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## Relationship between parenting stress and school closures due to the COVID-19 pandemic

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COVID-19 has spread rapidly throughout the world and there is increased risk of child maltreatment and domestic violence due to its spread.<sup>1, 2</sup> One reason for this is that school closures force children to stay at home for longer durations, which may increase parenting stress. In Japan, all schools nationwide were temporarily closed starting on 2 March 2020. Many children had remained at home at least until the end of April 2020. The purpose of this study was to quantify parenting stress, and to understand the qualitative structure of parenting stress through textual analysis during this unprecedented situation.

The sample included 353 parents aged 23–58 years (mean = 37.60 years, SD = 6.11 years; 78 males, 273 females, and two sexes unknown). The mean age of the eldest child was 8.04 years (SD = 4.62 years, range = 0–18 years), and the mean age of the youngest child was 6.11 years (SD = 4.66 years, range = 0–18 years). All information gathered was processed anonymously. The study protocol and all procedures were approved by the Ethics Committee of the University of Fukui, Japan (Assurance # FU-20200007). The survey was conducted entirely on the Web between 29 and 30 April 2020. All participants were recruited using Crowdworks (a crowdsourcing service in Japan). Participants saw the advertisement and applied to participate using the crowdsourcing service. We then sent the survey questionnaire form to participants who met the requirements for participation (living with their children aged 0–18 years who were under school closure). Informed consent for participation was obtained from all participants prior to starting the survey.

The Parenting Stress Index – Short Form (PSI-SF)<sup>3</sup> was used to measure parenting stress; this is composed of 36 items with a Likert-type answer format of five options. We adapted a bifactorial structure (the Parental Distress subscale and the Childrearing Stress subscale) based on a recent validation study.<sup>4</sup> Participants were asked to complete the PSI-SF twice. First, the participants answered the PSI-SF without any particular instructions. Following completion, they were then asked to complete the PSI-SF again, recalling what it was like before the school closures had begun. In addition to the PSI-SF, participants were asked if it would be possible to handle parenting-related stress if the school closures continued into the future using a single item. This result is reported in Appendix S1. Personal distress scores reported on the PSI-SF before school closures and after school closures were 2.39 (SD = 0.80, min. = 1.00, max. = 4.58, sum = 29.89) and 2.49 (SD = 0.72, min. = 1.00, max. = 4.83, sum = 28.75), respectively. Parents' current personal distress levels were significantly higher ( $t = 4.89$ ,  $P < 0.01$ ,  $d = 0.12$ ) than before the school closures had occurred. Additionally, childrearing stress scores before school closures and after school closures were 2.09 (SD = 0.64, min. = 1.04, max. = 4.04, sum = 50.08) and 2.21 (SD = 0.58, min. = 1.08, max. = 4.08, sum = 53.08),

respectively. Current (i.e., after school closures) childrearing stress scores were significantly higher ( $t = 9.17$ ,  $P < 0.01$ ,  $d = 0.20$ ) than before school closures had occurred. Finally, total parenting-stress scores before and after school closures were 2.24 (SD = 0.66, min. = 1.02, max. = 4.40, sum = 80.69) and 2.35 (SD = 0.61, min. = 1.08, max. = 4.29, sum = 84.64), respectively. Current (i.e., after school closures) total parenting stress scores were significantly higher ( $t = 7.79$ ,  $P < 0.01$ ,  $d = 0.17$ ) than before school closures had occurred.

Participants were asked to freely describe what types of stress they felt about parenting. In addition to the above questions, participants were asked to describe what they were doing or devising to relieve the parenting stress mentioned above. Co-occurrence network analyses<sup>5</sup> were conducted for both questions. First, 626 words were extracted regarding parenting stress. A co-occurrence network analysis was performed using the most common 30 words that appeared. The results are visually depicted in Figure S1 in Appendix S1. Next, 540 words were extracted from the second open-ended question regarding methods of relieving parenting stress. A co-occurrence network analysis was conducted using the 30 most common words. Figure S2 in Appendix S1 visually depicts the co-occurrence network.

In conclusion, we found that there was a significant increase in parenting stress, as reported on the PSI-SF. One strength of this study is that it allows for future longitudinal and comparative studies between different regions to assess parenting stress using a globally used scale. The results demonstrated by the PSI-SF in this study will serve as a meaningful comparator for future fundamental research on this topic. The inclusion of qualitative descriptive data allowed us to understand specific aspects of parenting stressors. Specifically addressing these issues through local and national policies may help in relieving parenting stress during this pandemic. In addition, we were able to obtain ideas about effective coping methods that could be practiced at individual and household levels. Disseminating these strategies is expected to increase resilience to parenting stress in households during this time. However, it is possible that some families may find it difficult to implement such solutions due to their individual circumstances. These families will need additional support from local governments and the private sector.

