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Issue Note

Achieving continued compliance with public health measures among youth and young adults experiencing COVID-19 isolation and fatigue

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Executive summary

Youth and young adults may experience fewer complications from COVID-19, however they represent a risk as carriers of the disease and have been particularly affected by COVID-19 isolation and fatigue. This group is also known to have ongoing challenges with continued compliance in following public health measures including vaccination, physical distancing, and masking.[1] This can be due to a lower perceived risk of the disease, fatigue with public health measures, and adverse mental health conditions which result from these directives. This paper aims to answer the following questions:

1. **What strategies are effective to achieve continued compliance with public health measures among youth (ages 12-17) and young adults (ages 18-30) who are experiencing COVID-19-related isolation and loss of in-person social interaction (e.g. "lockdown" fatigue)?**
2. **How can a social and behavioural science approach help achieve compliance with ongoing public health measures for this group, who may experience fatigue almost 1.5 years into the pandemic?**

A rapid literature scan was conducted in academic and grey literature databases which included Cochrane Library, TRIP, PSYCINFO, LitCOVID, PubMED, Epistemonikos, WHO Global Literature, Science Table Briefs, and COGNIT. Study selection followed a team-based, multi-step process involving screening through keywords, abstracts, methods, conclusions, and applying hierarchy of evidence and inclusion and exclusion criteria. Canadian scientific experts focusing on COVID-19, youth and young adults and public health measures compliance were also consulted.

Important thematic areas have revealed key messages to help with mitigating efforts:

- Public health messaging should aim to improve the understanding of what important public health measures are (vaccination, physical distancing, masking, etc.) during the pandemic, reinforce the efficacy of public health measures to mitigate risk, and should be targeted to less compliant groups including youth and young adults. As well, messaging should be consistent and unified, clear, accurate, timely, and actionable.
- Youth and young adults specifically are more receptive to public health measures if the tone and style is more hopeful, succinct, and highly visual. Positive reinforcement is important for this cohort.
- The pandemic has disrupted and fatigued youth leading to non-compliance with public health measures as coping with changes in lifestyle and routines are challenging, especially during a crucial developmental stage for them.
- There is emerging agreement of the association between COVID-19 public health measures and deleterious effects on mental health including conditions such as anxiety, depression, disturbances in sleep, appetite, loneliness, and digital overuse.
- There are overarching conceptual models focused on behaviour change and contextual understanding that can play an important role in improving continued compliance to public health measures, these should be incorporated in public health messaging and intervention strategies.

Limitations

This report has limitations that need to be considered:

- It is possible that relevant information was missed given that the searches and reviews were rapid, adhering to rapid review timelines to produce this report.
- The quality of evidence assessed, and therefore the strength of the evidence, can be varied.
- Only English-language resources were consulted.
- Due to the emerging nature of this topic, some of the single studies also involved mostly cross-sectional designs, and are therefore missing larger longitudinal and cohort study designs that would be able to explain more about the changing impacts of COVID-19 and mitigating strategies (e.g. pre and post effects).

Research Gaps and Future Considerations

The following are some notable research gaps, and areas that could benefit from future study and investigation:

- It will be important to consider the settings where youth and young adults will be returning to and spending much of their time if the pandemic starts to slow. More studies will need to focus on returning to school settings to understand how these environments can be adapted to promote public health measures using real-world evidence.[1] Employment settings will also be important to investigate as youth and young adults will return more fully to jobs (including on site) and employers may have a role in continued compliance with public health measures.
- There should be some additional focus on disentangling the effects of different prevention and control measures to understand which are most effective, or which combinations work best and cost less in terms of economic and health burden on society.[5] This is especially important as the pandemic moves beyond one and a half years, is ongoing, and where resources are finite and limited.
- While certain dimensions of demographics and diversity have been investigated, less has been written about socioeconomic status, sex, sexual orientation, race, class, and gender as it relates to following public health measures amongst youth and young adults.[18,24] This is important considering that equity-seeking and marginalized groups should be provided equal access to treatment, and at a more upstream level, have access to interventions and tools that help with adherence to protective measures.
- Internet-based campaigns and mobile applications promoting public health measures are suggested to be effective for youth and young adults [2], however there has been limited evaluation of these interventions, especially in local Canadian contexts. Further investigation would help identify strategies to reach this target group and can be scaled if found to be effective.

