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Impacts of Community-Based Public Health Measures During Respiratory Outbreaks or Pandemics on Adolescents and Young Adults

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Introduction

Southwestern Public Health (SWPH) conducted a rapid review on the potential harms of community-based public health measures in place during respiratory outbreaks or pandemics as well as mitigation strategies that impact adolescents and young adults (age 13-25). Examples of community-based public health measures include stay-at-home and physical distancing guidelines, childcare and school closures, limited access to health, community, and social services, workplace closures, and closures of outdoor and community spaces. Non-pharmacological interventions like community-based measures are important to protect the public in the absence of pharmacological interventions like treatment or vaccines. This rapid review focused on assessing actions from the COVID-19 pandemic as well as previous respiratory virus pandemic and outbreaks since 1917. The research questions addressed in this review are:

1. What is known about the harms of public health measures being experienced by adolescents and young adults (age 13-25) during current or past pandemics?
 - a) Is there an association between public health measures (stay-at-home physical distancing guidance/orders, childcare and school closures, decreased access to health/community/social services, non-essential workplace closures, closure of outdoor/community spaces, etc.) and the occurrence of substance use among adolescents and young adults age 13-25?
 - b) Is there an association between public health measures (stay-at-home physical distancing guidance/orders, childcare and school closures, decreased access to health/community/social services, non-essential workplace closures, closure of outdoor/community spaces, etc.) and worsening mental wellness among adolescents and young adults age 13-25?
 - c) Is there an association between public health measures (stay-at-home physical distancing guidance/orders, childcare and school closures, decreased access to health/community/social services, non-essential workplace closures, closure of outdoor/community spaces, etc.) and decreasing physical activity levels among adolescents and young adults age 13-25?
2. What are the recommended actions for local, provincial, and/or national governments to implement (e.g. messaging, programs, policies) to prevent or mitigate the harms for adolescents and young adults age 13-25?

Background

On December 31, 2019, Chinese health authorities identified a new (or novel) coronavirus (referred to as COVID-19) through a series of reported cases of pneumonia in Wuhan, China. Coronaviruses are a large family of viruses that circulate both in humans and animals. Human coronaviruses are common and are typically associated with mild illness, like the “common cold” or more severe illnesses, such as Severe Acute Respiratory Syndrome (SARS) and Middle East Respiratory Syndrome (MERS). Coronaviruses spreads through droplets from an infected person who coughs or sneezes. Through these virus-laden droplets, it can spread to people who spend a lot of time together (close contacts) such as household members. There is no specific treatment for COVID-19, and there is no vaccine that protects against the coronavirus that causes it.¹

The COVID-19 pandemic has brought historic restrictions and interventions. The success of interventions like physical distancing is encouraging in the fight against COVID-19, but there may be risks to health and well-being. The purpose of this literature review is to develop a strategy to mitigate the harms caused by public health measures like physical distancing.

A timeline for the trajectory of public health measures we look at in this review are as follows:

Date	Event
January 25, 2020	First reported case in Ontario
March 11, 2020	The World Health Organization declared the outbreak of COVID-19 a pandemic
March 12, 2020	Public Schools were ordered closed for two weeks following March Break
March 17, 2020	The Ontario Government declared state of emergency and ordered closure of some businesses including daycares, bars and restaurants, theatres, and private schools. Social gathering ban of 5 person maximum outside the household.
March 21, 2020	Canada-US boarder closed to all non-essential traffic
March 23, 2020	All non-essential businesses had to close Southwestern Public Health confirmed its first case of COVID-19
March 31, 2020	Provincial parks and outdoor areas were closed. Additionally, school closures are extended until the end of May.
May 14, 2020	Reopening plan announced with priority stage measures required to be met to progress in reopening.
May 19, 2020	Stage one reopening begins. This stage includes construction, retail (that is open to the street, not in a mall), golf courses & marinas, drive-in religious services and libraries for pick up, individual sports and recreation, property maintenance/domestic services, Veterinary and animal based services. School closure for the remainder of the school year announced.
June 8, 2020	Stage two reopening begins. This stage includes personal care services, restaurants/bars, daycares and summer camps, water recreation, malls, beaches/parks and camping, libraries, community centres, places of worship and small outdoor events. Social cohorting/bubbles (groups of same 10 people that can interact closely i.e., hug) advised. Maximum social gatherings of 10 people from outside the household
June 19, 2020	Strategy to reopen schools in fall announced by Ministry of Education

In addition to the closure of schools, childcare centres, and non-essential workplaces, public health also advised people to stay at home and not visit friends or extended family members. Physical distancing measures (remaining two metres away from those outside your household) were advised. A social gathering limit of 5 persons maximum from outside your household was implemented. This limit lasted until Stage two reopening when social gatherings increased to 10 persons maximum. Essential services such as grocery stores and medical care remained open throughout all stages.²

The SWPH area has had a total of 91 COVID-19 cases as of July 20, 2020. As Ontario, including Oxford County, Elgin County, and the City of St. Thomas move through the reopening phases, and given that the COVID-19 pandemic continues, it is critical to identify any harms of

public health measures that have been implemented and to have strategies to mitigate these harms.

Summary

- 23 studies were identified that referenced the harms of public health measures implemented during respiratory pandemics or outbreaks on adolescent and young adult (age 13-25) mental health, substance use, or physical activity. Many studies also identified future actions and mitigation strategies.
- 17 grey literature resources were identified that included information on the harms of public health measures implemented during COVID-19 on adolescent and young adult (age 13-25) mental health, substance use, or physical activity.
- The pandemics or respiratory outbreaks included in the literature were Severe Acute Respiratory Syndrome (SARS), H1N1, and COVID-19.
- Community-based public health measures that have an impact on adolescents and young adults include stay-at-home orders, self-isolation, quarantine, physical distancing, school closures, and closures of public spaces/events.
- Community-based public health measures implemented during past pandemics or outbreaks, and the beginning of the COVID-19 pandemic, may have negative impacts on mental health, substance use, and physical activity levels of adolescents and young adults.
- Overall, there was a small and limited amount of evidence on the harms of public health measures and mitigation strategies specifically for the adolescent and young adult population.

Methods

- A rapid review was conducted to synthesize evidence about the harms of public health measures during the COVID-19 pandemic and past respiratory outbreaks or pandemics, as well as mitigation strategies affecting adolescents and young adults (age 13-25).
 - Rapid reviews are used to generate knowledge. This method synthesizes results and assesses the validity of evidence using a condensed systematic review. This can generate evidence in a short period of time.³
- A peer reviewed search strategy was developed and conducted by the Shared Library Services Partnership Librarian. For more details, please see Appendix A: Ovid Medline Search Strategy. In addition, grey literature searching was performed within targeted health organization websites and through select search engines. Search strategies for all databases and grey literature are available upon request.
- Electronic databases searched include:
 - Ovid MEDLINE® <1946 to May Week 4 2020>
 - Ovid MEDLINE® (Epub Ahead of Print, In-Process & Other Non-Indexed Citations and Daily Update) May 29th, 2020
 - APA PsychInfo from <1806 to May Week 4 2020>
 - SocINDEX with Full Text from inception to June 1st, 2020.
- Grey literature was also searched using a standard search strategy. Some examples of targeted organizations: The World Health Organization, Centre for Addiction and Mental Health, Public Health England, and the Centres for Disease Control and Prevention.
- Research was included in the review if it examined the impacts of public health

measures implemented in response to a pandemic or infectious disease outbreaks on adolescents and young adults age 13-25. Reviews with no methods or that were commentaries, editorial letters, and conference abstracts were excluded.

- First, SWPH staff screened all article titles and abstracts and then reviewed full-text articles that met inclusion criteria. One staff member screened all titles and abstracts and a second staff member screened 25% of the excluded abstracts and articles from the first staff member. Inclusions were made based on consensus.
- For all included articles, one SWPH staff member extracted the data and summarized the content. A second SWPH staff member reviewed and checked data and content.

Results

The outcomes included in this search included mental health, substance use, and physical activity. The electronic database search yielded 6088 articles, with 23 that met the rapid review inclusion criteria. The literature included mostly cross-sectional studies as well as one systematic review. Articles were from China, Taiwan, United States, Greece, Nepal, Spain, Italy, and Europe as a whole.

