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Mini Review

Effect of the Coronavirus Disease 2019 Pandemic on School-going Children

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ABSTRACT

Coronavirus disease 2019 (COVID-19) pandemic and lockdown have brought about a sense of fear and anxiety around the globe. Having the second largest population along with poor health infrastructural facilities, India has fairly performed well in its initial fight against COVID-19 as compared to the far developed and equipped countries. COVID-19 led to short term as well as long-term psychosocial and mental health implications for children and adolescents. The quality and magnitude of impact on minors are determined by many vulnerability factors such as developmental age, educational status, pre-existing mental health condition, being economically underprivileged or being quarantined due to infection or fear of infection. Anxiety, depression, irritability, boredom, inattention, and fear of COVID-19 are predominant new-onset psychological problems in children during the COVID-19 pandemic. Children with pre-existing behavioral problems such as autism and attention deficit hyperactivity disorder have a high probability of worsening of their behavioral symptoms. There is a pressing need for longitudinal and developmental studies, and implementing evidence based elaborative plan of action to cater to the psycho-social and mental health needs of the vulnerable children and adolescents during pandemic as well as post pandemic. Furthermore, to ameliorate children and adolescents access to mental health support services geared towards providing measures for developing healthy coping mechanisms during the current crisis. For this innovative child and adolescent mental health policies with direct and digital collaborative networks of psychiatrists, psychologists, pediatricians, and community volunteers are deemed necessary.

Keywords: Adolescence, Coronavirus disease 2019, Global impact, Mental health, Psycho-social

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Introduction

Coronaviruses are enveloped, positive single-stranded large RNA viruses that infect humans, but also a wide range of animals. Coronaviruses were first described in 1966 by Tyrell and Bynoe, who cultivated the viruses from patients with common colds.[1] Four subfamilies, namely alpha-, beta-, gamma-, and delta-coronaviruses exist. While alpha- and beta-coronaviruses apparently originate from mammals, in particular from bats, gamma- and delta-viruses originate from pigs and birds. SARS-CoV-2 belongs to the B lineage of the beta-coronaviruses and is closely related to the SARS-CoV virus.[2,3] The major four structural genes encode the nucleocapsid protein (N), the spike protein (S), a small membrane protein (SM), and the membrane glycoprotein (M) with an additional membrane glycoprotein (HE) occurring in the HCoV-OC43 and HKU1 beta-coronaviruses. SARS-CoV-2 is 96% identical at the whole-genome level to a bat coronavirus.[3]

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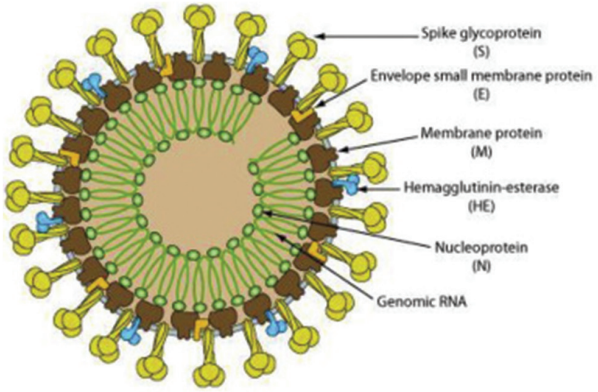
Genotype and Phenotype of coronavirus disease 2019.[2,3]



Epidemiology

On January 30, 2020, the WHO Emergency Committee declared a global health emergency based on growing case notification rates at Chinese and international locations. As of midst of February 2020, China bears the large burden of morbidity and mortality, whereas the incidence in other Asian countries, in Europe and North America remains low so far.[4] Of 317 research articles generated from our initial search on PubMed and preprint archives on February 21, 2020, 41 met our inclusion criteria and were included in the review. Current evidence suggests that it takes about 3–7 days for the epidemic to double in size. Of 21 estimates for the basic reproduction number ranging from 1.9 to 6.5, 13 were between 2.0 and 3.0. The incubation period was estimated to be 4–6 days, whereas the serial interval was estimated to be 4–8 days. Although the true case fatality risk is yet unknown, current model-based estimates ranged from 0.3% to 1.4% for outside China. There is an urgent need for rigorous research focusing on the mitigation efforts to minimize the impact on society.[5]

