

# Parental Self-Efficacy and Behavioral Problems in Children with Autism During COVID-19: A Moderated Mediation Model of Parenting Stress and Perceived Social Support

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**Purpose:** COVID-19 pandemic has been verified as a public health emergency of international concern. During the special period, the health of vulnerable groups, such as children with autism, should be concerned. Some studies have been carried out to investigate the behavioral problems of children with autism during the COVID-19, but underlying mechanisms behind it is not clear. This study examines the role of parenting stress as a mediator in the relationship between parental self-efficacy and behavioral problems in Chinese children as well as the role of perceived social support as a moderator for this mediation effect.

**Methods:** A total of 439 parents of children with autism (mean age=40.17, SD=5.26) were surveyed and completed five questionnaires (Conners Parent Symptom Questionnaire, Parental Self-Efficacy Questionnaire, Parenting Stress Index-Short Form 15, Perceived Social Support Questionnaire, and Neuroticism Extraversion Openness Five Factor Inventory). The statistical analyses were conducted by SPSS 26.0 and SPSS PROCESS macro.

**Results:** Controlling for neuroticism, which is highly associated with psychological changes in parents, the study found that parental self-efficacy was significantly and negatively correlated with behavioral problems in children with autism. In addition, the relationship between parental self-efficacy and behavioral problems was mediated by parenting stress. Furthermore, parenting stress moderated the indirect relationship between parental self-efficacy and behavioral problems via perceived social support.

**Conclusion:** These results provide direct evidences for the inextricable relationship between family, social factors and behavioral problems of children with autism. It suggest that improving perceived social support to enhance parental self-efficacy is critical to buffering against parenting stress and stabilizing children with autism during the COVID-19 pandemic.

**Keywords:** behavioral problems, children with autism, parental self-efficacy, moderated mediation model, COVID-19

## Introduction

Since 2020, the world has been experiencing the COVID-19 respiratory pandemic. It is vital, and humanitarian, to care about the excessive influence this pandemic has had on people, especially those in vulnerable groups. Autism spectrum disorder, which occurs in early childhood, is a type of lifelong, fixed, and widely related neurodevelopmental disorder characterized by core symptoms.<sup>1</sup> Children with autism generally have lasting impairments in their ability to engage in reciprocal social

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interaction and communication, which is accompanied by restricted, repetitive, and stereotypical behaviors. In 2020, with the series of changes following the COVID-19 pandemic, children with autism have behavioral problems that most likely due to their limited adaptation ability.<sup>2</sup> However, the behavioral mechanism underlying these problems still remains unclear. To date, the COVID-19 pandemic is not over and there thus remains a need to explore intensive family interventions for such problems during the pandemic. Therefore, it is critical that the internal mechanisms of behavioral problems in children with autism during the COVID-19 pandemic be explored.

## Relationship Between Parental Self-Efficacy and Behavioral Problems in Children with Autism

Bronfenbrenner proposed an ecosystem theory in which the family is the most direct and lasting system that affects the behavioral development of children.<sup>3</sup> Prior studies in the general population have established well-characterized associations between children's behavioral problems and elements of parenting including parenting style, strategies, and behaviors.<sup>4,5</sup> Some studies have shown that parental self-efficacy may be at the core of behavioral problems in children as it can predict sensitivity and satisfaction in parents regarding their parenting styles and behaviors.<sup>6,7</sup>

Parental self-efficacy is an extension of self-efficacy in the field of parenting, which refers to the perception of effective parenting ability and belief in the ability to perform parenting tasks.<sup>8</sup> Population-based studies have suggested that parental self-efficacy can directly and indirectly affect behavioral problems in children.<sup>7</sup> For example, parents with higher self-efficacy tend to demonstrate positive attribution,<sup>9</sup> less negative parenting strategies, and a less strict control environment when facing behavioral problems in children.<sup>10,11</sup> Consequently, children of parents with good self-efficacy tend to have fewer behavioral problems and better development over the long term.<sup>12,13</sup> In parents of children with autism specifically, it is plausible to speculate that both processes are at work. Sofronoff and Farbotko<sup>14</sup> set up an intervention program to improve self-efficacy among parents of children with Asperger's syndrome and reported fewer children's behavioral problems. In addition, Hastings and Brown<sup>15</sup> found that parental self-efficacy mediated the effect that behavioral problems in children with autism had on mothers' anxiety. This proved to be especially true during the COVID-19 pandemic when home quarantine policies

kept children at home in China. The role of parents has been enhanced. Thus, the following hypothesis is proposed. Hypothesis 1: Parental self-efficacy can be negatively related to behavioral problems in children with autism.

