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**The Cost and Benefit of Fear Induction Parenting on Children's Health during the  
COVID-19 Outbreak**

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## Abstract

**Objective.** The outbreak of the 2019 coronavirus disease (COVID-19) was an unprecedented global public health emergency with a significant psychological toll. This study aimed to understand how specific COVID-19 related stressors contributed to Chinese parents' fear induction practices, and how these practices, in turn, contributed to their children's disease prevention practices during the outbreak and depressive symptoms after the outbreak.

**Method.** Parents ( $N=240$ ,  $M_{age}=38.50$  years, 75% mothers) with elementary-school-aged children ( $M_{age}=9.48$  years, 46% girls) in Wenzhou, one of the most impacted cities in China, reported on the presence of confirmed or suspected cases in their communities, their frequencies of consuming COVID-19-related information, fear induction practices, and their children's trait anxiety and disease prevention practices during the outbreak (January 28 to 30, 2020). Child-reported depressive symptoms were collected between March 7 and 11, 2020, during which there were very few remaining cases and no new confirmed cases or deaths.

**Results.** Parents' higher frequency of virus-related information consumption but not the presence of community infection was associated with their engagement in more fear induction practices, which was in turn associated with children's greater engagement in prevention practices during the outbreak, but more post-quarantine depressive symptoms. Child trait anxiety exacerbated the association between parent fear induction and child depressive symptoms.

**Conclusion.** Using fear induction parenting may promote children's willingness to cooperate and participate in disease prevention practices during the crisis but at the cost of children's long-term mental health.

**Keywords:** COVID-19; parenting; fear induction; child depressive symptoms; child trait anxiety

## **Introduction**

The outbreak of the 2019 coronavirus disease (COVID-19) has caused an unprecedented public health emergency around the world. Family life has changed dramatically during the social-distancing period. Parents and children are living with increased stress, anxiety, and fear (Cluver et al., 2020). Children are particularly vulnerable during periods of school closure due to the lack of physical activities, structured routines, and social support from peers and teachers as well as increased risk of experiencing psychological problems (Liu et al., 2020; Nagata, 2020). For example, one study documented that 43.7% of Chinese children reported depressive symptoms during the COVID-19 quarantine period, whereas the prior prevalence of depressive symptoms among this sample was 15.4% (Zhou et al., 2020). Parents and children in many countries spend significantly more time interacting with each other during the prolonged period of quarantine. Therefore, examining parenting and its effects on children in the context of the COVID-19 pandemic is of significant theoretical and practical importance.

To protect their children during this health emergency, parents may be more inclined to socialize their children about the health risks caused by the disease to promote children's disease prevention practices. Specifically, in conditions of threat, parents may use psychologically controlling parenting practices, such as inducing fear, with their children to promote their cooperation and compliance during the pandemic (Grolnick & Pomerantz, 2009), which may have further behavioral and psychological consequences in children (Pinquart, 2017a, 2017b). The current study examined how COVID-19 related stressors may contribute to Chinese parents' use of fear induction practices to socialize their children during the outbreak. In addition, we explored whether Chinese parents' fear induction contributed to their children's disease prevention practices during the outbreak and depressive symptoms after the outbreak. Finally, we examined the moderating role of child trait anxiety in the

associations between parental fear induction practices and child disease prevention practices and depressive symptoms.

### **Parent Fear Induction during the COVID-19 Pandemic**

Studies have revealed increased parenting stress, decreased parental mental health, and their associations with child maladjustment during the COVID-19 pandemic (e.g., Hiraoka & Tomoda, 2020; Whittle et al., 2020). Some recent studies have also examined the associations between context-specific parenting practices and child outcomes during the COVID-19 pandemic. For example, increased parental stress and poor parental mental health during the pandemic were associated with higher child abuse potential (Brown et al., 2020). Romero et al. (2020) found parents' perceived distress during the COVID-19 pandemic negatively contributed to child adjustment through decreased parenting practices that appropriately inform children of the pandemic situation and maintain children's daily routine and structure in Spanish families. Domínguez et al. (2020) further found that these context-specific parenting practices mediated the associations between children's emotion regulation skills and their maintenance of daily routines during the pandemic. Marchetti et al. (2020) reported that parent distress during the pandemic was associated with child emotional symptoms through increased parent verbal hostility.

However, no studies have focused on context-specific parenting centering psychological control during the COVID-19 pandemic. Parental psychological control refers to parenting practices that manipulate and control children's emotional experiences to achieve parents' desirable socialization goals (Barber & Harmon, 2004). Parents use more psychological control when they face environmental risks, threats, and stressors (Cheah et al., 2016; Ungar, 2009). The current COVID-19 pandemic is a highly stressful event in which parents may be pressured to be decisive in protecting their children and apply urgent, emergency mode parenting strategies (Scharf & Goldner, 2018). Therefore, parents may be

more inclined to engage in psychologically controlling parenting such as fear induction with their children to achieve desirable socialization outcomes quickly under such time urgency and low-resourced situations.

Fear is the most prevalent emotional response during an epidemic outbreak (Eichelberger, 2007; Person et al., 2004). Fear induction, like other forms of psychological control, aims to achieve socialization goals through eliciting children's fear and anxiety. Parents may use strategies such as frequent sharing of COVID-19 related information, exaggerating the severity of the situation, and emphasizing the negative consequences of this disease to induce fear and consequently promote compliance and cooperation in their children during the COVID-19 outbreak. We define fear induction socialization as parents' engagement in practices that induce fear in children through exaggeration and exposing children to negative COVID-19-related information. Parents may use fear induction socialization purposefully to manipulate children's emotions and change children's behaviors, or they may use it non-purposefully as a reflection of their own emotional experiences and behavioral reaction in stressful situations. However, these fear induction socialization practices may elicit intensive emotional arousal and lead to further behavioral and psychological consequences in children (Soenens & Vansteenkiste, 2010). Therefore, we focused on parents' fear induction socialization practices during the pandemic and the consequences for children's behavior and mental health in the current study.

The roles of two COVID-19 related stressors in parents' use of such practices were examined in the current study: the presence of confirmed or suspected COVID-19 cases in parents' communities and parents' frequency of consuming COVID-19-related information. The presence of confirmed or suspected COVID-19 cases in parents' communities was proposed to be a primary stressor given that the virus is known to be highly contagious and spread primarily through person-to-person transmission (Wu et al., 2020). Ren et al. (2020)

found that adolescents living in communities with COVID-19 cases reported more depressive symptoms after the quarantine. In addition, consumption of COVID-19-related information may change individuals' perceptions of health risk and induce anxiety, fear, and frustration even among those without the disease (Kreuter & Strecher, 1995; Maunder et al., 2003). These COVID-19 related stressors may increase parents' anxiety, perceived risk, and further lead to parents' more fear induction practices during the crisis.

### **Parent Fear Induction and Child Outcomes**

Researchers usually examine parental psychological control and its consequences on child outcomes under normal circumstances. Few studies of parental psychological control have been conducted under a truly high-risk and high-stressed situation such as the current COVID-19 pandemic. Despite its detrimental effects on child development in the long term, parental psychological control may be effective in reaching desirable socialization goals and ensuring children's safety in the short term (Grolnick & Pomerantz, 2009). This effectiveness may be particularly valued by parents under high-risk circumstances (Scharf & Goldner, 2018). Specifically, parents' fear induction may serve as an alarm for children at the start of the pandemic. Parents' use of fear induction socialization may increase children's awareness and perceived risk of the situation, and facilitate children's participation in disease prevention practices. Therefore, we expected that parents' use of fear induction practices would be associated with children's more participation in disease prevention practices during the pandemic outbreak.