Prevalence in India and Globally

India has verified 820,916 coronavirus disease 2019 (COVID-19) cases, and 22,123 deaths by July 12, 2020.[6] The mortality rate of India is 2.69%. The United States has 3,097,300 confirmed cases and 132,683 deaths with a mortality rate of 4.28% 8%. UK has an overall 288,137 cases and 44,650 deaths having a mortality rate of 15.49%. France witnessed 161,275 overall cases and 29,907 deaths with 18.54%.[7] This pandemic has accompanied along with some unparalleled challenges making the situation much more difficult physically, emotionally as well as psychologically for the people across the globe.[8]

Impact of COVID-19 on School and College Going Students

Globally, the pre-lockdown learning of children and adolescents predominantly involved one-to-one interaction with their mentors and peer groups. Unfortunately, the nationwide closures of schools and colleges have negatively impacted over 91% of the world's student population.[9] The home confinement of children and adolescents is associated with uncertainty and anxiety which is attributable to disruption in their education, physical activities, and opportunities for socialization.[10] The absence of structured setting of the school for a long duration result in disruption in routine, boredom, and lack of innovative ideas for engaging in various academic and extracurricular activities. Some children have expressed lower levels of affect for not being able to play outdoors, not meeting friends, and not engaging in the in-person school activities.[9,11,12] A study found that older adolescents and youth are anxious regarding cancellation of examinations, exchange programs, and academic events.[9] Moreover, they suggest to the policy makers that other less disrupting social distancing strategies should be followed by schools if social distancing is recommended for a long duration.[9,13,14] However, in current circumstances, it is controversial whether complete closure of school and colleges is warranted for a prolonged period. It has been reported that panic buying in times of distress indicate an instinctual survival behavior.[15] In present pandemic era, there has been a rise in the hoarding behavior among the teenagers.[16] It is also found that among youth social distancing is viewed primarily as a social responsibility and it is followed more sincerely if motivated by prosocial reasons to prevent others from getting sick.[16] Further, due to prolonged confinement at home children's increased use of internet and social media predisposes them to use internet compulsively, access objectionable content, and also increases their vulnerability for getting bullied or abused.[17,18]

Impact on Adolescents of COVID-19

With restrictions in learning, socializing, and physical activity the substantial risks to the most vulnerable adolescents will raise. Break-in basic health services, resulting in health deterioration and behavioral changes will not only affect present health but will also have an impact on their adulthood. This will soon evolve as a major public health challenge.[19] Besides, schools are closed for more than 2 months; with no chance of reopening any time soon. The current pandemic has put 89% adolescents out of schools, which equates to around 1.54 billion students of which, 0.74 billion are girls.[20] All these consequences of the COVID-19 pandemic will put adolescents at an increased risk of, school drop-outs,[21] gender gaps in education,[22] Stress and other mental health disorders,[9] Smartphone dependence or addiction,[23] early age of initiating smoking, alcohol, or drugs,[24] Interrupted learning depriving opportunities for growth and development,[25] Parents unprepared for distance and homeschooling, particularly those in lower socioeconomic status and illiterate parents,[26]

poor menstrual hygiene, increase in child labor,[27] early, and forced marriage,[27] early pregnancy (teenage pregnancy),[28] nutritional problems (due to stoppage of weekly IFA supplementation and mid-day meal scheme/program),[27] increase in exposure to violence, exploitation (including sexual), abuse/maltreatment, and neglect.[28]