## The Mediating Role of Parenting Stress

Parental self-efficacy, a crucial cognitive mechanism for generating goal-oriented and positive coping behaviors, is a concept rooted in self-efficacy theory and is situated as the key factor affecting how parents adapt to stress.<sup>16,17</sup> Parenting stress refers to the pressure that parents feel when they assume parental roles due to their own internal dynamics, children, or environmental factors.<sup>18</sup> Numerous studies have found that lower parental self-efficacy impairs a parent's ability to cope with parenting stress.<sup>19</sup> Similarly, higher self-efficacy motivates parents to think and act in ways that optimize children's development<sup>9</sup> and enhances their ability to actively cope with parenting stress.<sup>10</sup> Thus, although self-efficacy has been shown to predict parenting stress across many different types of children and families,<sup>10,20</sup> the relationship between parental self-efficacy, parenting stress, and the development of children with autism remains uncertain.

Raising a child with autism is quite stressful and extends from early childhood into adolescence.<sup>21,22</sup> It is therefore not surprising that parenting stress had been found to be the main factor predicting behavioral problems in children with autism.<sup>23,24</sup> The model from Hastings and Brown<sup>15</sup> indicates that parenting stress mediates the relationship between behavioral problems and parenting practices. This means that less positive interaction<sup>25</sup> and more negative parenting strategies<sup>26</sup> may be especially common among parents who face an increase in behavioral problems in children with autism. When parental stress reaches a critical point, the impatience and negative behaviors of parents are transmitted to their children, resulting in increased behavioral problems and poor development for the child.<sup>23,24</sup> During the COVID-19, parenting stress is more likely to be associated with behavioral problems in children with autism.<sup>2</sup> Therefore, the following hypothesis is proposed. Hypothesis 2: Parenting stress can significantly mediate the effect of parental self-efficacy on behavioral problems in children with autism.

## The Moderating Role of Perceived Social Support

According to Weiss,<sup>27</sup> the ability to perceive social support is more important than actually receiving support. Perceived

social support refers to the external provision of material resources or psychological support to the individual, which aims to help individuals avoid stressors and reduce their impact.<sup>28</sup> Evidence shows that increased social support may improve parental self-efficacy,<sup>29,30</sup> that is, instead of more effective parenting strategies,<sup>22</sup> higher perceived social support tends to help parents establish positive parental roles and good adaptive behavior associated with higher parental self-efficacy.<sup>31</sup> Subsequently, this can be associated with positive insights into parenting, which can reduce parenting stress, as discussed in detail previously.<sup>10,20</sup>

As known from the main effects hypothesis,<sup>32</sup> perceived social support can help reduce stress and obtain favorable effects. In the field of parenting, high-quality perceived social support motivates parents to obtain parenting confidence, experience, and skills, which could reduce parenting stress levels.<sup>22,33</sup> Consequently, low parenting stress urges parents to create a warm parenting environment, adopt more positive and effective parenting strategies, and increase safe attachment parent-child relationships.<sup>22</sup> Children who grow up in families with more perceived social support and lower parenting stress are better able to socially adapt to new situations due to effective parenting practices and are thus likely to experience fewer behavioral problems.<sup>34</sup>

It is evident that there is a correlation between perceived social support, self-efficacy, and parenting stress, and it is speculated that perceived social support may moderate the relationship between parental self-efficacy and parenting stress. Therefore, perceived social support may also moderate the relationship between parenting stress and behavioral problems in children. In line with this, the following hypothesis is proposed. Hypothesis 3: Perceived social support moderates the relationship among parental self-efficacy, parenting stress, and behavioral problems in children with autism. However, this result has rarely been studied in parents of children with autism. In previous studies of children with autism, parental self-efficacy was the deep family factor in studies of the general population, but this factor does not have a significant relationship with the behavioral problems of children with autism. Although Jones and Prinz<sup>7</sup> proposed that parental self-efficacy directly and indirectly affects children's behaviors in the general population, there is still no clear data to prove it. To date, no one has explored the moderated mediation model of parenting stress and perceived social support in parents of children with autism. Given the importance of determining this during the

unique time of the COVID-19 pandemic, investigating whether parenting stress moderates the indirect relationship between parental self-efficacy and behavioral problems of children with autism via perceived social support is essential.

