



# The role of empathy in the mechanism linking parental psychological control to emotional reactivities to COVID-19 pandemic: A pilot study among Chinese emerging adults

Xiaole Ma\*, Xingchao Wang

School of Educational Science, Shanxi University, No. 92 Wucheng Road, Xiaodian District, Taiyuan 030006, China



## ARTICLE INFO

### Keywords:

COVID-19 pandemic  
Empathy  
Parental psychological control  
Personal distress  
Mental health  
Negative emotion

## ABSTRACT

The outbreak of coronavirus disease 2019 (COVID-19) and its worldwide spread have brought economic, social and personal stress. To better understand human adjustments to this public health emergency and its underlying mechanism, the relationship between perceived parental psychological control in emerging adults and individual's emotional reactivity to COVID-19 as well as the role of empathy was examined. The study was conducted among 445 emerging adults using questionnaires measuring parental psychological control, empathy, and emotional reactivities in the initial stage of COVID-19. Results revealed that parental psychological control conferred risks for individual's increased negative emotional reactivity to this pandemic. Moreover, our findings shed light on personal distress as a mechanism through which parental psychological control induces negative emotional reactivities. Although no direct effect between parental psychological control and positive emotional reactivity was found, personal distress and perspective taking mediate the association in an opposite way. Findings have implications for predicting and intervening mental health problems in COVID-19 pandemic and future public health emergency.

## 1. Introduction

The coronavirus disease 2019 (COVID-19) has become a public health emergency posing enormous challenges to governments, businesses, local communities, and general public (Greenberg, Docherty, Gnanapragasam, & Wessely, 2020; Wu & McGoogan, 2020). Due to threat to public health, prolonged activity restrictions, financial pressure, and other attendant adverse impacts, COVID-19 has triggered kinds of psychological problems of the general population, including symptoms of anxiety, depression, fear, and stress (Brooks et al., 2020; Mann, Krueger, & Vohs, 2020; Qiu et al., 2020; Wang et al., 2020; Zhang, Wang, Rauch, & Wei, 2020). Some dysfunctional personality characteristics, such as pessimism (Jovančević & Miličević, 2020), detachment (Somma et al., 2020) and alexithymia (Tang, Hu, Yang, & Xu, 2020), were confirmed to predict declines in mental health during the COVID-19 pandemic. As the situation is likely to continue for some time around the world, there is an urgent call for more attention to public mental health. Against this background, the current study aims to further explore the personal and family risk factors concerning the maladaptive emotional reactivities to COVID-19 pandemic.

As a maladaptive parenting style, parental psychological control

may be one of the risk factors relating to declines in mental health during the pandemic directly or indirectly. This intrusive parental behavior attempts to control the child through covert psychological strategies (e.g., performing conditional regard, inducing guilt or invalidating feelings) and overinvolved interactions (Barber, 1996).

Self-determination theory (SDT) proposes that parental psychological control fails to satisfy one's basic psychological needs for experiencing autonomy, competence, and relatedness, which are considered to be essential for the realization of human potential (Deci & Ryan, 2008; Feeney & Collins, 2015; Ryan & Deci, 2000). The association between parental psychological control and adjustment problems, such as depression, anxiety, and social problems, were established by accumulative studies (Scharf & Goldner, 2018).

Although parental psychological control has been robustly linked with negative developmental outcomes in the child and adolescent periods (Barber & Harmon, 2002; Soenens & Vansteenkiste, 2010), the empirical work on how it functions in emerging adults is still limited (e.g., Liga et al., 2017). Previous evidence demonstrated that emerging adults' perceptions of their parents' extent of parental psychological control were highly correlated with their deficits in terms of self-efficacy (Givertz & Segrin, 2014), emotional regulation (Manzeske &

\* Corresponding author.

E-mail address: [maxiaole601@sxu.edu.cn](mailto:maxiaole601@sxu.edu.cn) (X. Ma).

Stright, 2009), life satisfaction (Faherty, Lowe, & Arnett, 2020) that conduce to coping successfully with emergency and adversity. Accordingly, we propose that parental psychological control impairs the healthy emotional reactivities to COVID-19 even for emerging adults.

In light of the examined literature, one potential mechanism for understanding the relationship between psychological control and maladaptive emotional reactivity to the current stressful public emergency might be empathy. Despite varied conceptualizations in previous literature, empathy is regarded as a multidimensional construct involving interrelated, yet distinct, affective and cognitive components (Cuff, Brown, Taylor, & Howat, 2016; Decety & Jackson, 2004). Cohen and Strayer (1996) defined empathy as one's ability to understand and share in another's emotional state or context. While empathy has been associated with more satisfying interpersonal outcomes and moral behaviors (e.g. Chow, Ruhl, & Buhrmester, 2013), recent research indicates a complex relationship between empathy and mental health development (Schreiter, Pijnenborg, & Rot, 2013).

Cognitive empathy represents the ability to understand and mentalize another's perspectives and affective states (Tully, Ames, Garcia, & Donohue, 2016). It is highly related to perspective taking, although the latter points to the tendency to spontaneously adopt the psychological point of view of others (Davis, 1983; Shamay-Tsoory, Aharon-Peretz, & Perry, 2009). Cognitive empathy (or perspective taking) has been negatively associated with depression (Bennik, Jeronimus, & Rot, 2019; Berecz, Tényi, & Herold, 2016; Schreiter et al., 2013). Besides, it also reveals a protective role of cognitive empathy in predicting higher self-esteem (Green, Missotten, Tone, & Luyckx, 2018). As suggested by existing theoretical accounts, individuals with higher cognitive empathy tend to assess situations or feelings from another person's perspective, allowing for a more objective and rational point of view and healthy empathic responses (Green et al., 2018).