One of the limitations of this study is that the PSI-SF rating before the school closure was obtained using a retrospective method. Most of the participants that completed this survey, however, agreed to participate in a subsequent survey. In the future, we plan to conduct this study longitudinally. We believe that these efforts will help parents cope with stress during the COVID-19 pandemic.

### Disclosure statement

The authors declare no conflict of interest.

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### Supporting information

Additional Supporting Information may be found in the online version of this article at the publisher's web-site:

**Appendix S1.** Supporting Information accompanies this paper. The result of the question about the possibility of handling parenting-related stress if the school closures continued into the future.

**Figure S1.** The co-occurrence network regarding factors related to parenting stress.

**Figure S2.** The co-occurrence network about the methods used to reduce parenting stress.

# Making a brochure about coronavirus disease (COVID-19) for children with autism spectrum disorder and their family members

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The coronavirus disease (COVID-19) situation is evolving rapidly, with an increase in the number of reported cases and countries affected worldwide. The World Health Organization declared the COVID-19 outbreak a public health emergency of international concern (PHEIC) on 30 January

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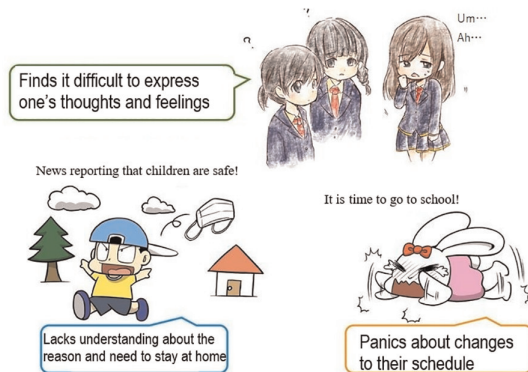
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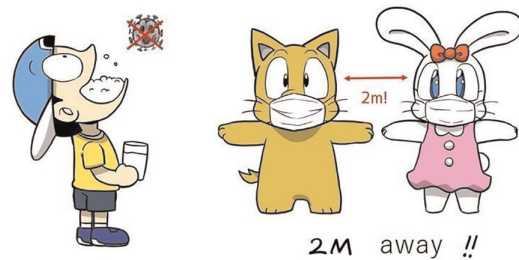
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## (a) Characteristics of autism spectrum disorder (ASD)

Signs that a child may be having trouble:



## (b) How to prevent corona virus disease (COVID-19)?

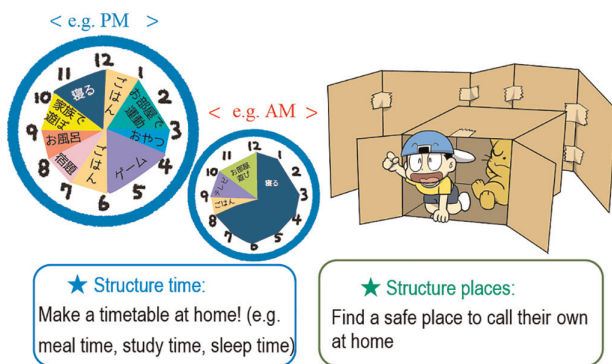


1. Keep social distance.
2. Wear a mask.
3. Wash hands often with soap and water, or with alcohol-based hand sanitizer.
4. Gargle the throat with warm water after being in public spaces.

Everyone's actions help to prevent the spread of COVID-19!

## (c) Coping strategies for children with ASD

Structure their lifestyle:



## (d) Coping strategies for children with ASD

Find a shared interest



Trains, national flags, animals, insects, maps, history, etc...  
Take this chance to become a specialist!

**Fig.1** COVID-19 supportive brochure for parents of children with autism spectrum disorder (ASD). (a) Characteristics of ASD. The behaviors and characteristics of ASD patients with relation to COVID-19 are explained. For example, they may not understand the reasons for the instructions issued by the government to stay home. They might feel uncomfortable and limited with being forced to stay at home for the whole day. Information regarding COVID-19 from media sources, such as the television or the Internet, may cause unnecessary anxiety in ASD patients due to deficits in social and communication skills. Children with ASD may be hypersensitive and unwilling to wear masks. (b) How to prevent corona virus disease (COVID-19)? This slide explains the prevention measures. (c) Structure their lifestyle: Time and place management is very important for ASD children. Both verbal and visual information will help ASD children understand that their daily lifestyle has changed. For that purpose, it might be helpful for each family member to write their planned activities on a shared whiteboard after communicating them verbally. (d) Find a shared interest: Encourage activities and subjects that the child is naturally interested in. This image has been included in regards to ASD patients with restricted interests. They may be willing to engage with family members about a specific interest, such as trains, national flags, animals, insects, maps, or history, which can serve as a bonding opportunity.