## Materials and Methods

### Participants

Online questionnaires were used to survey the parents of children with autism in Guangdong Province, China, from February 2020. Parents were sampled by stratified random sampling method and recruited through special education schools and special education institutions that cooperated with the researchers. With the help of these institutions, parents were required to click on a link to enter the online questionnaires after being assured that the survey would be completely voluntary, anonymous, and non-commercial. After completing the questionnaire, researchers would provide free health guidance and services for parents and children. The inclusion criteria required parents to have a child diagnosed with autism, which was assessed by a qualified doctor using DSM-IV criteria.<sup>1</sup> The study was reviewed and approved by the ethics committee from the School of Education of Guangzhou University (Protocol Number: GZHU2020004).

A total of 485 parents volunteered to participate. Some subjects were excluded: (1) parents who finished the online questionnaires had the same IP address, (2) parents were younger than 18 years old and children with autism were older than 18 years old and (3) parents took too long or too short time to complete the online questionnaires, with 2.5 standard deviations of completion time as the boundary. Ultimately, 439 responses were valid, with a valid response rate of 90.51%. The average age of the parents was 40.17 years ( $SD=5.26$ ), and there were 119 (27.1%) males (mean age=42.48,  $SD=5.46$ ) and 320 (72.9%) females (mean age=39.31,  $SD=4.92$ ). The average age of children with autism was 11.13 years ( $SD=3.11$ ), and there were 376 (85.6%) males (mean age=11.16,  $SD=3.11$ ) and 63 (14.4%) females (mean age=10.98,  $SD=3.18$ ).

### Measures

#### Demographic Information

Demographic information included parents' sex, age, educational attainment, family monthly income, and working state during COVID-19. The children's information included gender and age.

### Conners Parent Symptom Questionnaire

This is a 48-item questionnaire that assesses behavioral problems in children.<sup>35</sup> It consists of six subscales: psychosomatic disorders, conduct problems, impulsivity, learning problems, anxiety, and hyperactivity. The items are rated on a 4-point scale ranging from 0 (no such situation) to 3 (frequent occurrence), with higher scores indicating higher levels of behavioral problems in children. The Chinese version of the Conners Parent Symptom Questionnaire has good reliability and validity.<sup>36</sup> Cronbach's alpha for the Conners Parent Symptom Questionnaire was 0.95 in this study.

### Parental Self-Efficacy Questionnaire for Parents of Special Children

This is a 24-item questionnaire measuring parental sense of self-efficacy as a parent of special needs children, for example, children with autism.<sup>37</sup> It consists of four subscales: daily life care, study guidance, problem behavior management, and rehabilitation training. The items are rated on a 5-point scale ranging from 1 (strongly disagree) to 5 (strongly agree), with higher scores indicating higher levels of behavioral problems in children. The Chinese version of the Parental Self-efficacy Questionnaire for Parents of Special Children has good reliability and validity.<sup>37</sup> Cronbach's alpha for this questionnaire was 0.96 in this study.

### Parenting Stress Index-Short Form 15

This is a 15-item questionnaire that assesses parenting stress and burden.<sup>38</sup> It consists of three subscales: parenting distress, parent-child dysfunctional interaction, and difficult child. The items are rated on a 5-point scale ranging from 1 (strongly disagree) to 5 (strongly agree), with higher scores indicating higher levels of behavioral problems in children. The Chinese version of the Parenting Stress Index-Short Form 15 has good reliability and validity.<sup>39</sup> Cronbach's alpha for this scale was 0.93 in this study.

### Perceived Social Support Questionnaire

This is a 12-item questionnaire that measures the magnitude of perceived support.<sup>40</sup> It consists of three subscales: family support, friend support, and other necessary support. The items are rated on a 7-point scale ranging from 1 (strongly disagree) to 7 (strongly agree), with higher scores indicating higher levels of behavioral problems in children. The Chinese version of the Perceived Social Support Questionnaire has good reliability and validity.<sup>41</sup>

Cronbach's alpha for this questionnaire was 0.97 in this study.

