also significant ($\beta = -0.31$, $p < 0.01$). In addition, the main effect of post-traumatic growth on parenting self-efficacy was significant ($\beta = 0.65$, $p < 0.001$), and the interaction between post-traumatic growth and self-esteem on parenting self-efficacy was also significant ($\beta = -0.35$, $p < 0.05$). And the moderated mediation was directly shown in Fig. 3.

Simple slope tests were conducted to illustrate the moderating effect of self-esteem, we first plotted the conditional effects of social support on post-traumatic growth, at Mean ± 1 *SD* levels of self-esteem (1 *SD* below the mean and 1 *SD* above the mean, respectively; see Fig. 4). And then we plotted the conditional effects of post-traumatic growth on parenting self-efficacy, at Mean ± 1*SD* levels of self-esteem (1 *SD* below the mean and 1 *SD* above the mean, respectively; see Fig. 5). Firstly, it could be seen from Fig. 4 that the association between social support and post-traumatic growth was stronger for low self-esteem than for high self-esteem. Specifically, as shown in Table 5, although the conditional effect of social support on post-traumatic growth at different levels of self-esteem was always significant, it was strongest at low levels of self-esteem ($\beta = 0.68$, $p < 0.001$), weaker at medium levels of self-esteem ($\beta = 0.53$, $p < 0.001$), and weakest at high levels of self-esteem ($\beta = 0.37$, $p < 0.001$). Secondly, it could be seen from Fig. 5 that the association between post-traumatic growth and parenting self-efficacy was stronger for low self-esteem than for high self-esteem. Specifically, as shown in Table 5, although the conditional effects of post-traumatic growth on parenting self-efficacy at different levels of self-esteem were always significant, it was strongest at low levels of self-esteem ($\beta = 0.82$, $p < 0.001$), weaker at medium levels of self-esteem ($\beta = 0.65$, $p < 0.001$), and weakest at high levels of self-esteem ($\beta = 0.47$, $p < 0.05$). These results indicated that self-esteem not only moderated the predictive effect of social support on post-traumatic growth, but also had a significant

Table 5 The moderation effect of self-esteem

Level of self-esteem	*β*	*SE*	*t*	LLCI	ULCI
Conditional effect of social support on post-traumatic growth at different levels of self-esteem					
Low (1 *SD* below mean)	0.68^{***}	0.09	7.88	0.51	0.85
Medium (mean)	0.53^{***}	0.07	7.31	0.39	0.67
High (1 *SD* above mean)	0.37^{***}	0.09	4.20	0.20	0.55
Conditional effect of post-traumatic growth on parenting self-efficacy at different levels of self-esteem					
Low (1 *SD* below mean)	0.82^{***}	0.16	5.01	0.50	1.14
Medium (mean)	0.65^{***}	0.15	4.22	0.35	0.95
High (1 *SD* above mean)	0.47^{*}	0.18	2.59	0.11	0.83

N = 208. *SE* = standard error, LLCI = lower limit of the 95% confidence interval, ULCI = upper limit of the 95% confidence interval. $^{**}p < .01$, $^{***}p < .001$

moderated effect on the predictive effect of post-traumatic growth on parenting self-efficacy. Thus, Hypothesis 3 was supported.

