

The Impact of Lockdown during COVID-19 Pandemic on Physical and Mental Health of Adolescents

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ABSTRACT

The COVID-19 pandemic is a once-in-a-lifetime incident whose impact touched everyone from all walks of life. Such an unparalleled global event warranted unprecedented measures to mitigate the imminent public health catastrophe and protect risk groups. However, these actions have inevitably marginalized the physical and mental health of adolescents who were at a lower threat of adverse physical outcomes from COVID-19 infection. Restrictive public health measures resulted in disruption of routines from the closure of the school and public spaces, social isolation, loneliness, lack of engagement, and boredom. These impacts culminated in physical inactivity, sedentary lifestyle, eating disorders, and obesity and led to physical changes that have long-term implications. Equally, the substantial psychological stress of the pandemic resulted in an increased report of anxiety, depression, behavioral problems, and suicide attempts among adolescents in both previously healthy and those with pre-existing mental conditions. This narrative review provides a brief overview of the current evidence of the physical and mental impact of the pandemic lockdown on adolescent health and discussed interventional implications.

Keywords: COVID-19 pandemic; adolescent; physical health; mental health (Siriraj Med J 2022; 74: 895-902)

INTRODUCTION

Since its emergence as a global health crisis in December 2019, the COVID-19 pandemic has had a deep and far-reaching impact on every aspect of livelihood across all age groups. This highly contagious novel respiratory illness has caused a significant toll on the physical health of nearly 600 million people to date and claimed the lives of more than 6 million.¹ Much of the early research focused on morbidity and mortality among risk groups as it disproportionately affects the elderly population with comorbidities.² However, as the pandemic pans its course, there is an expanding recognition of the multi-facet mental and indirect physical consequences faced

by other less physically vulnerable groups of the general population that were inadvertently overlooked initially.

Adolescence is a challenging phase of life which involves dealing with biological and physical bodily changes, as well as forging emotional maturity, mental health, social networking, and identity. It is during this unique transitional period that adolescents are subject to increased exposure to health-influencing events and behaviors that could shape long-term health outcomes.^{3,4} The COVID-19 pandemic has brought new physical consequences and emotional stress that compound this fragile adolescent period via disruption to social opportunities, which resulted in isolation, loneliness,

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and deprivation of various routine services.⁵ This has come as a result of the enormous effort invested by health authorities and governments to mitigate the rapid viral transmission through social and physical distancing directives, isolations and quarantines, and lockdowns as a last resort. While these measures served their purposes and facilitated alleviation of one specific health burden for the general population, they are inevitably without their costs to other aspects of physical and mental health for adolescents (Fig 1). This review article aimed to highlight the impact of the COVID-19 pandemic lockdown on the physical and mental health of adolescents, specifically focusing on physical inactivity, eating behaviors, obesity, malnutrition, and substance use in the physical domain, and psychological conditions and suicidal rate in the mental domain. The implication for intervention is also discussed. A search of medical databases, including PubMed, Google Scholar, and references in original and review articles were carried out for the following terms in the title and keyword: COVID-19, pandemic, adolescent, physical health, mental health, psychological impact, physical inactivity, weight, weight gain, overweight, obesity, eating behavior, eating disorder, food insecurity, food access, anxiety, depression, suicide, and substance use. Relevant articles focusing on the health impact on adolescents published between 2019 and 2022 were evaluated and summarized.

Impacts of COVID-19 pandemic lockdown on adolescents' physical health

Research has shown that adolescents were at a lower risk of developing severe COVID-19-related morbidity and mortality.⁶ However, they are not exempted from impaired physical health as an indirect consequence of the pandemic and there are increasing reports highlighting several adverse physical outcomes among adolescents during lockdowns.

Impact of COVID-19 pandemic on physical inactivity

It is not difficult to envisage the effects of restrictive social measures on physical activity, and studies have shown a consistent reduction across all geographic regions with the closure of schools, parks, and public spaces. Several studies have reported a decrease in physical activity of up to 60%, and a recent meta-analysis showed a mean reduction of 20% among children and adolescents compared to the pre-pandemic period.⁷⁻¹⁰ Unsurprisingly, moderate to vigorous activities were most affected (28%), while the impact on light activities was unclear. Additionally, the result was not affected by the baseline levels of physical activity, suggesting that the product of the lockdown was felt across the board, and not only in those with a previously active lifestyle.¹⁰ The implication of such finding concerns the risk of obesity, given its prevalence is subsequently four times higher among physically