Affective empathy can be defined as the degree to which someone vicariously experiences the feelings of another person (Schreiter et al., 2013). This experience may have two forms of consequences. First, empathic concern refers to experience of "other-oriented" compassion for another person. Second, personal distress (alternatively labeled empathic stress) represents experience of "self-oriented" negative feelings of distress in reaction to another's state or condition (Davis, 1983; Schreiter et al., 2013). Affective empathy may represent risk factors for depression (Calandri, Graziano, Testa, Cattellino, & Begotti, 2019; MacDonald & Price, 2019) and anxiety (Gambin & Sharp, 2016, 2018a) when present at extreme levels or in particular contexts. Specifically, one study claimed that no effect of empathic concern was found (Schreiter et al., 2013). Instead, individuals with higher personal distress may behave high level of self-focus, over-identification with others' difficult emotions, erroneous responsibility for others' suffering, resulting in the development of depression, anxiety, fear, stress and maladaptive behaviors (e.g., Gambin & Sharp, 2018b; Neumann, Chan, Wang, & Boyle, 2016; Schreiter et al., 2013; Smith & Rose, 2011; Tone & Tully, 2014; Tully et al., 2016). From a perspective of emotional contagion, a highly correlated concept with affective empathy, observation of emotions in one agent may trigger isomorphic states and feelings in a second agent automatically and primitively (Healey & Grossman, 2018; Preston & Waal, 2001). Consequently, the spread of information about other's infections or deaths and plenty of misinformation carrying negative emotion in relation to COVID-19 from social media may induce excessive empathic responses and exacerbate panic and depression among the public (Depoux et al., 2020; Kramer, Guillory, & Hancock, 2014).

Preliminary studies have yielded inconsistent results about associations between parental psychological control and empathy. Maternal control promotes preoccupation with one's personal distress, but reduces the tendency of empathic concern in emerging adults (Kanat-Maymon & Assor, 2010). Adolescent perceptions of parental psychological control predicted empathy through their perceptions of balanced connectedness with parents (Yoo, Feng, & Day, 2013). A recent

study also suggested that adolescent perception of parental psychological control predicted lower empathic concern indirectly with self-concept as a mediator, and lower perspective taking directly in early emerging adulthood (Choe, Lee, & Read, 2019).

Based on the SDT, satisfaction of one's autonomy needs induces sense of wellbeing, which promotes people to be less preoccupied with their own frustrations (Gagne, 2003; Ryan & Deci, 2000), while individuals under controlling parenting experienced much self-focused distressed feelings, leaving not enough psychological resources available to care for others in empathic ways. In addition, those under psychological control have been inevitably deprived of opportunities to identify and understand their own emotions, leading to difficulties in developing perspective taking capabilities (Choe et al., 2019).

In the present study, whether ones' perceived parental psychological control had a negative impact on the emotional reactivity to the COVID-19 pandemic through empathy for individuals in emerging adulthood was investigated. We assumed that parental psychological control would predict high personal distress and poor perspective taking, which in turn lead to maladaptive emotional reactivities in the pandemic. The effect of empathic concern was also examined to validate the existing evidence. In addition, women had increased risk for depression, anxiety, trauma-related and stress-related problems when compared to their male counterparts during the COVID-19 pandemic (Xiong et al., 2020). Gender differences on personal distress and empathic concern (but not perspective taking) have been observed as well (e.g., Grynberg, Luminet, Corneille, Grezes, & Berthoz, 2010). Thus, gender was controlled for in the analysis.

## 2. Methods

### 2.1. Participants

We adopted a cross-sectional design and a convenience sample was composed of 453 adults aged from 18 to 30 in China, who completed a web-based survey during the initial period of COVID-19 (Feb. 2020). This research was approved by the ethics committee from the relevant university (No. SXULL2020001) and all participants completed the informed consent form. After excluding invalid questionnaires (e.g., providing the same answer for every item), 445 (232 males) participants were included in the analysis, and the effective rate was 98.23%. Participants were lived in Shanxi ( $n = 328$ ), Sichuan ( $n = 49$ ), or other regions ( $n = 68$ ; e.g., Anhui, Fujian, Henan, Shandong). None of them were from Hubei, the most affected areas of COVID-19 in China.

### 2.2. Measures

#### 2.2.1. Parental psychological control

Parental psychological control was assessed by the 18-item Parental Psychological Control Scale (PPC, Wang, Pomerantz, & Chen, 2007). Participants were instructed to rate how often their parents exhibit parenting behavior like guilt induction, love withdrawal or authority assertion on a 5-point scale (1 = *never*; 5 = *always*). Scores were averaged to form an index, with higher scores indicating higher perception of parental psychological control. Cronbach's  $\alpha$  for this sample was 0.92.

#### 2.2.2. Empathy

Empathy was assessed by the 22-item of the Interpersonal Reactivity Index (IRI, Chan, 1986; Davis, 1983; Zhang, Dong, & Wang, 2010). Participants were instructed to rate how well each item describe themselves on a 5-point scale (1 = *does not describe me well*; 5 = *describes me very well*). Scores were averaged to form an index in subscale of *perspective taking* (IRI-PT), *empathic concern* (IRI-EC), and *personal distress* (IRI-PD) with higher scores reflecting greater empathy. *Fantasy* (IRI-FS) was not included in data analyses as it was unrelated (Gleichgerrcht & Decety, 2014). Cronbach's  $\alpha$  for this sample was 0.81

(0.80 for IRI-PT, 0.53 for IRI-EC, and 0.80 for IRI-PD).