Introduction

COVID-19 has spread quickly throughout the world. In response to the pandemic, governments across jurisdictions have implemented various public health measures in order to control the spread of the virus and to reduce serious illness and death.[3] Some of these measures may include, but are not limited to vaccination [4–6], physical distancing [6–8], and masking.[11,6]

Youth (ages 12-17) and young adults (ages 18-30) (YYAs) may experience fewer complications from the disease, however they represent a risk to more vulnerable populations and the population at large, by acting as carriers of the virus.[9] It has been suggested in Canada that age is a leading factor in the COVID-19 compliance index.[10] That is, the younger Canadians are, the less likely they are to follow recommended COVID-19 public health measures and this non-compliance has been identified as a contributor to Canada's COVID-19 case count.[10] Overall, young people may have a high potential for spreading the virus largely because they display mild or no symptoms of COVID-19, while still being infectious.[7]

To date, there is scant research on the behaviour of youth during the pandemic and some published research may overlook unique considerations for youth, limiting the response in public health measure effectiveness.[11] Research on past pandemics show there are differences between how youth react compared to adults during outbreaks.[12] Consequences for YYAs can often be more immediate and greater, having an excessive impact on their social life, development, physical and mental health.[11] By focusing on YYAs, their perspectives will be taken into account which is important in policy development for this understudied group.

Evidence also suggests that adherence to preventive measures is influenced by real or perceived risk of infection whereby a lower perceived risk leads to lower adherence.[9] YYAs are usually a population with a lower perception of risk than other age categories, and this may be explained by the lower morbidity and mortality seen in this age group.[9] Nevertheless, if YYA's self-perceived risk is low, it is important to understand these underlying factors so they may be targets for effective public health messaging which can help with continued compliance. Indeed, YYAs can play an important role in the societal effort to reduce disease transmission by complying with public health measures and adopting preventive behaviours. Human behaviour is the main driver of the disease transmission and mitigation strategies require large scale behaviour change.[6,13,14] As such, the effectiveness of public health interventions depends on the level of individual compliance.[14]

So far, there has been a multitude of studies, study designs, populations, settings, interventions, and outcomes that have accumulated in the literature on this topic to date. This paper will serve to address the following questions:

1. **What strategies are effective to achieve continued compliance with public health measures among youth (ages 12-17) and young adults (ages 18-30) who are experiencing COVID-19-related isolation and loss of in-person social interaction (e.g. 'lockdown' fatigue)?**
2. **How can a social and behavioural science approach help achieve compliance with ongoing public health measures for this group, who may experience fatigue almost 1.5 years into the pandemic?**

[1] *Vaccination*: Immunization is established as a public health intervention most effective and cost-beneficial at significantly preventing numerous infectious diseases and premature mortality [4–6]*; Physical Distancing*: Avoiding close proximity and direct physical contact when interacting with people [1,6]; *Masking*: Covering face (mouth and nose) with a mask.[1,6]

Methods

Data for this report was retrieved through academic and grey literature databases which included high quality clinical research evidence found through Cochrane Library for reviews, TRIP, and PSYCINFO. It also included COVID-19 focused databases such as LitCOVID linked to PubMED, Epistemonikos, and WHO Global Literature. To get a pan-Canadian view, Science Table Briefs and COGNIT (https://cognit.ca/en/) were also used to gather up-to-date evidence and identify experts on the topic. For more information about our search strategy and our inclusion criteria please see the Appendix.

In addition to a rapid review of the literature, Canadian researchers were selected from pan-Canadian studies to be interviewed as experts. These candidates specifically focus on COVID-19 and impacts on youth and young adults, especially as related to public health measures, compliance, mental health, and isolation. For more information on the key informants, please see the Appendix.

Findings

Strategies for achieving continued compliance

In general, to promote public adherence to these measures, well-planned public health communications are important [15,16], and it is useful to understand characteristics that contribute to successful uptake. Organizations at federal, provincial, and municipal levels have taken an active part in designing and disseminating public health communications with the aim of influencing public attitudes and behaviours related to the pandemic.

Overall, there are certain characteristics known for individuals where adherence has been more effective. Studies have shown consistently there is a higher adherence to public health measures among people who: perceive the threat of the virus to be greater; have greater knowledge of the pandemic; who are older; and who identify as women.[17] This clearly leaves youth and young adults as an under-represented and vulnerable group when it comes to continued compliance.