Psychological Responses between 5–12 and Different Age Group

Anxiety, depression, irritability, boredom, inattention, and fear of COVID-19 are predominant new-onset psychological problems in children during the COVID-19 pandemic and while confined in quarantine. Children with pre-existing behavioral problems such as autism and ADHD have a high probability for worsening of their behavioral symptoms.[19] Most studies from Asia showed a higher prevalence of psychological morbidities as compared with other developed countries such as Italy and Spain.[10,29,30,31] The studies were done in the earlier stage of the pandemic also included a high proportion of participants with uncertainty and fear.[32]

During this COVID-19 pandemic, also some investigators have completed clinical studies in this regard and have demonstrated that children and adolescents, whereas remaining in lockdown/under quarantine show increased anxiety and depression. Apart from worrying a lot and showing fear of affected by the illness, they were also found to be worried about their family members. Similarly, students also suffered additional psychological stress due to interrupted academics and uncertain future. The caregivers were also found to be increasingly worried about the impaired behavior and psychological symptoms are seen in their children during this pandemic.[33-36] A large online survey conducted in China by Zhou *et al*.[37] including 8079 students aged 12–18 years showed that 43% and 37% had depression and anxiety symptoms respectively (26%, 15%, and 2% had mild, moderate, and severe depression, respectively, whereas 27%, 7%, and 3% had mild, moderate, and severe anxiety, respectively). Orgilés *et al*.[29] performed a survey on 1143 parents in Italy and Spain to study the emotional impact of quarantine on children and adolescents aged 3–18 years. Around 85% of the parents felt worsening of the emotional and behavioral symptoms of their children during the quarantine. The most frequent problems were: Difficulty in concentrating (76.6%), irritability (39%), boredom (52%), restlessness (38%), feelings of loneliness (31%), nervousness (38%), uneasiness (30%), worries (30%), anxiety (28%), anger (25%), increased reluctance (24%), sadness (23%), and fear (23%) of COVID-19.

Hou *et al*.[30] performed a cross-sectional study in rural China on 859 high school students to investigate the suicidality and mental health problems among senior high school students during this pandemic time and explore various potential influential factors. Around 85%, 71%, and 54% had symptoms of anxiety, depression, and post-traumatic stress disorder respectively. Around 31% and 7% of participants had suicidal ideation and reported suicidal attempts, respectively.

An online questionnaire-based study performed early during the pandemic in February 2020 in Shaanxi province of China by Jiao *et al*.[10] studied behavioral and emotional reactions in 320 children and adolescents aged 3–18 years. The study found that clinginess (36%), irritability (31%), distraction/inattention (32%), and fear of asking questions/ for the health of relatives (22%) were the most common behavioral and psychological problems in participants. Other common problems were excessive worry (29%), obsessive request of updates (28%), sleeping problems (21%), poor appetite (18%), fatigue (16%), nightmare (14%), and discomfort and agitation (13%). Children in the younger age group (3–6 years) were more likely to have clinginess and fear for relatives, whereas old age children (6–18 years) were more likely to show inattention and persistent inquiry. Pisano *et al*.[31] in Italy performed a cross-sectional study including 5989 children aged 4–10 years using a 12-item ad-hoc questionnaire including three areas. The study found that around 26% of children started having excessive clinginess and request to sleep in parent's beds, 3% of children developed new-onset enuresis, 5.5% had worsening of vocabulary, and 18% developed excessive and inappropriate fears. Around 54%, 43%, 31%, 21%, and 19% developed irritability, listless behavior, anxiety, mood swings, and sleep problems.

In India, Saurabh and Ranjan[38] interviewed 121 children and adolescents regarding their compliance with quarantine measures and psychological distress during the quarantine period and compared the same with 131 non-quarantined children and adolescents. Overall, only 7% of children were compliant with quarantine measures (17% for community protective measures and 10% for household protective measures). Anxiety, helplessness, and fear were highly prevalent among quarantined children (68%, 66%, and 61%, respectively) and the difference between the degree of psychological distress in these children and non-quarantined children was significant ($P < 0.001$). Notably, Saurabh and Ranjan have shown that although the children who are quarantined showed more psychological comorbidities, even the non-quarantined children had a relatively higher incidence of these problems, as compared with the studies in children in the pre-COVID era.