### 2.2.3. Emotional reactivity

Emotional reactivity to COVID-19 was assessed by the 40-item abbreviated Profile of Mood States scale (POMS, Grove & Prapavessis, 1992; Zhu, 1995). The measurement consists of two subscales measuring positive emotions (POMS-P, i.e., esteem and vigor) and negative emotions (POMS-N, i.e., anger, confusion, depression, fatigue, and tension). For example, “tension” includes six adjectives (e.g., restless, nervous, on-edge). Participants were instructed to rate how much they experience each emotion in response to COVID-19 over the past week on a 5-point scale (0 = not at all; 4 = extremely). Scores were averaged for POMS-P/POMS-N, with higher scores indicating more positive/negative emotional reactivities, respectively. Cronbach’s  $\alpha$  for this sample was 0.94 (0.88 for POMS-P and 0.96 for POMS-N).

### 2.3. Analytic strategy

Data analyses were performed using SPSS 24.0. Spearman’s bivariate correlation analysis was carried out between PPC, POMS subscales, and IRI subscales. Variables with correlations reaching significance at the bivariate level were included in our mediation analyses using the PROCESS 3.3 macro in SPSS 24.0 software (Hayes, 2013). The analysis utilized 95% bias-corrected bootstrap confidence intervals (95% CIs) based on 5000 bootstrap samples to infer whether the effects in Model 4 were significant. If the 95% CIs did not include zero, the effect was regarded as significant (Gardner & Altman, 1986). All variables were standardized before data analyses.

## 3. Results

### 3.1. Descriptive statistics and correlations of variables

Table 1 presents the descriptive statistics, including means, standard deviations, and correlations for all variables. PPC was positively correlated with POMS-N but not POMS-P. IRI-PD (but not IRI-EC) was positively correlated with PPC, POMS-N and negatively correlated with POMS-P. IRI-PT was positively correlated with PPC and POMS-P. The *t*-tests examining gender as a possible covariate indicated gender difference on IRI-PD ( $t = -3.29; p = .001$ ), POMS-P ( $t = 4.02; p < .001$ ), and POMS-N ( $t = -2.91; p = .004$ ), with males reporting lower personal distress and more positive emotional reactivities to COVID-19. Therefore, the effect of the gender was controlled for in all subsequent analyses.

### 3.2. Testing for mediation effect

Although there was no direct association between PPC and POMS-P, the study performed the corresponding bootstrapping analysis in order to test the indirect pathway through the mediation of IRI-PT and IRI-

**Table 1**  
Descriptive statistics and correlations.

| Measure   | <i>M</i> | <i>SD</i> | 1        | 2         | 3        | 4        | 5     | 6 |
|-----------|----------|-----------|----------|-----------|----------|----------|-------|---|
| 1. PPC    | 2.47     | 0.76      | –        |           |          |          |       |   |
| 2. POMS-P | 1.63     | 0.76      | –0.048   | –         |          |          |       |   |
| 3. POMS-N | 0.81     | 0.69      | 0.263*** | –0.164*** | –        |          |       |   |
| 4. IRI-PT | 3.14     | 0.84      | 0.130**  | 0.190***  | 0.066    | –        |       |   |
| 5. IRI-EC | 3.77     | 0.60      | –0.055   | 0.030     | –0.015   | 0.374*** | –     |   |
| 6. IRI-PD | 2.45     | 0.85      | 0.227*** | –0.153**  | 0.428*** | 0.241*** | 0.017 | – |

Note. *N* = 445. PPC = parental psychology control; POMS-P = positive emotion; POMS-N = negative emotion; IRI-PT = perspective taking; IRI-EC = empathic concern; IRI-PD = personal distress.

\*\*  $p < .01$ .  
\*\*\*  $p < .001$ .

PD. As Table 2 shows, after controlling for gender, PPC was positively associated with IRI-PT ( $\beta = 0.14, t = 2.95, p < .01$ ) as well as IRI-PD ( $\beta = 0.24, t = 5.24, p < .001$ ). After IRI-PT and IRI-PD were taken into account, the effect of PPC were still not significant while  $R^2$  changed from 0.05 ( $p < .001$ ) to 0.13 ( $p < .001$ ). Results showed that the bootstrapped confidence interval did not include zero for IRI-PT (95% CI: 0.17, 0.36) and IRI-PD (95% CI: –0.29, –0.10), respectively. As Table 3 shows, the indirect effect of PPC on POMS-P through IRI-PT (indirect effect = 0.04, 95%CI = [0.01, 0.07]) and IRI-PD (indirect effect = –0.05, 95% CI = [–0.08, –0.02]) were significant. Taken together, our results suggested that IRI-PT positively mediated the relationship between PPC and POMS-P while IRI-PD mediated the association in an opposite way.

To test the possible indirect effect between PPC and POMS-N, mediating analysis was performed with IRI-PD as a mediator. After IRI-PD was taken into account, the effect of PPC was still significant while  $R^2$  changed from 0.12 ( $p < .001$ ) to 0.23 ( $p < .001$ ), which suggests partial mediation (Table 2). Results showed that the bootstrapped confidence interval (CI) did not include zero for IRI-PD (95% CI: 0.26, 0.44). As Table 3 shows, the indirect effect of PPC on POMS-N through IRI-PD is significant (indirect effect = 0.08, 95% CI = [0.05, 0.13]). Our hypothesis that IRI-PD partially mediates the relationship between PPC and POMS-N was supported. The analysis diagram is shown in Fig. 1.