### Neuroticism Extraversion Openness Five Factor Inventory

This is a 60-item questionnaire measuring personality traits.<sup>42</sup> It consists of five subscales: neuroticism, extraversion, openness, agreeableness, and conscientiousness, and the neuroticism subscale, which is highly associated with psychological changes of parents, especially during COVID-19. Neuroticism as a control variable is conducive to exploring the relationship between parental self-efficacy, parenting pressure, social support, and children's behavioral problems. The item is rated on a 5-point scale ranging from 1 (strongly disagree) to 5 (strongly agree), with higher scores indicating higher levels of behavioral problems in children. The Chinese version of the Neuroticism subscale has good reliability and validity.<sup>43</sup> Cronbach's alpha for the Neuroticism subscale was 0.69 in this study.

### Statistical Analyses

Statistical analyses were performed using SPSS version 26.0 (IBM, Armonk, NY, USA) and SPSS PROCESS macro.<sup>44</sup> The variables of parents' gender, age, educational attainment, family monthly income, and working state, as well as children's gender and age were used as control variables, which have been consistently reported as important predictors of behavioral problems in autistic children.<sup>22</sup>

Firstly, a Pearson correlation matrix was used. This included children's behavioral problems, parental self-efficacy, parenting stress, and perceived social support.

Secondly, the four-step procedure framed by MacKinnon<sup>45</sup> was utilized to test for the mediating effect of parenting stress between parental self-efficacy and children's behavioral problems, including the significance of the relationship between (1) parental self-efficacy and behavioral problems, (2) parental self-efficacy and parenting stress, (3) parenting stress and children's behavioral problems while controlling for parental self-efficacy, and (4) parental self-efficacy and children's behavioral problems while controlling for parenting stress (Hypotheses 1, 2). The Sobel test was used to determine whether the effect of parenting stress remained significant.

Thirdly, the three regression models outlined by Muller<sup>46</sup> were used to conduct moderated mediation analyses. In the first model, the moderating effect of perceived social support on the way parental self-efficacy affects children's behavioral problems was estimated. In

**Table 1** Descriptive Statistics and Correlations Among Variables (N=439)

Variables	M	SD	1	2	3	4
1. Behavioral problems (children)	1.65	0.42	1.00			
2. Parental self-efficacy	3.35	0.77	-0.14**	1.00		
3. Parenting stress	2.46	0.82	0.62**	-0.09	1.00	
4. Perceived social support	4.56	1.022	-0.07	0.35**	-0.12**	1.00

Note: \*\* $p < 0.01$ .

Abbreviations: M, mean; SD, standard deviation.

the second model, the moderating effect of perceived social support on the way parental self-efficacy affects parenting stress was estimated. In the third model, the moderating effect of perceived social support on the way parenting stress affects children's behavioral problems and the residual effect of parental self-efficacy on children's behavioral problems was estimated (Hypotheses 1, 2, 3). All continuous variables were mean centered to avoid multicollinearity. According to the suggestion of Frazier et al,<sup>47</sup> all the predictive variables were standardized. The bootstrapping technique was used to estimate 5000 resamples of the data, which means that it is not necessary to assume that the sample obeys a certain distribution. Finally, 95% bias-corrected confidence intervals (CIs) were calculated, and CIs did not include zero, which indicated that the effects were significant.

## Results

### Correlations Between the Main Study Variables

The results of the Pearson correlation are presented in Table 1 below.

Parental self-efficacy was negatively correlated with children's behavioral problems ( $r = -0.14$ ,  $p < 0.01$ ) and positively correlated with perceived social support ( $r = 0.35$ ,  $p < 0.01$ ). Parenting stress was positively correlated with children's behavioral problems ( $r = 0.62$ ,  $p < 0.01$ ) and negatively correlated with perceived social support ( $r = 0.12$ ,  $p < 0.01$ ).

### Testing of the Mediation Model

The results of the mediation model investigating the relationship between parental self-efficacy, parenting stress, and behavioral problems in children with autism are presented in Table 2 below.

In Step One, the effect of parental self-efficacy on children's behavioral problems ( $\beta = -0.14$ ,  $p < 0.01$ ,  $R^2 = 0.12$ ) was significant. Hypothesis 1 was supported: Parental self-efficacy was significantly negatively related with behavioral problems in children with autism. The higher parental self-efficacy, the fewer behavioral problems in children with autism.