Depressive symptoms are one of the most common psychological distress reported after public crises and natural disasters (e.g., Fan et al., 2011; Hawryluck et al., 2004). Moreover, the lack of social interaction and outdoor activities for children during the prolonged social distancing period may introduce a high risk for developing depressive symptoms in children (Grippio et al., 2007; Ströhle, 2009). Psychologically controlling

parenting practices such as fear induction have been consistently found to be associated with children's internalizing and emotional problems (Pinquart, 2017b; Soenens & Vansteenkiste, 2010). Specifically, young children may be more frequently exposed to negative news and perceive more threats when their parents constantly use fear induction as a strategy for socialization (Costa et al., 2015). Parents' fear induction socialization may also add to children's existing frustration and hopelessness during the prolonged social-distancing period. Therefore, parents' fear induction practices were expected to contribute to more depressive outcomes in children after the outbreak.

### **Moderating Role of Child Trait Anxiety**

Developmental research has highlighted the interaction between individual characteristics and environmental influences in producing developmental outcomes (e.g., Bullock et al., 2018; Liu et al., 2015). Differential susceptibility model emphasizes individual differences in developmental plasticity and sensitivity such that children of certain attributes may be more vulnerable to detrimental contextual factors, or more likely to benefit from supportive conditions, or more susceptible to both adverse and supportive environmental influences (Belsky & Pluess, 2009). These variations in environmental sensitivity are attributed to individual differences in physiological and psychological reactivity towards environmental stimuli (Boyce & Ellis, 2005; Belsky, 2016). The most striking evidence supporting the individual-environment interactions comes from research on the interaction between child temperament and parenting (Rothbart & Bates, 2006). For example, children with more difficult temperamental characteristics are more likely to develop adjustment problems in the conditions of negative parenting but also profit more from supportive parenting in their social and cognitive development (Slagt et al., 2016).

Consistent with this idea, children with certain temperamental characteristics may be particularly vulnerable or resilient to fear inductive parenting practices during the outbreak.



We focused specifically on the role of child trait anxiety in moderating the efficacy of parent fear induction socialization in this study. Children's trait anxiety refers to their consistent and enduring disposition to experience anxiety in various situations (Endler & Kocovski, 2001). Individuals who score high on trait anxiety are more sensitive to environmental stressors and are more likely to develop psychological distress symptoms after adverse experiences (Jaksic et al, 2012; Kneer et al., 2019). Children who are temperamentally more anxious may be at higher risk of developing depressive symptoms during the quarantine period (Hensley & Varela, 2008). Furthermore, trait anxious children experience higher levels of emotional arousal and need more cognitive resources to manage negative emotions when emotionally challenged (Villada et al., 2016), whereas less anxious children might be more resilient and less sensitive to environmental stressors such as parental fear induction and experience fewer negative emotions during the pandemic. Therefore, we proposed that child trait anxiety would serve as a moderator and exacerbate the positive relation between parent fear induction and child depressive symptoms.

In contrast, whether child trait anxiety may moderate the relation between parent fear induction and child disease prevention practices was unclear. Trait anxious children may experience more anxiety and fear when their parents use fear induction practices to socialize them regarding the pandemic situation due to their increased sensitivity to environmental stimuli (Chen et al., 2015), leading them to engage in more disease prevention practices during the outbreak. However, trait anxiety is also associated with more internalized coping, less problem solving, and less behavioral engagement in emotionally challenging situations (Raffety et al., 1997; Wright et al., 2010). It is also possible that the increased fear and anxiety in children, especially trait anxious children, can be debilitating and prevent them from engaging behaviorally. Further, the association between child trait anxiety and disease prevention practices may be weaker than the association between child trait anxiety and

depressive symptoms. Trait anxiety, by definition, is more proximal to psychological distress than behavioral responses (Endler & Kocovski, 2001). Children's behavioral responses to a threat may be more closely related to parents' socialization and children's understanding of the situation (Croft et al., 2018). Indeed, young children rely heavily on parents' socialization and guidance to make behavioral responses to contextual influences (Anzman et al., 2010; Edwardson & Gorely, 2010), suggesting a more proximal association between children's disease prevention practices and parents' fear induction than children's temperament. Given limited evidence in the COVID-19 context, child trait anxiety was explored as a moderator in the relation between parents' fear induction and children's participation in prevention practices without an a-priori directional hypothesis.

### **The COVID-19 Outbreak in Wenzhou**

Given the variations in impact severity of COVID-19 across different cities, this study focused on a sample at the city level instead of the country level, which aligns with the specificity principle and the emphasis on the context in developmental science (Bornstein, 2017). Wenzhou is one of the most impacted cities in China due to its close business connection with Wuhan, the epicenter of the COVID-19 outbreak. The first COVID-19 case in Wenzhou was identified on January 20, 2020. The local government announced the first-level emergency on January 23, the same day when Wuhan went into lock-down, and implemented a stringent quarantine policy on February 1 in response to the rapid spread of the virus. The following lock-down measures were implemented from February 1 to February 17: (a) all schools, workplaces, and public spaces were closed; (b) all citizens were required to stay at home and only one person from each family was allowed to go out for necessities twice a week; (c) public transportation was closed and individuals were not allowed to enter or leave the city unless necessary; and (d) wearing face masks outdoors was mandatory. Beginning from February 17, lock-down measures (b) and (c) were stopped and lock-down

measure (a) was loosened, with some workplaces and public spaces (e.g., parks) reopened. There have not been any new confirmed cases or deaths in Wenzhou since February 22. The city government changed the first-level emergency to second-level on March 2. The city gradually began to resume normal activities with businesses (e.g., restaurants) and manufacturers reopening in early March. However, the following quarantine measures were still in place: schools remained closed, gathering size was restricted, wearing face masks in public space was mandatory, and citizens were encouraged to stay home and avoid unnecessary outdoor activities. As of March 13, 2020, the Centers for Disease Control and Prevention (CDC, 2020a) in Wenzhou reported a total of 504 infected cases, which is the largest number in all the cities outside of Hubei Province, where Wuhan is located. Figure 1 presents the COVID-19 development trajectory in Wenzhou and data collection time points.

### **Summary of the Present Study**

We examined how COVID-19 related stressors may contribute to young children's behavioral responses and mental health via parenting. Specifically, we aimed to: (a) investigate whether two types of acute COVID-19 related stressors (i.e., presence of confirmed or suspected cases in parents' communities and frequency of consuming virus-related information) contribute to parents' fear induction socialization practices; (b) test the links between parents' fear induction and children's engagement in disease prevention practices during the outbreak and depressive symptoms after the outbreak; (c) examine if the two COVID-19 related stressors may contribute to the child outcomes through the mediating role of fear induction parenting; and (d) investigate the moderating role of child anxiety in the associations between parents' fear induction and children's engagement in disease prevention practices during the outbreak and depressive symptoms after the outbreak. The present study focused on parents with elementary-school-aged children because young children are more likely to rely on their parents to develop an understanding of and reaction to the pandemic

situation, whereas adolescents can more independently seek information through various channels (e.g., social media).

Interviews were conducted with a sample of 20 parents in Wenzhou between January 24 and 26, 2020, to create a measure of parents' fear induction practices in response to the COVID-19 outbreak. We administered the first-round of surveys online at the early part of the outbreak, from January 28 to 30, 2020, before the quarantine, to capture greater variation in parents' information consumptions and fear induction practices. These variations may not manifest later due to vast media coverage and widespread panic. The follow-up survey was conducted when there were very few remaining COVID-19 cases in Wenzhou (March 7 to 11, 2020) to examine the relation between parents' fear induction practices and post-quarantine depressive symptoms in children.

