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Stressors for Youth during COVID-19: A Narrative Review

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ABSTRACT

This narrative review is a summary of published studies and reviews on stressors that youth have experienced during COVID-19. Most of the literature is focused on infection effects on pregnancy, the neonate, children and adolescents as well as Long COVID in youth. Although most youth have not experienced COVID infection or Long COVID, they have had other negative experiences during COVID-19. These have included lockdown school closings and exposure to aggression and violence. Related mental health problems have included loneliness, anxiety and depression, post-traumatic stress and suicidality. These mental health problems have been associated with excessive screen time/social media, inactivity, over-eating/unhealthy diet and sleep disturbances. Limitations of this literature include the typically absent baseline data and the questionable reliability of parents reporting on the activities and feelings of their youth.

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This narrative review is a summary of published studies and reviews on stressors that youth have experienced during COVID-19. Most of the literature is focused on infection effects on pregnancy, the neonate, children and adolescents as well as Long COVID in youth. Most youth have not experienced COVID infection or Long COVID but have had other negative experiences during COVID-19. These other stressors have been the focus of less research including lockdown school closings and experiences of aggression and violence. Related mental health problems have included loneliness, anxiety and depression, post-traumatic stress and suicidality. These have been exacerbated by behavior problems of the youth including excessive screen time/social media, inactivity, over-eating/unhealthy diet and sleep disturbances. This review is accordingly divided into sections on infection and lockdown effects, mental health effects and behavior problems.

Infection Effects

Pregnancy and Neonatal Outcomes

Pregnant women have been worrying about both the effects of COVID-19 infection as well as the effects of the vaccine on their fetus and newborn. In a recent narrative review, a summary was provided on the literature on COVID-19 infection effects on the women, their fetuses and neonates as well as the psychological problems experienced by the women [1]. Although early pandemic research suggested that the severity of COVID infection and the clinical course for infected pregnant women was no worse than for non-pregnant infected women, later pandemic, larger sample studies and meta-analyses suggest that infected pregnant women have more obstetric complications and negative outcomes than pregnant women without infection. Greater prevalence of pre-eclampsia, fetal distress, premature rupture of the membranes and preterm delivery have been reported for pregnant women who are infected, especially during the third trimester. Older pregnant women and those with comorbidities including elevated BMI, diabetes and hypertension are also at greater risk for obstetric complications [2-3]. The psychological problems studies have consistently shown a prevalence of approximately 20-40% anxiety and depression in pregnant women during COVID-19 [4]. Mixed data have been presented on vertical transmission of the virus to the fetus as well as questions about vertical transmission via reduced natural killer cells protecting the placenta and increased ACE-2 receptors. Although the neonatal infection rate has been relatively low, antibodies noted in some neonates (IgG and IgM) suggest intrauterine, delivery or postnatal transmission. Prematurity and low birth rates have been reported for neonatal outcomes and some have speculated that later developmental problems may occur for these offspring [5-7].

The very limited data on vaccination during pregnancy suggest positive effects. Although the data are even more limited on vaccination and fertility, there are no known negative effects [8, 9].

Methodological limitations of this literature include the data having been cross-sectional making it impossible to determine causality. In addition, the findings have been mixed because they have been derived from samples of symptomatic, hospitalized pregnant women at different gestational ages and different times during the pandemic.

Pediatric Problems

COVID-19 pediatric problems have been similar to the COVID problems for adults including medical, neurological, and sensory conditions, although these conditions have typically been less prevalent and severe. The lesser severity in children may relate to their less mature viral receptors, less dysregulation of immune responses, and a lesser incidence of pre-existing

comorbid conditions. The symptoms have been similar to those of adults including fever and cough. Other clinical indicators are elevated C-reactive protein, ferritin, proinflammatory cytokines including TNF (tumor necrosis factor as a sign of inflammation), interleukins-4, 6 & 10, and neutrophils as well as reduced lymphocytes [10-13].

Most of the literature on other infection effects has focused on neurological and sensory symptoms including headaches and loss of smell and taste as well as skin problems. In a systematic review based on 21 studies (3,707 children), 17% showed neurological symptoms [14]. The authors suggested that direct neural invasion may have occurred in some cases, although disruption of the blood–brain barrier and neural–inflammation were suggested in others. The pathway the authors described was "direct invasion of the olfactory neural epithelium as it expresses the ACE–2 (angiotensin converting enzyme 2) receptors, thereby causing inflammatory changes in the bilateral olfactory clefts".