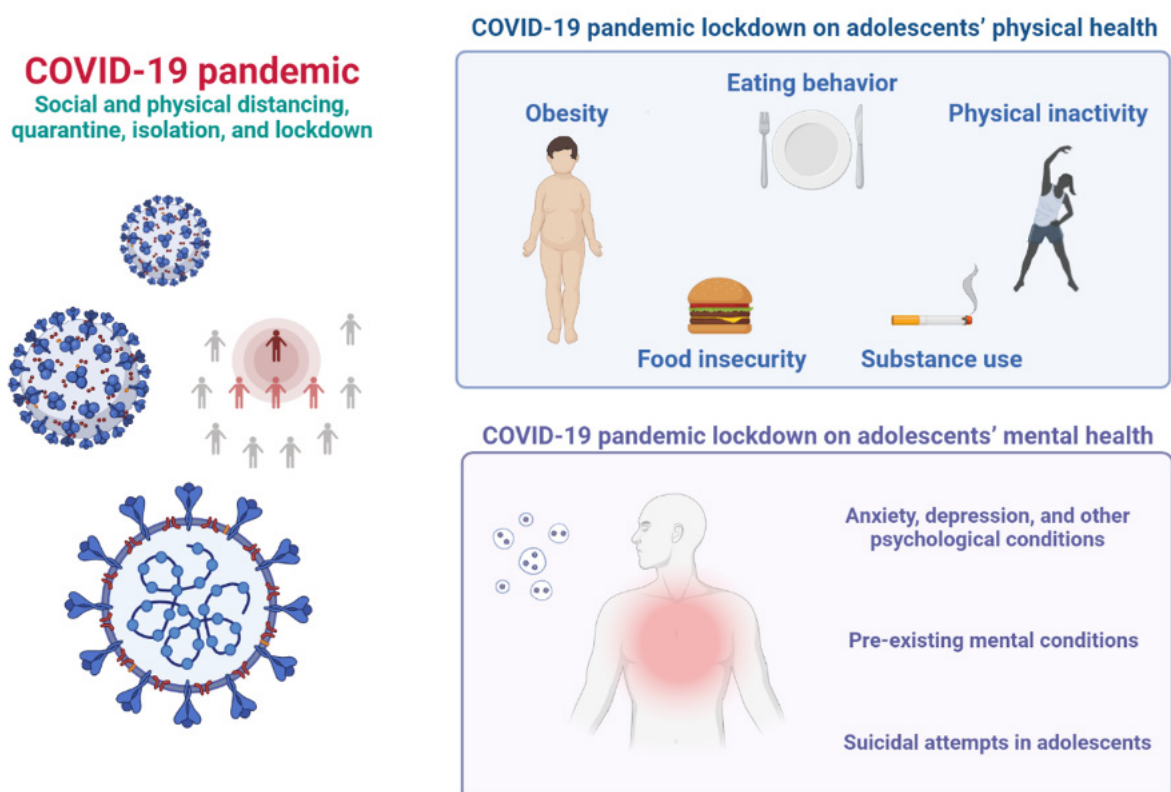


Fig 1. Impact of lockdown during COVID-19 pandemic on physical and mental health.

inactive individuals and is also linked to a myriad of adverse health consequences.¹¹

Impact of COVID-19 pandemic on eating behaviors

Stringent social confinement also aggravates stress and boredom, which, in turn, influence obesogenic eating behaviors and eventual weight gain. Such behaviors are brought about via disruption to structured routines, increased screen time-associated snacking, and a change in available household food inventory from stockpiling large quantity of less healthy non-perishable goods in order to minimize social exposure.¹²⁻¹⁵ The effect of altered organized schedules has previously been prototyped in summer recess-associated weight gain compared to during the school year due to lack of daily routines. Increased screen time, such as playing video games and watching television, is also associated with unhealthy eating habits and snacking.¹³⁻¹⁷ A pilot cross-sectional survey of children and adolescents during the first lockdown in Italy illustrated the effect of social isolation and loneliness on unfavorable food intake by reporting an increase in comfort food consumption, namely sweet packaged snacks (34%), ice cream and desserts (32%), chocolate (32%), as well as bakeries (47%) and processed meats (25%). Consequently, 60% of the study participants gained weight during the study period.¹⁸ This inclination was further supported by a study in 563 adolescents, which demonstrated a 45% surge in consumption of sweet, desserts, and high carbohydrate food at home, in adjunct to a 24% increase in total food intake.¹³ Such phenomenon reinforced the association of social isolation and loneliness with eating disorders, particularly overeating and binge eating as a coping mechanism, contributing to weight gain and obesity via excess caloric balance.^{5,19,20}