The following hypotheses were proposed based on the existing literature reviewed above: (1) parents were expected to engage in more fear induction practices if there were confirmed or suspected cases in their communities or if they consumed COVID-19 related information more frequently; (2) parents' increased use of fear induction practices during the crisis was predicted to be associated with children's greater engagement in disease prevention practices during the outbreak and more depressive symptoms after the outbreak (one and a half months later); (3) the two COVID-19 related stressors were expected to contribute to more engagement in prevention practices during the crisis and more depressive symptoms after the crisis in children through the mediating role of parental fear induction practices; (4) child trait anxiety was expected to exacerbate the effect of parental fear induction on child depressive symptoms; and (5) the analyses regarding the moderation role of child trait anxiety in the relation between parental fear induction and child disease prevention practices were exploratory.

## **Method**

## Participants

A total of 261 parents participated in the study at wave 1. Twenty-one parents withdrew at wave 2. The demographic characteristics of these parents were not different from the rest of the sample. They were excluded from the analyses. Final sample included 240 parents ( $M_{\text{age}} = 38.50$  years,  $SD = 5.80$ , 75% mothers) and their elementary-school-aged children ( $M_{\text{age}} = 9.48$  years, ranging from 7 to 12 years,  $SD = 1.39$ , 46% girls) from the suburbs of Wenzhou, China. All parents and children were of Han ethnicity. The majority of the parents were married (97%) and of low- to middle-socioeconomic status (81%) with a monthly household income below RMB 8000 (around USD 1300). The highest education levels were elementary school or below for 12% of the parents, middle school for 38% of the parents, high school or equivalent for 42% of the parents, and college or above for 8% of the parents. None of the parents reported that their family members, close friends, or themselves had COVID-19 or were suspected of having COVID-19.

## Procedures

Parents were recruited from online communities of local schools and parent groups with the help of teachers and principals in local elementary schools in Wenzhou, China. Ethical approval was obtained from the [Blinded] Institutional Review Board. Consent was obtained online from parents and their children prior to the survey completion. Both parents and children completed the measures online. The first wave of data was collected from January 28 to 30, 2020 (T1), during which Wenzhou witnessed a steep rise of confirmed COVID-19 cases but the quarantine policy had not yet been implemented. Parents reported their families' demographic characteristics, the presence of confirmed or suspected COVID-19 cases in their communities, their frequency of consuming COVID-19-related information, engagement in fear induction practices, and their children's trait anxiety and prevention practices at T1. Child-reported depressive symptoms were collected between

March 7 and 11, 2020 (T2), during which there were no new confirmed cases or deaths reported and the official quarantine policy had ended in Wenzhou. Only parent-reported child prevention practices and trait anxiety were collected at T1 because the T1 survey was administrated in a highly-stressful period during which parents were reluctant to allow their children to participate in the study. However, as COVID-19 prevention practices (e.g., wash hands, wear face masks) were easy to observe, we deemed that parent-reported child prevention practices were accurate estimates of children's actual behaviors. Similarly, child-reported depressive symptoms were not collected at T1 because only parents participated in the T1 survey. The Western-based measures were translated and back-translated to ensure their comparability with the original English version.

Semi-structured interviews were conducted with a sample of 20 parents ( $M_{\text{age}} = 40.10$  years,  $SD = 4.17$ , 80% mothers) between January 24 and 26, 2020, to create a measure of parents' fear induction practices in response to the COVID-19 outbreak. These parents also participated in the following surveys and no difference was found between the interview sample and the overall sample for all variables in the study. We asked parents how they interacted with their children to socialize children of the current crisis and promote children's prevention practices in the interview.

## Measures

**COVID-19 Cases in the Community.** At T1, parents were asked four questions regarding whether there were confirmed or suspected COVID-19 cases or individuals under medical quarantine among their family members, close friends, communities or villages, and themselves. All questions were recorded as dichotomous variables (0 = *No*, 1 = *Yes*). All parents reported "No" for the three questions regarding themselves, family members, and close friends. Thirty of the 240 parents reported "Yes" at the community level. Therefore,

only the presence of confirmed or suspected cases in parents' communities was examined as a COVID-19 related stressor in the analyses.

**Parents' Information Consumption.** Parents reported how often they consumed COVID-19-related information from four different sources (media and social media, families and friends, schools and teachers, and communities and government) during the past a few days at T1. Each source item was rated on a five-point scale (1 = *never* to 5 = *very often*). The mean of the four items was calculated to represent parents' frequencies of consuming COVID-19-related information. The  $\alpha$  was .95 for the 4 items.

**Parents' Fear Induction Practices.** Five items (see below) that were representative of parents' responses from the semi-structured interviews and appropriate for the fear induction conceptualization were generated to assess parents' fear induction socialization practices during the COVID-19 outbreak. Two developmental psychology experts reviewed the items to confirm the face validity of the construct. At T1, parents were asked to rate how well the five fear induction items described their interactions with their children in order to promote children's disease prevention practices since the COVID-19 outbreak: (1) "I tell my child how dangerous and horrible the disease is," (2) "I tell my child how bad the situation is outside," (3) "I make sure my child understands there is a lot of pain for people who get infected (e.g., doctors, nurses, and patients)," (4) "I tell my child how horrible it would be if he/she gets infected," and (5) "I keep my child updated of the number of confirmed cases and COVID-19 related news every day." Each item was rated on a five-point scale (1 = *not at all* to 5 = *very much*) and the mean of the five items was calculated as parents' engagement in fear induction. The  $\alpha$  of the measure was .88 in the present sample. The unidimensionality of the construct was further confirmed with confirmatory factor analyses (CFA) using Mplus 8 (Muthén & Muthén, 2017). All five items were treated as ordinal variables and specified to load on one latent factor. Residuals of items 2 and 5 were allowed to correlate. The weighted

least square mean and variance adjusted (WLSMV) estimator was used to analyze the model. The CFA model yielded a good fit (CFI = 1.00, RMSEA = .01), with factor loadings of the items ranging from .76 to .87 in the CFA model. McDonald's Omega was calculated based on the factor loadings as a more accurate and unbiased estimate of the internal reliability (Dunn et al., 2014; Peters, 2014). The omega was .91 for the five items, indicating good reliability.

**Children's Participation in COVID-19 Prevention Practices.** Four items were designed to capture children's participation in COVID-19 specific prevention practices at T1. Specifically, parents rated how much their children *proactively and voluntarily* (1) "stay at home and practice social distancing," (2) "wear a face mask or engage in other necessary preventative actions when they go out," (3) "wash their hands more often," and (4) "pay attention to disease prevention guidelines." Each item was rated on a five-point scale (1 = *not at all* to 5 = *very much*). The mean of the four items was calculated to represent children's participation in COVID-19 prevention practices. The  $\alpha$  was .86 for the four items in the present sample. We conducted a CFA model using Mplus to test the unidimensionality of the four items. All four items were specified to load on one latent factor as ordinal variables and residuals of items 1 and 4 were allowed to correlate. WLSMV estimator was used to analyze the model (Li, 2016). The unidimensionality of the four items was confirmed in the CFA model (CFI = 1.00, RMSEA = .00), with the factor loadings ranging from .73 to .94. The omega was .92 for the four items, indicating good reliability.