Public health messaging should aim to improve general knowledge of the COVID-19 pandemic, reinforcing the efficacy of public health measures to mitigate risk.[16] As well, messaging and health promotion strategies should be designed and targeted to groups with a higher risk of non-compliance which includes younger people and men specifically.[16] As well, interventions should be designed for distribution on multiple platforms, including social media (online) and traditional media (newspapers, other print, radio, television, etc.).[6,15,16,18] Taken together, there is also a need for a consistent and unified public health messaging approach that cuts across political divides and any growing skepticism in science.[15,19] As well, the public needs information that is clear, accurate, and timely with actionable messages.[19]

When we talk about targeting YYAs specifically, it is suggested young adults may be more receptive to COVID-19 information pertaining to public health measures if the messaging, tone, and style are adapted to optimize reach across age groups.[10] Important considerations when developing interventions include that young people respond to a tone and style that is more hopeful, emphasizing how one's actions can have impact or make a difference.[10] As well, young people are more receptive to succinct, highly visual formats which include videos and graphics.[10] Further, family and friends can play a key role influencing behaviour and compliance, along with public health officials and voices of authority and expertise.[10] Positive reinforcement is known to be especially important for the younger aged cohorts between 16 to 24 years of age.

Focusing on practical and applied interventions, The Lancet Commission has also developed a framework where multiple strategies can be implemented to address the burden faced by YYAs (Figure 1).[20] This example illustrates a coordinated approach in which health information can be disseminated. The interventions involve: school-based interventions, education, information dissemination, behaviour activation, telehealth, and other interventions.[20]

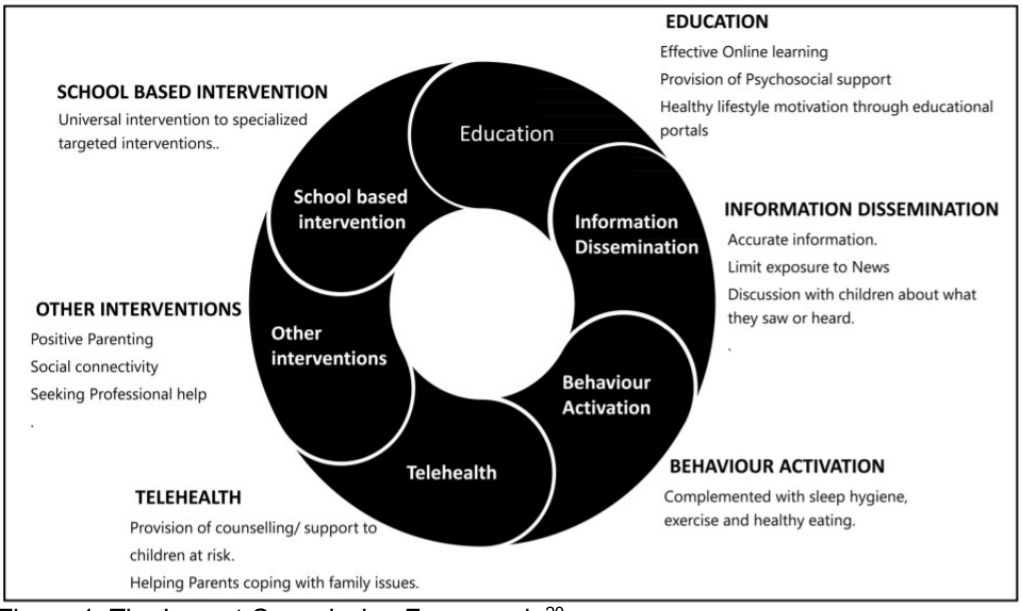


Figure 1: The Lancet Commission Framework [20]

While several important strategies have been discussed, it is also important to make clear that strategies are differentiated also according to each public health measure. For instance, adherence to masking has become habitual with 86% reporting wearing a mask, whereas 75% of people report following physical distancing.[13] Additionally, evidence suggests that people are growing tired of following public health measures due to 'pandemic fatigue'.[13] This will all require new, evidence-informed approaches to continue helping with public health measures.

When it comes to more targeted strategies, several approaches may increase the number of YYAs who get vaccinated including health education, gifts, and incentives, and/or passing laws and legislation to be followed at a societal level. As it relates to physical distancing, it is important to focus on: communication and messaging, behavioural changes and skill development, and social influences and influencers. For effective masking, important factors involve persuasion, enablement, clear education, and modeling behaviours.