Impact on Emotion and Mental Wellbeing

It has been indicated that compared to adults, this pandemic may continue to have increased long-term adverse consequences on children and adolescents.[39] In young children and adolescents, the pandemic and lockdown have a greater impact on emotional and social development compared to that in the grown-ups. In one of the preliminary

studies during the on-going pandemic, it was found that younger children (3–6 years old) were more likely to manifest symptoms of clinginess and the fear of family members being infected than older children (6–18 years old). Whereas, the older children were more likely to experience inattention and were persistently inquiring regarding COVID-19. Based on the questionnaires completed by the parents, findings reveal that children felt uncertain, fearful, and isolated during current times. It was also shown that children experienced disturbed sleep, nightmares, poor appetite, agitation, inattention, and separation related anxiety.[40]

For many children, the current pandemic reflects an acute case of cumulative risk – they are being exposed to multiple co-occurring risk factors that increase the likelihood of mental health difficulties. For some children, there will be a precipitous increase in risk. For others, the aggregation of risk will be insidious and unfold over time. As risks accrue, there is corresponding wear-and-tear on the body caused by repeated physiological mobilization to respond to environmental challenge, termed allostatic load. Worsening mental health over time may reflect a progressive aggregation of risk that can only be elucidated using longitudinal designs that repeatedly assess both risk factors and behavior. Such sleeper effects have been reported for exposure to adversities such as intimate partner violence, the rates of which have been increasing cross-nationally during the pandemic. The mental health ramifications of COVID-19 are likely to be longstanding, but not simply chronic. New difficulties for children who initially appeared well-adapted may surface later in development. This underscores the need for continued outcome monitoring among children facing near-term risks to intervene if difficulties begin to emerge.[41]

In addition, two types of sensitizing effects should be considered in longitudinal research on COVID-19. First, pre-existing vulnerabilities may place some children at risk for later mental health problems in response to stress. The second sensitizing effect considers pandemic-related stress as the index event – that is, for individuals who have experienced relatively little prior adversity, the current pandemic may be a sensitizing event that lowers the threshold for tolerating later stress which triggers psychopathology. This is of concern given the possibility of extended confinement, repeated isolation, or cyclical exposure to stressful events during future disease mitigation efforts.[42]

The mechanistic effects of the pandemic on child and youth mental health entail an interplay of distal stressors and proximal family processes. Developmental research is predicated on the ability to uncover the factors accounting for change over time. Change can be mapped in at least two ways: (i) trajectories – the charting of within and between-person change on a given construct (e.g., mental health); and (ii) pathways – the proximal processes linking distal risk to behavior change. In the case of pathways, cross-lagged models that measure mediators of change (e.g., parent-child relations) and outcomes (e.g., mental health) allow an assessment of directional influences. This is crucial, as efforts to treat and prevent mental health difficulties should target not only symptoms, but the primary mechanisms/mediators of change.[42,43]

Finally, resilience is not simply a trait of individuals (something "they have"), but instead reflects the processes and resources that restore equilibrium, offset challenges, and foster adaptation to harsh conditions. At the family level, this includes positive relationships, patterns of communication, rules and rituals, and belief systems (e.g., meaning-making of adversity). Moreover, the timing of exposure to risk and resilience factors is likely to be consequential in predicting the mental health sequelae of the pandemic. Understanding how these "windows of plasticity" shape children's mental health necessitates longitudinal research that examines the type, timing, and intensity of risk and protective factors over time.[43,44]

Physical Activity versus Sedentary Lifestyle

Regular physical activity is related to many factors in a university student's environment. The coronavirus pandemic and the resulting lockdown have restricted many elements of our environment. A healthy lifestyle should be promoted among all ages, but the earlier a habit is formed, the more likely it is to become rooted.[45] Regular physical activity is one of the most effective ways of preventing premature death.[46,47] Meanwhile, sedentary behavior is a health problem in the child and youth population, which is aggravated with age.[48]

