



School Closing and Re-Opening Mental Health Problems for Youth: A Narrative Review

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ABSTRACT

This narrative review of the literature suggests that 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. These problems have been exacerbated by excessive screen time, inactivity and over-eating. Re-openings were less often studied, but infection rates typically increased as well as stress levels and insufficient sleep. Methodological limitations include the typically absent baseline data and the questionable reliability of parents reporting on the activities and feelings of their youth.

Keywords: school closings, school re-openings, COVID-19, youth, mental health problems

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School closings and re-openings have been significant problems for youth during COVID-19. This narrative review involved entering the terms school closings, school re-openings and COVID-19 into PubMed and PsycINFO. The search yielded 127 papers but following exclusion criteria including case studies and non-English papers, this review summarizes the research reported in 39 papers. Most of this literature has highlighted positive effects of school closings on transmission of the virus but negative effects on academic performance and mental health.

Extensive debating occurred prior to school closures about whether they would lower the rate of infection in youth as well as in teachers

and families. Several reports confirmed lower infection rates following school closures. And other studies reported infection outbreaks upon the reopening of schools. Negative effects have also been reported for school closings, most especially on the loss of learning. Data on mental health effects of school closings and re-openings are less definitive but all pervasive in the literature. Following a brief summary of the research on transmission of the virus and academic performance related to school closures, this review is primarily focused on the mixed literature regarding mental health effects of school closings and re-openings for youth during COVID-19.

Table 1. School closing effects (and first authors).

Effects	First authors
Reduced transmission virus	Alfani, Auger, Chaabane, Liyaghatdar, Pfefferbaum
Reduced academic performance	Hammerstein
-math and reading	Panagouli
Enhanced academic performance (math online)	Panagouli
Reduced academic pressure	Pfefferbaum
Mental health problems	
-Strengths and Difficulties Questionnaire	Havrilenko, Zhao
-greater anxiety parents and children	Kishida, Tang
-fear, anxiety, loneliness, inattention	Pfefferbaum, Viner
-depression	Petretto, Rajmil, Tang
-posttraumatic stress	Petretto
-self-injurious behavior & suicidality	Zhang
Sleep changes	
-longer sleep time	Albrecht, Saito, Weingart
-disrupted sleep patterns	Saito
Excessive social media	Kim, Pfefferbaum, Ranjbar, Viner, Zhao
Decreased physical activity	Kim, Rajmil, Saito, Viner, Zhao
Over-eating/unhealthy diet	Kim, Saito, Viner

School Closing Effects

Reduced transmission of COVID has reputedly resulted from school closures. However, several negative effects have also been reported including academic lags, mental health issues,

sleep disturbances and several behavior problems including excessive use of social media, over-eating and lack of exercise. In a review of 36 studies on school closure effects, for example, 69 % of the studies cited emotional,

behavioral and inattention effects of school closures (Viner et al, 2022). 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.

Reduced Transmission

In a cross-country panel analysis on daily data from 40 European countries regarding school closures, the countries that implemented closures had fewer COVID cases which became a reality at 20 days after implementation and remained detectable at 100 days (Alfano, 2021). This author also reported an asymmetric impact that closures had on gender due to traditional childcare roles of women.

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 (Chaabane et al, 2021). However, these authors also pointed to the negative effects of widening educational disparities and of increased anxiety, loneliness and sadness being experienced by youth. In addition, they noted frustration, hyperactivity and increased body mass index in youth following school closures.

In other confirmatory data, reduced infection rates were reported across schools in 188 countries (Liyaghatdar et al, 2021). Countries that closed schools the fastest had the lowest number of COVID cases or deaths per million of the population on total days of involvement. In a report from the U.S., schools that closed at a time when the state had a low prevalence of infection had a greater reduction of cases and mortality (Auger et al, 2020).