The grey literature search yielded 17 websites, fact sheets, reports, and policy briefs that met the inclusion criteria. There was a total of 12 records on mental health, 5 on substance use and 1 on physical activity. The search identified results from Canada, China, England, Europe, United States as well as a few international resources. Results were produced by agencies such as the Centre for Addiction and Mental Health, The world Health Organization, United Nations, Public Health England, the Centre for Substance Use and Addiction as well as various authors.

Mental Health

The literature search identified 22 articles that explored mental health as an outcome. Of the 22 articles, 16 of them were cross-sectional studies, three were editorial correspondence, one was a call for submissions, one was a longitudinal study, and one was a systematic review. There were 16 studies that were from COVID-19, four studies that focused on SARS, and three from H1N1. Most studies focused on young adults aged 18-24 or 18-25, while eight studies focused on adolescents aged 13-19. Public health measures identified in the studies selected included isolation, quarantine, stay-at-home recommendations, school closures, physical distancing, and the closure of public spaces. The studies identified in the literature search focused on a variety of mental health issues including immediate issues and negative impacts to mental health following the ending of pandemics. The mental health of adolescents and young adults was negatively impacted by issues like stress, sleep disturbances, anxiety, depression, worry, post-traumatic stress disorder and suicidal intention. Protective factors, such as parental influence and social support systems, were identified in many articles.

The grey literature search identified twelve pieces of literature that focused on mental health related to COVID-19 public health measures. The literature was in the form of fact sheets, webpages, policy briefs, reports, PowerPoints, and evidence reviews. The grey literature focused on anxiety, stress, worry, and decreased social connection.

Substance Use

There were two cross-sectional studies that identified substance use being associated with public health measures during COVID-19. No articles were identified from earlier pandemics or respiratory outbreaks. The studies identified centered on young adults age 18-25. One of the

studies focused on tobacco smoking while the other focused on alcohol use.

There were five pieces of grey literature that identified negative impacts of public health measures on substance use for adolescents and young adults. Results were in various forms including webpages, reports, and fact sheets. Results in the grey literature focuses on alcohol and tobacco use during the COVID-19 pandemic.

Physical Activity

The literature search retrieved two studies that assessed physical activity as an outcome. One was a cross-sectional study and the other a longitudinal study. The public health measures examined focused on school closures, physical distancing, and isolation. The studies were of young adults age 18-24. Both articles had findings from COVID-19 and no articles were identified from earlier pandemics or respiratory outbreaks.

The grey literature search found one piece of literature on the negative impacts of public health measures during the COVID-19 pandemic on the physical activity levels of adolescents. As a result of the pandemic, adolescents have missed opportunities for physical activity, which they often get at school or during organized sports.⁴ This literature focused on the impact to physical activity during school closures, the cancellation of organized sports, and physical distancing.

Discussion

This rapid review identified the harms of public health measures implemented during past or current respiratory outbreaks or pandemics, including COVID-19. The various public health measures described in the literature include physical distancing, isolation, quarantine, stay-at-home orders, school closures as well as public space closures. The impacts of public health measures included poorer mental health, increased alcohol use, and decreased physical activity for adolescents and young adults age 13-25. The literature did also identify some protective factors like spending more time with parents and caring adults.

Findings from the literature search identified mental health concerns in adolescents and young adults related to public health measures in place during outbreaks or pandemics. Research found that adolescent and young adult mental health declined when public health measures were put in place.^{5,6,7,8,9} Adolescents and young adults have been found to be more vulnerable when it comes to negative impacts of public health measures when compared to other populations.¹⁰ Additionally, vulnerabilities such as lower socioeconomic status, longer stay-at-home orders, being ill themselves, or having a close friend or family member ill was associated with poorer mental health outcomes.^{11,12} Adolescents or young adults that had strong family supports and spent valued time with family were less likely to develop psychological symptoms as support is a key protective factor in preventing mental illness in this population.^{13,14} Symptoms of post-traumatic stress disorder, anxiety, suicidal intention, and depression were most often reported in young people during or after public health measures.^{5,7,13,15,16,17} In addition, some adolescents and young adults reported poorer sleep patterns that negatively impacted their overall mental health.^{18,19} Another key factor impacting mental health was a disruption in daily routines with measures such as school closures.¹⁹ Maintaining routines and getting regular exercise can improve mental health.¹⁹

Special mention should be made regarding post-secondary students and mental health. Students from this group have faced significant disruption such as the movement to online learning and closures of schools. They also face challenges in terms of paying for school,

graduating, and the potential impact on future careers.^{20,21,22} Studies in this review highlighted that the mental health of students may be negatively impacted because of public health measures in place during pandemics or outbreaks. Post-SARS students were found to have psychological symptoms and stresses related to poor coping mechanisms.²⁰ To assist in mitigating harms experienced by students, post-secondary schools and communities should assist them in developing positive coping skills and building strong social support networks.^{20,21,22} Additionally, the literature suggests that communication should be targeted at students to help build trust between them and government agencies as young adults were more likely to not trust the government compared to other age groups.²¹

The search identified mitigation strategies at various levels. At the individual level, factors including social support, coping skills, and promoting the maintenance of routine were identified as strategies to mitigate the harms of public health measures on mental health.^{5,13,19,20,23} The literature also suggested that various agencies, including those in the health and social service sector, should be involved in multi-faceted approaches to prevent negative consequences during pandemics. Such approaches should consider providing robust online or virtual psychological support for young people and implementing screening for potential mental health issues like post-traumatic stress due to pandemics.^{10,24}

It is recommended that mental health promotion be embedded into the work of all health professionals following pandemics or other public health emergencies.¹³ Supporting health professionals to reach adolescents and young adults and advocate to governments for proper supports for this population is important to mitigate harms.¹² Schools and communities should help to develop protective factors in adolescents and young adults including increasing coping mechanisms, providing a sense of community, and providing trauma-related training to adult allies.^{13,20,25} In addition, parents and adults are a key influence on this population and adults learning skills in empathy, listening and reassurance can help adolescents and young adults cope with stressful situations.^{12,15} Parents themselves should also develop positive behaviours like regular exercise and role-modelling of these behaviours to help mitigate potential harms to mental health of their adolescents or young adults.¹² Articles in the literature search also identified a key strategy of providing clear communication and education to this population as a strategy to mitigate harms.^{21,22} Building trust is important with this population and partnerships between media and public health to provide consistent messaging is beneficial.^{21,22}

Evidence from the COVID-19 pandemic shows that alcohol use increased for young adults age 18-25.^{10,26,27} There was no evidence available for adolescents age 13-18. Studies note that young adults were at a greater risk for alcohol use disorder, hazardous drinking, and harmful drinking compared to older adults.^{10,26,27} A report from the Centre for Substance Use and Addiction states that 21.1% of young adults reported drinking more alcohol during the COVID-19 pandemic.²⁸ Studies did not find changes in tobacco use during the COVID-19 pandemic.²²

The World Health Organization (WHO) also recommends that opportunities must be provided for people to quit tobacco use, including vaping, due to the impact on respiratory health.²⁹ Strategies to mitigate the harms of substance use include discussing the harms of use with adolescents and young adults in a way that is meaningful and impactful to them as well as encouraging healthy coping behaviours.^{26,30} Multi-faceted approaches to wellness should be implemented at the personal, social, and international levels.^{10,26,27} A critical mitigation strategy involves providing clear communication to young people. Critical thinking skills should be taught to adolescents and young adults to assist them in filtering information from the media (including social media) during a pandemic.²⁶ To mitigate the harms of substance use, and mental health problems related to substance use, appropriate care for vulnerable groups such as those with

existing mental illnesses and those with a low socioeconomic status must be provided.¹²

The literature review included limited studies on physical activity. However, the studies included found a decreased level of physical activity during pandemics or outbreaks in adolescents and young adults.^{19,22,31} Adolescents often get most of their physical activity at school during physical education and recess and conversely are more sedentary when at home.³¹ School closures and the closure of public sporting facilities has resulted in decreased physical activity levels during COVID-19.³¹ Females were less likely to engage in physical activity compared to males.¹⁹ Participating in regular physical activity during the implementation of public health measures can result in positive impacts on mental health.^{19,22,31} Recommended actions to mitigate the harms of public health measures related to physical activity include working to incorporate exercise into daily activities, promote healthy behaviour messaging including physical activity, incorporate physical activity into school lessons, and encourage health care providers to discuss the importance of physical activity for this population with parents.^{19,31} Additionally, strategies to mobilize existing resources and creating online gathering platforms for education on healthy lifestyles and psychosocial supports available can help increased physical activity and mental well-being among adolescents and young adults.