**Children's Trait Anxiety.** Parents rated children's trait anxiety at T1 using the 20-item trait subscale of the State-Trait Anxiety Inventory for Children (STAIC; Spielberger & Gorsuch, 1973). STAIC is one of the most widely used child self-report measure for the assessment of child anxiety. It has been demonstrated to be reliable in Chinese samples (Cao & Liu, 2015). We used a modified parent-report version of STAIC (Strauss, 1987), which has also been demonstrated as valid and reliable for child anxiety assessment (Southam-Gerow et



al., 2003). Parents reported how frequently their children displayed enduring tendencies to experience anxiety under general situations rather than during the outbreak (e.g., “She/he worries about making mistakes”). Items were rated on a three-point scale (1 = *hardly* to 3 = *often*) and item mean was calculated to represent the construct. The  $\alpha$  was .90 in the current sample.

**Children’s Depressive Symptoms.** Children reported their depressive symptoms at T2 using the Center for Epidemiologic Studies Depression Scale for Children (CES-DC; Weissman et al., 1980). The CES-DC was designed to be friendly and easy to administer for young children. We asked parents with children from Grades 4 or lower Grades to read and explain the items to their children but allow children to provide answers independently. Teachers explained the task as part of the before-school preparation assignment and all students were requested to send a voice message to the teachers when they finished the questionnaires. Twenty items were used to assess children’s depressive symptoms within the past week on a four-point scale (0 = *rarely* to 3 = *most or all of the time*). Item mean was calculated to represent the construct. CES-DC has been demonstrated to be reliable and valid in a sample of Chinese children (Li et al., 2010). The  $\alpha$  was .84 in the current sample.

## Results

Less than 1% of the items were missing and they were missing completely at random, Little's MCAR test ( $\chi^2 = 1077.31$ ,  $df = 1260$ ,  $p = 1.00$ ). Multiple imputation with five iterations in SPSS was conducted before averaging the items to generate the constructs. The descriptive statistics and correlations among study variables are presented in Table 1. Parents’ information consumption was positively related to parents’ fear induction practices and children’s disease prevention practices. Parents’ fear induction practices were positively correlated with children’s trait anxiety, disease prevention practices, and depressive symptoms. Children’s depressive symptoms were positively correlated with their trait anxiety

and disease prevention practices. Surprisingly, the presence of confirmed or suspected COVID-19 cases in parents' communities was not correlated with any variables.

Parental fear induction practices were examined as a mediator in the associations between the two types of COVID-19 related stressors (i.e., the presence of confirmed or suspected COVID-19 cases in parents' communities and consumption of virus-related information) and child outcomes (i.e., disease prevention practices during the outbreak and depressive symptoms towards the end of the outbreak). The moderation effect of child trait anxiety was examined in the associations between parent fear induction and the two child outcomes. *Mplus* 8 (Muthén & Muthen, 2017) was used to analyze the moderated mediation model. Bayesian estimation was used to estimate the path model. The Bayesian approach to path analysis is endorsed over traditional frequentist analyses for various reasons, including more intuitive interpretation of credibility intervals (CI), incorporating prior knowledge for model estimation, better performance with small sample sizes, and higher accuracy for non-normal parameters such as interaction terms (Muthén & Asparouhov, 2012; Schoot et al., 2014). For instance, the CI under the Bayesian framework reflects a 95% probability that the estimated parameters lie between the lower and upper limits, whereas the correct interpretation for the classic frequentist-based confidence interval is that 95 out of 100 replications of the same study capture the true fixed parameter (Schoot et al., 2014). No specific priors were specified in the path model given the limited previous literature in the current topic. *Mplus* by default used the parameters estimated from the maximum likelihood estimator as the priors for the Bayesian model. We used the default 2 MCMC chains in *Mplus* and 40000 replicates to analyze the path model. Parent age, gender, education, and child age and gender were included as covariates in the paths to the mediator and the child outcomes. We also explored the potential moderating effects of these covariates and they did not moderate any associations between variables of interest. The overall structure and results

of the tested model are presented in Figure 2. The data used for the path model and the output files has been made public in Open Science Framework (doi: <https://osf.io/y256k/>) for replication purposes.

The Bayesian moderated mediation model yielded an acceptable fit: posterior predictive  $p = .36$ , CFI = .97 (95% CI [.95, .99]), TLI = 1.00 (95% CI [1.00, 1.00]), RMSEA = .05 (95% CI [.02, .08]). The model accounted for 10% (95% CI [5%, 17%]), 28% (95% CI [19%, 38%]), and 24% (95% CI [15%, 34%]) of variances for parental fear induction, child prevention practices, and child depressive symptoms, respectively. Hypothesis 1 was partially supported, such that parents' COVID-19 information consumption was positively associated with their fear induction practices ( $b = 0.14$ , Posterior  $SD = 0.04$ , 95% CI [0.06, 0.22]), whereas the presence of COVID-19 cases in parents' communities was not associated with their fear induction parenting ( $b = -0.13$ , Posterior  $SD = 0.17$ , 95% CI [-0.48, 0.22]). Hypothesis 2 was supported. Parental fear induction was positively associated with child disease prevention practices ( $b = 0.46$ , Posterior  $SD = 0.06$ , 95% CI [0.33, 0.58]) and depressive symptoms ( $b = 0.11$ , Posterior  $SD = 0.02$ , 95% CI [0.08, 0.15]). Hypothesis 4 was supported whereas the exploratory analyses regarding hypothesis 5 yielded a non-significant result. Child trait anxiety moderated the association between parental fear induction and child depressive symptoms ( $b = 0.09$ , Posterior  $SD = 0.04$ , CI [0.01, 0.17]) but not the association between parental fear induction and child disease prevention practices ( $b = -0.03$ , Posterior  $SD = 0.14$ , CI [-0.31, 0.23]). Therefore, the simple slopes were only probed for the relation between parental fear induction and child depressive symptoms.

### Simple Slopes

The interaction was probed at the mean, 1  $SD$  below the mean, and 1  $SD$  above the mean of child trait anxiety. Parents' more fear induction practices were associated with children's more depressive symptoms at high ( $b = 0.20$ , Posterior  $SD = 0.05$ , CI [0.11, 0.30])

and mean ( $b = 0.11$ , Posterior  $SD = 0.02$ , CI [0.08, 0.15]) levels of child trait anxiety, but not at low levels ( $b = 0.03$ , Posterior  $SD = 0.04$ , CI [-0.05, 0.11]). As such, parent fear induction socialization during the outbreak was more strongly related to child depressive symptoms at higher levels of child trait anxiety (see Figure 3).

### **Indirect Effects**

The indirect effects of community infection on neither child disease prevention practices nor child depressive symptoms were significant, which was different from what we expected in hypothesis 3. The direct relation between parental information consumption and child disease prevention practices was significant after accounting for parental fear induction ( $b = 0.11$ , Posterior  $SD = 0.04$ , CI [0.03, 0.18]). There was also a significant indirect effect from parent COVID-19 information consumption on child disease prevention practices through parental fear induction practices ( $ab = 0.06$ , Posterior  $SD = 0.02$ , CI [0.03, 0.11]). The direct relation between parental information consumption and child depressive symptoms was not significant ( $b = -0.01$ , Posterior  $SD = 0.01$ , CI [-0.03, 0.01]). The conditional indirect effect of parental information consumption on child depressive symptoms via the path of parental fear induction was tested from 2  $SD$  below the mean to 2  $SD$  above the mean of child trait anxiety. Parents' higher frequency of consuming virus-related information indirectly predicted more depressive symptoms in children via parents' fear induction practices when children's trait anxiety was higher than -0.6  $SD$  of the mean, with the indirect relation becoming stronger at higher levels of children's trait anxiety (see Figure 4). These results supported the part of hypothesis 3 regarding the indirect effect of parental information consumption.