Mixed data have also been reported for school closure effects on transmission of the virus (Pfefferbaum, 2021). In this review, a negative

association between school closures and COVID transmission was noted in a U.S. study but a stronger association was reported for the relationship between transmission and behavior changes including reduced time at the workplace and restaurants. And other references were given for no association between school closures and transmission of COVID. This author provided a list of precautions to obviate the need for school closures.

Academic Performance

Student achievement has been said to suffer from school closings. In one study, negative effects were noted especially in younger and in low socioeconomic status students (Hammerstein et al, 2021). In a literature review on school performance, parents and teachers reported losses particularly in math and reading (Panagouli et al, 2021). But 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 (Pfefferbaum, 2021).

Mental Health Problems

Several mental health effects were noted in the COVID literature on school closures. These included fear, anxiety, sadness, loneliness, depression and suicidal ideation. Several of these problems were comorbid.

In a study on the effects of online homeschooling on children, parents and teachers in China, parents reported that 18% of children in grades 1-9 were experiencing mental health problems based on the Strengths and Difficulties Questionnaire (Zhao et al, 2020). Parents and teachers were noted to have higher anxiety levels based on the Self-Rating Anxiety Scale. In a study from the U.S. that also surveyed parents' responses on the Strengths and Difficulties Questionnaire (N= 2,324), older children living in remote areas were noted to have more mental health problems and especially Black and

Hispanic children living in remote areas (Hawrilenko et al, 2021).

In a study on the relationship between different kinds of school closures and mental health in parents and children, a full school closure sample was compared to partial closure and open school samples (N= 1984) (Kishida et al, 2021). Mental health problems were greater for parents and children in the full closure sample, but only 2% were affected in the full closure sample and only 6% in the partial closure samples. Greater anxiety was noted for both parents and children in the partial closure sample.

In a study on the challenges of school closures, several psychological consequences were noted including fear, anxiety, worry, nervousness, clinging, restlessness, irritability, attention and concentration difficulties, as well as boredom and loneliness (Pfefferbaum, 2021). The author attributed these data to decreased social interaction, extracurricular and athletic activities, health and mental health services and mentioned that disadvantaged children in particular were missing the advantages of food and mental health services. In contrast, positive consequences were noted for those with pre-pandemic problems which the authors related to improved family relations and decreased peer interaction stress.

In a narrative review of 22 studies from multiple countries including Australia, Spain and China, outcomes noted for 0- to 18-year-old-youth included increased depression and decreased life satisfaction (Rajmil et al, 2021). The authors attributed the health and psychological effects to decreased physical activity, an increasingly unhealthy diet and decreased child protection.

In a study from China, primary and secondary students (N= 4342) experienced psychological stressors along with school closures including anxiety (25%), depression (20%) and stress (15%). (Tang et al, 2020). Although, as many as 21% became more satisfied with life during the school closure. Perceived benefit of the quarantine was negatively correlated with

psychological symptoms and those who had more discussions with their parents about COVID were less depressed, anxious and stressed. In a longitudinal study from China, smart phone addiction and academic performance were predictors of depression, anxiety and stress levels that decreased after a one-month follow-up, although greater distress levels were noted at the follow-up assessment (Chen et al, 2020).

In a study from Italy, a long list of negative effects were noted for quarantine and social distancing including emotional disturbance, depression, stress, low mood, irritability, post-traumatic stress symptoms and attention deficit (Petretto et al, 2020). The authors not only attributed this to negative lifestyles including over-eating, decreased activity and increased sleep disturbances but also to the digital divide and distance-learning as well as the schools being closed as an important source of food, healthcare and mental health services.

Significant increases were not only noted in depression but also in self-injurious behavior and suicidality in a study from China (Zhang et al, 2021). 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. However, the research was limited by unmeasured confounds and the limited representativeness of the sample.

