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[Correction added on 17 October 2020, after first online publication: Ana Ines Ansaldo has been added as the last author.]
Received 8 June 2020; revised 5 September 2020; accepted 23 September 2020.

COVID-19 pandemic-onset anorexia nervosa: Three adolescent cases

doi:10.1111/pcn.13160

The world has faced a growing global health crisis caused by the COVID-19 outbreak. All nations have implemented measures to control the spread of COVID-19, including curfews, lockdowns, and restrictions on persons' movements with social distancing. The first case diagnosed with COVID-19 in Turkey was reported on 11 March 2020. As the world focused on measures to mitigate transmission of COVID-19, the Turkish government ordered a nationwide school closure by 13 March and, by 1 April, a lockdown for people younger than 20 years. This quick action was taken to slow and prevent the infection's spread; however, school closure and home confinement might have adverse effects on children's physical health and psychological well-being. When children are at home and reduce their outdoor activity, they may become less physically active; become socially withdrawn from their usual environment and devoid of peer relations; spend much more time viewing screens; have irregular sleep patterns; and have less favorable diets.[1]

Additionally, in all age groups, reactive psychiatric symptoms have been described as secondary effects of social isolation and quarantine.[2] Some of these symptoms are associated with changes in eating and exercise behavior. A study conducted in the general population reported both increased restricting and binge eating behaviors during the COVID-19 pandemic; however, respondents also reported less exercise relative to before the pandemic.[3] Another study that evaluated the early impact of COVID-19 on people with eating disorders showed that participants with anorexia nervosa reported increased restriction, fears about being able to find foods consistent with their meal plan, and concerns about relapse related to COVID-19 circumstances.[4] These two studies included adult participants and there have been no reports on pandemic-onset eating disorders or anorexia nervosa in adolescents.

In this case series, we present three adolescent girls of similar ages and similar psychiatric symptoms. The onset of their anorexia nervosa symptoms occurred suddenly in April 2020 when curfews were imposed because of the COVID-19 pandemic. The three girls had initially fasted during Ramadan, the holy month of fasting, from 23 April to 24 May 2020. For healthy adolescent and adult Muslims, Ramadan fasting and prolonged hunger have a spiritual factor. All patients fasted during Ramadan by eating a single meal per day; however, after the month of Ramadan, they each continued to eat just one meal per day and excessive sports behavior began due to the excessive fear of gaining weight. One-meal eating turned into restricted eating, fast weight loss, thoughts about

Table 1. Summary of each case's background characteristics and clinical findings

	Case 1	Case 2	Case 3
Age (years)/sex/diagnosis	13/female/anorexia nervosa	16/female/anorexia nervosa	16/female/anorexia nervosa
Bodyweight (kg)	40	37	40
Body mass index (kg/m^2)	14.3	14.1	15.2
Disease duration	8 weeks	6 weeks	8 weeks
Weight loss	20 kg in 4 weeks	10 kg in 4 weeks	15 kg in 8 weeks
Premorbid psychiatric history	None	None	None
Follow-up in inpatient unit	1 day in pediatric emergency unit	10 days in pediatric inpatient unit	2 days in pediatric emergency unit
Comorbid psychiatric disease	Major depressive disorder	Major depressive disorder	Anxiety disorder
Amenorrhea	+	+	+
Psychiatric medication	Olanzapine 10 mg/day + fluoxetine 20 mg/day	Olanzapine 5 mg/day + fluoxetine 20 mg/day	Olanzapine 5 mg/day + sertraline 50 mg/day
Laboratory values on admission			
Fasting blood glucose (mg/dL)	62	65	53
Na/K (mEq/L)	138/4.4	135/4.0	135/4.4
AST/ALT (U/L)	24/18	32/20	41/21
BUN/Cr (mg/dL)	6/0.76	8/0.80	14/0.84
WBC ($\times 10^3/\mu L$)	3.6	5.0	4.6
Hgb (g/dL)	13.9	12.5	15.1
Plt ($\times 10^3/\mu L$)	214	270	224
Heart rate (b.p.m.)	60	62	45

Laboratory reference values: fasting blood glucose, 65–110 mg/dL; ALT, 10–40 U/L; AST, 10–37 U/L; BUN, 5–18 mg/dL; Cr, 0–1.2 mg/dL; Hgb, 12.0–17.0 g/dL; K, 3.5–5.3 mEq/L; Na, 136–146 mEq/L; Plt, 150.0–440.0 $\times 10^3/\mu L$; WBC, 4.0–10.0 $\times 10^3/\mu L$; heart rate, 60–100 b.p.m.
ALT, alanine aminotransferase; AST, aspartate aminotransferase; BUN, blood urea nitrogen; Cr, creatinine; Hgb, hemoglobin; K, potassium; Na, sodium; Plt, platelets; WBC, white blood cells.