In an overview of smell and taste problems in children, 19% tested positive for these disorders. Other authors have reported greater prevalence at 30% and 37%. However, most of these studies were self-report surveys. When a more objective test was given (a mix of eugenol, ethanol and vinegar on swabs held 1 to 2 centimeters from the nostril), only 10% of those who had normal subjective olfaction showed abnormal responses [15-17]. It is notable that 54% of these occurred in mild cases of COVID-19 infection, 37% in moderate cases and 17 % in severe cases of COVID-19, suggesting that these disorders are less apparent as COVID-19 symptoms increase.

In a systematic review of the literature, skin problems were said to derive from immune dysregulation in the pediatric-age group [18]. The authors suggested that the underlying mechanisms for these may be viral-induced skin damage, vasculitis-like reactions and/or indirect injury from inflammatory reactions. Surprisingly, although skin conditions are said to be more common in children than adults, fewer studies have appeared in the COVID literature on the prevalence and symptoms of skin problems in children than adults, and the literature is also more sparse on skin conditions than it is for smell and taste dysfunction in children and adolescents. Some have suggested that these may be transient disorders or persist after respiratory symptoms have resolved, as in "long-haul" symptoms [19]. Methodological limitations of this literature include small sample, cross-sectional studies assessing single variables in countries that experienced lockdowns early in the pandemic and, sequelae or post-COVID problems have rarely been researched.

Long COVID

Long COVID-19 or the persistence of COVID-19 symptoms beyond four weeks has been recently recognized as a medical condition in children and adolescents. However, in a recent review of the literature, only twelve studies could be found on Long COVID in youth [1]. Just as the prevalent COVID-19 acute infection symptoms are similar in adults and youth, so are the Long COVID symptoms including fatigue and dyspnea. Other persistent symptoms shared by the two age groups include headaches, muscle pain, memory loss and "brain fog". Just as in COVID, smell, taste and skin problems have been seen in youth as well as similar patterns of brain PET hypometabolism [20-23]. At this time, the symptoms have been less severe and persistent for youth versus adults. This may relate to their lesser severity of acute infection, in turn, related to less developed ACE-2 receptors and autonomic function or less frequent comorbidities. In a more recent review, children were noted again to be less likely to develop long COVID when compared to adults and adolescents and those who had symptomatic COVID-19 had a higher probability for long COVID [24-26]. This research has several methodological limitations including non-representative samples that have typically been surveyed almost exclusively on physical symptoms at only one point in time and have not been compared to non-Long COVID control groups. Nonetheless, this sparse literature may inform potential diagnostic and preventative interventions

Lockdown Effects

School Closing and Reopening Problems

In a recent narrative review of the literature, school closings during COVID-19 were associated with reduced transmission of the virus but also reduced academic performance and mental health problems including anxiety, depression and disrupted sleep rhythms [1]. These problems have been exacerbated by excessive screen time, inactivity and over-eating. In a cross-country panel analysis on daily data from 40 European countries regarding school closures [31], the countries that implemented closures had fewer COVID cases which became a reality at 20 days after implementation and remained detectable at 100 days. These data were supported by a systematic review of 10 studies suggesting that closures resulted in a decrease in the number of hospitalizations and pediatric emergency room visits [27,28].

Reviews of the literature also suggest mixed effects on academic progress and negative effects on mood. In a literature review on school performance, parents and teachers reported losses particularly in math and reading. However, in other studies in the same review, researchers reported benefits of learning math online. Still another author suggested that school closures had positive effects by reducing academic pressure [29,30]. Negative effects on mood have included depression, anxiety and stress. In a study from China, for example, primary and secondary students (N= 4342) experienced psychological stressors along with school closures including anxiety (25%), depression (20%) and stress (15%), although, as many as 21% became more satisfied with life during the school closure. In a review of 36 studies suggesting negative effects of school closings, 69 % of the studies cited emotional, behavioral and inattention effects of school [31]. closures Increased social media was reported in five studies, less physical activity was noted in six studies, sleep disturbances were reported in 10 studies and diet problems were cited in five studies. The authors suggested that a metanalysis could not be conducted because of the different types of studies with 58% being cross-sectional, 25% being longitudinal and 14% being cohort studies.