In Step Two, the effect of parental self-efficacy on parenting stress ( $\beta = -0.10$ ,  $p < 0.05$ ,  $R^2 = 0.18$ ) was significant. In Step Three, the effect of parenting stress on children's

**Table 2** Testing of the Mediating Role of Parenting Stress

Predictor	$\beta$	SE	t
<b>Model 1 (Outcome: Behavioral problems of children)</b>			
Parental self-efficacy $R^2=0.12$ , $F=7.42$ , $p<0.01$	-0.14	0.05	-3.17**
<b>Model 2 (Outcome: Parenting stress)</b>			
Parental self-efficacy $R^2=0.18$ , $F=11.79$ , $p<0.01$	-0.10	0.04	-2.23*
<b>Model 3 (Outcome: Behavioral problems of children)</b>			
Parental self-efficacy Parenting stress $R^2=0.39$ , $F=29.03$ , $p<0.01$	-0.09 0.58	0.04 0.04	-2.30* 13.91**

Notes: \* $p < 0.05$ , \*\* $p < 0.01$ .

**Table 3** Testing of the Moderating Role of Perceived Social Support and the Moderated Mediation Model

Predictor	$\beta$	SE	t
<b>Model 1 (Outcome: Behavioral problems of children)</b>			
Parental self-efficacy	-0.17	0.05	-3.37**
Perceived social support	-0.02	0.04	-0.35
Parental self-efficacy $\times$ Perceived social support	-0.08	0.03	-2.41*
$R^2=0.15$ , $F=6.66$ , $p<0.01$			
<b>Model 2 (Outcome: Parenting stress)</b>			
Parental self-efficacy	-0.11	0.05	-2.28*
Perceived social support	-0.08	0.04	-1.74
Parental self-efficacy $\times$ Perceived social support	-0.11	0.03	-3.35**
$R^2=0.22$ , $F=11.14$ , $p<0.01$			
<b>Model 3 (Outcome: Behavioral problems of children)</b>			
Parental self-efficacy	-0.11	0.04	-2.72*
Perceived social support	0.03	0.04	0.90
Parental self-efficacy $\times$ Perceived social support	-0.02	0.03	-0.62
Parenting stress	0.55	0.04	13.24**
Parenting stress $\times$ perceived social support	-0.05	0.03	-1.83
$R^2=0.41$ , $F=22.74$ , $p<0.01$			

Notes: \* $p < 0.05$ , \*\* $p < 0.01$ .

behavioral problems ( $\beta = 0.58$ ,  $p < 0.01$ ,  $R^2=0.39$ ) was significant while controlling for parental self-efficacy.

In the fourth step, the effect of parental self-efficacy on children's behavioral problems declined but remained significant ( $\beta = -0.09$ ,  $p < 0.05$ ,  $R^2 = 0.39$ ) when controlling for parenting stress. The Sobel test indicated that the partial mediation effect of parenting stress on the relationship between parental self-efficacy and behavioral problems in children with autism was significant ( $Z = -2.18$ ,  $p < 0.05$ ). Thus, Hypothesis 2 was supported: Parenting stress can significantly mediate the effect of parental self-efficacy on behavioral problems in children with autism.

## Testing of the Moderated Mediation Model

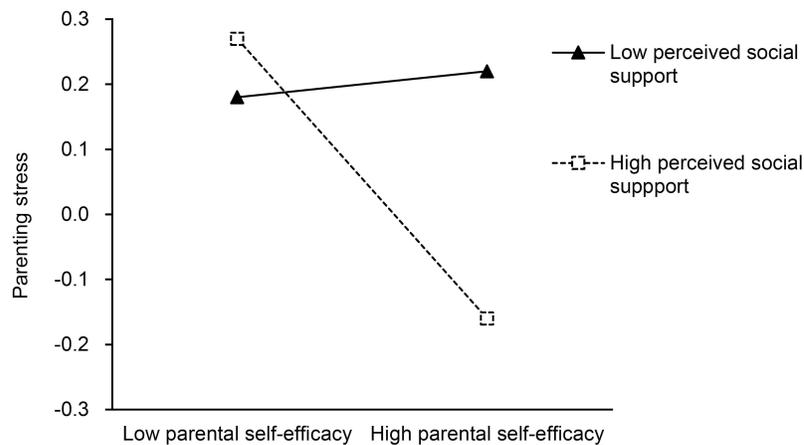
The results of the moderated mediation model investigating the relationship between parental self-efficacy, parenting stress, perceived social support, and behavioral problems in children with autism are presented in Table 3 below.