Overall, there are some noted negative impacts related to public health measures implemented during current or past respiratory pandemics. More research is needed to understand the short-term and long-term negative harms to mental health, substance use, and physical activity relating to public health measures implemented, especially during the COVID-19 pandemic.

Limitations and Strengths

There are limitations that exist with this rapid review. The review was finished on a short timeline and no quality appraisal was conducted. Many of the results were cross-sectional surveys representing a lower quality of evidence. Most studies focused on young adults in a formal educational setting (e.g., post-secondary school) and few studies were available for individuals not in an educational setting. The COVID-19 pandemic has brought unprecedented public health measures, such as lengthy school closures, that were not present during other pandemics. Many of the study results are focused on shorter-term impacts on adolescents and young adults. In addition, generalizability to the SWPH population or Ontario may be challenging as most results were from other countries outside of Canada. Lastly, as mentioned, there was limited evidence on substance use and physical activity outcomes related to public health measures. Overall, more research is needed to determine the impacts of public health measures on adolescents and young adults as a whole and priority groups such as those living with low income.

Although limitations exist, there are also strengths with this review. Article abstracts and full-text articles were reviewed independently by two reviewers. The decision to include abstracts and full-text articles was based on consensus. Additionally, the search involved a peer-reviewed search strategy that searched multiple electronic databases. A grey literature search was also conducted by the Shared Library Services Partnership Librarian.

Conclusion

There are various harms associated with the public health measures put in place during past respiratory outbreaks or pandemics, including harms from the present COVID-19 pandemic. Adolescents and young adults face unique challenges such as school demands/changes, peer influence, and work demands. Public health measures put in place during the COVID-19

pandemic can have negative consequences in terms of adolescent and young adult mental health, substance use, and physical activity. Looking towards the future of COVID-19, as well as other pandemics, actions should be taken at the local, provincial, and national level to help mitigate the harms of public health measures. Collaboration among multiple sectors will be necessary to effectively implement mitigation measures.

The success of interventions like physical distancing is encouraging in the fight against COVID-19, but there will be significant risks to health and well-being in domains other than infectious disease control. The potential negative effects of the COVID-19 pandemic response may be disproportionately affecting high-risk populations including youth and young adults living in poverty or unsafe home situations, and youth and young adults with diagnosed mental health or complex medical needs. Looking from the lens of youth and young adult's stage of social emotional development, the closures of massive gathering spaces (e.g., schools) and the Public Health requests to remain apart from those outside the household, it is clear that the reverberations of this time will be enduring, and that the work of public health will be more needed than ever to support the health and wellbeing of the community.

Appendix A: Ovid Medline Search Strategy

Ovid MEDLINE(R) <1946 to May Week 2 2020>

Search history sorted by search number ascending			
#	Searches	Results	Type
1	("covid 19" or "covid 2019" or "severe specific contagious pneumonia" or 2019ncov or covid19 or covid2019 or ncov or sarscov2 or quarantin* or patient isolat*).af.	15744	Advanced
2	(betacoronavir* or pneumonia* or SARS or "severe acute respiratory syndrome").af.	199424	Advanced
3	(coronavir* or "corona vir*").mp.	15305	Advanced
4	Epidemics/ or Pandemics/	16967	Advanced
5	(epidemic* or pandemic*).ti,ab,kf,kw.	108047	Advanced
6	(H1N1 or MERS or "Middle Eastern Respiratory Syndrom*" or "swine flu" or "influen* A").af.	58636	Advanced
7	disease outbreaks/ or ("community acquired infect*" or (disease* adj2 outbreak*)).ti,kw,kf.	79412	Advanced
8	Influenza, Human/ or Hemorrhagic Fever, Ebola/ or Ebolavirus/ or ("beta corona vir*" or "beta coronavir*" or "severe specific contagious pneumonia" or Ebola* or "Spanish flu" or "Spanish influenza" or "Asian flu" or "Asian influenza" or "hong kong flu" or "hong kong influenza" or "swine flu" or "swine influenza").mp.	57407	Advanced
9	(wuhan or ncov2019 or novel CoV or new CoV or nouveau CoV or Poliomyelitis or polio).mp.	26530	Advanced
10	((outbreak* or "respiratory illness*" or "respiratory disease*" or "respiratory symptom*") adj2 (China or chinese)).ti,kw,kf.	125	Advanced
11	Anxiety/ or Anxiety Disorders/ or Loneliness/ or Depression/ or Depressive Disorder, Major/ or Depressive Disorder, Treatment-Resistant/ or Depressive Disorder/ or Mental Disorders/ or Mental Health Services/ or Mental Health/ or Mood Disorders/ or Self Mutilation/ or Self-Injurious Behavior/ or Stress Disorders, Post-Traumatic/ or Stress Disorders, Traumatic, Acute/ or Stress Disorders, Traumatic/ or Stress, Psychological/ or Suicide Ideation/ or Suicide, Attempted/ or Suicide/ or (anxiet* or anxious or depressed or	894546	Advanced

	depression or depressive or ((mental* or psyc* or mood*) adj2 (disorder* or illness* or ill or disease* or sick* or condition* or ailment* or affliction* or syndrome* or health or wellness)) or lonely or loneliness or loner or alone or ((self or self inflict* or self-harm*) adj2 (cut* or injur* or mutiliat*)) or stress or stressed or PTSD or posttrauma* or post trauma* or suicide* or suicidal).ti,kw,kf.		
12	Cigarette Smoking/ or Electronic Nicotine Delivery Systems/ or Ex-Smokers/ or Non-Smokers/ or Pipe Smoking/ or Smokers/ or Smoking Cessation/ or Smoking Devices/ or Smoking Pipes/ or Smoking Prevention/ or Smoking Prevention/ or Smoking Reduction/ or Smoking Water Pipes/ or Smoking, Non-Tobacco Products/ or Tobacco smoke pollution/ or Tobacco Smoke Pollution/ or Tobacco, Smokeless/ or Tobacco, Waterpipe/ or Tobacco/ or Vaping/ or Water Pipe smoking/	85925	Advanced
13	("smoke free" or tobacco or cigar* or nicotine or smok* or snuf or smoker* or smoking).ti,kw,kf.	129617	Advanced
14	(vape or Mig Vapo?r* or vapo?r* pen? or e butt? or e juic* or e liquid? or vaper? or vapes or ("heat not burn" adj1 tobacco) or cigalike? or vape juice or eliquid* or ecig* or ejuic* or SUORIN or vape pen? or vapo?r* device* or alternative nicotine delivery system* or battery-powered vapo* or cig-alikes or cig-a-likes or digital cig* or digital vapo?r* or e cig* or E lites or e pipe* or e smoke* or e vapo?rise or e vapo?r or ECIGs or electr* vapo* or electri* shisha* or electric cig* or electronic cig* or elites or epipe* or evapo?rise or evapo?rize or g pen? or hookah pen? or Juul* or Green Smoke or non-medicinal nicotine delivery system* or personal vapo?r* or pod mod? or protonated nicotine or Puritane or tank model? or technofogger* or tobacco-free cig* or vap* nicotine* or vapelife or vaping* or vapo?r tank? Mod? or vapo?rette* or Vuse or Vype).ti,kf,kw.	3584	Advanced
15	Alcohol Drinking/ or Alcoholic Beverages/ or Beer/ or Wine/ or Drinking Behavior/	88391	Advanced
16	((bing* or episodic or excessive* or hazardous or heavy* or intake or low-level* or minimal or misuse or moderate* or overconsum* or consume? or problem or social or sensible or reasonable or responsible or irresponsible or risk? or drunk or intoxicat* or abuse or abuse? or abusing or excess*) adj2 drink*) or ((bing* or episodic or excessive* or hazardous or heavy* or intake	69280	Advanced