Significant increases were not only noted in depression but also in self-injurious behavior and suicidality in a study from China [32]. In this longitudinal study on children from grades 4 to 8 (N=1241), assessments were made of mental health before the outbreak and closing of schools and again at reopening. For depression, the prevalence was 19% before the outbreak and closing of schools and 25% after the re-opening. Self- injurious behavior was 31% before the outbreak/ school closing and 42% after the reopening. Suicidal ideation went from 23 to 30%, suicidal plans from 9 to 15% and suicidal attempts from 3 to 6%. This study suggests that COVID had severely negative effects on mental health.

Re-openings were less often studied, but infection rates typically increased as well as stress levels and insufficient sleep. In a study from Croatia, a statistical increase in the cumulative incidence of COVID was reported for 49 weeks after schools reopened including increases in hospitalizations and mortality. When schools

were later closed for winter holidays there was a decrease in cases, hospitalization and mortality. In a study from Israel, an outbreak occurred 9 days after the reopening of schools [32,33]. In this study, 13% of students and 17% of staff were infected.

Sleep problems were also noted upon school re-openings in the study from Canada and, in a sample from China, sleep duration decreased from 8.9 hours during school closures to 7.8 hours upon re-opening (N=3265) [34]. The prevalence of insufficient sleep increased from 21 to 64% with greater changes noted in females.

Methodological limitations of this literature include the typically absent baseline data and the questionable reliability of parents reporting on the activities and feelings of their youth. Youth may be more accurate reporters of their own sleep and emotional problems.

Aggression and Violence Experiences

Youth have indirectly or directly experienced aggression and violence during COVID-19. Youth are observing violence via excessive social media exposure. According to ABC News (June 13, 2021 1:34 pm), 4 mass shootings occurred in just 6 hours leaving 39 wounded and 5 dead including an 18-month-old baby and two teenagers who were wounded [1]. A more recent report suggested that at least 150 people were fatally shot in more than 400 shootings over the fourth of July weekend (CNN, 7/5, 4:24).

Partner violence has also been experienced at home along with sibling violence. Domestic violence, a quieter form of violence, has been referred to as "the hidden pandemic" or "Danger in Danger" and others have referred to the pandemic as "the perfect storm" leading to family violence and still others as a "pandemic within a pandemic. Sibling abuse or sibling violence has rarely appeared in the COVID-19 literature, although it has been reportedly as prevalent as partner violence. Reputedly, the prevalence of partner violence has increased the odds of sibling violence by 1.8. Sibling abuse is generally either physical abuse (punching, kicking, choking) or emotional abuse (threatening, manipulating, insulting). Being the target of aggression/violence has been reported by youth via texting hotlines and via self and parent-report surveys. A more precise way of assessing violence against youth was exploring the differences between texts that were sent on hotlines (Childhelp,..) during the COVID-19 pandemic) [35-37]. The data from this study suggested that there has been a 14% increase in hotline calls during the pandemic.

Models for underlying mechanisms include that frustration during lockdowns leads to aggression and that touch deprivation leads to aggression Limitations of these studies include their non-representative samples and cross-sectional data deriving from different pandemic periods

Mental Health Problems

Loneliness

For a recent narrative review, only a couple dozen publications could be found on loneliness of youth during COVID-19. They are limited to research on prevalence, effects and risk factors. The prevalence has widely ranged from 8-68% across different countries. Loneliness has increased from pre-COVID to COVID and especially across lockdowns [1]. Increases in loneliness-related depression and anxiety have ranged from 15-25% which have been comorbid with excessive use of social media, physical inactivity, sleep disturbances and inflammation markers including increased C -reactive protein and neutrophil- lymphocyte ratios (38-41). And inflammation markers including increased C-reactive protein and neutrophil-to-lymphocyte ratios. Only a few buffers have been noted for the stressful effects of loneliness including peer relationships, Parent relationships, meditation and exercise [42-44].

Despite methodological limitations, including that causality cannot be determined from cross-sectional data this research highlights the importance of further research on the relatively unknown underlying mechanisms for loneliness. In addition, interventions are needed for reducing loneliness in youth.