It is known that individual factors such as age, sex, and health status affect the physical activity that individuals do.[49] Other factors associated with physical activity are motivation, lack of time and aspects related to body image or physical appearance;[50] some of the beneficial effects of physical activity are reduced anxiety and depression.[51,52] The COVID-19 pandemic led to the population being confined to their homes.[53]

During this period, elements of the built environment and other factors related to individuals' environments were restricted due to the state of alarm. Experts' recommendations to prevent sedentary behavior during lockdown included taking active breaks, getting up, and walking around the house, and doing online workouts.[54] However, during the pandemic, an overall negative effect on physical activity intensity was observed, as well as a rise in the consumption of less healthy food and a 28.6% increase in sedentary behavior.[55] A reduction in physical activity was also observed in university students,[56] along with increased levels of anxiety among 18–34-year-olds.[57]

Online Schooling versus Regular School

The COVID-19 has resulted in schools shut all across the world. Globally, over 1.2 billion children are out of the

classroom. As a result, education has changed dramatically, with the distinctive rise of e-learning, whereby teaching is undertaken remotely and on digital platforms. Research suggests that online learning has been shown to increase retention of information, and take less time, meaning the changes coronavirus have caused might be here to stay.[58]

Effect on Children with Special Needs/Disabilities

Even with millions of cases, we still have a lot to learn about the COVID-19 pandemic and its impact on childhood disability. Hypotheses to explain the apparent paradox are yet to be explored, for example, underreporting, social factors (limited contacts), behavioral factors (limited environment and face touching), and possibly physiological factors. Very early on, triage protocols were designed in anticipation of, or response to, shortage of hospital or intensive care beds, based on criteria including frailty, comorbidities, expected "utility," or requirement for help with activities of daily living. Due to epidemiology, this has not affected disabled children as dramatically as elderly people, many thousands of whom died without receiving appropriate care. Although some aspects of the triage approach relate to COVID-19, general principles and the way they have been applied are not specific. These principles reflect a societal response to a health crisis, with the value of life based on the judgment of a third party and determined according to medical or social categories. This is worrisome for future crises and calls for pre-emptive action to protect vulnerable individuals.[59,60]

Suggestive Action to Be Taken and Future Scope

Anxiety, depression, irritability, boredom, inattention, and fear of COVID-19 are predominant new-onset psychological problems in children during theCOVID-19 pandemic and while confined in quarantine. Children with pre-existing behavioral problems like autism and ADHD have a high probability for worsening of their behavioral symptoms. To mitigate this far-reaching and significant negative impact on the psychological well-being of children, multifaceted age and developmentally appropriate strategies are required to be adopted by health-care authorities.

Conclusion

Although the rate of COVID-19 infection among young children and adolescents is low, the stress confronted by them poses their condition as highly vulnerable. Studies show that young children show more clinginess, disturbed sleep, nightmares, poor appetite, inattentiveness, and significant separation problems. There is a need to ameliorate children and adolescent's access to mental health services using both face to face as well as digital plat forms. For this collaborative network of parents, psychiatrists, psychologists, pediatricians, community volunteers, and NGOs are required.