	or low-level* or minimal or misuse or moderate* or overconsum* or consum* or problem or social or sensible or reasonable or responsible or irresponsible or risk? or drink* or drunk or intoxicat* or abuse or abuse? or abusing or excess* or disorder* or abstain* or abstinence) adj2 (alcohol* or beer or liqueur? or liquor? or wine or booze or vodka or bourbon or scotch or wine or beer or mead or aperitif or champagne or tequila or rum or ale or mead or lager or stout or sherry or vermouth or sangria or marsala or madeira or sake or brandy or schnapps or gin or absinthe or cognac or liqueur or cocktail* or cider*)) or (alcoholic* or alcoholism)).ti,kf,kw.		
17	alcohol-related disorders/ or alcohol-induced disorders/ or alcohol-induced disorders, nervous system/ or cardiomyopathy, alcoholic/ or exp liver diseases, alcoholic/ or pancreatitis, alcoholic/ or psychoses, alcoholic/ or alcoholic intoxication/ or alcoholism/ or binge drinking/ or Alcohol Abstinence/	106421	Advanced
18	((alcohol or drinking) adj3 (withdraw* or detox* or treat* or therap* or reduc* or cessation or intervention* or abstain* or abstinence)).ti,kf,kw.	8276	Advanced
19	Cannabaceae/ or Cannabinoids/ or Marijuana Smoking/ or Marijuana Abuse/ or Humulus/ or Marijuana Smoking/ or Cannabis/ or Smoking, Non-Tobacco Products/ or Trema/ or Cannabaceae/ or Cannabinoid Receptor Modulators/ or Endocannabinoids/ or Receptor, Cannabinoid, CB2/ or Medical Marijuana/	30983	Advanced
20	(bhang or weed or 9THC or cannabi* or Cesamet or cesamet or delta 9 tetrahydrocannabi* or delta 9 THC or delta9 tetrahydrocannabi* or delta9 THC or delta-9-tetrahydrocannabinol or dronabinol or endocannabinoid* or ganja or ganja* or ha?chi?ch\$1 or hashis?h\$1 or marihuana* or marijuana* or marinol or medical marijuana or nabilone or non-opiate phamarcotherapy or non-opioid analgescis or pot or synthetic 9-THC or tetrahydrocannabi* or THC or CBD or bangs or bhangstar or cannabutter or doobie* or gajas or gajas or honeycomb or mary jane* or moon rock or reefer* or roach*).ti,kf,kw.	35042	Advanced
21	"Drug and Narcotic Control"/ or Amphetamine-Related Disorders/ or Behavior, Addictive/ or Buprenorphine/ or Buprenorphine, Naloxone Drug Combination/ or Cocaine/ or Cocaine-Related Disorders/ or Cocaine Smoking/ or Counterfeit Drugs/ or Crack Cocaine/ or Designer Drugs/ or Drug Overdose/ or Drug Misuse/ or Drug Users/ or Drug-Seeking Behavior/ or exp Amphetamines/ or exp Benzodiazepines/ or exp Benzofurans/ or exp Fentanyl/ or exp Neuregulins/ or Harm Reduction/ or Heroin Dependence/ or	387607	Advanced

	Heroin/ or Inhalant Abuse/ or Methadone/ or Morphine Dependence/ or Morphine Derivatives/ or Naloxone/ or Naltrexone/ or Narcotic Antagonists/ or exp Narcotic-Related Disorders/ or Narcotics/ or Opiate Substitution Treatment/ or Opioid Epidemic/ or Opioid-Induced Constipation/ or Opioid-Related Disorders/ or Opium Dependence/ or Oxycodone/ or Phencyclidine Abuse/ or Prescription Drug Misuse/ or Psychoses, Substance-Induced/ or Risk-Taking/ or Street Drugs/ or Substance Abuse Detection/ or Substance Abuse, Oral/ or Substance Withdrawal Syndrome/ or Substance-Related Disorders/		
22	((abus* or addict* or dependen* or disorder* or habit* or illegal* or illicit* or misus* or overdos* or recreation* or relian* or street* or withdrawal* or seeking or designer) adj2 (alprazolam or Ambien or amphetamine* or Ativan or barbiturate* or bath salt? or benzo* or cathinone* or chlordiazepoxide* or diazepam or drug* or eszopiclone or Halcion or hallucinogen* or inhalant* or inhale* or Librium or lorazepam or morphine or narcotic* or Nembutal or opioid* or prescrib* or prescrip* or solvent* or sonata or steroid* or stimulant* or substance* or triazolam or valium or Xanax or zaleplon or zolpidem)).ti,kf,kw.	44671	Advanced
23	((((opiat* or opioid* or heroin* or morphin* or morfin* or narcot* or amphetamine* or methamphetamine*) adj2 (self-administ* or intravenous or inject* or vein?)) or (crack adj2 (cocaine or smok* or pipe*)) or 2 dpmp or 2ce or angel dust or benzodiazepine* or benzofuran compound or benzos or buprenorphine or carfentanil or catha or cathinone or cesamet or codeine or crystal meth or cyclizine or dextromoramide or diacetylmorphine or diamorphine or diconal or dihydrocodeine or dihydromorphine or dilaudid or drug user* or ecstasy or ephedrine or fentanyl or foil chasing or heroin or hydrocodone or hydromorphone or ketamine or khat lisdexamfetamine dimesylate or lsd or lysergic acid diethylamide or magic mushroom* or methadone or methamphetamine or methoxetamine or morphine or msj or nabilone narcotic* or nbome compound or nrg1 or opium or oxycodone or oxymorphone or palfium or pcp or pethedine or phenazepam or poppers or shooting-up or skin-popping or suboxone or temazepam or temgesic or tramadol or valium or vicodin or xanax or zopiclone).ti,kf,kw.	94942	Advanced
24	Substance Abuse, Intravenous/ or ("injection drug user*" or "intravenous	15474	Advanced

	drug user*" or IDUs or "person* who inject* drug*" or "people who inject* drug*" or PWID).ti,kf,kw.		
25	exp Exercise/ or exp Motor activity/ or exp Sports/ or Resistance training/ or exp Exercise Therapy/ or (exercis* or motor activit* or sport* or resistance train* or fitness or (physical* adj3 (activ* or fit* or train* or endur* or exer*)) or active or swim* or pilates or yoga or tai ji or tai chi or tai ji or (resistance adj3 train*) or walk or walks or walking or pedometer* or manpo-meter or manpometer* or manpo meter* or step meter* or stepmeter* or "10 000 step*" or ten thousand step*).ti,kf,kw.	567628	Advanced
26	Adolescent/ or Adolescent Behavior/ or Adolescent Health Services/ or Adolescent Health/ or Minors/ or Peer Group/ or Pregnancy in Adolscence/ or Students/ or Underage Drinking/ or Peer Influence/	2048941	Advanced
27	((("13 year*" or "thirteen year*" or "14 year*" or "fourteen year*" or "15 year*" or "fifteen year*" or "16 year*" or "sixteen year*" or "17 year*" or "seventeen year*" or "18 year*" or "eighteen year*") adj2 (old or olds or age*)) or ((high or middle or secondary or junior) adj3 school*) or (school* adj1 (middle or high or secondary or intermediate)) or adolescen* or juvenile* or late* teen* or laterteen* or mid?teen* or minors or pre adolescen* or pre teen or preadolescenc* or preteen* or pupil or teen* or tween*).ti,kf,kw.	228986	Advanced
28	Young Adult/ or (exp Education, Graduate/ and (Students/ or Peer Group/)) or (Universities/ and (Students/ or Peer Group/)) or Alcohol Drinking in College/ or College Admission Test/	838638	Advanced
29	(straight to work* or (("19 year*" or "nineteen year*" or "20 year*" or "twenty year*" or "21 year*" or "twenty-one year*" or "22 year*" or "twenty-two year*" or "23 year*" or "twenty-three year*" or "24 year*" or "twenty-four year*" or "25 year*" or "twenty-five*") adj2 (old or olds or age*)) or ((delay* or postpone) adj2 adulthood) or ((new or newly) adj2 graduat*) or (universit* adj2 (student* or age* or study* or grad*)) or (college adj2 (student* or age? or grad* or study*)) or (extend* adj2 adolescence) or (transition* adj3 (adult* or youth*)) or (young* adj2 (person? or people* or adult* or graduate* or grad)) or adultolescen* or aya or ayas or early adulthood or early twenties or emerging adult* or freshman* or gap year? or millen?ial* or millen?ium or "echo boomer*" or "21st century" or "geny" or "generation next" or "generation me" or "net generation" or "generation y" or "why generation" or	119016	Advanced