## 4. Discussion

This study investigated empathy as an indirect effect of a hypothesized positive association between perceptions of parental psychological control and maladaptive emotional reactivity to COVID-19 pandemic in a sample of emerging adults in China. Results provided evidence that parental psychological control predicted negative emotional reactivity partially through improving personal distress. Individuals’ perception of parental psychological control predicted higher perspective taking, which then promoted their experience of positive emotion, although this effect was counteracted by personal distress’s mediating effect. Besides, the relationships among parental psychological control, empathic concern, and emotional reactivities to COVID-19 were not found.

In line with our expectations, parental psychological control directly predicts negative emotional reactivity to the pandemic, which supports the evidence that individuals under higher psychological control reported higher negative emotions (Cui, Morris, Criss, Houlberg, & Silk, 2014). The unhealthy self-concept, nonadaptive emotional regulation, inadequate coping abilities and poor volitional functioning might weaken one’s ability to exhibit adaptive forms of emotional reactivity to this coronavirus pandemic (Scharf & Goldner, 2018).

Most importantly, our results provided novel information that personal distress partially mediated the relationship between parental psychological control and maladaptive emotional reactivity. That is, parental psychological control promotes over-focus on ones’ own distress, leading to negative emotional reactivities to COVID-19. Integrated with the neuroanatomy evidence, perception-action model of empathy speculated that with the development of prefrontal cortex, the extent of the automatic forms of empathy (i.e., personal distress) would be regulated and controlled (Preston & Waal, 2001). The current results indicated parental psychological control leads to excessive self-regard tendency and promotes the “self-focused” distressed feelings of others’ emotion.

Results suggested that those with higher personal distress showed higher level of negative emotions and lower level of positive emotions. This lends further support to linking the personal distress to internalizing symptoms (Calandri et al., 2019; Neumann et al., 2016; Shu, Hassell, Weber, Ochsner, & Mobbs, 2017). Individuals who excessively share negative emotions of others may also be immersed in negative affect during COVID-19, thus experiencing depression, anxiety, and

**Table 2**  
Mediation analysis.

| Variable | Predictors | R <sup>2</sup> | F        | β     | SE   | t        | Boot LLCI | Boot ULCI |
|----------|------------|----------------|----------|-------|------|----------|-----------|-----------|
| IRI-PT   | Gender     | 0.02           | 4.69**   | -0.03 | 0.05 | -0.57    | -0.12     | 0.07      |
|          | PPC        |                |          | 0.14  | 0.05 | 2.95**   | 0.04      | 0.24      |
| IRI-PD   | Gender     | 0.08           | 19.46*** | 0.18  | 0.05 | 3.85***  | 0.09      | 0.27      |
|          | PPC        |                |          | 0.24  | 0.05 | 5.24***  | 0.15      | 0.33      |
| POMS-P   | Gender     | 0.13           | 16.37*** | -0.16 | 0.05 | -3.42*** | -0.24     | -0.07     |
|          | PPC        |                |          | -0.10 | 0.05 | -2.16    | -0.19     | 0.00      |
|          | IRI-PT     |                |          | 0.27  | 0.05 | 5.79***  | 0.17      | 0.36      |
|          | IRI-PD     |                |          | -0.19 | 0.05 | -4.05*** | -0.29     | -0.10     |
| POMS-N   | Gender     | 0.23           | 43.38*** | 0.10  | 0.04 | 2.43*    | 0.02      | 0.19      |
|          | PPC        |                |          | 0.23  | 0.04 | 5.30***  | 0.15      | 0.31      |
|          | IRI-PD     |                |          | 0.35  | 0.04 | 7.99***  | 0.26      | 0.44      |

Note. N = 445. PPC = parental psychology control; POMS-P = positive emotion; POMS-N = negative emotion; IRI-PT = perspective taking; IRI-PD = personal distress. The beta values are standardized coefficients. Gender was coded as male 0, female 1.

\* p < .05.  
\*\* p < .01.  
\*\*\* p < .001.

**Table 3**  
Indirect effects.

| Pathway                  | Effect | SE   | Boot LLCI | Boot ULCI |
|--------------------------|--------|------|-----------|-----------|
| Outcome variable: POMS-P |        |      |           |           |
| PPC-IRI-PT-POMS-P        | 0.04   | 0.01 | 0.01      | 0.07      |
| PPC-IRI-PD-POMS-P        | -0.05  | 0.01 | -0.08     | -0.02     |
| IRI-PT minus IRI-PD      | 0.08   | 0.02 | 0.04      | 0.13      |
| Outcome variable: POMS-N |        |      |           |           |
| PPC-IRI-PD-POMS-N        | 0.08   | 0.02 | 0.05      | 0.13      |

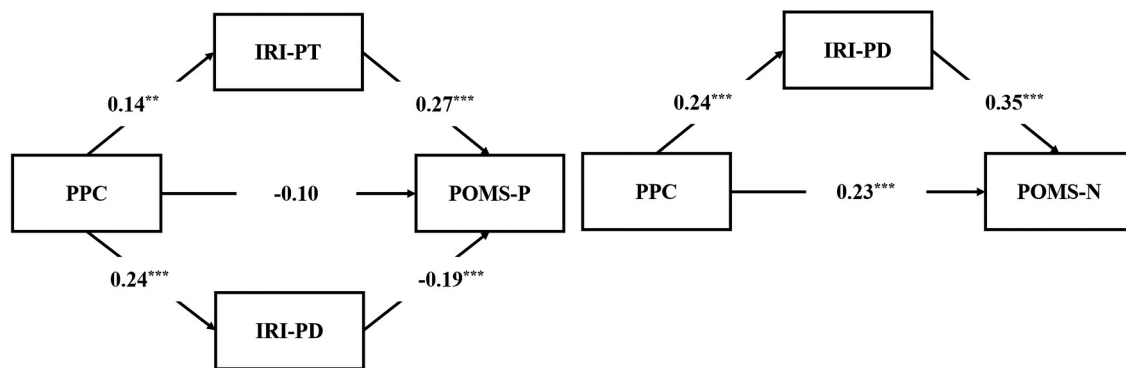
Note. N = 445. PPC = parental psychology control; POMS-P = positive emotion; POMS-N = negative emotion; IRI-PT = perspective taking; IRI-PD = personal distress.