In the first model, there was a main effect of parental self-efficacy ( $\beta = -0.17$ ,  $p < 0.01$ ), and the effect of the interaction between parental self-efficacy and perceived social support was significant ( $\beta = -0.08$ ,  $p < 0.05$ ).

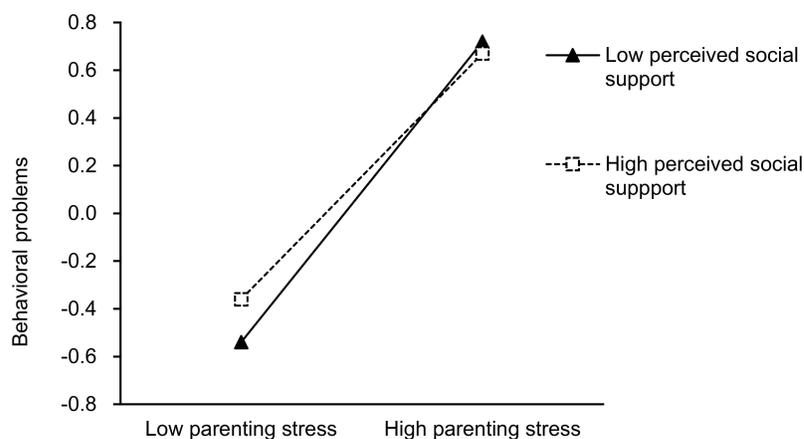
In the second model, there was a main effect of parental self-efficacy ( $\beta = -0.11$ ,  $p < 0.05$ ), and the effect of

the interaction between parental self-efficacy and perceived social support was significant ( $\beta = -0.11$ ,  $p < 0.01$ ). To facilitate the interpretation of the interaction, simple slope tests were used to show the effect of parental self-efficacy on parenting stress under different levels of perceived social support. These results are presented in Figure 1 below. Simple slope testing showed that for parents with high perceived social support, higher parental self-efficacy was associated with lower parenting stress ( $\beta = -0.21$ ,  $p < 0.01$ ). However, for parents with low perceived social support, the effect of parental self-efficacy on parenting stress was non-significant ( $\beta = 0.02$ ,  $p > 0.05$ ).

In the third model, there was a main effect of parenting stress ( $\beta = 0.55$ ,  $p < 0.01$ ), and the effect of the interaction between parenting stress and perceived social support was marginally significant ( $\beta = -0.05$ ,  $p = 0.07$ ). To facilitate the interpretation of this interaction, simple slope tests were used to show the effect of parenting stress on behavioral problems under different levels of perceived social support. These results are shown in Figure 2 below. Simple slope testing showed that parenting stress was associated with behavioral problems in parents with low perceived social support ( $\beta = 0.62$ ,  $p < 0.01$ ). For high perceived social support, the effect of parenting stress on behavioral problems was weaker ( $\beta = 0.50$ ,  $p < 0.01$ ). Thus, Hypothesis 3 was supported: Perceived social support moderated the



**Figure 1** Interaction between parental self efficacy and perceived social support on parenting stress.



**Figure 2** Interaction between parenting stress and perceived social support on behavioral problems of children with autism.

relationship among parental self-efficacy, parenting stress, and behavioral problems in children with autism.

## Discussion

COVID-19 has particularly affected vulnerable groups, such as children with autism; however, little research has investigated the mechanism underlying these children's behavioral problems. Thus, the purpose of this study was to investigate the internal mechanism of behavioral problems in children with autism during the COVID-19 pandemic. To keep scientific and rigorous, neuroticism—a trait highly associated with psychological changes in parents—was used as a control variable. Finally, of particular interest in this study was that parental self-efficacy, behavioral problems in children with autism, parenting stress, and perceived social support can constitute a moderated mediation model, which can provide insights for developing and implementing effective interventions in families with autistic children.