	"gen wired" or "we generation" or "dotnet generation" or "ne(x)t generation" or nexters or "first globals" or "ipod generation" or "iygeneration" or (born adj (198* or 199*)) or "gen z" or "generation z" or "post-millennial*" or "after millennial*" or igeration or "homeland generation" or Xennial? or new adult* or pre-adult* or provisional adulthood or pubert* or pubescen* or schoolies celebration* or schoolies week or sorority or fraternity or transition* age or twenty something* or twixter year* or young adult* or youth* or youthhood* or undergrad*).ti,kf,kw.		
30	or/1-10	455911	Advanced
31	or/11-25	2091237	Advanced
32	or/26-29	2500535	Advanced
33	30 and 31 and 32	4678	Advanced
34	((distanc* adj2 (social* or physical*)) or (stay* adj2 home) or "stay at home" or (shelter adj2 place) or "shelter-in-place" or (restrict* adj2 movement*) or lockdown* or (restrict* adj2 measure*) or (lock* adj2 down*)).mp.	9075	Advanced
35	31 and 32 and 34	794	Advanced
36	limit 33 to english language	4294	Advanced
37	limit 35 to english language	745	Advanced

Appendix B: Electronic Database Data Extraction Table

Study Citation	Year	Location (Country)	Study Design	Infectious Disease	Population	Community-Based Public Health Measure	Outcome	Outcome Results
Lau T.F. Joseph, Tsui H.Y., Yang Xilin, Pang Ellie, Wing Yun Kwok. Positive mental health-related impacts of the SARS epidemic on the general public in Hong Kong and their associations with other negative impacts. <i>Journal of Infection</i> . 2006; 53, 114-124.	2005	China	Cross-Sectional	SARS	Young adults	Isolation Quarantine	Mental health	During SARS young adults had better family and social supports, increased awareness for mental health, and a healthier lifestyle. Family and friends were much more valued, increased time spent with family, increased worry/care for family/friends with exchanges of messages and check ins. Entire society slowed down with decreased work/community activities. Those who were more affected by the SARS epidemic may mobilize their support systems to deal with the problems. It is also possible that those who were more adversely affected learned to value family, friends, and mental health. Health workers should include mental health promotion as part of the follow-up work in the post-SARS period.
Ko, C, Yang, M, Yen, C, Yen, J. Psychosocial impact among the public of the severe acute respiratory syndrome epidemic in Taiwan. <i>Psychiatry and Clinical Neurosciences</i> . 2006;60(4):397-403.	2006	Taiwan	Cross-Sectional	SARS	Young adults	Isolation Quarantine	Mental health	Individuals who had been quarantined or indirectly exposed to SARS during the epidemic, experienced depression symptoms possibly due to the SARS impact, the economic downturn, poor health conditions, and inadequate social support. Individuals directly impacted by SARS (i.e., put in quarantine/isolation) were more likely to be depressed. People experiencing financial trouble during SARS were more likely to experience depression. Psychological impact can be moderated by protective factors like social support.
Douglas Pamela K, Douglas David B, Douglas Kathleen M, Harrigan Daniel C. Preparing for Pandemic Influenza and its Aftermath: Mental Health Issues Considered. <i>Int J</i>	2009	United States	Systematic Review	H1N1	Adolescents	Isolation Quarantine	Mental health	Strong correlation of physical and mental health deterioration in adolescents especially if they are ill as their healthy may be further compromised. Agencies like schools and communities can provide support networks to increase coping abilities, trauma-related training to be better prepared to handle the aftermath, parents/adults who are better equipped to cope with stressors provide the skills, comfort and support to adolescents,

Emerg Ment Health. 2009; 11(3): 137-144.								empathetic listening skills will provide a safe, reassuring environment to discuss experiences.
Leucken, L, Liu, X, Ma, Y, Main, A, Zhou, M. Relations of SARS related stressors and coping to Chinese college students' psychological adjustment during the 2003 Beijing Sars epidemic. J. Couns. Psychol. 2011;58(3):410-423.	2011	China	Cross-Sectional	SARS	Young adults Students	Isolation Stay-at-home recommendations Closure of public spaces/schools	Mental health	Experience of SARS-related stressors (e.g., illness) was associated with poor coping and psychological symptoms. Individuals who were not directly affected by SARS still experienced psychological symptoms. Effective coping strategies and social support were associated with more positive outcomes.
Gu, J, Hao, Y, Zhong, Y. Preventative behaviours and mental distress in response to H1N1 among university students in Guangzhou, China. Asia-Pac J Public He. 2012;27(2).	2012	China	Cross-Sectional	H1N1	Young adults Students	Stay-at-home recommendations Avoiding public spaces	Mental health	Compared to other populations young adults were less likely to trust the government or follow infection prevention and control recommendations. Young adults were more likely to worry about friends/family members getting ill and have a stronger emotional response related to the pandemic. Results showed increases in mental distress related to the pandemic. To mitigate these issues, health education programs targeting university students and build trust amongst young adults and the government are recommended.
Sprang, G, Silman, M. Post-traumatic stress disorder in parents and youth after health-related disasters. Disaster Med Public Health Prep. 2013;7(1):105-110.	2013	United States	Cross-Sectional	H1N1 SARS	Adolescents	Isolation Stay-at-home recommendations Social distancing	Mental health	Post-traumatic stress disorder increased during and after pandemics. Use of mental health services increased during or after pandemics. Health care and social service workers should collaborate during pandemics to minimize the impact of psychological consequences on children. Trauma-informed approaches should be used by professionals.
Chen, J, Chen, X, Guo, Z, Liu, M, Wang, J, Wang, L, Zhang, L, Zhou, S. Prevalence and socio-demographic	2020	China	Cross-Sectional	COVID-19	Adolescents (age 12-18)	School closures Stay-at-home	Mental health	School closures, uncertainty, and potential negative academic impacts have a negative impact on mental wellness. Students being isolated at home can lead to anxiety and depression. To mitigate the harms of closures and stay-at-home orders it is suggested to share accurate and updated

correlates of psychological health problems in Chinese adolescents during the outbreak of COVID-19. Eur Child Adolesc Psychiatry. 2020; 29:749-758.								information, refute rumors, provide sense of security, ensure adequate PPE is available, promote positive and optimistic attitudes. Additionally, online psychological support should be provided to students.
Huang, H, Jiang, B, Liao, Z, Wang, Y, Yuan, S, Zhang, X, Zhao, M. Comparison of the indicators of psychological stress in the population of Hubei Province and non-endemic provinces in China during two weeks during the coronavirus disease 2019 (COVID-19) outbreak in February 2020. Med Sci Monit. 2020;26.	2020	China	Cross-Sectional	COVID-19	Young adults (age 18-24)	Stay-at-home recommendations Isolation	Mental health	Young adults age 18-24 had increases in sleep disorders and a poorer emotional state compared to older adults during stay-at-home/isolation orders due to the pandemic. Governments should encourage physical activity while staying home. Physical activity is an important factor in mental well-being and regular sleep cycles.
Chen, S, Hu, B, Jin, C, Tang, W, Wang, G, Xie, C, Xua, J. Prevalence and correlates of PTSD and depressive symptoms one month after the outbreak of the COVID-19 epidemic in a sample of home-quarantined Chinese university students. J Affect Disord.	2020	China	Cross-Sectional	COVID-19	Young adults	Stay-at-home recommendations Isolation	Mental health	Longer stay-at-home/isolation measures were associated with increased post-traumatic stress disorder (PTSD) and depression among students. Older/graduating students experienced more negative psychological impacts compared to other students. Psychological interventions that reduce the fear of the pandemic and instill emotional resilience in the people exposed to the pandemic could be helpful in preventing the development of PTSD or depression.