Discussion

The results of the present study showed that after the traumatic event that the children were diagnosed with autism, the parents showed positive psychological change and growth, which is consistent with the results of previous studies (Tiba et al., 2012). When individuals obtain certain social support, they can better resist the negative effects of traumatic events, regain the courage to live, and obtain a certain degree of post-traumatic growth (Ooi et al., 2016). In the present study, the level of post-traumatic growth of parents of children with ASD was consistent with the results of domestic studies (Li et al., 2015), but significantly lower than that of Phelps's study (Phelps et al., 2009). This may be due to the late reporting of the first cases of autistic in China (Zou, 2001). Therefore, public awareness of ASD and the motivation of parents of children with ASD to actively seek professional support are both insufficient, and these factors ultimately lead to relatively low levels of post-traumatic growth among parents of children with ASD. Consistent with prior research, the present study found that there were significant positive correlations among social support, parenting self-efficacy, post-traumatic growth and self-esteem (Benson, 2016; Zeng et al., 2021; Zhao et al., 2020). In addition, the present study found that the post-traumatic growth of parents of children with ASD played a significant mediating role between social support and parenting self-efficacy, and individual self-esteem played an important moderating role in this process. According to Bandura's self-efficacy theory, parenting self-efficacy, as a kind of belief, is great significance in changing individual behavior. High self-efficacy can improve the completion of individual goal behavior (Bandura, 1977). Therefore, in order to give children with ASD good family parenting, it is important not only to improve their parents' parenting skills, but also to enhance their sense of parenting self-efficacy. In addition, the post-traumatic growth model proposed by Tedeschi and Calhoun (2004) assumes that personality traits, personal social resources, social demographic variables and other factors will affect an individual's post-traumatic growth level, thus affecting an individual's self cognition, including the perception of self-efficacy (Tedeschi & Calhoun, 1996). Therefore, from the perspective of individual growth, the present study focuses on the psychological and social characteristics of parents of children with ASD to promote their parenting self-efficacy, so as to promote children with ASD to obtain better family parenting and care.

The effects of social support on parenting self-efficacy

The present study found that social support, which includes personal psychological support family parental support and social welfare support, could positively predict the parenting self-efficacy of parents of children with ASD, that was, the higher the level of social support parents receive, the more conducive to improving their parenting self-efficacy, which was similar to the previous research results (Mathew et al., 2017). Social support is a flow of instrumental aid, emotional concern, information between people (House, 1981). It includes social support from family, friends, therapeutic organizations and communities. On the one hand, this social support provides individuals with the opportunity to talk to others to adapt to the stressful environment (Salmon et al., 2000) which helps to enhance parenting self-efficacy (Lu et al., 2021). On the other hand, multi-faceted social support, especially that from parents of children with ASD who have similar experiences, can provide novice parents with experience and oral guidance to help parents better accomplish difficult parenting tasks (Jones et al., 2009). Specifically, they can get more opportunities to interact with members of the in-group. They learn and share parenting skills and parenting experience in a group environment, and also gain a certain sense of belonging. In addition, parents of children with ASD are faced with great parenting pressure and the resulting negative emotions such as anxiety and depression (Marshall et al., 2018). Parenting support and emotional support provided by family members can effectively reduce parents' parenting pressure and powerlessness. According to Bandura's self-efficacy theory (Bandura, 1977), the indirect experience obtained by observing the behavior of others is an important source for individuals to obtain self-efficacy. At the same time, individuals' emotional state will also affect their self-efficacy. Therefore, good social support means that parents can get more indirect successful parenting experience and positive emotional experience, which is conducive to improving their sense of parenting self-efficacy.

The mediating role of post-traumatic growth

The present study found that the post-traumatic growth of parents of children with ASD played a partial mediating role between social support and parenting self-efficacy, that was, social support not only had a direct positive predictive effect on parenting self-efficacy of parents of children with ASD, but also could affect parenting self-efficacy through the mediating role of post-traumatic growth. In other words, parents with more social support could achieve a higher level

of post-traumatic growth, which had a significant positive predictive effect on their sense of parenting self-efficacy. This was consistent with the main effect hypothesis (Cohen, 2004), which holds that no matter how much pressure, social support will have a direct and positive impact on individual mental health, considering that social support can provide individuals with stable positive emotional experience and social return, and then they can alleviate pain and grow from trauma (Calhoun & Tedeschi, 2014). The conceptual model created by Schaefer and Moos (1998) for understanding positive outcomes of crisis classifies social support as a key environmental resource (Prati & Pietrantoni, 2009). Schaefer and Moos suggest that social support leads to personal growth by influencing coping and adaptation behavior. Specifically, after experiencing a traumatic event when children were diagnosed with autism, social support can provide parents of children with ASD with the resources and emotional support they need to deal with trauma, help them experience more positive emotions, improve their relationship with others, and encourage them to reflect on themselves, others and the world. These changes in turn help relieve psychological stress and promote post-traumatic growth (Ali et al., 2012). Individuals with a higher level of post-traumatic growth will experience stronger strength and self-efficacy for possible problems in the future (Tedeschi & Calhoun, 1996). Therefore, social support will help parents to promote their post-traumatic growth, and ultimately effectively enhance their sense of parenting self-efficacy effectively.