## Direct Effect of Parental Self-Efficacy on Behavioral Problems

The results showed that parental self-efficacy was significantly and negatively correlated with behavioral problems in children with autism, which supports previous studies.<sup>7,14</sup> For example, Gibaud-Wallston and Wandersmann<sup>6</sup> pointed out that parental self-efficacy is a predictor of sensitivity and satisfaction among parenting. More importantly, parental self-efficacy has been identified as a crucial cognitive mechanism that supports goal-oriented and positive coping behaviors when faced with a traumatic crisis.<sup>16</sup>

Since 2020, the sudden and unstoppable COVID-19 pandemic has evolved into a traumatic disaster that parents of children with autism have had to face, especially since COVID-19 brings more economic burden and could initiate more behavioral problems in children.<sup>2</sup> It is possible that parents with higher parental self-efficacy, who tend to actively attribute and optimize their children's behavioral

outcomes, would report lower behavioral problems in children with autism.<sup>9</sup> Similarly, parents with high self-efficacy were likely to adopt more active parenting strategies such as enhancing parenting skills and experience, creating a warm environment conducive to improving children's behavior, and compensating for children's inability to accept the need for routine rehabilitation.<sup>10,11</sup> Contrastingly, parents with low self-efficacy may give up more quickly and present negative emotions toward life and their children, which may ultimately lead to more unstable behavioral and emotional problems in children with autism.<sup>48</sup>

### Mediating Effect of Parenting Stress

In investigating the pathways between behavioral problems of children with autism and parental self-efficacy via parenting stress, it was clear that parental self-efficacy is a key factor in predicting parenting stress.<sup>10,19</sup> The findings support Bandura's social cognitive theory,<sup>16,49</sup> which points to self-efficacy as an internal cognitive resource for parents to cope with parenting stress. More specifically, parental self-efficacy largely determines parental persistence and sensitivity during adversity.<sup>49</sup> Similarly, higher self-efficacy can be beneficial for exercising effective parenting skills and understanding the potential needs of children, which can help parents buffer against the negative impacts of parenting stress.<sup>10,11</sup> Alternatively, lower parental self-efficacy impairs the ability to cope with parenting stress.<sup>19</sup> During the COVID-19, parenting stress occurred and parental self-efficacy has naturally become a protective factor to relieve negative impacts of stress. This finding adds to existing studies underling why researchers call for improving parental self-efficacy as an intervention in the treatment of children with autism and their family function.<sup>50</sup>

In line with previous studies, parenting stress was positively related to behavioral problems in children with autism.<sup>51,52</sup> This result was not surprising as high parenting stress may interfere with the ability to respond sensitively and appropriately to children's behavior,<sup>53,54</sup> thereby focusing on negative attribution about children's behavioral problems. In the past, parents with higher stress had reduced tolerance and built an unsafe parent-child attachment relationship, leading to a greater risk of behavioral problems in children with autism.<sup>25</sup> During the COVID-19, parenting stress is more likely to be associated with behavioral problems in children with autism.<sup>2</sup> As discussed previously, the relationship

between parental self-efficacy and behavioral problems in children with autism was indeed mediated by parenting stress. Combined with this study, intervention strategies for children with autism may need to use integration and diversified thinking in developing future interventions for children with autism.

### Moderating Effect of Perceived Social Support

In this study, perceived social support was an important variable that moderated the mediating effect of parenting stress on the relationship between parental self-efficacy and behavioral problems in children with autism. The role of perceived social support in this model can be explained in two ways. On the one hand, high levels of perceived social support help to influence parental self-efficacy as a buffer against parenting stress. As the stress buffering hypothesis argues, perceived social support is a protective factor for parents in the face of stressful events, which enhances self-confidence and urges parents to reevaluate or provide solutions for buffering stress.<sup>32</sup> Thus, improving perceived social support is conducive to enhancing parental self-efficacy as parents tend to obtain more effective parenting strategies,<sup>22</sup> establish positive parental roles, and adopt good adaptive behavior.<sup>31</sup> Alternatively, parents would also have a buffer against the negative impact of parenting stress during the COVID-19 pandemic.<sup>30</sup>