At present, Health Canada has authorized vaccines for youth aged 12 and older.[21] Strategies focusing on vaccine uptake for YYAs is important for several reasons including preventing COVID-19 infection, reducing hospitalization and severe outcomes, and reducing spread in schools and the community.[22] There are important strategies that can help target YYAs specifically in an Ontario and Canadian context [22]:

1. School-based Vaccination: a high impact and effective approach involving a familiar location for reaching many YYAs with a history of successful school-based vaccination programs.
2. Healthcare Provider Recommendation: a well-researched strategy for increasing uptake that involves a trusted source (may involve primary care provider partnerships).
3. Reminders for Vaccines: this has demonstrated impact involving targeted and personalized reminders for YYAs where via a vaccine registry, reminders can be sent directly to recipients.
4. School and Community Health Campaigns: these are effective if delivered by authoritative and trusted sources and consider YYAs and parents as key audiences.

How can social isolation and fatigue be affecting youth and young adults?

The pandemic has taken a toll on Canadians, and some subgroups feel as though public health measures do not consider the unique impact these measures have on mental health and well-being.[8,23] For example, focus groups conducted show young Canadians are overwhelmed by daily updates and confused about messaging regarding COVID-19 response framework.[6,23] Fatigue may also be setting in and this can lead to complacency towards public health measures.[6,23]

YYAs may have a different response to public health measures than adults. YYAs are part of complex social networks that support their growth, learning, and development.[11] Social contact with others is essential for motivation and development, especially as identity development primarily takes place in relation to others.[24,25] These effects can be especially marked as related to school, where isolation measures can lead to a backlog in knowledge and skills and reduces possibilities for socialization and development.[26]

In addition, young people's non-compliance with public health measures may be attributed to their difficulty coping with the changes in their lifestyles and routines imposed by the pandemic (e.g. in-person school closures, sports, and socializing with friends decreasing, organized activities reduced, etc.).[23] This has resulted in widespread disruption of all aspects of the lives and routines of YYAs which can lead to challenges and feelings of desperation, boredom, and uncertainty. Daily routines are instrumental in maintaining physical activity, regulating sleep cycles, and providing social interactions, which are all key protective factors for YYA mental health.[23]

It is important to consider the unique developmental stage of YYAs during this time. That is, the period of life between the ages of 10-24 is associated with increased risk taking, need for social connection and peer acceptance, and heightened sensitivity to peer influence.[20] Routines, social interactions, and friendships are among the important factors for YYA's 'normal' psychological development.[20] These factors may result in difficulties, especially adhering to physical distancing measures amongst young people.

So far in the literature, emerging studies have highlighted the likely deleterious effects of COVID-19 public health measures on YYA mental health. Some of the results are characterized broadly and then linked to specific mental health conditions. The pandemic may have increased long-term adverse consequences on YYA's mental health, and in particular social isolation has affected this group.[27] Greater stress has been shown to come from social isolation, including the cancellation of important events such as graduation ceremonies, school trips, and vacations.[27] This loss of in-person social interaction was strongly associated with deterioration in mental health across multiple domains. This finding underscores the importance of school, recreation, social activities, and milestone events.[2,27]

Multiple studies have revealed the impact of the pandemic on the decline of YYA mental health. They have experienced increased emotional stress, feelings of helplessness, and fear which can evolve into mental health conditions, the most common of which have been anxiety, depression, and disturbances in sleep and appetite.[20,27]

As well, social distancing and isolation are likely to result in loneliness for the YYA cohort, whose usual social contacts are contained due to public health measures.[28] Loneliness is the painful emotional experience of a discrepancy between actual and desired social contact.[28] Early indications of the pandemic context have shown that YYAs report high levels of loneliness, especially during stay at home or 'lockdown' measures. There are well established links between loneliness and adverse mental health effects.[28]

Additionally, the pandemic has resulted in a significant increase in the number of hours that YYAs spend online and on social media.[27] Studies have shown that smartphone and internet overuse can lead to mental health or behavioural problems which may be associated with poorer study performance, a decrease in social interactions, neglect in personal lives, and may be associated with relationship disorders and mood dysfunction.[27] Further, internet addictive behaviours have also been observed and

this can be due to financial hardships, isolation, substance abuse, and previously mentioned mental health conditions including anxiety, depression and stress.[2]

Models that can be used for behaviour change and mitigation strategies

There are various overarching models and frameworks that can play a key role in influencing behaviour and compliance.[6] Theories and models are helpful at an aggregate level and can help inform approaches and interventions across disciplines. These will be useful in driving and informing public health messaging and strategies that would encourage continued compliance towards public health measures.