Anxiety and Depression

A narrative review on anxiety and depression in non-infected youth during COVID-19 has documented significant prevalence of depression and anxiety even in youth who are not infected based on surveys on the Patient Health Questionnaire and the Generalized Anxiety Disorder Scale [1]. Anxiety and depression symptoms have been noted in youth (on average in 38% and 36% respectively) across several countries, although most of the studies have been from China and the U.S. The prevalence rates for both anxiety and depression have been significantly greater for females and lower for children versus high school and, in turn, university students [45,46]. According to a Center for Disease Control and Prevention study on 7,700 teens conducted in the first six months of 2021 and published on March 31, 2022, 4 in 10 teens were reporting that they felt 'persistently sad or hopeless", two of the criteria for a depression diagnosis. In October of 2021, the American Academy of Pediatrics declared a national emergency in child and adolescent mental health citing "soaring rates of depression, anxiety, trauma, loneliness and suicidality".

Comorbidities have included stress, Insomnia, social anxiety, PTSD, OCD and suicidality [47,48]. The most frequent risk factors have been worries about COVID infection These have particularly involved worries about academic performance, inactivity (lack of exercise) and excessive time on social media This research, not unlike many of the COVID-19 studies, is limited by being cross-sectional samples suggesting limited generalizability and, the results are also, again, limited by being self-report data [45-54].

Post-traumatic Stress

The prevalence of post-traumatic stress (PTSS) in youth during COVID-19 has widely ranged from 3% in China to 69% in Bangladesh It has also varied by type of questionnaire and whether it was assessed during a lockdown or during the non-lockdown pandemic [1]. In several studies reviewed here, PTSS has been highly correlated with anxiety, depression and sleep disturbances suggesting the comorbidity of those problems. Risk factors or correlates of PTSS in youth during COVID-19 have included demographic factors, e.g. older age and female gender [30]. Risk factors involving parents have included negative relationships, divorce and parent PTSD. Youth risk factors have included loneliness, loss of friends and fear of infection Behavior problems have included lack of exercise, excessive mobile phone use and sleep problems [28]. Methodological limitations of this literature include the cross-sectional nature of the data collection. The literature is also lacking in studies on potential underlying mechanisms and interventions for post-traumatic stress [55- 60].

Suicidality

In a recent review research on COVID-19 youth suicidality (ideation, attempts and completed) is summarized [1]. The review reflects the literature which is primarily focused on prevalence

and risk factors derived from survey and medical records data. The prevalence of suicidality has been highly variable across different countries at different times during the pandemic. At the beginning of the lockdown, rates decreased although it became more prevalent after a couple of weeks into lockdown periods. Inactivity has been a risk factor. However, loneliness, anxiety and depression were the most frequently reported risk factors for suicidality at all levels. According to a survey by the Center for Disease Control and Prevention published on March 32, 2022, one in five teens said that they contemplated suicide. Protective factors have included school closures that were thought to lead to less academic pressure, peer conflict and bullying The Interpersonal Psychological Theory has been advanced saying that suicidality requires both desire and capability to die. These studies are limited by being cross-sectional, not longitudinal, making it difficult to determine causality or directionality of effects. In addition, although different models exist on predictor variables for suicidality, these were not assessed in these studies [61-69].

Behavior Problems

Excessive Screen Time/Social Media

Social media effects on youth during COVID-19 have been studied in the context of excessive use and mental health. In a recent review, some positive effects have been reported including connecting and social support [70], although the COVID-19; research has typically noted negative effects including sedentary behavior, limited social interaction, depression and anxiety. This narrative review of eighteen COVID-19 publications on social media effects on youth included sections on prevalence, on effects and on mediators/moderators of those effects [1]. The prevalence of social media use by youth during COVID-19 has varied between 5% and 97% across 22 countries as a function of location, quarantine/lockdown, and type of social media, although the overall prevalence has significantly increased by 27% during the pandemic and has averaged 38% across studies. The most popular social media have been Facebook, What's App, Instagram and Twitter [71]. The prevalence of mental health symptoms has also varied across countries but has averaged 27% for anxiety, 34% for depression and 35% for stress [1]. Mediators for the relationships between excessive social media and mental health symptoms have included rumination, psychological problems, sense of control and active use and moderators have included mindfulness, academic burnout and ''flow." Limitations of this literature are its sampling of self-reports from university students via cross-sectional surveys and confounding variables including pre-existing psychopathology, lockdown conditions, and sedentary behavior. Research is needed on the specific reasons for excessive social media use (e. g. information seeking, social interaction and escape from negative feelings including loneliness and touch deprivation) to inform intervention protocols for reducing this addictive behavior and its negative consequences on mental health symptoms in youth [71-72].