### **Statistical Power**

Statistical power of the moderated mediation model was tested using Monte Carlo simulation in Mplus (Muthén & Muthén, 2002). We used 10000 replications with a sample

size of 240. The parameter estimates from the previously analyzed moderated mediation model were set as population values. Power was evaluated based on the proportion of the replications for which the significant effects can be detected. The power estimates for significant direct links between variables ranged from .80 to 1.00, indicating sufficient power for these effects. There was also sufficient power to detect the indirect effect of parent information consumption on child disease prevention practices (.94). However, the power estimate of the moderated mediation effect was .64, suggesting less power to detect this effect with the current sample size.

## **Discussion**

The current study provided empirical evidence of how COVID-19 related stressors may be related to elementary-school-aged children's behavioral responses and psychological distress through parenting during a public health emergency. Specifically, we examined how two types of COVID-19 related stressors during the COVID-19 outbreak (i.e., presence of confirmed/suspected case in parents' communities and frequency of consuming virus-related information) may contribute to children's disease prevention practices during the pandemic and post-quarantine depressive symptoms via parents' engagement in fear induction socialization.

As predicted, the frequency that parents reported consuming virus-related information was related to their engagement in fear induction practices to obtain their children's compliance with the public health safety recommendations. Individuals have been found to become more anxious and stressed regarding disease when they are frequently exposed to disease-related information (Rosen et al., 2010). Further, parents tend to use more controlling parenting when they perceive the situation as dangerous and uncontrollable (Grolnick et al., 2007; Ren et al., 2019). Constantly consuming virus-related information may add to parents' feelings of uncertainty, anxiety, and fear at the start of the crisis (Kreuter & Strecher, 1995;

Maunder et al., 2003). Therefore, these parents may use more fear induction socialization to control their children and ensure their children's health and safety (Scharf & Goldner, 2018). Further, parents may exaggerate the severity of the situation and expose their children to negative information as a way of expressing their stress and anxiety during self-quarantine. Surprisingly, the presence of confirmed or suspected cases in parents' communities was not related to parents' fear induction practices. This is likely due to the lack of variation of the community infection variable in the current sample. Because the first survey was conducted at the start of the crisis, only 30 of 240 parents reported the presence of COVID-19 cases in their communities, which precluded our ability to accurately reveal the effect of this variable. These results suggested that the consumption (or likely over-consumption) of virus-related information may be an important contextual stressor that can contribute to parents' increased fear induction socialization during the outbreak.

The findings also revealed that parents' increased use of fear induction practices was related to children's more participation in disease prevention practices during the outbreak. However, such parenting practices were also related to more depressive symptoms in children one and a half months later, towards the end of the outbreak. Parents may use psychologically controlling parenting practices, including inducing fear, to achieve desirable socialization goals like compliance in the short term when they are in high-risk contexts (Grolnick et al., 2007). Fear induction appeared to be effective in obtaining children's immediate cooperation and compliance at the early part of the outbreak, which can protect children from environmental health risks (Dearing, 2004; Scharf & Goldner, 2018). Children who received more fear induction socialization may have stronger motivations to comply with these health practices because they understanding the severity of the epidemic. Children may also fear the virus more and perceive more threats from the virus when their parents use exaggeration and negative information to induce fear during the crisis. Further, parents who endorsed fear

induction socialization during the pandemic may be more controlling and demanding in general (Barber & Harmon, 2004; Scharf & Goldner, 2018), and their children may feel forced to engage in disease prevention practices. Therefore, children may be more proactive in practicing prevention with parents' increased use of fear induction practices.

Further, parenting practices that manipulate and intrude in children's emotional experiences are associated with adverse psychological outcomes in children (Pinquart, 2017b; Soenens & Vansteenkiste, 2010). Specifically, despite its associations with more disease prevention practices in children, parents' fear induction practices may create a sustained unsettling and stressful climate for children during the prolonged quarantine period (Barber & Harmon, 2004). Young children may not be able to develop an appropriate understanding of the severity of the epidemic outbreak due to parents' exaggeration of the situation. Children may also feel overwhelmed by the negative news that their parents share and experience more hopelessness during the outbreak. Therefore, parents' greater use of fear induction practices may be associated with more post-quarantine depressive symptoms in children.

Importantly, this association between parents' greater use of fear induction practices and higher levels of children's post-quarantine depressive symptoms was moderated by children's trait anxiety. Interestingly, this moderation effect was not found for the relation between parent fear induction and child prevention practices. Trait anxious children are more sensitive to environmental stressors and may be more susceptible to developing depressive symptoms after the quarantine period (Weems et al., 2007). Parents' fear induction may provoke more negative emotional arousal in more trait anxious children (Field & Price-Evans, 2009), which may be detrimental to children's daily psychological functioning over time. Further, trait anxious children may have more difficulties coping with the increased anxiety and hopelessness elicited by parents' fear induction (Villada et al., 2016). Therefore, children

who are temperamentally prone to being anxious are more likely to develop depressive symptoms after the quarantine when their parents endorsed more fear induction socialization during the outbreak.

In contrast, young children are highly dependent on parents' socialization when making behavioral decisions in high-risk contexts (Anzman et al., 2010; Edwardson & Gorely, 2010). We observed a moderate to large effect size of parent fear induction on child prevention practices in the current study ( $b = 0.46, f^2 = 0.24$ ; Cohen, 2013). There might be a ceiling effect for children's engagement in prevention practices when their parents use fear to increase children's cooperation in the context of a highly stressful, life-threatening epidemic outbreak. The strong concurrent association between parent fear induction and child engagement in prevention practices may thus not be moderated by child trait anxiety.

Parents' frequency of consuming COVID-19 information indirectly contributed to children's disease prevention practices and depressive symptoms through parents' fear induction practices. Parents endorsed fear induction as a strategy to socialize their children when they are frequently exposed to environmental stressors such as negative news and rapidly increasing COVID-19 cases. In turn, using fear induction practices may be effective in the short term as it leads to children's immediate compliance and cooperation. However, fear induction may be detrimental to children's psychological well-being after the crisis, especially when the child is temperamentally anxious. Notably, even children who scored 0.6 *SD* below the mean of child anxiety were susceptible to the negative indirect effect of parent information consumption through fear induction. Thus, the majority of young children may be psychologically impacted through the proposed mechanism during the crisis. However, children who reported low levels of trait anxiety (lower than -0.6 *SD* of the mean) did not report more post-quarantine depressive symptoms when their parents used more fear inductive parenting practices during the outbreak.



The interplay of child trait anxiety and parent fear induction manifested more clearly when we examined the distribution of children across different depressive symptom percentiles. A similar percentage of children belonged to the highest depressive symptom percentile among children from the lowest trait-anxiety percentile (13 of 60, 22%) and the highest trait-anxiety percentile (16 of 60, 27%). In contrast, only 6% (1 of 17) of children were in the highest depressive symptom percentile among those who simultaneously belonged to the lowest trait-anxiety percentile and the lowest parent fear induction percentile, whereas 45% (9 of 20) of children were in the highest depressive symptom percentile among those who simultaneously belonged to the highest trait-anxiety percentile and the highest parent fear induction percentile. The transactional model proposes that child development is a product of continuous interaction between child characteristics and the environmental, social settings (Sameroff, 2010). Consistent with this idea, our findings highlighted the interconnectedness of child temperament and parenting in producing child adjustment during the pandemic, such that a combination of high (or low) risk individual and environmental factors was most predictive of child mental health outcomes.