References

1. Tyrrell DA, Bynoe ML. Cultivation of viruses from a high proportion of patients with colds. Lancet 1966;1:76-7.
2. GISAID Global Initiative on Sharing All Influenza Data. Phylogeny of SARS-like Betacoronaviruses Including Novel Coronavirus (nCoV). Available from: https://www.nextstrain.org/groups/blab/sars-like-cov. [Last accessed on 2021 Apr 01].
3. Zhou P, Yang XL, Wang XG, Hu B, Zhang L, Zhang W, *et al*. A pneumonia outbreak associated with a new coronavirus of probable bat origin. Nature 2020;588:E6.
4. Velavan TP, Meyer CG. The COVID-19 epidemic. Trop Med Int Health 2020;25:278-80.
5. Park M, Cook AR, Lim JT, Sun Y, Dickens BL. A systematic review of COVID-19 epidemiology based on current evidence. J Clin Med 2020;9:967.
6. Home Ministry of Health and Family Welfare, Government of India; 2020. Available from: https://www.mohfw.gov.in. [Last accessed on 2020 Jul 12].
7. Available from: https://www.covid19.who.int. [Last accessed on 2020 Jul 12].
8. Sharma S, Basu S, Shetti NP, Aminabhavi TM. Current treatment protocol forCOVID-19 in India. Sens Int 2020;2020:100013.
9. Lee J. Mental health effects of school closures during COVID-19. Lancet Child Adolesc Health 2020;4:421.
10. Jiao WY, Wang LN, Liu J, Fang SF, Jiao FY, Pettoello-Mantovani M, *et al*. Behavioral and emotional disorders in children during the COVID-19 epidemic. J Pediatr 2020;221:264-6.e1.
11. Liu JJ, Bao Y, Huang X, Shi J, Lu L. Mental health considerations for children quarantined because of COVID-19. Lancet Child Adolesc Health 2020;4:347-9.
12. Zhai Y, Du X. Mental health care for international Chinese students affected by the COVID-19 outbreak. Lancet Psychiatry 2020;7:e22.
13. Sahu P. Closure of universities due to coronavirus disease 2019 (covid-19): Impact on education and mental health of students and academic staff. Cureus 2020;12:e7541.
14. Viner RM, Russell SJ, Croker H, Packer J, Ward J, Stansfield C, *et al*. School closure and management practices during coronavirus outbreaks including COVID-19: A rapid systematic review. Lancet Child Adolesc Health 2020a;4:397-404.
15. Arafat SY, Kar SK, Marthoenis M, Sharma P, Apu EH, Kabir R. Psychological underpinning of panic buying during pandemic (COVID-19). Psychiatry Res 2020;289:113061.
16. Oosterhoff B, Palmer CA, Wilson J, Shook N. Adolescents' motivations to engage in social distancing during the covid-19 pandemic: Associations with mental and social health. J Adolesc Health 2020a;67:179-85.