Sleep Changes

Sleep changes have been noted in several of the COVID school closure studies. Increased sleep time was generally reported. Some authors attributed this to students no longer having early school hours. Others have referred to the sleep

changes as correlates of the mental health problems. In a study from the U.S., for example, on adolescents in grades six to twelve (N=590), greater sleep time was attributed to later rise time (Weingart et al, 2021). The authors noted that these data were similar to data from high school versus middle school classes that had later start times resulting in later awake time as well as later bedtime. In a study on the association between homeschooling and sleep during school closures, students of 26 public high schools in Switzerland (N=8,972) were noted to sleep 75 minutes longer on average during the school closures (Albrecht et al, 2022). In a study from Japan, school closure effects were compared to reopening effects on elementary and junior high school students (Saito et al, 2021). The school closure group (N=78) was noted to spend more time in sleep than the reopening group (N=113). However, the closure group had more disrupted sleep rhythms which may have related to the disruption in their physical activity and eating habits. Further, the closure group had less vigor and interest in school activities. These results are also confounded by the groups being comprised of different students.

Excessive Use of Social Media

Excessive use of social media or screen time has reputedly contributed to negative mood states and sleep disturbances during COVID school closures. Most studies have reported significant correlations between these problems and excessive social media use in general. Only a few studies have specified the platforms of social media. Limited physical activity and unhealthy diet are often noted as confounding variables for social media effects (Pfefferbaum, 2021)

In a study from South Korea, excessive social media use was linked with limited physical activity and weight gain (Kim et al, 2021). The use of YouTube was noted in 88% of the users and gaming in 78%. In a study on home schooling in China, children in grades one through nine spent more than three hours on

average on screen time and less than two hours on outdoor activity (Zhao et al, 2021). And in a study from Iran on adolescents (N=20,697), the use of social media was specified as being 30% of the time on mobile and computer games, 27% of the time on studying and 14% of the time watching TV (Ranjbar et al, 2021).

Decreased Physical Activity

Excessive use of social media was accompanied by less physical activity in several other studies. For example, in the study from South Korea, primary school children's tablet and smart phone time was correlated with less physical activity (Kim et al, 2021). In the review of 22 studies on 0 to 18-year-old youth, decreased physical activity was accompanied by an increase in depression (Rajmil et al, 2021) In the study on Japanese elementary and junior high school children, school closure was accompanied by disrupted physical activity as well as disturbed sleep patterns and eating habits (Saito et al, 2021). In the study on effects of online homeschooling in China, the children in grades 1 to 9 were engaging in more than three hours of screen time at the same time that they were engaging in less than two hours of outdoor activity (Zhao et al, 2021). These studies demonstrate the comorbidity of screen time and inactivity during school closures.

Over-eating

As already mentioned, eating habits were disrupted at the same time that physical activity was disrupted in the study on Japanese children (Saito et al, 2021). And, weight gain was a correlate of increased media usage and decreased activity in the South Korea study (Kim et al, 2021).

Risk and Protective Factors for School Closure Problems

Risk Factors

Several risk factors have been identified for school closure problems. These include demographic factors and pre-existing conditions. A couple buffers for these problems have also been documented. Being older has

been associated with more mental health problems based on the Strengths and Difficulties Questionnaire (Hawrilenko et al, 2021). Specifically, older children in remote areas had more mental health problems in this study from the U.S. In addition, Black and Hispanic children in remote areas also had more mental health problems.

Females have also been noted to be at greater risk for sadness in a study from Italy (N=2064)

(Esposito et al, 2021). The prevalence of sadness was 84% for females and 68% for males. And, the prevalence was also greater for older (14-19 years old) than younger youth (11-13-years old) (79 versus 70%). Females were also at greater risk for depression and anxiety in a large sample study (N= 11,765) on 8-13-year-old students from the UK (Mansfield et al, 2021). Those youth with previous mental health conditions were also at greater risk for depression and anxiety in this sample.

Table 2. Risk and protective factors for school closing problems (and first authors).