Impact of COVID-19 pandemic on obesity

With the pre-pandemic prevalence of overweight and obesity already at one-third among children and adolescents, the eminent alarming trajectory of this health concern – fueled by physical inactivity and eating behaviors – could only be undoubtedly anticipated.²¹⁻²³ A study in China, the first country to implement lockdown, evaluated the body weight status between pre-lockdown and during lockdown among high school students and found an increase in both body weight and body mass index (BMI). This resulted in a higher prevalence of overweight, from 26.7% to 30.4%, and obesity, from 16.1% to 19.3%.²⁴ A similar pre-pandemic and pandemic comparison study also replicated an increase in the overall prevalence of obesity from 13.7% to 15.4% among school children in 2020.²⁵ Two recent systematic reviews and

meta-analyses have confirmed the association between COVID-19 and weight gain and obesity in adolescents.^{26,27} La Fauci et al. identified 14 studies evaluating the effect of lockdown on obesity and found that only 4 (14.3%) studies reported unchanged weight distribution, while the remaining studies demonstrated an increase in either body weight or BMI scores.²⁷ In the study by Chang et al., the mean differences for weight gain and BMI was 2.67 kilograms (kg) and 0.77 kg/m², respectively. Interestingly, when subgroup analysis was performed, subjects with pre-existing type 1 diabetes mellitus or obesity did not reach statistical significance for weight gain and BMI change.²⁶ Although there is a possibility that these patients were already on a regimented diet, lifestyle modifications, and medication – therefore, were less affected by the loss of structured routines compared to healthy individuals – further exploration is needed to account for this disparity, given contradicting evidence in the literature among children and adolescents with pre-existing comorbidities exists.²⁸⁻³⁰

Altogether, the overall increase in body weight and BMI during the lockdown period should raise alarms for appropriate and timely interventions because the health implication of obesity is two folds. Firstly, at the face value, obesity is associated with an augmented risk of COVID-19 infection, disease severity, and mortality.^{19,31,32} It is also associated with comorbidities linked to adverse COVID-19 prognosis, such as diabetes and hypertension.³³ Therefore, the consequence of a growing number of vulnerable populations during the ongoing pandemic is worrying. Secondly, a sedentary lifestyle can become permanent out of habitual familiarity as a “new normal” the longer the lockdown continues. This behavior could, in theory, aggravates pre-existing comorbidities or paves the way to new-onset metabolic syndrome and its complications, such as cardiovascular diseases, in the long term.²⁶

Impact of COVID-19 pandemic on food insecurity and malnutrition

Good physical health also relies on adequate and optimum nutrition, and a growing number of studies have shown how the pandemic negatively impacted access to food for adolescents. It has been shown that vulnerability to food shortage was primarily the result of economic and financial hardship from parental unemployment. While the situation affected households of all socioeconomic status, poorer households were unsurprisingly at up to 46-fold risk of moderate to severe food insecurity. They also experienced a greater decline in meals with proteins.³⁴⁻³⁷ A multinational data reported that 30-40% of adolescents in developing countries have reportedly

gone hungry during the first wave of the pandemic, resulting in a decrease in the number of meals with proteins from 1.07 to 0.77 as well as the consumption of other nutrient-dense food such as eggs, vegetables, and dairy.^{35,36} The threatened food availability was further compounded by limited agricultural production, supply chain disruptions, and distribution and trade restrictions.³⁶ Ultimately, the impact of food insecurity and malnutrition on children and adolescents is far and wide beyond the immediate physical consequences of poorer general health, reduced cognitive performance, and higher risk of hospitalization, but also extends into mental health territory with increased risk of behavioral problems, anxiety, depression, and suicidal ideation.³⁸

Impact of COVID-19 pandemic on substance use

Perhaps, as dire as it may sound, the only solace that could be taken from this tumultuous turmoil is the relatively stable rate of alcohol and substance use among youth during the pandemic.³⁹ Studies focusing either exclusively on a single substance or multiple substances have yielded incongruent results. Most studies evaluating alcohol use, smoking, cannabis use, and other drug use reported no change in overall use.⁴⁰ Interestingly, adolescents who disregarded social distancing and engaged in physical in-person interaction had an increment association with alcohol use (odds ratio [OR]=1.41), heavy drinking (OR=1.81), marijuana use (OR=1.39), and recreational drug use (OR=1.37).⁴¹ This finding is unsurprising given that substance use usually occurs in a social context, and substance-using peer network is one of the strongest affiliated predictors.⁴²