On the other hand, perceived social support can reduce the impact of parenting stress on children's behavioral problems. As shown in the main effects hypothesis, perceived social support directly buffers against stress, regardless of the special circumstances or level of stress.<sup>32</sup> Parents with higher perceived social support are able to obtain more parenting skills and experience<sup>22</sup> and quickly establish appropriate parent roles and adaptive behaviors from social support networks, which is beneficial for creating a warm environment for children with autism to improve their behaviors.<sup>31</sup> Gradually, children who grow up in families with more perceived social support and lower parenting stress develop better social adaptation skills due to effective parenting practices; thus, resulting in fewer behavioral problems.<sup>34</sup> Therefore, perceived social support not only moderates the relationship between parental self-efficacy and parenting stress but also moderates the relationship between parenting stress and behavioral problems in children with

autism. This key result suggests that driving external resources, such as perceived social support, to enhance internal motivation, such as parental self-efficacy, is critical to buffering against parenting stress and stabilizing children with autism during the COVID-19 pandemic.

## Limitations

The study elucidated the internal mechanism between parental self-efficacy and behavioral problems of children with autism during the COVID-19 pandemic. However, there were some limitation that should be addressed. First, the results of moderated mediation model is novel in this special period of pandemic, but the cross-sectional data cannot totally conclude the causality. In order to better explore the internal mechanism of behavioral problems of children with autism in normal period, it is still necessary to infer the causal relationships between variables through longitudinal studies in the future. Secondly, parents of children with autism were all from Guangdong Province in China. Future studies should expand the scope of sampling and increase the sample sizes. Equally, attention should also be paid to the behavioral problems of other special need children (like children with intellectual disabilities) and family mechanism in the future. Thirdly, the data of the study come from the self-report of parents so that more objective data collection methods should be used in the future, such as the combination of parent's self-report and child's self-report.

## Conclusion

The present study increases the understanding of the relationship between family, social factors and behavioral problems of children with autism during the COVID-19 pandemic. Parental self-efficacy was significantly and negatively correlated with behavioral problems in children with autism. And parental self-efficacy, behavioral problems in children with autism, parenting stress, and perceived social support can constitute a moderated mediation model. Therefore, it can be determined that parental self-efficacy is the key factor influencing the behavioral problems of children with autism during the COVID-19 pandemic. Improving parental self-efficacy as soon as possible may be a vital and critical way to alleviate children's behavioral problems in this special period. Moreover, the moderated mediation model of this study also showed that parenting stress played a mediating role in the relationship between parental self-efficacy and behavioral problems of children. And perceived social support was an important variable that moderated the mediating effect of parenting stress on the relationship between parental

self-efficacy and behavioral problems in children with autism. It reminds educators and social workers that parenting stress would inevitably appear during the COVID-19 due to the influence of internal and external factors. Reducing parenting stress may be the smart way to reduce children's behavior problems, which may also need the help of external forces, such as perceived social support. These findings emphasized the importance of integrated and diversified thinking to improve intervention strategies for parents and children with autism. Educators and social workers should positively help parents create a supportive family environment which could enhance parental self-efficacy and reduce parenting stress to help children of autism develop better.

## Data Sharing Statement

The data presented are available on request from the corresponding authors at [chensq@gzhu.edu.cn](mailto:chensq@gzhu.edu.cn); [renjie@gzhu.edu.cn](mailto:renjie@gzhu.edu.cn)

## Ethics Approval and Consent to Participate

The study was conducted according to the guidelines of the Declaration of Helsinki, and approved by the Ethics in Human Research Committee of the Department of School of Education, Guangzhou University (Protocol Number: GZHU2020004).

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The authors sincerely thank all the parents for participating in this study. Prior to data collection, an ethical clearance letter was obtained from the School of Education of Guangzhou University (Protocol Number: GZHU2020004). Then, a permission letter was also gained from special education schools and special education institutions that cooperated with the authors. With the help of these institutions, parents were informed to read the Participant's Consent Form that explained the study's objective and showed they could withdraw from the study at any time. They were required to give consent to participate before being guided to the questionnaire in the first page of the online questionnaire. Only after parents gave informed consent were able to continue to the next pages. The study was conducted in accordance with the Declaration of Helsinki.

## Author Contributions

All authors made substantial contributions to design, data collection, analysis and interpretation; took part in drafting

and critically revising articles; agreed to submit to the current journal; gave final approval of the version to be published; and agree to be accountable for all aspects of the work.

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## Disclosure

The authors declare no conflicts of interest.

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