Physical Inactivity

The prevalence of physical inactivity in youth during COVID-19 has varied across countries and depending on whether the data were collected during lockdown versus non-lockdown as well as the age of the youth [1]. In those studies that compared activity pre- and during COVID, activity was noted to decrease in 40-59% of youth Several negative effects have been noted including excessive screen time, sleep problems, over – eating and affective disturbances. Physical inactivity was a significant correlate of all of these problems. Relatively little intervention research has been conducted and underlying mechanisms have not been explored. As in most of the COVID-19 literature, this research has the limitations of being typically cross- sectional and self-report [73- 77].

Eating/Diet Problems

Eating problems and disorders in youth have been increasingly prevalent during COVID-19. In a few different countries they have ranged from 27-44% Unhealthy eating has resulted in short-term effects including 49% of youth experiencing sleep problems and long-term effects including significant weight gain by 60% of youth. Several risk factors have been noted for eating problems in these mostly parent questionnaire studies including demographics such as low income and female gender, experiences of youth including excessive social media and limited physical activity [78-80] as we parent reinforcement for snacking. Eating disorder behaviors as well as medical instability and hospitalizations have also occurred Although these studies are limited by variability in sampling, in the measures used and the data analyses, the literature generally highlights the need for further research. Daily diet diaries might be used for more accurate assessment of unhealthy foods and excessive eating [81,83].

Sleep Disturbances

The prevalence of sleep problems in youth during COVID-19 has ranged widely across different countries from 19% in a study from China to 66% in a study from Egypt. Some researchers reported different prevalence for the different types of sleep problems including difficulties initiating sleep or maintaining sleep. Others reported as many as 49% failing to meet WHO global guidelines for sleep. Surprisingly, only two effects studies were found suggesting that stress and suicidal ideation had occurred following sleep disturbances. In contrast, most of the research in this literature has focused on risk factors/predictors of sleep problems. Several risk factors have been noted for sleep problems in youth during COVID-19 including excessive screen time, snacking and lack of physical activity. Negative mood states were also predictors or correlates including worrying about COVID being bored, anxious and depressed. Limitations of the literature on sleep problems of youth during COVID-19 include that many studies are cross-sectional so that causality cannot be determined [1]. In addition, the studies are highly variable on age of the youth and assessment measures. And, parents have typically been the reporters of their youth's sleep problems rather than reporting by youth. Nonetheless, the literature has highlighted sleep problems in youth that can inform potential intervention protocols [84-139].

Methodological Limitations

Most of this literature is based on surveys. And the surveys have often been parent not youth report. It's conceivable that youth report may be more reliable for the assessment of time spent in various activities like sleep and Screen Time as well as feelings like depression and anxiety. Future studies might use beepers with self-report being recorded on cell phones. In addition, in smaller sample studies, saliva samples might be collected for assaying stress hormones and immune measures.

Meta-analyses could not be conducted because of several differences between studies including data being collected at different assessment periods. They varied on lockdown versus non-lockdown and early versus late in lockdowns. Different measures were also used in different studies. For example, for emotional problems, different depression scales and different anxiety scales were used, making comparisons across studies difficult.

Causality could not be determined given the cross-sectional nature of the data from most studies. A few studies compared assessments during lockdown versus post lockdown but most data derived from one datapoint. Several confounding variables limited the conclusiveness of these studies including whether the youth were in school, partial school (blended), or zoom schooling. In addition, many of the samples were mixed age including young children and adolescents. Potential mediating and moderating variables, for example sleep disturbances, were typically not assessed.

Psychological measures were not included in studies on infected youth which is surprising given that inflammation and depression, for example, are typically related. Similarly, physical data were not collected in the emotional problem and behavior problem studies even though physical effects would be expected from emotional behavioral disturbances.

Underlying mechanism studies are missing from this literature including examining potential predictor variables for long COVID versus non-long COVID. Structural equations analysis and even regression analysis would desirably be used to determine the relative significance of predictor variables. Despite these and other potential methodological limitations, the existing literature has been suggestive of the stressors youth are experiencing during COVID-19. These would presumably lead to more in-depth studies and help inform intervention research that was missing in this literature on stressors experienced by youth during COVID-19.