The present study found that post-traumatic growth of parents of children with ASD is a partial mediator between social support and parenting self-efficacy, which shows the importance of individual growth in their social role. Therefore, it is necessary to improve the parenting self-efficacy of parents of children with ASD from two aspects. On the one hand, it is to provide some necessary social support, such as improving their parenting skills (Wittkowski et al., 2016), to improve their parenting self-efficacy. On the other hand, it could focus on the individual growth of parents, by providing some social support to help them carry out psychological adjustment and live a more positive and optimistic life ((Jin et al., 2014)), to indirectly improve their child-rearing self-efficacy.

The moderating role of self-esteem

The present study found that the mediating role between social support and parenting self-efficacy of parents of children with ASD was moderated by self-esteem, which indicated that the mediating role of post-traumatic growth of parents of children with ASD between social support and parenting self-efficacy was conditional. Specifically, in the first half of the mediating role of social support, post-traumatic growth and parenting self-efficacy, the lower the level of self-esteem, the greater impact of social support on the post-traumatic growth of parents of children with ASD. In the second half of the mediating role of social support, post-traumatic growth and parenting self-efficacy, the lower the level of self-esteem, the greater the impact of post-traumatic growth on parenting self-efficacy.

For the mediating role of the first half path, compared with individuals with higher self-esteem, social support had a greater predictive effect on the post-traumatic growth of individuals with lower self-esteem. This result supported the post-traumatic growth model (Tedeschi & Calhoun, 2004), which assumes that factors such as self-esteem and social support will affect an individual's post-traumatic growth level, in which self-esteem is an important personal factor. Previous studies have proved that a higher level of self-esteem is related to a higher level of post-traumatic growth (Taku & McDiarmid, 2015). People with high self-esteem have sufficient internal resources such as self-confidence and positive emotions to deal with external threats (Steele, 1988), and tend to deal with stress and reinterpret it more actively, therefore achieving personal growth (Dolbier et al., 2010). Similarly, social support is also an important resource to face difficult life experiences. The transformation degree of an individual in trauma and adversity depends not only on his internal resources, but also on his relationship structure, intimacy with others and other external resources (Back et al., 2011). Therefore, when an individual has insufficient internal resources, that is, his self-esteem is low, he needs to obtain more external resources such as social support, so as to better achieve his post-traumatic growth.

For the mediating role of the second half path, compared with high self-esteem parents, post-traumatic growth had a greater positive predictive effect on parenting self-efficacy of low self-esteem parents. Previous study has found that self-esteem regulates the relationship between negative events and emotional responses. Specifically, when facing major stressors or setbacks, individuals with low self-esteem have a greater risk of emotional distress (Brown & Dutton, 1995). Previous studies have shown that parents' emotion and self-regulation are related to self-efficacy (Bandura et al., 2003). If individuals with low self-esteem can achieve post-traumatic growth and reassess trauma or stress events, they will be able to achieve higher control over emotions, thoughts and behavioral intentions, enhance their confidence in healthy parenting, and finally obtain a higher level of parenting self-efficacy (Healey et al., 2018). Therefore, compared with parents with high self-esteem, parents with low self-esteem rely more on their own post-traumatic growth to enhance their sense of parenting self-efficacy.