stress together with less vigor and positive emotions to some extent. The current study also yielded nuanced findings regarding the impact of parental psychological control on perspective taking and empathic concern development, which may expand the existing knowledge. Contrary to our expectations, parental psychological control did not weaken individual's empathic concern toward others in the present study, which was also supported by previous study (Schreiter et al., 2013). A possible explanation is that the effects of perceived parental psychological control are culture-dependent. Family systems theories highlight the importance of flexible family structures, boundaries, and power distribution for the healthy development in personal growth, which varies as a function of cultural context (Rothbaum, Rosen, Ujije, & Uchida, 2002). In the collectively oriented familial contexts, parental psychological control can be perceived as an acceptable behavior

conveying parental love, which is conducive to their maintained empathic concern abilities in early emerging adulthood even though they tend to be self-focused and emotional susceptible.

This may also explain the positive link between parental psychological control and perspective taking. Additionally, when parents expressed what they were thinking and feeling, it would facilitate one's socialization process (Fung & Lau, 2012). An alternative explanation was that parental psychological control might alienate child's true self. Individuals may perceive psychological control as an indication that violates one's own autonomy but they still may adopt parents' perspective when they comply with parents' norms. One might be accustomed to please others and to stand on others' shoes if a person exposed to parental psychological control does not want to disappoint others (Fung & Lau, 2012). Our findings did not reveal an association between perspective taking and negative emotional reactivity, which was supported by a recent study (MacDonald & Price, 2019). However, perspective taking was found to be associated with positive emotions. It was proved that individuals with better perspective taking abilities are less likely to ruminate and more likely to do well in emotional regulation, thus resulting in higher levels of well-being as well as positive affect (Rueda, Fernández-Berrocal, & Schonert-Reichl, 2014).

The purpose of this study is to deepen our understanding of individual emotional reactions during the initial stage of the epidemic and potential risk factors like specific personality features. To the best of our knowledge, this study is the first to examine the mediation effect of empathy between perceived parental psychological control and emotional reactions during COVID-19, which distills the mechanisms through which parental psychological control hampers healthy



**Fig. 1.** Diagram for the path models controlling for participant gender. Note. N = 445. PPC = parental psychology control; POMS-P = positive emotion; POMS-N = negative emotion; IRI-PT = perspective taking; IRI-PD = personal distress. Values are standardized path coefficients.  
\*\*p < .01. \*\*\*p < .001.



emotional reactivities. The results of this study also provide a comparatively complete picture of the parental psychological control and empathy during the developmental time frame of emerging adulthood (e.g., Kanat-Maymon & Assor, 2010). Considering that individuals with extreme personal distress and low perspective taking are more likely to present emotional issues in the period of epidemics, these dimensions of empathy could be potential factors of prevention and intervention processes. Groups identified as at higher risk of declines in mental health during COVID-19 would still remain at heightened risks for severe mental health problems in other stressful situations, so priority should be given to prevention of mental disorders (e.g. major depressive disorder) in vulnerable populations. As for family education, parents should know that an improvement in parenting behavior would be beneficial for their children's adjustment outcomes.

Nonetheless, the following limitations were present. First, our study only relies on self-reported measures and this might have partially biased the results by reason of shared method variance. Future studies should incorporate measures from multiple informants. Second, we had no opportunity to assess the mental health of our participants before COVID-19. The cross-sectional research also limits the possibility to interpret the directionality of the relations. Longitudinal investigations on this topic will be useful in the further study. Furthermore, there has been an ongoing discussion as to whether the detrimental effects of psychological control techniques are cultural-dependent. Studies with a larger sample across different culture are necessary in order to confirm the preliminary results of the present study. The future study should include other descriptive information about the sample (i.e. marital status, number of dependents, family status) to explore the protentional confounders.

## 5. Conclusion

This study examines the potential risk factors for declines in mental health during COVID-19 and represents a new attempt to explore the mediating role of empathy in the association between parental psychological control and emotional reactivity among emerging adults. A partial indirect effect of parental psychological control on the negative emotional reactivity through personal distress is found. The results surprisingly indicate that parental psychological control improves perspective taking abilities, which functions as a protective factor against the negative prediction of personal distress on positive emotion reactivity. The current findings contribute to a better understanding of empathy development and its effect on mental health problems in COVID-19. It also provides some thoughts for conducting effective measures to protect individuals from adverse psychological impacts during the current coronavirus disease and future public emergency.

## CRedit authorship contribution statement

**Xiaole Ma:** Conceptualization, Methodology, Investigation, Formal analysis, Writing - original draft, Writing - review & editing. **Xingchao Wang:** Conceptualization, Formal analysis, Writing - review & editing.

## Declaration of competing interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

## Acknowledgements

This work was supported by Program for the Philosophy and Social Sciences Research of Higher Learning Institutions of Shanxi, China (2019W003).