Further, the differential susceptibility model emphasizes that children with certain attributes may be particularly vulnerable or resilient towards negative environmental impacts (Belsky, 2016; Belsky & Pluess, 2009). Among children who were trait anxious and received high levels of fear induction parenting, zero percent was in the lowest depressive symptom percentile and 45% (9 of 20) were in the highest depressive symptom percentile. In contrast, among children who were not trait anxious and received high levels of fear induction parenting, 44% (7 of 16) were in the lowest depressive symptom percentile and 31% (5 of 16) were in the highest depressive symptom percentile. The meaning of these results is two-fold. First, all trait anxious children were susceptible to parents' fear induction whereas a proportion (44%) of less anxious children exhibited resilience and overcame the negative

psychological impacts of parent fear induction, which is consistent with the notion of the differential susceptibility model. Second, even among non-anxious children, there were large variations in their depressive symptoms when they received high levels of parental fear induction (i.e., 44% in the lowest depressive symptoms percentile and 31% in the highest percentile). Together, these findings suggested the presence of heterogeneity in the impact of fear induction parenting on child mental health within different subgroups as well as at individual child levels.

### **Implications**

This is, to our knowledge, the first empirical study that examined fear induction parenting and its associations with child outcomes in the context of a global pandemic. The findings revealed that, in the stressful context of the COVID-19 pandemic, high consumption of mostly negative information contributed to both children's pre-quarantine prevention practices and post-quarantine depressive symptoms through fear induction parenting. Our findings may guide parents who are currently going through the quarantine period regarding using non-fear inductive strategies when communicating with their young children. The findings could also inform future policies made during public health emergencies to help parents and children manage their anxieties. Specifically, parents should be aware of the potential negative effect of frequently consuming negative information regarding the event, particularly when the information does not give parents a greater sense of efficacy and control, during public health emergencies. Government and public health institutions should promote parents' understanding of that fear induction practices are detrimental to children's mental health despite its effectiveness in promoting child compliance in the short term. Parents should remain calm and reassuring instead of inducing fear when talking to their children (CDC, 2020b). Honest and accurate information rather than an exaggeration of the severity of the situation should be provided (CDC, 2020b). Parents should also be educated

on more positive and interactive socialization strategies such as listening to children's feelings, practicing daily prevention with children, and teaching virus- and prevention-related knowledge in a friendly and non-threatening way (CDC, 2020b).

Further, our findings highlighted children's different susceptibility to parents' fear induction practices during the pandemic. Parents with trait anxious children should avoid using fear induction practices as they appear to be susceptible to the negative psychological impact of fear induction parenting. Intervention attention should be given to trait anxious children with fear inductive parents as they are at high risk for mental health problems. In contrast, fear induction may be an effective socialization strategy for parents with less trait anxious children to promote their disease prevention practices at a smaller cost to their long-term mental health. Nevertheless, parents with less trait anxious children should use fear induction cautiously and monitor children's reaction to such parenting as some of these children may still be susceptible to the negative psychological influence of such practices.

### **Limitations and Future Directions**

Several limitations should be noted. First, some measurement issues should be considered. Parent-reported child prevention practices and trait anxiety may not reflect children's perspectives. Though T2 child depressive symptoms were collected one and a half months after measuring parent fear induction, it is possible that T2 child depressive symptoms overlapped highly with T1 child depressive symptoms. We controlled T1 child characteristics (i.e., trait anxiety) to compensate for the issue, but the causal linkage between parent fear induction and child post-quarantine depressive symptoms should still be interpreted cautiously. Further, some children from Grades 4 or lower Grades may have difficulties reading and understanding the measures so we asked their parents to assist them in their survey completion. Although we emphasized that parents should allow their children to provide answers independently, parents, especially those who are intrusive and

overcontrolling, may still intervene in children's questionnaire completion, which was beyond our control due to the online data collection process during a short period of time. As such, future studies should consider administering questionnaires via an online assisted manner or over the phone to young children.

Second, the concurrent associations between a few of the studied variables in the proposed model precluded our ability to determine the direction of the relations. For example, we proposed that parent COVID-19 information consumption predicted fear induction parenting, but it is possible that parents who endorse fear induction parenting tend to seek more COVID-19-related information. Third, most parents in the present study came from low- to middle-class families in suburban areas of Wenzhou, China. Future studies could sample parents from more diverse socio-economic and cultural backgrounds to test the generalizability of the current findings and explore the effects of other socialization strategies during public emergencies. Fourth, future studies should increase the sample size to refine the findings given the limited power for the moderated mediation effect with the current sample size.

Finally, the current study only examined the presence of confirmed or suspected COVID-19 cases in parents' communities and parents' consumption of COVID-19 information as contextual stressors during the crisis. Unemployment and economic hardship may be more acute stressors during the quarantine period. Future research may examine how financial stressors may impact parents and children during the crisis. Importantly, researchers should identify potential protective factors that may buffer the negative effects of the contextual stressors during a highly-stressful public health emergency.

### **Conclusions**

Parents' higher frequencies of consuming COVID-19-related information contributed to children's greater engagement in disease prevention practices during the outbreak, but

more depressive symptoms towards the end of the outbreak through parent's fear induction socialization. Using fear induction parenting may promote children's engagement in disease prevention practices during the crisis but at the cost of children's long-term mental health. Important interactions between context-specific parenting and child characteristics during the pandemic were revealed, such that trait anxious children were more susceptible to parent's fear induction socialization and were more likely to develop depressive symptoms, whereas less anxious children may benefit from parents' fear induction and participate in disease prevention with a lower risk of developing depressive symptoms. . Efforts should be made to educate parents on more positive and interactive parenting practices during public emergencies.

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**TABLE 1***Correlations and Descriptive Statistics of Study Variables (N = 240)*

	1	2	3	4	5	6	7	8	9	10	11
1. Parent Information consumption	-										
2. Presence of cases in community	.11	-									
3. Parent fear induction practices	.23***	.01	-								
4. Child trait anxiety	.04	.05	.13*	-							
5. Child prevention practices	.26***	-.03	.48***	.04	-						
6. Child depressive symptoms	.03	.00	.37***	.25***	.21**	-					
7. Child age	-.03	-.02	.00	.08	-.02	.03	-				
8. Parent age	-.09	-.01	.05	.04	-.03	.03	.26***	-			
9. Child gender	.03	.00	.08	-.01	.10	-.01	.15*	.11	-		
10. Parent gender	-.04	.01	-.04	.02	.02	-.03	.08	-.25***	.11	-	
11. Parent education	.14	.03	.06	.10	.02	.06	.07	-.02	.05	.10	-
12. Child trait anxiety×parent fear induction	-.13*	.03	-.28***	.02	-.17**	.04	-.01	.01	-.10	-.10	-.02
<i>M</i>	3.61	0.13	4.03	1.70	4.24	1.04	9.48	38.50	1.46	1.75	2.47
<i>SD</i>	1.42	0.33	0.89	0.39	0.92	0.26	1.39	5.80	0.50	0.43	0.81

*Note.* Male = 1, Female = 2 for both parent and child gender. \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ .

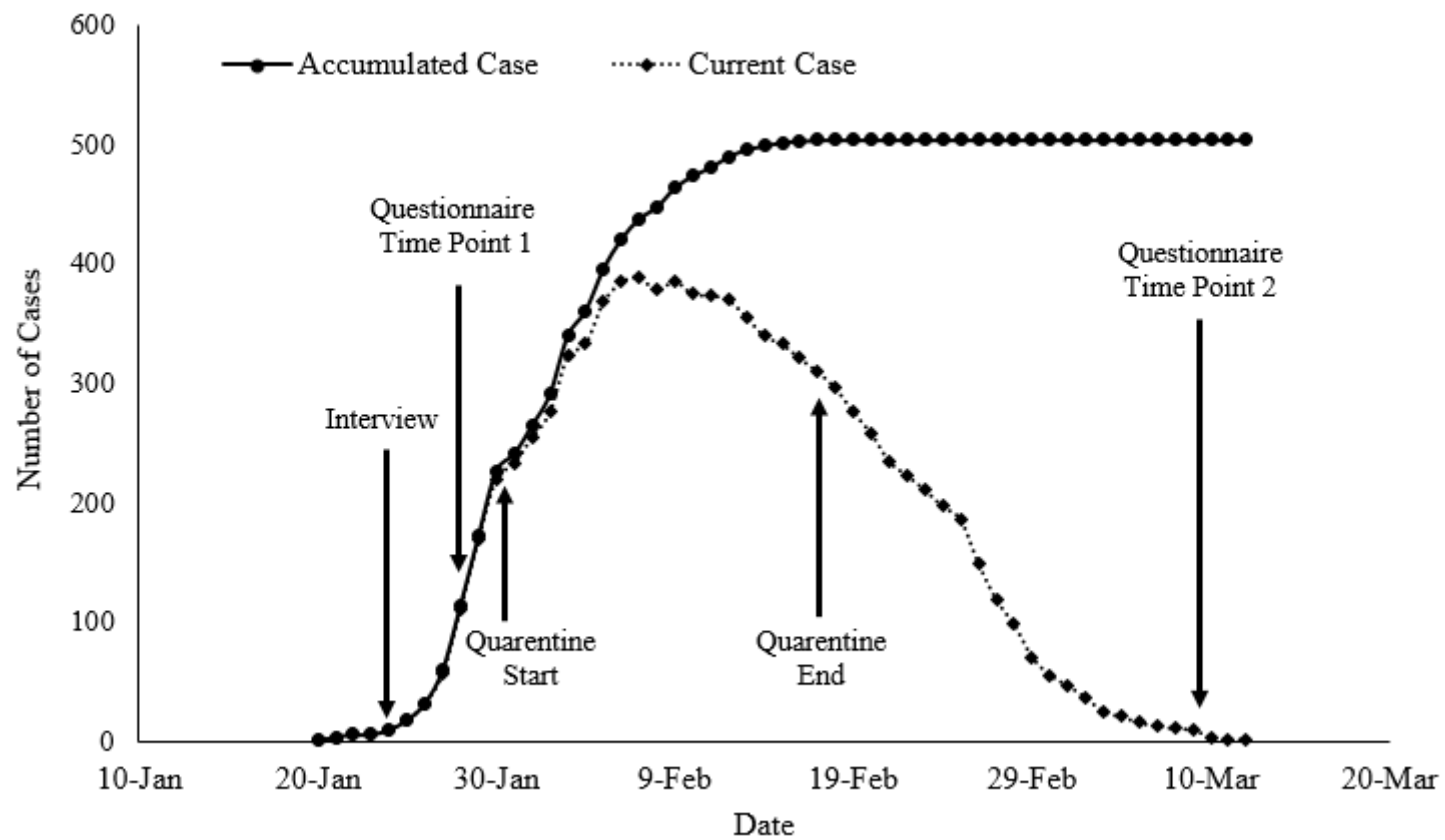


Figure 1. COVID-19 accumulated case number and current case number in Wenzhou between January 20 and March 13, 2020



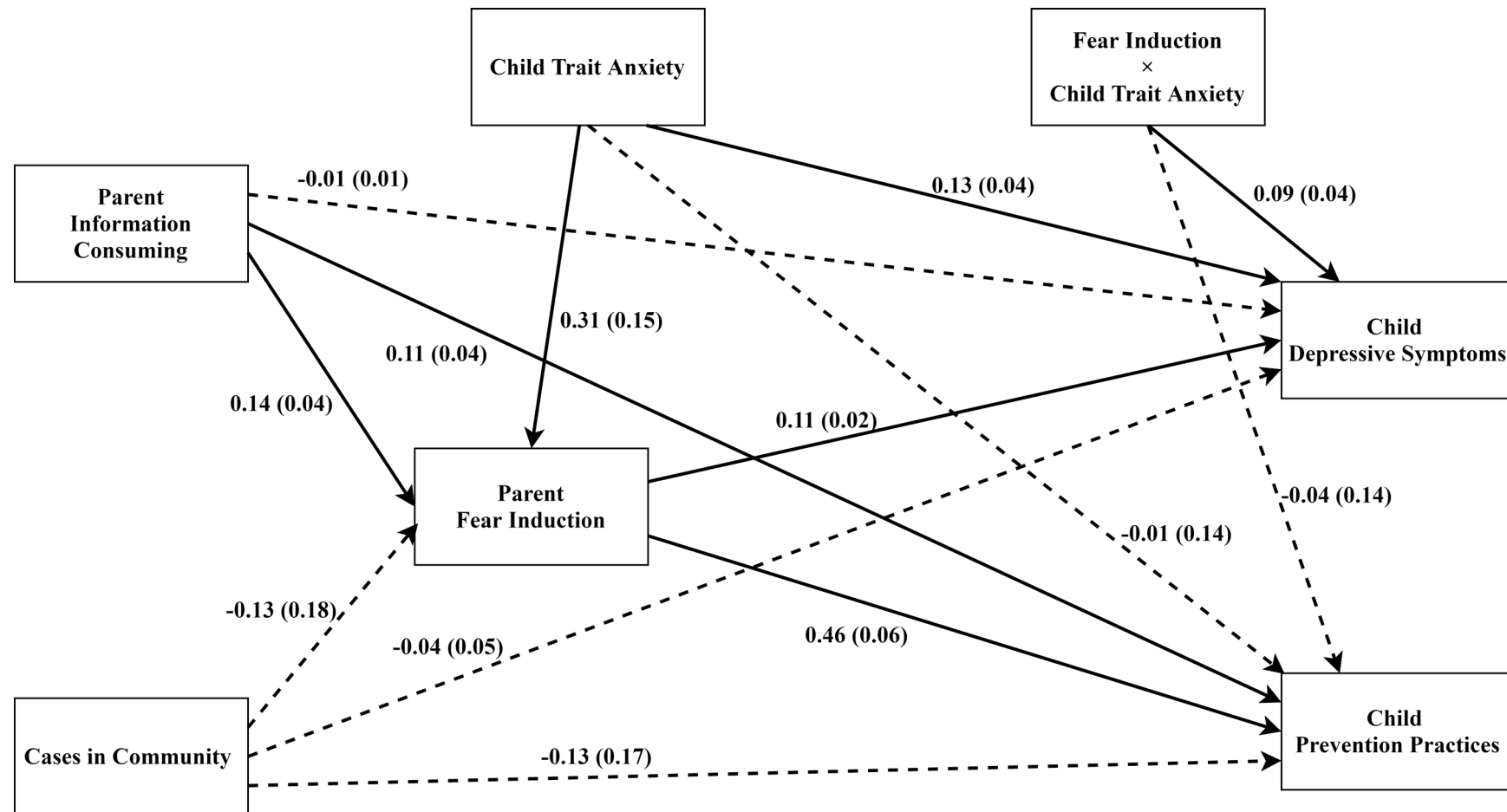


Figure 2. Results of the moderated mediation model. Unstandardized regression coefficients and posterior *SD* (in parentheses) were reported. Solid lines represented significant paths whereas dashed lines represented non-significant paths. Parents' fear was controlled as a covariate in the path to the mediator. Parent age, gender, education, and child age and gender were controlled as covariates in paths to the mediator and the outcomes in the model.