2020;274:1-7.								
de Luis-Garcia, R, Irutia, M, Planchuelo-Gomez, Odriozola-Gonzalez. Psychological effects of the COVID-19 outbreak and lockdown among students and workers of a Spanish university. Psychiatry Res. 2020;290.	2020	Spain	Cross-Sectional	COVID-19	Young adults	Stay-at-home recommendations Isolation Closure of public spaces	Mental health	Students experienced high levels of depression, anxiety, and stress. Mental health should be carefully monitored during this crisis. Psychological services oriented and adapted to these circumstances to mitigate the emotional impact on young adults.
Fountoulakis, K, Kaparounaki, C, Mousa, D, Papadopoulou, E, Papadopoulou, K, Patsali, M. University students' mental health amidst the COVID-19 quarantine in Greece. Psychiatry Res. 2020;290.	2020	Greece	Cross-Sectional	COVID-19	Young adults	Stay-at-home orders Quarantine	Mental health	Young adults reported an increase in anxiety, depression, suicidal intention, and loss of value in life.
Cui, Y, Li, W, Zheng, Y. Mental health services for children in China during the COVID-19 pandemic: Results of an expert-based national survey among child and adolescent psychiatric hospitals. Eur Child Adolesc Psychiatry. 2020;29:743-748.	2020	China	Cross-Sectional	COVID-19	Adolescents	Stay-at-home orders School closures Closure of public spaces	Mental health	Separation of children and adolescents from their parents (e.g., due to isolation) can lead to anxiety and stress. Children and adolescents should be screened for PTSD due to trauma from COVID-19 measures. Parents should pay attention to their children/adolescent's mental health status.
Brambilla, I,	2020	Italy	Cross-	COVID-19	Adolescents	Stay-at-home orders	Mental	COVID-19 significantly and negatively

Buzzi, C, Caimmi, S, Ciprandi, G, Ciprandi, R, marseglia, G, Tucci, M. The psycho-social effects of COVID-19 on Italian adolescents' attitudes and behaviors. Ital. J. Pediatr. 2020;69.			Sectional			School closures Closure of public spaces	health	impacted the emotion of adolescents. Initiatives should be adopted to support and inform adolescents during pandemics. School lessons that continued online provided social connection for adolescents.
Ahmad, A, Ahmed, O, Ahmed, Z, Aibao, Z, Hanbin, S, Siyu, L. Epidemic of COVID-19 in China associated with psychological problems. Asian J Psychiatr. 2020;21.	2020	China	Cross-Sectional	COVID-19	Young adults	Stay-at-home orders School closures Closure of public spaces	Mental health Substance use	Young adults were in a more vulnerable position during the COVID-19 pandemic compared to older adults. There were higher rates of anxiety, depression, alcohol use disorder (large increases are hazardous and harmful drinking), and lower mental well-being during the pandemic. Multi-faceted approaches to mental wellness should be implemented at the personal, social, and international levels. To mitigate mental health issues, it is suggested to form multidisciplinary mental health team, provide psychiatric treatments and other mental health services, utilizing online counseling platforms, rehabilitation program, ensuring certain care for vulnerable groups.
Di, Q, Xindong, M, Zhang Y, Zhang H. Mental health problems during the COVID-19 pandemics and the mitigation effects of exercise: A longitudinal study of college students in China. Int J Environ Res Public Health. 2020; 17(10).	2020	China	Longitudinal	COVID-19	Young adults (18-24)	Physical distancing	Mental health Physical activity	The amount of physical activity was significantly higher in the male participants than female. The percentage of female young adults reporting abnormal levels of every negative emotion was higher than in male respondents. The development trend of negative emotions may imply that the adverse impact of COVID-19 on public mental health will continue to increase as COVID-19 spreads across the world. An indirect influence on young adults' mental health was sleep quality playing an important role with the stay at home measures creating irregular behavioural patterns. Regular exercise is a good treatment for poor mental health and may directly reduce negative emotions within a certain range. Encourage and promote maintenance of routines, importance of sleep, opportunities for physical activity in home setting.
Fegert, J, Martin,	2020	Internationa	Call for	COVID-19	Adolescents	Physical distancing	Mental	Suicide rates may increase during the crisis

A, Ordonez, A, Vitiello Witt, A. Child and adolescent mental health service provision and research during the Covid-19 pandemic: challenges, opportunities, and a call for submissions. Child Adolesc Psychiatry Ment Health. 2020;14(19).		I	submissions			Isolation Stay-at-home orders	health	as a consequence of distancing, quarantine and isolation. The uncertain duration of the quarantine measures, the need for families to simultaneously work (or manage the stressors of employment loss), to provide childcare and to support distance-learning efforts, as well as to manage the impact of disease and loss of life in their families and communities may lead to long-lasting effects, many of them related to mental health and psychopathology.
Jiang, F, Wang, G, Zhao, J, Zhang Y. Mitigate the effects of home confinement on children during the COVID-19 outbreak. The Lancet. 2020. Available from: https://www.thelancet.com/pdfs/journals/lancet/PIIS0140-6736(20)30547-X.pdf .	2020	China	Editorial Correspondence	COVID-19	Adolescents	Isolation Quarantine School and public space closures	Mental health	Evidence suggests that when children and youth are out of school, they are physically less active, have much longer screen time, irregular sleep patterns, and less favourable diets, resulting in weight gain and a loss of cardiorespiratory fitness. Such negative effects on health are likely to be much worse when children are confined to their homes without outdoor activities and interaction with same aged friends during the outbreak. The interaction between lifestyle changes and psychosocial stress caused by home confinement could further the detrimental effects on child physical and mental health. Mitigation strategies include mobilize existing resources, perhaps involving NGOs, and create a platform for gathering the best online education courses about healthy lifestyle and psychosocial support programs available for schools to choose from. Promotional videos can be useful to motivate children to have a healthy lifestyle at home by increasing physical activities, having a balanced diet, regular sleep pattern, and good personal hygiene.
Ortiz, R, Sharma, N, Sharma, V. Risk and protective factors for adolescent and young adult mental health	2020	Nepal	Editorial Correspondence	COVID-19	Adolescents Young adults	Isolation Quarantine	Mental health	Mental health concerns related to COVID-19 for youth include: (1) deficient youth mental health services funding; (2) social media use; (3) a suddenly-imposed lockdown; (4) lack of understanding of lockdown restrictions; (5) sudden work/student life changes; (6) abrupt postponement of the

within the context of COVID-19: A perspective from Nepal. J Adolesc Health. 2020;67(1): 135-137.								Secondary Education Examination. Implementation of a lockdown mandate with only a few hours of notice in Nepal left people unprepared for a long-term restriction on mobility. Working youths cannot continue their work, either because their places of employment are closed or because they lack resources (i.e., computers) at home. For students, engagement in schools, in colleges, and with peers, which is a protective factor against adverse mental health outcomes. Mitigation includes joint and extended families which provide youth with a support system. As a result, youths are reconnecting with their family values and cultural identity. Increased support from friends and family have been reported in the context of COVID-19. Opportunities that instill a sense of social responsibility and community support that may negate adverse mental health outcomes and free psychological help/systems available are beneficial.
Dosil, M, Idoiaga, N, Ozamiz, N, Picaza, M. Stress, anxiety, and depression levels in the initial stage of the COVID-19 outbreak in a population sample in the northern Spain. Cad. Saúde Pública. 2020;26(4).	2020	Spain	Cross-Sectional Descriptive	COVID-19	Young adults	School closure Isolation Physical distancing	Mental health Substance use	The fear of the unknown and uncertainty can lead to the development of mental disorders such as stress, anxiety, depression, somatization, and adverse behaviors such as increased alcohol and tobacco consumption. There were higher mean levels of stress, anxiety, and depression in the 18-25-year age bracket compared to other. Teaching institutions will need to implement prevention and intervention programs to mitigate the stress levels. The various social, health, administrative, and educational institutions, including academia, could thus design plans and programs to help mitigate stress (i.e., hotlines, websites/texting services, mental health first aid training/handbooks). It is crucial to create programs for both academic support and psychological support for those receiving information on the pandemic. It would also be useful to analyze the content that people are receiving from social networks and help them develop the necessary skills to be able to filter such information.
Battista, G, Caggiano, G, Da	2020	Italy	Cross-Sectional	COVID-19	Young adults (18-25)	School closure Isolation	Mental health	During COVID-19 pandemic the majority of the students did not modify their diet and