Focusing on compliance, there is a need to understand attitudes and current behaviours regarding the uptake of public health measures as to inform public health messaging to change behaviour.[6,29] The Health Belief Model (HBM) was developed to understand why people fail to adopt disease prevention strategies (Figure 2).[22] It suggests that individuals' perceptions of threat (e.g. the likelihood of contracting COVID-19), control (e.g. the ability to bring about desired outcomes), and knowledge can affect whether one engages in disease prevention behaviours or not.[30] The HBM could be useful for explaining why some people do or do not practice public health measures.[30]

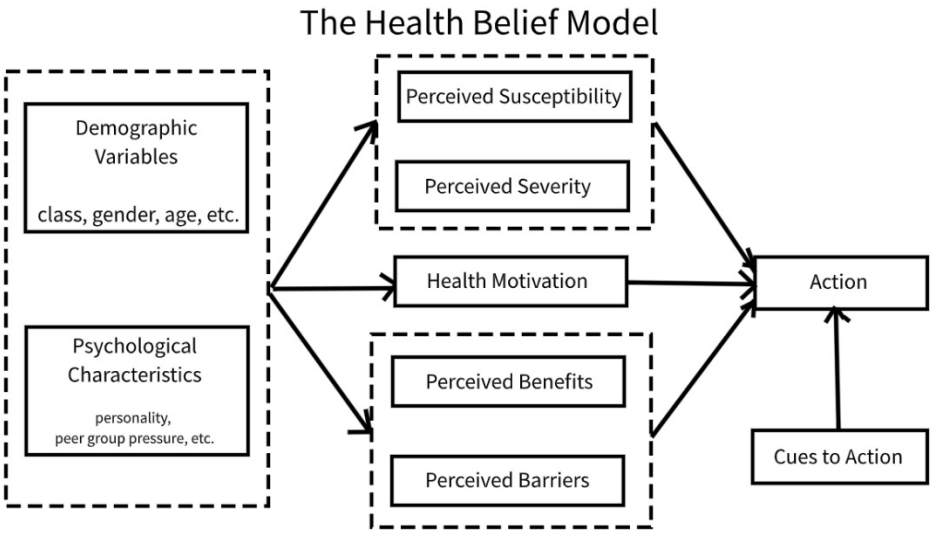


Figure 2: The Health Belief Model[22]

This approach may stimulate the development of more targeted public health messaging campaigns. This model is also especially important since findings show that younger aged adults have low levels of adherence to COVID-19 mitigation strategies, and this may be informed by lower levels of perceived threat, control, and knowledge about COVID-19.[7,8,22] Future public health campaigns may motivate adherence by increasing YYA's perceptions of risk, managing deficits in perceived control and knowledge through targeted education, empowerment, and self-monitoring.[9,10,30]

Another important model has been proposed by the Ontario's COVID-19 Science Advisory Table.[13] This involves a refreshed approach to maintain adherence towards public health measures, especially as related to effective masking and physical distancing. The framework involves identifying known barriers and behaviour change strategies that can be used to address issues of capability, opportunity, and motivation which are key determinants of whether or not an individual behaviour is carried out.[13] Key behaviour change strategies are outlined in Table 1.

Table 1: Key Behavioural Science Principles

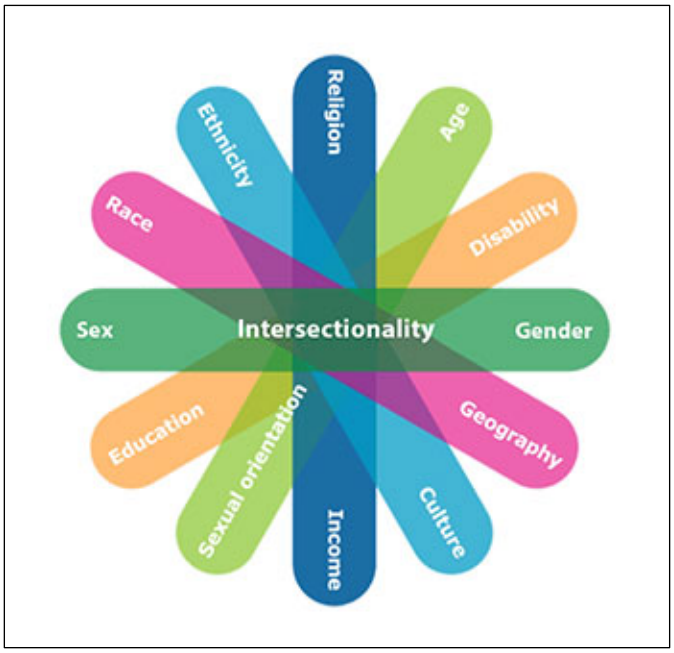
Principle	Description
Enablement	Empowering someone to do something
Modelling	Observing and imitating behaviour
Education	Teaching knowledge to others
Restrictions	Limitations on behaviour
Persuasion	Leading people to believe something
Incentivization	Attaching reward to behaviour
Training	Process of learning skills and behaviours
Environmental Restructuring	Changing environment to be accommodating