17. Cooper K. Don't let Children be the Hidden Victims of COVID-19 Pandemic; 2020. Available frim: https://www.unicef.org/press-releases/dont-let-children-be-hiddenvictims-covid-19-pandemic. [Last accessed on 2021 Apr 01].
18. UNICEF. Global Population of Children 2100, Statista; 2019. Available from: https://www.statista.com/statistics/678737/total-number-of-children-worldwide. [Last accessed on 2021 Apr 01].
19. Kumar MM, Priya PK, Panigrahi SK, Raj U, Pathak VK. Impact of COVID-19 pandemic on adolescent health in India. J Family Med Prim Care 2020;9:5484.
20. Covid-19 School Closures around the World will Hit Girls Hardest. UNESCO; 2020. Available from: https://www.en.unesco.org/news/covid-19-school-closures- around-world-will-hit-girls-hardest. [Last accessed on 2021 Apr 01].
21. COVID-19: More than 95 Per Cent of Children are out of School in Latin America and the Caribbean. Available from: https://www.unicef.org/press-releases/covid-19-more-95-cent- children-are-out- school-latin-america-and-caribbean. [Last accessed on 2021 Apr 01].
22. Hupkau C, Petrongolo B. COVID-19 and Gender Gaps: Latest Evidence and Lessons from the UK; 2020. Available from: https://www.voxeu.org/article/covid-19-and-gender- gaps-latest-evidence-and-lessons-uk. [Last accessed on 2021 Apr 01].
23. Screen Time Limits for Kids Disappear in Virus Lockdown-Bloomberg. Available from: https://www.bloomberg.com/news/articles/2020-04-02/screen-time-once-like-candy- for-kids-is-now-the-whole-meal. [Last accessed on 2021 Apr 01].
24. Adverse Consequences of School Closures. UNESCO; 2020. Available from: https://www.en.unesco.org/covid19/educationresponse/consequences. [Last accessed on 2021 Apr 01].
25. COVID-19 Crisis Will Push Millions of Vulnerable Children into Child Labour. Available from: https://www.thewire.in/rights/covid-19-crisis-will-push- millions-of-vulnerable-children-into-child-labour. [Last accessed on 2021 Apr 01].
26. Brides GN. COVID-19 and Child, Early and Forced Marriage: An Agenda for Action. Girls Not Brides. Available from: https://www.girlsnotbrides.org/resource-centre/covid-19-and-child-early- and-forced-marriage-an-agenda-for-action. [Last accessed on 2021 Apr 01].
27. Laviano A, Koverech A, Zanetti M. Nutrition support in the time of SARS-CoV-2 (COVID-19). Nutrition 2020;74:110834.
28. Joint Leaders' Statement-Violence against Children: A Hidden Crisis of the COVID-19 Pandemic. Available from: https://www.who.int/news-room/detail/08-04-2020-joint-leader-s-statement---violence-against-children-a-hidden-crisis-of-the-covid-19-pandemic. [Last accessed on 2021 Apr 01].
29. Orgilés M, Morales A, Delvecchio E, Mazzeschi C, Espada JP. Immediate psychological effects of the COVID-19 quarantine in youth from Italy and Spain. Front Psychol 2020;11:579038.
30. Hou TY, Mao XF, Dong W, Cai WP, Deng GH. Prevalence of and factors associated with mental health problems and suicidality among senior high school students in Rural China during the COVID-19 outbreak. Asian J Psychiatry 2020;54:102305.
31. Pisano L, Galimi D, Cerniglia L. A Qualitative Report on Exploratory Data on the Possible Emotional/behavioral Correlates of Covid-19 Lockdown in, 4-10. Years Children in Italy. PsyArXiv; 2020.
32. Saxena R, Saxena SK. Preparing children for pandemics. Coronavirus Dis 2019 2020;30:187-98.
33. Yeasmin S, Banik R, Hossain S, Hossain MN, Mahumud R, Salma N, *et al*. Impact of COVID-19 pandemic on the mental health of children in Bangladesh: A cross-sectional study. Child Youth Serv Rev 2020;117:105277.
34. Duan L, Shao X, Wang Y, Huang Y, Miao J, Yang X, *et al*. An investigation of mental health status of children and adolescents in china during the outbreak of COVID-19. J Affect Disord 2020;275:112-8.
35. Colizzi M, Sironi E, Antonini F, Ciceri ML, Bovo C, Zoccante L. Psychosocial and behavioral impact of COVID-19 in autism spectrum disorder: An online parent survey. Brain Sci 2020;10:341.
36. Denis-Ramirez E, Sørensen KH, Skovdal M. In the midst of a "perfect storm": Unpacking the causes and consequences of Ebola-related stigma for children orphaned by Ebola in Sierra Leone. Child Youth Serv Rev 2017;73:445-53.
37. Zhou SJ, Zhang LG, Wang LL, Guo ZC, Wang JO, Chen JC, *et al*. Prevalence and socio-demographic correlates of psychological health problems in Chinese adolescents during the outbreak of COVID-19. Eur Child Adolesc Psychiatry 2020;29:749-58.
38. Saurabh K, Ranjan S. Compliance and psychological impact of quarantine in children and adolescents due to Covid-19 pandemic. Indian J Pediatr 2020;87:532-6.
39. Evans GW, Li D, Sara Sepanski Whipple. Cumulative risk and child development. Psychol Bull 2013;139:1342.
40. Holmes MR. The sleeper effect of intimate partner violence exposure: Long-term consequences on young children's aggressive behavior. J Child Psychol Psychiatry 2013;54:986-95.
41. Masten AS. Resilience from a developmental systems perspective. World Psychiatry 2019;18:101-2.
42. Prime H, Wade M, Browne DT. Risk and resilience in family wellbeing during the COVID-19 pandemic. Am Psychol 2020;75:631-43.
43. Stroud CB. The stress sensitization model. In: The

