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## COVID-19 Related School Closings and Risk of Weight Gain Among Children

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### Keywords

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The COVID-19 pandemic is causing substantial morbidity and mortality, straining health care systems, shutting down economies, and closing school districts. While it is a priority to mitigate its immediate impact, we want to call attention to the pandemic's longer-term effect on children's health: COVID-19, via these school closures, may exacerbate the epidemic of childhood obesity and increase disparities in obesity risk. In many areas of the U.S., the COVID-19 pandemic has closed schools and some of these school systems are not expected to re-open this school year. The experiences in Hong Kong, Taiwan and Singapore suggest that social distancing orders, if lifted after short periods, will have to be periodically re-instated to control COVID-19 flare ups.(1) In short, we anticipate that the COVID-19 pandemic will likely double out-of-school time this year for many children in the U.S. and will exacerbate the risk factors for weight gain associated with summer recess.

While much has been written regarding the poor food and physical activity environments in schools, the data show that children experience unhealthy weight gain, not during the school year, but primarily during the summer months when they are out of school. (2, 3, 4) Von Hippel and colleagues have documented increases in student's weight and the prevalence of obesity and overweight across three school years, with increases in obesity and overweight prevalence occurring only during summer recess.(2) This and subsequent work has found that weight gain over the summer school recess is particularly apparent for Hispanic and African American youth, and children already experiencing overweight.(3) Importantly, the data show that the weight gained during the summer months is maintained during the school year and accrues summer to summer.(2) Unhealthy weight gain in childhood is of long term concern, because multiple studies show that obesity experienced in

childhood is associated with higher weight in adulthood. (5) For instance, obesity experienced as young as age 5 has been shown to be associated with significantly higher BMI through to age 50 and higher fat mass at age 50.(5)

We argue that, in addition to increasing out of school time, the COVID-19 pandemic exacerbates all the risk factors for weight gain associated with summer recess.(4) The closing of schools and the shelter in place orders create food environment and physical activity challenges for children. Annually more than 30 million children receive free or subsidized school lunches and among eligible households, food insecurity rates are higher in the summer months.(6) Our projections in Philadelphia demonstrate that just three days of school closures could result in more than 405,000 missed meals among school-aged children.(7) Food insecurity has been linked to risk of obesity and weight gain and although many communities are implementing innovative means to continue school lunches, we expect food insecurity to increase for children during the pandemic.(8)

Additionally, as households stock up on shelf-stable foods they appear to be purchasing ultraprocessed, calorie-dense comfort foods. (9) Our own experiences in supermarkets show that along with the shelves that held flour, rice and beans, the shelves that held crackers, chips, ramen noodles, soda, sugary cereals, and processed ready to eat meals are quite empty. While stocking up on shelf stable food items is clearly a preparedness necessity and helps minimize trips outside of the home, we anticipate that many children will experience higher calorie diets during the pandemic response.

Obviously the social distancing and stay at home orders issued in cities across the globe reduce the opportunities for physical activity among children, particularly for children in urban areas living in small apartments. Sedentary activities and screen time are expected to expand under social distancing orders; available data show that online video game usage is already soaring.(10) Screen time is associated with experiencing overweight/obesity in childhood, likely because of the dual issues of sedentary time and the association between screentime and snacking. (11) While increases in sedentary activity affect all children, it is likely to have the largest impact on urban children who do not have access to safe, accessible outdoor spaces where they can maintain social distance. While parks and playgrounds remain open in some cities, there is widespread appreciation that it is not possible to keep the playgrounds clean and children will have difficulty maintaining social distance. Therefore, urban families may, understandably, elect not to use these spaces, exacerbating the disparity between those who can/cannot remain physically active outdoors.

What are the public health, planning, and social service responses that can continue to support healthy eating and active living of school-age children through this pandemic? First, it will require innovative approaches to addressing food insecurity within the constraints of social distancing or full stay at home orders. The common summer recess practice of schools providing grab-and-go meals at school sites can be expanded into the school shut down months, but may not be appropriate for families with vulnerable older adults in the home. (12) Alternatively, some communities have already begun delivering meals via school buses running along their regular pick-up routes.(12) Farmers markets often provide specialty and ethnic produce and prepared foods valued by immigrant communities, and as such, states

and municipalities should consider them as part of essential food services and develop social distancing protocols for these markets.(13, 14) As schools build their remote teaching capacity we should make physical education a priority. Where schools are sending home lesson plans for math and English, they could also send home lesson plans for physical activity. There are several exercise programs designed for use by business travelers in hotel rooms and with limited gym equipment; such exercise programs could be adapted into at-home lesson plans.(15) For schools that have the capacity to online stream classes, physical education teachers could stream exercise classes. Lastly NIH's Environmental influences on Child Health Outcomes (ECHO) program, includes 70 cohorts that are studying childhood obesity and is a resource that can be used to study the obesity related consequences of extended school closure.

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