## References

- Barber, B. K. (1996). Parental psychological control: Revisiting a neglected construct. *Child Development*, 67(6), 3296–3319. <https://doi.org/10.1111/j.1467-8624.1996.tb01915.x>.
- Barber, B. K., & Harmon, E. L. (2002). Violating the self: Parental psychological control of children and adolescents. In B. K. Barber (Ed.), *Intrusive parenting: How psychological control affects children and adolescents* (pp. 15–52). American Psychological Association. <https://doi.org/10.1037/10422-002>.
- Bennik, E. C., Jeronimus, B. F., & Rot, M. A. H. (2019). The relation between empathy and depressive symptoms in a Dutch population sample. *Journal of Affective Disorders*, 242, 48–51. <https://doi.org/10.1016/j.jad.2018.08.008>.
- Berecz, H., Tényi, T., & Herold, R. (2016). Theory of mind in depressive disorders: A review of the literature. *Psychopathology*, 49(3), 125–134. <https://doi.org/10.1159/000446707>.
- Brooks, S. K., Webster, R. K., Smith, L. E., Woodland, L., Wessely, S., Greenberg, N., & Rubin, G. J. (2020). The psychological impact of quarantine and how to reduce it: Rapid review of the evidence. *The Lancet*. [https://doi.org/10.1016/S0140-6736\(20\)30460-8](https://doi.org/10.1016/S0140-6736(20)30460-8).
- Calandri, E., Graziano, F., Testa, S., Cattelino, E., & Begotti, T. (2019). Empathy and depression among early adolescents: The moderating role of parental support. *Frontiers in Psychology*, 10, 1447. <https://doi.org/10.3389/fpsyg.2019.01447>.
- Chan, C. (1986). *The relations between age, sex-role, orientation of human and empathy*. Unpublished thesis/Taipei: Department of Education, National Chengchi University.
- Choe, S. Y., Lee, J. O., & Read, S. J. (2019). Self-concept as a mechanism through which parental psychological control impairs empathy development from adolescence to emerging adulthood. *Social Development*, 29(3), 713–731. <https://doi.org/10.1111/sode.12431>.
- Chow, C. M., Ruhl, H., & Buhrmester, D. (2013). The mediating role of interpersonal competence between adolescents' empathy and friendship quality: A dyadic approach. *Journal of Adolescence*, 36(1), 191–200. <https://doi.org/10.1016/j.adolescence.2012.10.004>.
- Cohen, D., & Strayer, J. (1996). Empathy in conduct-disordered and comparison youth. *Developmental Psychology*, 32(6), 988–998. <https://doi.org/10.1037/0012-1649.32.6.988>.
- Cuff, B. M. P., Brown, S. J., Taylor, L., & Howat, D. J. (2016). Empathy: A review of the concept. *Emotion Review*, 8(2), 144–153. <https://doi.org/10.1177/1754073914558466>.
- Cui, L., Morris, A. S., Criss, M. M., Houlberg, B. J., & Silk, J. S. (2014). Parental psychological control and adolescent adjustment: The role of adolescent emotion regulation. *Parenting*, 14(1), 47–67. <https://doi.org/10.1080/15295192.2014.880018>.
- Davis, M. H. (1983). Measuring individual differences in empathy: Evidence for a multidimensional approach. *Journal of Personality and Social Psychology*, 44(1), 113–126. <https://doi.org/10.1037/0022-3514.44.1.113>.
- Decety, J., & Jackson, P. L. (2004). The functional architecture of human empathy. *Behavioral and Cognitive Neuroscience Reviews*, 3(2), 71–100. <https://doi.org/10.1177/1534582304267187>.
- Deci, E. L., & Ryan, R. M. (2008). Self-determination theory: A macrotheory of human motivation, development, and health. *Canadian Psychology/Psychologie Canadienne*, 49(3), 182–185. <https://doi.org/10.1037/a0012801>.
- Depoux, A., Martin, S., Karafillakis, E., Preet, R., Wilder-Smith, A., & Larson, H. (2020). The pandemic of social media panic travels faster than the COVID-19 outbreak. *Journal of Travel Medicine*, 27(3). <https://doi.org/10.1093/jtm/taaa031>.
- Faherty, A. N., Lowe, K., & Arnett, J. J. (2020). Mind games: Parental psychological control and emerging adults' adjustment. *Journal of Social and Personal Relationships*, 37(2), 695–714. <https://doi.org/10.1177/0265407519877240>.
- Feeney, B. C., & Collins, N. L. (2015). A new look at social support: A theoretical perspective on thriving through relationships. *Personality and Social Psychology Review*, 19(2), 113–147. <https://doi.org/10.1177/1088868314544222>.
- Fung, J., & Lau, A. S. (2012). Tough love or hostile domination? Psychological control and relational induction in cultural context. *Journal of Family Psychology*, 26(6), 966–975. <https://doi.org/10.1037/A0030457>.
- Gagne, M. (2003). The role of autonomy support and autonomy orientation in prosocial behavior engagement. *Motivation and Emotion*, 27(3), 199–223. <https://doi.org/10.1023/A:1025007614869>.
- Gambin, M., & Sharp, C. (2016). The differential relations between empathy and internalizing and externalizing symptoms in inpatient adolescents. *Child Psychiatry & Human Development*, 47(6), 966–974. <https://doi.org/10.1007/s10578-016-0625-8>.
- Gambin, M., & Sharp, C. (2018a). Relations between empathy and anxiety dimensions in inpatient adolescents. *Anxiety Stress and Coping*, 31(4), 447–458. <https://doi.org/10.1080/10615806.2018.1475868>.
- Gambin, M., & Sharp, C. (2018b). The relations between empathy, guilt, shame and depression in inpatient adolescents. *Journal of Affective Disorders*, 241, 381–387. <https://doi.org/10.1016/j.jad.2018.08.068>.
- Gardner, M. J., & Altman, D. G. (1986). Confidence intervals rather than p values: Estimation rather than hypothesis testing. *BMJ*, 292(6522), 746–750. <https://doi.org/10.1136/BMJ.292.6522.746>.
- Givertz, M., & Segrin, C. (2014). The association between overinvolved parenting and young adults' self-efficacy. *Psychological Entitlement, and Family Communication*, 41(8), 1111–1136. <https://doi.org/10.1177/0093650212456392>.
- Gleichgerrcht, E., & Decety, J. (2014). The relationship between different facets of empathy, pain perception and compassion fatigue among physicians. *Frontiers in Behavioral Neuroscience*, 8, 243. <https://doi.org/10.3389/fnbeh.2014.00243>.
- Green, L. M., Missotten, L., Tone, E. B., & Luyckx, K. (2018). Empathy, depressive symptoms, and self-esteem in adolescence: The moderating role of the