Impacts of COVID-19 pandemic lockdown on adolescents' mental health

The literature is increasingly emphasizing the impact of the COVID-19 pandemic on adolescent mental health, either directly as a consequence of the disease or indirectly from public health policies. The importance of such awareness could not be overstated because adolescents are at risk of enduring poor mental health outcomes from an unprecedented global event, yet they lack the range of coping mechanisms and mental resilience of adults. The result of a negative psychological impact could be permanent and fuels additional undesirable physical health outcomes long-term.^{5,43}

Impact of COVID-19 pandemic on anxiety, depression, and other psychological conditions

Several studies have shown that children who tested positive or were quarantined for COVID-19 experienced separation stress and were more likely

to develop psychological conditions such as anxiety, adjustment disorder, and post-traumatic stress.^{3,44-47} Tangibly, coping with stress and grief from losing family members and friends to the disease can overwhelm an adolescent's mental resolve. The COVID-19 pandemic also prompted other psychological tolls from social isolation, loneliness, lack of engagement, and boredom attributable to restrictive public health policies. A recent systematic review and meta-analysis, which included 15 studies and 22,996 participants, found that 79.4% of children were negatively affected by the lockdown. The results showed a pooled prevalence estimate for anxiety (34.5%), depression (41.7%), irritability (42.3%), sleep disturbance (21.3%), inattention (30.8%), and excessive fear of infection, financial uncertainty, and food insecurity (22.5%).⁴⁸ Another systematic review demonstrated an overall consistent trend of higher anxiety and depression experienced by adolescents associated with the COVID-19 pandemic.⁴³ Additionally, there have been suggestions that disruption of daily routines and engagement may result in poor in-person rapport, attention seeking, clingy behavior, and parental dependence.⁴

Impact of COVID-19 pandemic on pre-existing mental conditions

The COVID-19 pandemic also wreaks havoc on children and adolescents with pre-existing mental health conditions because the lockdown deprived them of daily routines, medical care, and tailored services. As a consequence, there are emerging reports on impaired mental well-being in patients with mental comorbidities. Reports have shown aggravated intensity and frequency of behavioral problems in 35-41% of autistic patients. Parents of children with attention deficit and hyperactive disorder reported "emotional rollercoaster," aggressiveness, and sleep problems during lockdowns, and 34% of the patients exhibited clinical deterioration.^{48,49} Children and adolescents with varying psychiatric problems also experienced worse anxiety, depressive symptoms, anger, sleep impairment, peer relationship, and general well-being than those with chronic somatic conditions and healthy individuals.⁵⁰ More research is needed to delineate the natural history of these observations as the pandemic becomes under control. Nonetheless, they highlight the collateral damage from the existing public health measures for the pandemic and an area of opportunity for future intervention.

Impact of COVID-19 pandemic on adolescent suicidal rate

The ultimate perturbing implication of the COVID-19 pandemic comes in the form of increased rate of suicidal

attempts in adolescents. Studies have steadily shown that the suicidal rate among youth escalated during the pandemic, especially in the early months when the lockdown was implemented as a countermeasure while vaccines were still in their infancy of research and development.⁵¹⁻⁵⁴ A study in Japan reported a 1.86-fold surge relative to the pre-pandemic level, and U.S. data pointed to a 31% increase in suicide attempts requiring emergency department visits. Notably, girls and those with mental illness were disproportionately affected, with 51% higher emergency visits and more than 5 folds mental illness-related suicides, respectively.^{52,53} Although the suicide rate has since plateaued and decreased in the subsequent time-course of the pandemic, it remains elevated compared to pre-pandemic time.⁵²

Implication for intervention

There is limited head-to-head evidence on the magnitude of the effects adolescents experienced compared to other age groups in the population to date per se. Furthermore, there is also a paucity of available data in the literature on the longitudinal natural history of the aforementioned pandemic-related physical and mental health impact on adolescents, given that the world only recently shifted its paradigm to “living with COVID-19”. Therefore, it remains to be seen whether these health outcomes are long-lasting, require interventions, or are subject to subsidence with the easing of the lockdown.