Risk factors	First authors
Being older	Esposito, Hawrilenko
Being female	Esposito, Mansfield
Previous mental health condition	Mansfield
Protective factors	
Less bullying	Vaillancourt
Posttraumatic growth	Yu

Protective Factors

Protective factors have also been identified. For example, in a study from China (N= 430), although 4% experienced anxiety and 6% experienced depression, 13% experienced posttraumatic growth during school closures (Yu et al, 2020). This growth was said to be mediated by resilience and “greater meaning in life”.

Another positive aspect was a decrease in bullying during school closures as reported on a sample of 4th to 12th grade students in Canada (N= 6578) (Vaillancourt et al, 2021). These results were not surprising given that there is less opportunity for bullying, at least physical, verbal and social bullying, during school closures except cyber bullying which surprisingly wasn't measured. Girls were more likely to be bullied and elementary school students were more likely to be bullied than secondary school students. Gender diverse and LGBTQ students were also more likely to report being bullied. The authors suggested that these data implied that smaller class size and blended learning would

be optimal. Another limitation of the study was that the pre-COVID group was a retrospective recall group which was compared to a group reporting currently during COVID.

School Reopening Effects

The reopening of schools following school closures for COVID-19 has had significant effects on youth. These include transmission of the virus, emotional and sleep effects.

Transmission Effects

Fears about the transmission of COVID were probably the most serious consideration about re-opening schools. The data are mixed across different countries with some reporting negligible effects and others reporting significant increases in transmission. 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 (Simetin et al, 2021). 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 (Stein-Zami et al, 2021). In this study 13% of students and 17% of staff were infected. The infections, in turn, spread to siblings and parents. The rates were higher in junior than senior high school. The authors attributed this outbreak to crowded classrooms, school buses, continuous air conditioning, poor ventilation and no masking. Although 60% of the asymptomatic students recovered in a few weeks, only 37% of the symptomatic students experienced recovery over that time period.

Data from England on infection rates following the reopening of schools suggested that the

infection rates were greater in secondary schools (Keeling et al, 2021). But these rates were most affected by social distancing, control measures in the classrooms and compliance with mass testing.

In Florida, less than 11% of the schools had outbreaks after re-openings and less than 1% of COVID-infected children had school- related COVID (Doyle et al, 2021). Although the re-openings were not associated with an increase in infection, greater rates were noted in districts without mask mandates. Similarly, a study from Korea suggested no increase in pediatric cases after reopening (Yoon et al, 2020). The authors noted that 78% of children had been infected by family members and 24% of adolescents had been infected by family members.

Table 3. School reopening effects (and first authors).

Effects	First authors
Transmission virus effects	
-increase for 49 weeks	Simetin
-increase for 13% students, 17% staff	Stein- Zemi
-increase greater for secondary school students	Keeling
-increase in districts without masking	Doyle
-no increase	Yoon
Mental health problems	
-stress greater in females and older students	Schwartz
-less prevalent after reopening	Wang
Sleep problems	
-shorter duration	Lian, Schwartz
-greater prevalence insufficient sleep	Lian

Mental Health Problems

Reopening of schools has been labeled the “second mental health crisis” in a paper from Canada (Schwartz et al, 2021). In this study, 25% of the 12- 18-year-old students were said to be above critical thresholds for stress (N= 2310). The stress included conduct problems, negative affect, inattention and hypervigilance. These problems were greater in females and in older

adolescents (15-18-year-olds). In contrast, emotional and behavioral difficulties were less prevalent after schools reopened in a study from China (Wang et al, 2021). These findings were based on responses by parents of primary school children to the Strengths and Difficulties Questionnaire (N =6017).

Sleep Effects

Sleep problems were also noted upon school re-openings in the study from Canada (Schwartz et al, 2021). 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) (Lian et al, 2021). The prevalence of insufficient sleep increased from 21 to 64% with greater changes noted in females.