- mother–adolescent relationship. *Journal of Child and Family Studies*, 27(12), 3964–3974. <https://doi.org/10.1007/S10826-018-1216-Z>.
- Greenberg, N., Docherty, M., Gnanaprasam, S., & Wessely, S. (2020). Managing mental health challenges faced by healthcare workers during covid-19 pandemic. *BMJ*, 368. <https://doi.org/10.1136/BMJ.M1211>.
- Grove, J. R., & Prapavessis, H. (1992). Preliminary evidence for the reliability and validity of an abbreviated Profile of Mood States. *International Journal of Sport Psychology*, 23(2), 93–109.
- Grynberg, D., Luminet, O., Corneille, O., Grezes, J., & Berthoz, S. (2010). Alexithymia in the interpersonal domain: A general deficit of empathy? *Personality and Individual Differences*, 49(8), 845–850. <https://doi.org/10.1016/J.PAID.2010.07.013>.
- Hayes, A. F. (2013). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach*.
- Healey, M. L., & Grossman, M. (2018). Cognitive and affective perspective-taking: Evidence for shared and dissociable anatomical substrates. *Frontiers in Neurology*, 9, 491. <https://doi.org/10.3389/FNEUR.2018.00491>.
- Jovančević, A., & Miličević, N. (2020). Optimism-pessimism, conspiracy theories and general trust as factors contributing to COVID-19 related behavior – A cross-cultural study. *Personality and Individual Differences*, 167, 110216. <https://doi.org/10.1016/j.paid.2020.110216>.
- Kanat-Maymon, M., & Assor, A. (2010). Perceived maternal control and responsiveness to distress as predictors of young adults' empathic responses. *Personality and Social Psychology Bulletin*, 36(1), 33–46. <https://doi.org/10.1177/0146167209347381>.
- Kramer, A. D. I., Guillory, J. E., & Hancock, J. T. (2014). Experimental evidence of massive-scale emotional contagion through social networks. *Proceedings of the National Academy of Sciences of the United States of America*, 111(24), 8788–8790. <https://doi.org/10.1073/PNAS.1320040111>.
- Liga, F., Ingoglia, S., Inguglia, C., Lo Coco, A., Lo Cricchio, M. G., Musso, P., ... Gutow, M. R. (2017). Associations among psychologically controlling parenting, autonomy, relatedness, and problem behaviors during emerging adulthood. *The Journal of Psychology*, 151(4), 393–415. <https://doi.org/10.1080/00223980.2017.1305323>.
- MacDonald, H. Z., & Price, J. L. (2019). The role of emotion regulation in the relationship between empathy and internalizing symptoms in college students. *Mental Health & Prevention*, 13, 43–49. <https://doi.org/10.1016/j.mhp.2018.11.004>.
- Mann, F. D., Krueger, R. F., & Vohs, K. D. (2020). Personal economic anxiety in response to COVID-19. *Personality and Individual Differences*, 167, Article 110233. <https://doi.org/10.1016/j.paid.2020.110233>.
- Manzeske, D. P., & Stright, A. D. (2009). Parenting styles and emotion regulation: The role of behavioral and psychological control during young adulthood. *Journal of Adult Development*, 16(4), 223. <https://doi.org/10.1007/s10804-009-9068-9>.
- Neumann, D. L., Chan, R. C. K., Wang, Y., & Boyle, G. J. (2016). Cognitive and affective components of empathy and their relationship with personality dimensions in a Chinese sample. *Asian Journal of Social Psychology*, 19(3), 244–253. <https://doi.org/10.1111/AJSP.12138>.
- Preston, S. D., & Waal, F. B. M. d. (2001). Empathy: Its ultimate and proximate bases. *Behavioral and Brain Sciences*, 25(1), 1–20. <https://doi.org/10.1017/S0140525X02000018>.
- Qiu, J., Shen, B., Zhao, M., Wang, Z., Xie, B., & Xu, Y. (2020). A nationwide survey of psychological distress among Chinese people in the COVID-19 epidemic: Implications and policy recommendations. *General Psychiatry*, 33(2), <https://doi.org/10.1136/gpsych-2020-100213>.
- Rothbaum, F., Rosen, K., Ujiie, T., & Uchida, N. (2002). Family systems theory, attachment theory and culture. *Family Process*, 41(3), 328–350. <https://doi.org/10.1111/J.1545-5300.2002.41305.X>.
- Rueda, P., Fernández-Berrocal, P., & Schonert-Reichl, K. A. (2014). Perspective-taking and empathic concern as mediators for happiness and positive affect in adolescents with and without asperger syndrome. *Journal of Developmental and Physical Disabilities*, 26(6), 717–735. <https://doi.org/10.1007/S10882-014-9391-3>.
- Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*, 55(1), 68–78. <https://doi.org/10.1037/0003-066X.55.1.68>.
- Scharf, M., & Goldner, L. (2018). “If you really love me, you will do/be...”: Parental psychological control and its implications for children's adjustment. *Developmental Review*, 49, 16–30. <https://doi.org/10.1016/j.dr.2018.07.002>.