Table 1: COVID-19 infection effects (and first authors)

Effects	First authors
Pregnancy and neonatal outcomes	
>obstetric complications	Field, Chi, Panahi, Elsaddig
>anxiety and depression	Fan, Sun, Tomofor-Madsen
Vertical transmission to fetus	Kumar, Nareng
>prematurity and low birthweight	Elsaddig
Pediatric Problems	
Similar to those of adults but less prevalent and severe	Field, Masakano
<dysregulation of immune responses and pre-existing conditions	Rathore
Fever and cough	Moreira, Pei
Immune markers	Rokkas
19-37% smell and taste disorders	Erdede, Mannheim, Qui
Skin problems	Larenas-Linnemann

Table 2: COVID-19 lockdown effects (and first authors)

Effects	First authors
School Closings	
Fewer cases COVID	Alfano, Chaabane
<performance math, reading	Panagouli
<academic pressure	Pfefferbaum
Anxiety 25%, depression 20%, stress 15%	Tang
Negative behavior, inattention, excessive social media,	
Less activity, more sleep problems	Viner
>self-injurious behavior and suicidality	Zhang
School Reopening	
>Hospitalization and mortality	Simeton
Outbreak at school	Stein-Zani
Sleep problems	Schwartz, Lian
Exposure to Aggression and Violence	
>exposure via social media	Field
Partner violence	Evans, Mazza, Usher, Xue
Sibling abuse	Perkins, Ortiz
Models-frustration leads to aggression	Breuer
-touch deprivation leads to aggression	Field

Table 3: Mental health problems for youth during COVID-19 (and first authors)

Problem	First author
Lonelines	
Prevalence 8-68%	Field
Increases across pandemic 15-25%	Mehus
Associated with excessive social media	Cooper, Li
Associated with physical inactivity	Pourriyahi
Associated with sleep disturbances	Becker
Inflammation markers	Kayama
Buffers	
Peer relationships	Chen
Parent relationships	Cooper
Meditation	Deguma
Exercise	Field
Anxiety and Depression	
Prevalence 38% anxiety, 36% depression	Field
More prevalent in females	Chen, Debowska
Less prevalent in children	Liang
Comorbidities	
Stress	Rudinstine, Wang
Insomnia	Wang
Social anxiety	Howes
PTSD	Liu, Wang
OCD	Favoz, Mazza
Suicidality	Liu, Wang
Risk Factors	
Worries about COVID	Liu, Rosenstine, Zhao
Worries about academic performance	Islam
Inactivity	Huchins, Wang
Excessive social media	Chen, Wang
Posttraumatic Stress	
Prevalence 3-69%	Tang, Khan
Comorbidities	
Anxiety	Khan

Depression	Liu, Terzioglu
Sleep disturbance	Tang, Zhang
More prevalent in older youth	Ma, Zhang
More prevalent in females	Ochnick, Wathelet, Xu
Negative relationships with parents	Cao, Terzioglu, Zhang
Loneliness	Liu
Loss of friends	Ochnick
Fear of infection	Khan, Tang, Wathelet
Lack of exercise	Khan
Excessive mobile phone use	Hu, Li
Suicidality	
Prevalent later in lockdown	Papadopoulos, Tanaka
Risk factors	
Inactivity	Kerr
Excessive social media	Fitzpatrick, Longohardi, Nomura
Loneliness	Every-Palmer
Anxiety and depression	Czeisler, Jiang, Nomura
Protective factors	
School closures	Tanaka
Less academic pressure, peer conflict & bullying	Hoekstra

Table 4: Behavior problems for youth during COVID-19 (and first author)

Problem	First Author
Excessive screen time	
Prevalence 5-97%	Field, Goodyear
Mediators/moderators	Boursier, Mong
Physical inactivity	
Activity decrease in 40-59%	Bingham, Guo
Correlated with affective problems	Kang, Xiao
Eating problems/diet	
Prevalence 27-44%	Dondi, Pujia, Rose
Risk factors-boredom	Phillipe, Ruiz-Rosso
-parent reinforcement snacking	Jansen, Phillipe
Sleep Disturbances	
Prevalence-49% fail to meet WHO guidelines	Lopez-Gil
Negative effects-stress	Gruber
-suicidal ideation	Wang
Risk factors-excessive screen time	El Refay, Guo
-lack of physical activity	Luszozki
-worrying about COVID	Jameson, Zhai
-bored	Panda
-lonely	Dondi
-anxious	El Refay
-depressed	Liao

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