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being overweight, and refusal of eating. There was no binge eating, purging, or laxative misuse. Social isolation was a common feature in all three patients. Each girl withdrew from her family and peers, failed to attend online education, weighed herself every day, checked her body image in mirrors, engaged in discourse about weight gain, calculated calories, spent a lot of time on social media and the Internet (especially videos showing food recipes and people eating), and prepared food at home for family members. None of the patients had a premorbid psychiatric history, and their levels of academic success and peer relationships were described as good. Summaries of each case's background characteristics and clinical findings are given in Table 1.

The insight about their symptoms and clinical courses of all patients was partial. They did not want to apply to the child and adolescent psychiatric outpatient unit due to worry about being infected with COVID-19 at the hospital. One of the cases was monitored in the pediatric inpatient unit and the other two were monitored in the pediatric emergency unit. Tube feeding was not needed as they each agreed to adapt to an oral diet with the help of a nutritionist. They were each diagnosed with anorexia nervosa according to the DSM-5[5] and were followed at Marmara University Pendik Research and Training Hospital Child and Adolescent Psychiatry Clinic. One of the patients had anxiety symptoms in addition to anorexia nervosa and the other two had major depression. Patients were followed up with olanzapine and fluoxetine/sertraline combination medication, individual cognitive behavioral therapy, and family interviews weekly. There was no history of contact with COVID-19 or having COVID-19 in patients or their family members. Follow-up of patients continues at the same child and adolescent psychiatry clinic.

Chia *et al*. showed that dietary restriction for religious purposes, such as that observed during the practice of Ramadan, may not confer increased risk of eating disorder symptoms.[6] Also, there were no patients with these symptoms presenting to the Marmara University Pendik Research and Training Hospital Child and Adolescent Psychiatry Clinic during the 2019 Ramadan period. In another study, social isolation was associated with binge eating, not dietary restraint.[7] However, no study investigating the relation between social isolation and the onset of eating disorders has been observed in literature. Social isolation and quarantine may have important adverse psychological effects on the most vulnerable groups, such as adolescents, but it is not possible to say with three cases that social isolation and quarantine may cause eating disorders.

Written consent was taken from the participants. This study fulfills the ethical provisions of the Declaration of Helsinki.

Disclosure statement

The authors declare no conflicts of interest.

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Received 20 July 2020; revised 1 September 2020; accepted 27 September 2020.

Depressive symptoms in students during school closure due to COVID-19 in Shanghai

doi:10.1111/pcn.13161

Since the first identification of a patient with COVID-19, this infection has spread rapidly worldwide, with a high case fatality rate among the elderly and individuals with chronic diseases.[1] While this virus is less likely to cause serious illness in the younger generation, many affected countries have adopted school closure as a measure to prevent its spread among the community.[2]

Concerns may be raised about the adverse effects of school closure not only on education but also on the health of children. The drastic changes in children's lifestyles during school closure may deteriorate their mental health.[3] The present paper reports the changes in depressive symptoms among students in Shanghai caused by school closure due to the COVID-19 epidemic.

The present study was originally designed to assess health and health-associated factors using a web-based survey among schoolchildren (aged 6–17 years) and their parents from five schools across Shanghai, China. Details of the study procedure are described in Appendix S1. The first survey was conducted from 3 to 21 January 2020 (before school closure) and the second survey was conducted from 13 to 23 March 2020 (during school closure). Depression was assessed using the Children's Depression Inventory – Short Form (CDI-S)[4]; the total score ranges from 0 to 20, with a higher score indicating more depressive symptomatology. We also asked about the positive aspects of lifestyle change during school closure. We calculated the mean and SD of CDI-S scores before and during school closure and tested the difference using the paired *t*-test. A within-subjects analysis of variance was conducted to determine the interactions of Time × Subgroup (sex, school levels, and annual household income levels) in terms of CDI-S score. We declared statistical significance when $P < 0.05$ for the paired *t*-test and $P < 0.1$ for the interaction test.

Of 3042 students in the target schools, 2641 (87%) participated in the first survey. Of these, 2427 participated in the second survey. Overall, the mean CDI-S score significantly decreased between the two surveys: 4.19 before school closure and 3.90 during school closure ($P < 0.01$). In stratified analyses, children in middle school showed a greater decrease in CDI-S scores than those in primary school (P for interaction = 0.09), whereas a lower CDI-S score during school closure was consistently observed across sexes and household income categories (Table 1). As regards positive aspects of lifestyle change during school closure, 71%, 80%, and 83% of children were satisfied with having more time 'at home,' 'with their parents,' and 'doing their own things,' respectively.

School closure with a stay-at-home policy should drastically decrease the opportunity for direct contact with persons other than family members, decrease physical activity, and increase the time of screen viewing, all of which may deteriorate the mental health of school children. However, the present result is at variance with the prior hypothesis; rather, we observed fewer depressive symptoms during school closure compared to those measured before the closure.