Practical Implications

Researchers have recognized the importance of parenting self-efficacy for children with ASD to obtain good family parenting (Batool & Khurshid, 2015). The present study showed that social support, post-traumatic growth and self-esteem could enhance the parenting self-efficacy of parents of children with ASD to some extent. In order to better improve parenting self-efficacy and provide good family parenting for the growth and learning of children with autism, we suggest the following points:

Firstly, there is a need for services, such as educational settings, employment settings and social welfare settings. On the one hand, it is important to improve the social support system for the rehabilitation and education of children with autism. Specifically, social organizations should establish social support networks and professional centers (such as schools, children's rehabilitation centers and mobile clinics.) to provide different types of support for children with autism (such as telemedicine, community health workers, special education teachers and psychologists), and help parents establish partnerships with professionals, and provide active professional support services (Das et al., 2017). On the other hand, attention should be paid to improving the parenting skills of the parents of children with ASD, such as imparting necessary knowledge and technology to parents and supporting their parenting activities. These methods and strategies can effectively reduce the parenting pressure of parents (Lee et al., 2013). For instance, the study found that the team based on parenting program can improve the parenting self-efficacy of parents of children with ASD and alleviate the emotional and behavioral problems of children with ASD (Wittkowski et al., 2016).

Secondly, we found a positive association between post-traumatic growth and parenting self-efficacy. Post-traumatic growth is the result of cognitive remodeling, and traumatic experiences can make people doubt existing cognitive models. If individuals can give up negative models and choose more positive ones in this process, they can better achieve personal growth (Xu et al., 2016). Therefore, there is a need to give these parents the support and help they need to deal with trauma, including emotional support, psychological assistance and so on, for instance, studies have found that the experience of participating in support groups is of great significance for mothers of children with ASD to change their cognition and achieve personal growth (Markoulakis et al., 2012).

Finally, our results showed that self-esteem played an important role in social support, post-traumatic growth and parenting self-efficacy. As adults, the parents of children with ASD have stable self-esteem and limited plasticity. Therefore, parents of children with ASD with different self-esteem levels should take different measures to improve their parenting self-efficacy. For parents with high self-esteem, there is a need to give them more affirmation and trust, and believe that they can give full play to the buffer role of self-esteem, an important internal resource, in coping with stress and traumatic events (De Man & Gutierrez, 2002), and can achieve personal growth from trauma and obtain a high sense of parenting self-efficacy. For parents with low self-esteem, there is a need to give them more social support and help them through external support and strength, improve their parenting self-efficacy, and provide more active and effective family rearing for children with autism.

Limitations and further research

Some limitations should be taken into account when interpreting the results of the present study. First of all, the data used in the present study were cross-sectional, which only explained the correlation between social support and parenting self-efficacy of children with ASD, rather than causality. So further research and experiments should perhaps verify the causal relationship. Secondly, The sampling of the present study had some limitations, which were reflected in two aspects. First of all, the total number of samples in the present study was relatively small, although it was difficult to sample because the parents of children with ASD were relatively special, but the small sample size affected the representation of the results of the present study to some extent. On the other hand, there was a certain deviation in the selection of samples in the present study, that is, the participants in the present study had a large deviation in the demographic distribution. For example, there are significantly fewer males than females in the present study and the numbers of participants in the variable of the duration of time since receiving details of diagnosis were also uneven. were also obviously uneven, but the sampling deviation may affect the results of the present study to some extent. Therefore, future research should expand the scope of sample selection to increase the total number of samples. In addition, future research should balance the sample size between sample groups as far as possible in order to avoid sampling deviation in the sampling process and discuss the related problems more deeply. Finally, the severity of autism in children may affect the results of the present study which had not been taken into account in the present study. Therefore, future research should collect information on the severity of autism and consider it as a control variable in the process of exploring the intrinsic mechanism of parenting self-efficacy of parents of children with ASD.

Conclusion

In the present study, we found that social support was significantly associated with parental parenting self-efficacy in children with ASD, a relationship mediated by post-traumatic growth. Additionally, the self-esteem of parents of children with ASD played an important moderating role in the prediction of social support for post-traumatic growth and post-traumatic growth for parenting self-efficacy.

Data availability The datasets generated during and/or analyzed during the present study are available from the corresponding author on reasonable request.

Declarations

Ethical approval Ethical approval for the present study was granted by the Ethics Committee of the University (Blind review requires)and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Consent to participate All participants were provided with an online informed consent before their participation.

Conflict of interest The authors state that there is no conflict of interest.

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