- Schreier, S., Pijnenborg, G. H. M., & aaa het Rot, M. (2013). Empathy in adults with clinical or subclinical depressive symptoms. *Journal of Affective Disorders*, 150(1), 1–16. <https://doi.org/10.1016/J.JAD.2013.03.009>.
- Shamay-Tsoory, S. G., Aharon-Peretz, J., & Perry, D. (2009). Two systems for empathy: A double dissociation between emotional and cognitive empathy in inferior frontal gyrus versus ventromedial prefrontal lesions. *Brain*, 132(3), 617–627. <https://doi.org/10.1093/BRAIN/AWN279>.
- Shu, J., Hassell, S., Weber, J., Ochsner, K. N., & Mobbs, D. (2017). The role of empathy in experiencing vicarious anxiety. *Journal of Experimental Psychology General*, 146(8), 1164–1188. <https://doi.org/10.1037/XGE0000335>.
- Smith, R. L., & Rose, A. J. (2011). The “cost of caring” in youths' friendships: Considering associations among social perspective taking, co-rumination, and empathetic distress. *Developmental Psychology*, 47(6), 1792–1803. <https://doi.org/10.1037/A0025309>.
- Soenens, B., & Vansteenkiste, M. (2010). A theoretical upgrade of the concept of parental psychological control: Proposing new insights on the basis of self-determination theory. *Developmental Review*, 30(1), 74–99. <https://doi.org/10.1016/j.dr.2009.11.001>.
- Somma, A., Gialdi, G., Krueger, R. F., Markon, K. E., Frau, C., Lovallo, S., & Fossati, A. (2020). Dysfunctional personality features, non-scientific supported causal beliefs, and emotional problems during the first month of the COVID-19 pandemic in Italy. *Personality and Individual Differences*, 165, Article 110139. <https://doi.org/10.1016/J.PAID.2020.110139>.
- Tang, W., Hu, T., Yang, L., & Xu, J. (2020). The role of alexithymia in the mental health problems of home-quarantined university students during the COVID-19 pandemic in China. *Personality and Individual Differences*, 165, Article 110131. <https://doi.org/10.1016/J.PAID.2020.110131>.
- Tone, E. B., & Tully, E. C. (2014). Empathy as a “risky strength”: A multilevel examination of empathy and risk for internalizing disorders. *Development and Psychopathology*, 26, 1547–1565. <https://doi.org/10.1017/S0954579414001199>.
- Tully, E. C., Ames, A. M., Garcia, S. E., & Donohue, M. R. (2016). Quadratic associations between empathy and depression as moderated by emotion dysregulation. *The Journal of Psychology*, 150(1), 15–35. <https://doi.org/10.1080/00223980.2014.992382>.
- Wang, C., Pan, R., Wan, X., Tan, Y., Xu, L., Ho, C. S. H., & Ho, R. C. M. (2020). Immediate psychological responses and associated factors during the initial stage of the 2019 coronavirus disease (COVID-19) epidemic among the general population in China. *International Journal of Environmental Research and Public Health*, 17(5), <https://doi.org/10.3390/IJERPH17051729>.
- Wang, Q., Pomerantz, E. M., & Chen, H. C. (2007). The role of parents' control in early adolescents' psychological functioning: A longitudinal investigation in the United States and China. *Child Development*, 78(5), 1592–1610. <https://doi.org/10.1111/j.1467-8624.2007.01085.x>.
- Wu, Z., & McGoogan, J. M. (2020). Characteristics of and important lessons from the coronavirus disease 2019 (COVID-19) outbreak in China: Summary of a report of 72 314 cases from the chinese center for disease control and prevention. *JAMA*, 323(13), 1239–1242. <https://doi.org/10.1001/JAMA.2020.2648>.
- Xiong, J., Lipsitz, O., Nasri, F., Lui, L. M. W., Gill, H., Phan, L., & Majeed, A. (2020). Impact of COVID-19 pandemic on mental health in the general population: A systematic review. *Journal of Affective Disorders*, 277, 55–64. <https://doi.org/10.1016/J.JAD.2020.08.001>.
- Yoo, H., Feng, X., & Day, R. D. (2013). Adolescents' empathy and prosocial behavior in the family context: A longitudinal study. *Journal of Youth and Adolescence*, 42(12), 1858–1872. <https://doi.org/10.1007/s10964-012-9900-6>.
- Zhang, F.-f., Dong, Y., & Wang, K. (2010). Reliability and validity of the Chinese version of the Interpersonal Reactivity Index-C. *Chinese Journal of Clinical Psychology*, 18(2), 155–157.
- Zhang, S. X., Wang, Y., Rauch, A., & Wei, F. (2020). Unprecedented disruption of lives and work: Health, distress and life satisfaction of working adults in China one month into the COVID-19 outbreak. *Psychiatry Research Neuroimaging*, 288, 112958. <https://doi.org/10.1016/J.PSYCHRES.2020.112958>.
- Zhu, B. L. (1995). Brief introduction of POMS scale and its model for China. *Journal of Tianjin Institute of Physical Education*, 10(1), 35–37.