Oxford Handbook of Stress and Mental Health. Oxford University Press, USA; 2020.
44. Xie X, Xue Q, Zhou Y, Zhu K, Liu Q, Zhang J, *et al*. Mental health status among children in home confinement during the coronavirus disease 2019 outbreak in Hubei Province, China. JAMA Pediatr 2020;174:898-900.
45. Naudeau S, Cunningham W, Lundberg MK, McGinnis L. Programs and policies that promote positiveyouth development and prevent risky behaviors: An international perspective. New Dir Child Adolesc Dev 2008;2008:75-87.
46. Warburton DE, Nicol CW, Bredin SS. Health benefits of physical activity: The evidence. CMAJ 2006;174:801-9.
47. Warburton DE, Bredin SS. Health benefits of physical activity: A systematic review of current systematic reviews. Curr Opin Cardiol 2017;32:541-56.
48. Mielgo-Ayuso J, Aparicio-Ugarriza R, Castillo A, Ruiz E, Avila JM, Aranceta-Bartrina J, *et al*. Sedentary behavior among Spanish children andadolescents: Findings from the ANIBES study. BMC Public Health 2017;17:94.
49. Bauman AE, Reis RS, Sallis JF, Wells JC, Loos RJ, Martin BW, *et al*. Correlates of physical activity: Why are some people physically active and others not? Lancet 2012;380:258-71.
50. Joseph NM, Ramaswamy P, Wang J. Cultural factors associated with physical activity among US adults: An integrative review. Appl Nurs Res 2018;42:98-110.
51. Schuch FB, Vancampfort D, Firth J, Rosenbaum S, Ward PB, Silva ES, *et al*. Physical activity and incident depression: A meta-analysis of prospective cohort studies. Am J Psychiatry 2018;175:631-48.
52. Schuch FB, Stubbs B, Meyer J, Heissel A, Zech P, Vancampfort D, *et al*. Physical activity protects from incident anxiety: A meta-analysis of prospective cohortstudies. Depress Anxiety 2019;36:846-58.
53. Legido-Quigley H, Mateos-García JT, Campos VR, Gea-Sánchez M, Muntaner C, McKee M. The resilience of the Spanish health system against the COVID-19 pandemic. Lancet Public Health 2020;5:e251-2.
54. Ricci F, Izzicupo P, Moscucci F, Sciomer S, Maffei S, Di Baldassarre A, *et al*. Recommendations for physical inactivity and sedentary behavior during the coronavirus disease(COVID-19) pandemic. Front Public Health 2020;8:199.
55. Ammar A, Brach M, Trabelsi K, Chtourou H, Boukhris O, Masmoudi L, *et al*. Effects of COVID-19 home confinement on eating behaviour and physical activity: Results of the ECLB-COVID19 international online survey. Nutrients 2020;12:1583.
56. Gallo LA, Gallo TF, Young SL, Moritz KM, Akison LK. The impact of isolation measures due tocovid-19 on energy intake and physical activity levels in Australian university students. Nutrients 2020;12:1865.
57. Antunes R, Frontini R, Amaro N, Salvador R, Matos R, Morouço P, *et al*. Exploring lifestyle habits, physical activity, anxiety and basic psychological needs in a sample of portuguese adultsduring COVID-19. Int J Environ Res Public Health 2020;17:4360.
58. Available from: https://www.weforum.org/agenda/2020/04/coronavirus-education-global-covid19-online-digital-learning. [Last accessed on 2021 Apr 01].
59. Dan B. Curating clinical science: What is the future of academic publishing? Dev Med Child Neurol 2020;63:4.
60. Pearl PL. Child neurology, COVID-19, and crisis in society. Dev Med Child Neurol 2020;62:1113-3.