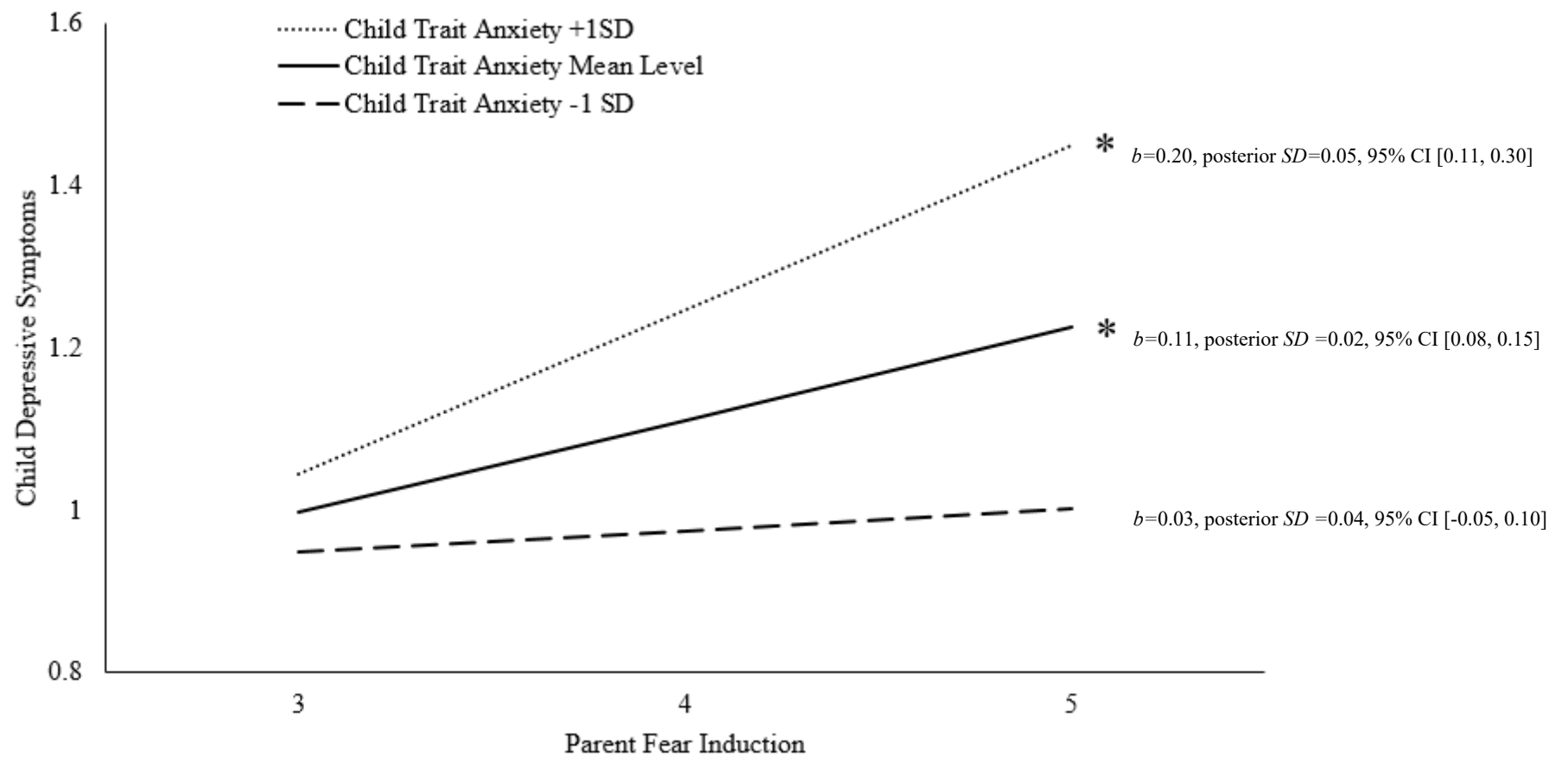


Figure 3. Simple slopes of the relation between parent fear induction and child depressive symptoms at different levels of child trait anxiety.

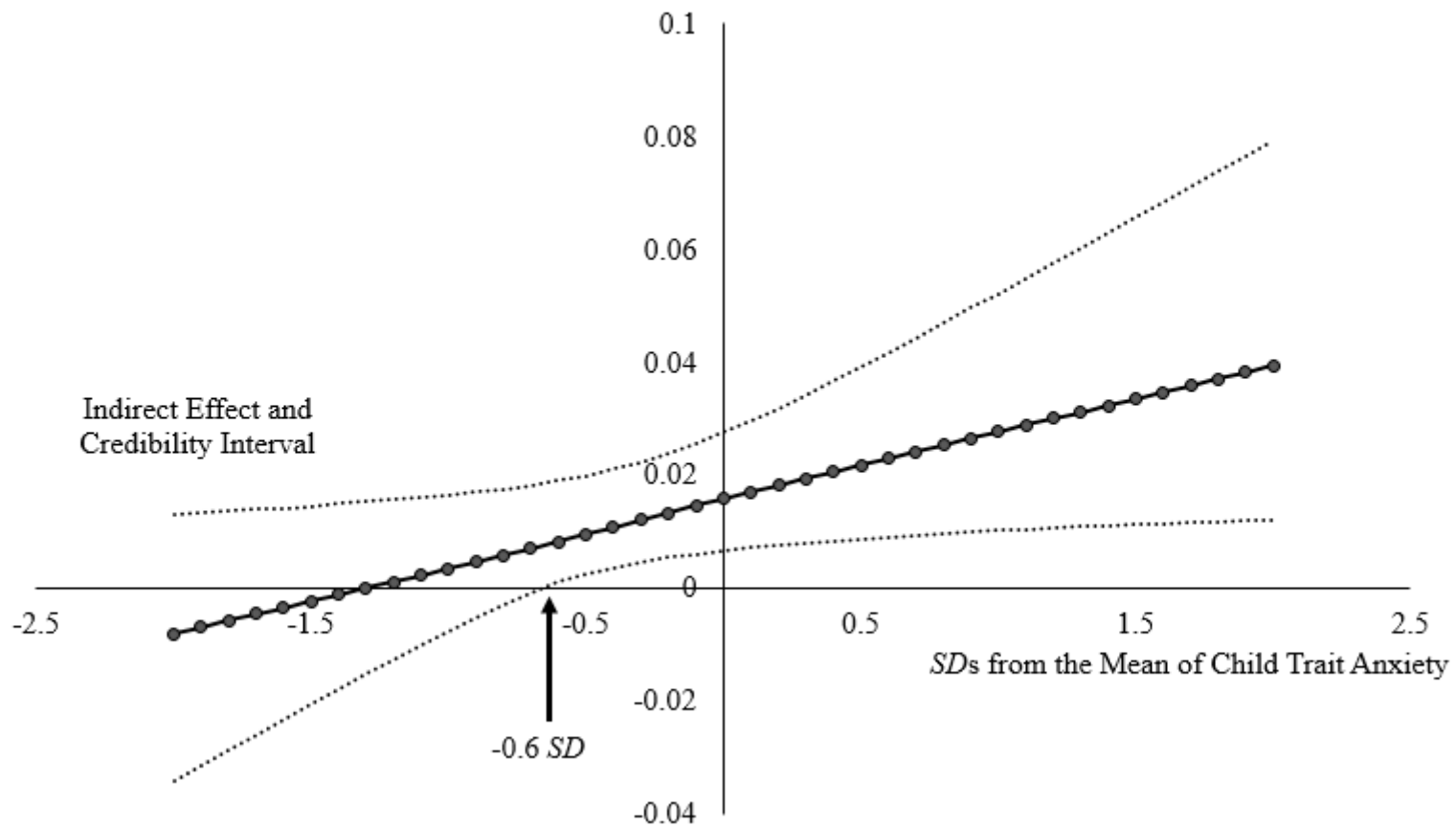


Figure 4. The conditional indirect effect of information consumption on child depressive symptoms via parent fear induction at different levels of child trait anxiety.