Risks for School Reopening Problems

Both demographic and excessive screen time have been noted as risk factors for problems related to school re-openings. The risk factors for these problems were similar to those reported for school closures.

In the study from Canada, females and older adolescents (15-18 versus 12-14-years-old) reportedly had more stress including negative affect and sleep problems during re-openings (Schwartz et al, 2021). In the study from China, more time spent doing homework and playing computer games was related to psychological problems when schools were reopened (Wang et al, 2021). Physical exercise and communication with others were buffers for the problems related to school re-openings.

Limitations of the Literature

Although this review highlighted the mental health effects of school closures and re-openings, the focus of most of the COVID-19 literature on these closures and re-openings has been on problems regarding transmission of the virus on the one hand and loss of learning on the other hand. Surprisingly, no studies could be found on effects of the absence or loss of family and friends from COVID infections.

The negative effects of school closures are confounded by several factors including confinement at home and limited opportunity for socializing and physical activity. Separation from peers and teachers would have significant effects on negative mood states but were not assessed in this research, possibly because most of the data have been derived from parent report rather than perspectives of the youth. Although survey research on youth is more

limited because of the need for parental permission, mood states and even sleep patterns may be less reliably reported by parents than by the youth simply because the youth may not be sharing their feelings and their sleep patterns with their parents.

Surprisingly, parental stress and mood states were rarely considered among the negative effects on youth. Home schooling was likely not only negatively affected by limited technical resources but also by the stress being experienced by a parent who may be trying to work at home and at the same time being a substitute teacher.

Touching was never mentioned in this literature even though social distancing was the norm and hugs were no longer part of greeting behavior. Especially during the lockdown, youth were not being touched by their peers and touching was not always occurring at home. A study on the lockdown suggested that only 22% of parents were touching their children "a lot" and only 33% were touching their partners a lot (Field et al, 2020). It is not surprising, then, that significant aggression has been occurring during the pandemic given that less touching has been associated with greater verbal and physical aggression in both children (Field, 1999) and adolescents (Field, 1999).

Returning to school has been studied less frequently than school closures but it also seemed to have stressful effects. No discussion has appeared in this literature on separation anxiety from leaving parents and siblings to return to school. And little mention was made of preparing youth for reentry and their fears about infection, catching up with school work and the social anxiety of being rejected by peers. Other issues that were not addressed were the likely decrease in parental stress when no longer homeschooling and the increase in teacher stress returning to classrooms that now involved masking and social distancing and the challenges of helping the youth improve their academic performance. The specific stressors for the students returning to school were also not

studied. For examples, mask wearing in schools hiding features of friends' faces and facial expressions, the difficulty hearing friends and teachers through masks and the social distancing in classrooms. And youth may have been disturbed by not recognizing their peers behind masks or because some had grown taller and fatter during school closures.

Given all of the above problems, studies are needed comparing distance, hybrid and in person learning. And, classroom alterations such as reducing hours, expanding space and reducing class size need to be compared with partial and full-time closures. The need for more research on closure effects on family and peer relations is highlighted by the absence of that research.

The methodological problems with the school closure and re-opening research are the same as those that have been noted for other COVID-19 research. These include the lack of baseline data in most studies given their cross-sectional rather than longitudinal methods. Although sample sizes were large in most cases, they were often not representative. Being primarily surveys of parents, the respondents were more often women. And, as already mentioned, parents may be less reliable reporters of the activities or feelings of their youth. Although several reviews of the research have appeared in this literature, meta-analyses could not be conducted because of the dissimilarity of measures and time periods across studies. And, because schools were closed, interventions were not available for these youth.

Despite these limitations, this literature on school closings and re-openings has highlighted the mental health problems associated with them including depression, anxiety and sleep disturbances. In addition, it has documented unhealthy activities that have occurred including excessive social media, inactivity and over-eating. Further, it suggests the need for continuing mental health services that were not available during school closures for these

significant side effects of school closures and re-openings.

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