Molin, G, De Giglio, O, Di Onofrio, V, Ferracuti, S, Galle, F, Liguori, O, Montagna, T, Napoli, C, Sabella, A. Understanding knowledge and behaviors related to COVID-19 epidemic in Italian undergraduate students: The EPICO study. Int J Environ Res Public Health. 2020;17(10):3481.					Students	Physical distancing	Physical Activity Substance use	smoking habits, while a great part of the sample reported a decrease in physical activity. Create momentum for opportunities to modify lifestyle during the lockdown/restrictions. Communication and collaboration between public health and media outlets sure occur to ensure alignment of messaging.
Clemens, V, Fegert, J, Plener, P, Vitiello, B, Challenges and burden of the Coronavirus 2019 (COVID-19) pandemic for child and adolescent mental health: a narrative review to highlight clinical and research needs in the acute phase and the long return to normality. Child Adolesc Psychiatry Ment Health. 2020;14(20).	2020	Europe	Editorial Correspondence	COVID-19	Adolescents	Quarantine Isolation School and public space closure	Mental health	Mental health was impaired disproportionately in the most vulnerable socio-economic groups—adolescents whose families faced more severe economic pressure. The COVID-19 pandemic represents a dangerous accumulation of risk factors for mental health problems in children and adolescents of enormous proportions: re-organization of family life, massive stress, fear of death of relatives, especially with relation to grandparents and great-grandparents, economic crisis with simultaneous loss of almost all support systems and opportunities for evasion in everyday life, limited access to health services as well as a lack of social stabilization and control from peer groups, teachers at school, and sport activities. To mitigate impacts, increase time with caregivers can lead to increased social support, which strengthens resilience. Initiatives to support the continuity of care, to guide parents, teachers, children and health professionals on how to handle the mental issues and to advocate national authorities on the biopsychosocial impact of the crisis on the life of children and adolescents.
Cao, W, Dong, J, Fang, Z, Han, M, Hou, G, Xu, X,	2020	China	Cross-sectional	COVID-19	Young adults (18-24) Students	Isolation School and public space closure	Mental health	Student anxiety focused on their place of residence, source of parental income, whether living with parents or an

<p>Zheng, J. The psychological impact of the COVID-19 epidemic on college students in China. <i>Psychiatry Res.</i> 2020;287.</p>								<p>acquaintance was infected with COVID-19. Living in urban areas was conducive to reducing the anxiety of college students. The urban economy is relatively prosperous and provides citizens with better material security. Results suggest that effective and robust social support is necessary during public health emergencies.</p>
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Appendix C: Grey Literature Data Extraction Table

Citation	Location	Document Type	Outcome	Findings/Recommendations (includes mitigation strategies recommended)
Centre for Addiction and Mental Health. Talking with children about COVID-19 and its impacts [Internet]. Toronto: Centre for Addiction and Mental Health, 2020. Available from: https://www.camh.ca/-/media/files/camh_covid19_infosheet-talking_to_kids-pdf.pdf?la=en&hash=59AC3799BC481EC9238ECD9044A98B40C5CEA253	Canada	Fact sheet	Mental health	Young people may sense anxiety in their parents and worry about their own health as well as the health of family members. Strategies to assist with young people's mental health include limiting news and social media exposure, encouraging youth to interact with friends virtually and reminding them about the importance of physical distancing, and advising adolescents not to smoke or vape and assist them in stopping immediately since sharing smokes or vapes is common.
Centre for Addiction and Mental Health. Impact of COVID-19 on mental health and substance use [Internet]. Toronto: Centre for Addiction and Mental Health, 2020. Available from: https://www.camh.ca/en/health-info/mental-health-and-covid-19/covid-19-national-survey	Canada	Data dashboard	Mental health Substance use	Younger adults engaged in binge drinking, showed more worry and stress, experienced anxiety, and felt lonelier compared to adults age 40+.
World Health Organization. Mental health and psychosocial considerations during the COVID-19 outbreak [Internet]. Switzerland: World Health Organization, 2020. Available from https://www.who.int/publications-detail/WHO-2019-nCoV-MentalHealth-2020.1	World	Fact sheet	Mental health	COVID-19 is generating stress throughout the population. Messages to assist children cope with stress include helping them find positive ways of expressing emotions, keeping them close to parents/families, trying to avoid separating them from their caregivers, maintain familiar routines as much as possible, and discuss COVID-19 with children in honest and age-appropriate way.
United Nations. Policy brief: COVID-19 and the need for action on mental health [Internet]. United States: United Nations; 2020.	World	Policy brief	Mental health	<p>When crises affect people's lives and communities, high levels of stress are expected. Adversity is a well-established risk factor for short and long-term mental health problems. Adolescents and young people are a high-risk group as most mental health conditions develop during this age. Many young people have seen their futures impacted through changes to post-secondary settings. A study carried out with young people with a history of mental health needs living in the UK reports that 32% of them agreed that the pandemic had made their mental health much worse. The main sources of distress included concerns about their family's health, school and university closures, loss of routine, and loss of social connection.</p> <p>Provision of mental health services must include specific actions tailored for this population. To minimize the mental health consequences these actions are recommended:</p> <ul style="list-style-type: none"> • Apply a whole society approach to promote, protect, and care for mental health (considerations in national response plans, respond proactively, craft communications to be sensitive on mental health). • Ensure widespread availability of mental health and psychosocial support (support community actions that strengthen social cohesion and

				<p>decrease loneliness, invest in mental health interventions that can be delivered remotely, ensure uninterrupted in-person care for severe mental health conditions, protecting and promoting the human rights of people with severe mental illness).</p> <ul style="list-style-type: none"> • Support recovery from COVID-19 by building mental health services for the future (use current momentum/interest, make mental health part of universal health coverage, organize community-based services that protect and promote people's human rights like involving people with lived experience)
Public Health England. Guidance for parents and carers on supporting children and young people's mental health and wellbeing during the coronavirus (COVID-19) pandemic [Internet]. England: Public Health England, 2020. Available from: https://www.gov.uk/government/publications/covid-19-guidance-on-supporting-children-and-young-peoples-mental-health-and-wellbeing/guidance-for-parents-and-carers-on-supporting-children-and-young-peoples-mental-health-and-wellbeing-during-the-coronavirus-covid-19-outbreak	England	Webpage	Mental health	Some preteens and teenagers respond to worrying situations by acting out. This could include reckless driving, being afraid to leave the home, and alcohol or drug use. They may cut back on how much time they connect with their friends. They can feel overwhelmed by their intense emotions and feel unable to talk about them. Their emotions may lead to increased arguing and even fighting with siblings, parents, or other adults. They may have concerns about how the school closures and exam cancellations will affect them. Helping people cope: listen, provide clear information about the situation, be aware of your own actions, connect regularly, create a new routine, limit media exposure
Clemens, V, Fegert, J, Plener, P, Vitiello, B. Challenges and burden of the Coronavirus 2019 (COVID-19) pandemic for child and adolescent mental health: a narrative review to highlight clinical and research needs in the acute phase and the long return to normality. Child Adolesc Psychiatry Ment Health. 2020;14(20). Available from: https://capmh.biomedcentral.com/articles/10.1186/s13034-020-00329-3 .	Europe	Article	Mental health	<p>Limitations of peer-to-peer interactions can have negative effects on adolescents that impacts their well-being. School closures may not have a major impact on reducing infections and preventing deaths and the possible negative consequences such as loss of education time, restricted access to peers and loss of daily structure need to be taken into account when estimating the advantages and disadvantages of this particular measure.</p> <p>Economic recessions and connected factors such as unemployment, income decline, and unmanageable debts are significantly associated with a decrease of mental well-being, increased rates of several mental disorders, substance-related disorders, and suicidal behavior.</p> <p>Since the beginning of the pandemic, children and adolescents have spent more time online, which may increase the risk of contact with online predators. Due to limited social encounter, children's outreach to new contacts and groups online has increased. As more adults have been isolated at home, there may also be an extended demand for pornography. Europe has reported an increase in child pornography since the beginning of the pandemic.</p> <p>Strategies should focus on high risk children as children already disadvantaged are at a high risk for mental health problems (ACEs).</p>
Radomski, A, Capelli, M. The mental health impact of COVID-19 on youth and young adults: Getting ahead of the mental health surge. Toronto: Centre for	Canada	PowerPoint	Mental health	Survey of youth and young adults age 18-25. 60% of youth reported their mental health has gotten somewhat worse since the COVID-19 pandemic. COVID-19 has youth and young adults experiencing situation-specific anxiety or worsening of existing anxiety.