Intervention for physical health

On the physical aspect, an Australian study reported that adolescents were less likely to meet moderate-to-vigorous physical activity compared to adults during the social restriction implemented in early 2020 (OR 1.26, 95% CI 1.01-1.57).⁵⁵ An inference that adolescents might have suffered more weight gain compared to adults could be drawn from a systematic review and meta-analysis by Bakaloudi et al. in which their weight gain exerted a driving effect for statistical significance on the summative weighted mean difference (WMD) when combined to the weight gain in the adult population (WMD 1.57, 95% CI 1.01-2.14).⁵⁶ It could be postulated that the loss of moderation to a sedentary lifestyle and eating habits secondary to hindered structured routines, social interactions, and playtime are likely responsible for the differences in the outcomes, given that these activities constitute a more significant proportion of their daily lives than adults. Therefore, the assertion that there is a pressing need to re-engage adolescents in healthy eating and a physically active lifestyle is well-founded. This is because current behaviors are the foundation for future

adult habits, and it has been shown that maintaining sufficient physical activity is associated with reduced decline, chronic diseases, and deaths.⁵⁷ The immediate minimum goal would be to restore adolescents’ physical activity back to pre-pandemic levels to prevent these lifetime consequences. The resumption of access to routine healthcare and re-allocation of resources that had worn thin by the pandemic can be the stepping stones in facilitating identification of those adversely affected and delivery of appropriate physical lifestyle interventions, on top of regular provision for preventive health maintenance (e.g., vaccination, sexual health) and management of pre-existing chronic diseases.

Intervention for mental health

Being an adolescent is a robust risk factor for poorer mental health in studies conducted in the pediatric population⁵⁸; however, its predictive value is less pronounced when gauged with the general population. It appears that adolescents were just as equally affected psychologically by the pandemic lockdown as adults, as demonstrated in a meta-analysis by Prati et al. The study included 25 studies in adults and adolescents and found that age was not a significant contributor to the effect size of mental health impact.⁵⁹ A subsequent study and subgroup analysis also confirmed no evidence that the standardized mean change in mental health symptoms differed between adolescents and adults.⁶⁰ These results reiterate the challenges of the full-scale adulthood burden faced by adolescents with their limited coping mechanisms and mental resilience during their maturation phase. Moreover, the long-term evaluation of mental health impact from the pandemic lockdown is, unfortunately, less straightforward, partly because of the intersecting range of onset and the broad definitions for the neuropsychiatric domain of long-COVID syndrome.⁶¹ Hence, distinguishing adolescents with long-term mental health conditions caused by COVID-19 infection – especially in those without symptoms initially – and those secondary to the pandemic remains challenging.⁶² To the best of the authors’ knowledge, there are no longitudinal studies assessing adolescents’ mental health in the post-lockdown period available to date; therefore, more studies are needed to fill this knowledge gap in order to develop a tailored and structured action plan for adolescents for global events of similar scale hereafter.

Potential strategic implementation

In addition to fine-tuning public health policies that are more mindful of adolescents’ holistic well-being, one promising strategic avenue to explore in preventing

the negative impact of any lockdown in the future is the implementation of telemedicine. Reports have suggested that digitally proficient adolescents increasingly embrace virtual technology as a mean to receive consultation and therapy.⁶³ The advantages of telemedicine, even before the COVID-19 pandemic, include decreased wait times, removal of geographic and travel barriers, and higher patient turnovers for physicians.^{57,63} It also enables continuity of medical care in a contactless proxy to conventional in-person visits during the pandemic lockdown. Furthermore, the upside of this emerging technology in diagnosing, counseling, and treating adolescents with psychological conditions could be expansive. Telehealth offers the benefit of enhanced confidentiality in private settings and the removal of the social stigma of being seen seeking mental health consultation. There is also a growing evidence of the application of telepsychotherapy and self-guided therapy based on digital health platforms, which Garagiola et al. have reviewed extensively.⁵⁷ Nonetheless, as with virtual classrooms, questions remain on the accessibility for adolescents in disadvantaged households and communities who face barriers to internet infrastructures and necessary technological devices.

CONCLUSION

The COVID-19 pandemic posed an unparalleled global health crisis and brought about equally unprecedented public health measures; however, adolescents at lower risk of COVID-19 infection were unfortunately marginalized. Closure of schools and public spaces, social isolation, loneliness, lack of engagement, and boredom have left adolescents reeling from a myriad of physical and mental health consequences. The potential of these effects on long-term health is alarming. Therefore, the growing awareness of the physical and mental tolls on adolescents must be translated into resource allocation and policies by governing bodies, healthcare authorities, and stakeholders to provide appropriate and timely prevention and intervention to ensure the best health outlook of this “COVID-19 generation”.

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