Addiction and Mental Health, 2020.				Youth and young adults report greater interest in accessing more intensive services. 75% of youth are interested in accessing mental health services.
Cortina, M. A, Gilleard, A, Deighton, J. Emerging evidence: coronavirus and children and young people's mental health. London: Evidence Based Practice Unit; 2020.	England	Report	Mental health	<p>Some populations of youth and young adults have additional vulnerabilities to COVID-19. It is important to focus efforts on these populations.</p> <ul style="list-style-type: none"> The disruption to routine may be particularly challenging for young people with additional support needs such as Autism Spectrum Condition (ASC) and Attention Deficit Hyperactivity Disorder (ADHD). Existing mental health conditions can make some young people more vulnerable to the stay-at-home measures. Ethnic minority groups may face stigma and/or find it harder to access support. Children in temporary or residential care are at greater risk of distress caused by sudden, relocation or difficult housing situations. <p>Levels of domestic violence and reported child abuse have risen during school closures, further increasing mental health risks for these young people. Collaboration is needed between families, education, social care, and health. Adolescents, and increasingly younger children, are the biggest consumers of social media. This may place them in a particularly vulnerable position, as repeated exposure to the highly emotive and virus news can be psychologically harmful. Media over-exposure can cause an increase in health anxiety to the extent that it may become disproportionate to actual need. For example, excessive media coverage of panic buying may lead to the worry that there is an actual scarcity of resources.</p>
Nagata, J. Supporting young adults to rise to the challenge of COVID-19 [Internet]. J. Adolesc. Health. 2020. Available from: https://www.jahonline.org/article/S1054-139X(20)30207-X/fulltext#articleInformation	United States	Article	Mental health	<p>Effective ways to communicate to young adults regarding COVID-19.</p> <ul style="list-style-type: none"> Address their desire for status and respect rather than threatening them Motivational interviewing is commonly used with young adults, particularly in dealing with addiction or mental illness. Give them privacy while at home. Young adults have many strengths, leverage their strengths. Young adults are experts at distant socializing through social media and virtual communications.
Canadian Centre for Substance Use and Addiction. COVID-19 and increased alcohol consumption: NANOS poll summary report. Ottawa: Canadian Centre for Substance Use and Addiction; 2020.	Canada	Report	Substance use	21.1% of people age 18-34 are drinking more alcohol.
World Health Organization. Alcohol and COVID-19: What you need to know [Internet]. Switzerland: World Health Organization, 2020. Available from: https://www.euro.who.int/__data/assets/pdf_file/0010/437608/Alcohol-and-COVID-19-what-you-need-to-know.pdf?ua=1	World	Fact Sheet	Substance use	Alcohol is not a necessary part of your diet and should not be a priority on your shopping list. Avoid stockpiling alcohol at home, as this will potentially increase your alcohol consumption and the consumption of others in your household. Alcohol use can increase during self-isolation and both, isolation and drinking, may also increase the risk of suicide, so reducing alcohol consumption is very important. Discuss with children and young people the problems associated with drinking and COVID-19, such as violations of quarantine and physical distancing, which can make the pandemic worse.
World Health Organization. Q&A: Tobacco and COVID-19 [Internet].	World	Webpage	Substance use	The who encourages helping people quit tobacco. Given the risks to health that tobacco use causes, WHO recommends quitting tobacco use. Quitting

Switzerland: World Health Organization, 2020. Available from: https://www.who.int/news-room/q-a-detail/q-a-on-tobacco-and-covid-19				will help your lungs and heart to work better from the moment you stop. WHO recommends the use of proven interventions such as toll-free quit lines, mobile text-messaging cessation programs, and nicotine replacement therapies (NRTs), among others, for quitting tobacco use. Be sure to talk with youth and young adults about substance use and not sharing supplies.
Aguilar-Farias, N, del Pozo Cruz, B, Draper, C, El Hamdouchi, A, Okley, A. Promoting healthy movement behaviours among children during the COVID-19 pandemic. <i>Child Adolesc Health</i> ; 2020; 4(6), 416-418.	World	Article	Physical activity	Children/youth typically obtain their daily physical activity through active travel to school, physical education and recess, organized sports, games, active play, and spending time in playgrounds and parks. Conversely, most of their sedentary time and sleep are accumulated at home. As a result of the coronavirus disease 2019 pandemic, opportunities for children to meet the movement behaviour guidelines have been affected by school closures and physical distancing measures implemented by many governments. The pandemic provides an opportunity to raise awareness of movement behaviour guidelines for children and to promote their uptake across all areas of society. Recommendations include incorporating physical activity into daily routines, incorporate physical activity into education lessons (teachers and educators), health professionals recommend guidelines to parents, governments promote healthy behaviour guidelines in messaging, media should provide regular messaging, children should advocate for their right to healthy, active life.
Bartlett, J & Vivrette, R. Ways to promote children's resilience to the COVID-19 pandemic [Internet]. Maryland: Child Trends, 2020. Available from: https://www.childtrends.org/publications/ways-to-promote-childrens-resilience-to-the-covid-19-pandemic	United States	Fact Sheet	Mental health	The COVID-19 pandemic and its associated social and economic stressors can undermine children's development and well-being. Not only must they cope with major changes to everyday life, such as physical distancing and home confinement, but their families may struggle to meet their basic physical and emotional needs. Rates of poverty, unemployment, parental mental health problems and substance abuse, child abuse and neglect, and intimate partner violence tend to rise during disasters. Children may not receive critical supports they need when community services are limited, and fewer adults have direct contact with children. Promote protection factors in children: <ul style="list-style-type: none"> • Presence of sensitive and caring adult • Meeting basic needs • Providing emotional support • Support caregiver well-being • Promote social connectedness
Liu JJ, Bao Y, Huang X, Shi J, Lu L. Mental health considerations for children quarantined because of COVID-19. <i>Lancet Child Adolesc Health</i> , 2020. Available from: https://www.thelancet.com/journals/lanchi/article/PIIS2352-4642(20)30096-1/fulltext .	China	Article	Mental health	Mental health responses to previous emergencies and disasters have included widespread psychological first aid, focusing on psychoeducation about normative reactions and coping strategies. Providing information and prioritizing communication about COVID-19 is an essential component of any universal, community-led response to the pandemic.
National Collaborating Centre for Methods and Tools. What is the effect of the COVID-19 pandemic on alcohol use and alcohol-related harms [Internet]? Canada: National Collaborating Centre for Methods and Tools, 2020. Available from: http://email.nccmt.ca/ls/click?upn=G	Various countries	Rapid Review	Substance use	Among the global population, trends in changes to alcohol intake during the pandemic are unclear. Younger people in Canada were more likely to report drinking more often during the COVID-19 pandemic compared to older Canadians. Increased alcohol consumption was related to stress, boredom, loneliness, and lack of a regular schedule.

<p>I7MP-2B-2B9BgX2UAgp00A- 2BryD9SXnLixjmK0AFeumTGP2GCm- 2BgGrpz9KygH- 2FT4uluQJ6m0VMmRk0HOwRwkua- 2Fys3UhdxiZr-2FSabs9j91V1jii- 3DZsne_HF0mo6U3KCLFXTpv1UIHVH3 Z-2FNWsvpiz8VnnQ0Lcgd0-2FsQZI71k- 2BhQujWUByL4DzH107nnVD- 2FXkcU72NHRWndMQ83V6cDPcFFnRr A5hASSttb5HBpRLe3rpTSMGQTYV4afJ 6xS09SibRjUO8Fr1A1ksn6OAhVeDQAL S57WIXI3f0ZfOwXRc1qGkn- 2BvDamCQu9LubmDH1TSplXSJZBpbrR gkoP6nrN4LF9t34aOJsNssN2ukw30Voh CQXFLxkO6GJuxMnY8cJPmotMVzBom gsbxYzJcX2xel3wBiifQTmyVoxGW3XcL NGgmNKkxrn4xt.</p>				
<p>Du, X, Zhai, Y. Addressing collegiate mental health amid COVID-19 pandemic. <i>Psychiatry Res.</i> 2020;288.</p>	<p>United States</p>	<p>Editorial/ Correspondence</p>	<p>Mental health</p>	<p>College students experienced distress contributed by the uncertainty and abrupt disruption of the semester in addition to the anxiety caused by school closure during COVID-19. Although this transition can lead to acute stress among some students due to the lack of time for adjustment, remote learning allows college students to sustain their academic routine which is found to benefit mental health and psychological resilience in the long run. Schools should continue to develop courses of action and public health messaging to better address collegiate mental health issues caused by the disruptions of education and career trajectory. Virtual mental health support has been found effective in treating anxiety and depressive symptoms. Develop and pass public health messaging onto students, sharing coping resources, and encouraging them to take action to protect their mental health.</p>

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