Source: Ontario COVID-19 Science Advisory Table [13]

Finally, another interdisciplinary model of intersectionality can help address a theme that has been emerging in the literature focused on YYAs (Figure 3). Multiple studies have shown that for successful health promotion and disease prevention strategies and communication, local knowledge of socio-demographic factors which inform compliance are very important.[31] That is, there are various dimensions of diversity that differ amongst youth and young adults that must be considered, so that relevant messaging and communication can occur.

As examples, gender is often neglected when developing health promotion interventions. Experience from previous pandemics and COVID-19 findings reveal that women are more likely than men to be compliant towards public health measures.[6,31] In addition, there are also findings of vulnerability and marginality amongst YYAs from different age, education, and ability/disability backgrounds, that make adherence to generic public health measures challenging.[27] Furthermore, there are also socio-economic barriers, digital divides, and differences in autonomy and choice amongst YYAs.[32]

Figure 3: Visual Example of Intersectionality[33]



Intersectionality is yet another lens that provides an analytic framework for understanding how aspects of a person's social identity combines to create different modes of privilege.[34] Targeted public health messaging and outreach will be more effective if these dimensions of diversity are considered in the planning and dissemination of key public health messages, especially as tailored approaches have been found to be more effective than general approaches.[18] It is essential to transcend homogeneous tendencies to develop and implement interventions for YYAs, especially since needs vary depending on demographic and identity locations.[27]

Research Gaps and Future Considerations

Through this review, it was clear there is an ongoing evolving and dynamic nature to complying with public health measures amongst youth and young adults. There were some notable gaps, and areas that could benefit from future study and investigation:

- It will be important to consider the settings where YYAs will be returning to and spending much of their time if the pandemic starts to slow. More studies will need to focus on returning to school settings to understand how these environments can be adapted to promote public health measures using real-world evidence.[1] Employment settings will also be important to investigate as YYAs will return more fully to jobs (including on site) and employers may have a role in continued compliance with public health measures.
- There should be emphasis on disentangling the effects of different prevention and control measures to understand which are most effective, or which combinations work best and cost less in terms of economic and health burdens on society.[5] This is especially important as the pandemic moves beyond one and a half years, is ongoing, and where resources are finite and limited.
- While some dimensions of demographics and diversity have been investigated across studies and articles, less has been written about socioeconomic status, sex, sexual orientation, race, class, and gender as it relates to following public health measures amongst YYAs.[18,24] This is important considering that equity-seeking and marginalized groups should be provided equal access to treatment, and at a more upstream level, have access to interventions and tools that help with adherence to protective measures.
- Internet based campaigns and mobile applications promoting public health measures are suggested to be effective for YYAs [2], however there has been limited application and evaluation of these interventions, especially in local Canadian contexts. Further investigation would help reach this target group and can be scaled if found to be effective.
- A list of upcoming research can be found in the appendix (Table 2).

Limitations

This report involves limitations that need to be considered when assessing this summary of evidence. Firstly, it is possible that relevant information would have been missed since the searches and reviews were rapidly conducted given the timelines to produce this report. As well, the quality of evidence was not formally assessed, and therefore the strength of the evidence may vary across the evidence cited in this report.

Due to the emerging nature of this topic, some of the single studies also involved mostly cross-sectional designs, and are therefore missing larger longitudinal and cohort study designs that would be able to explain more about the changing impacts of COVID-19 and mitigating strategies (e.g. pre and post effects).

The report is also limited to English-speaking jurisdictions and advanced industrial economies so that findings and trends are comparable. However, this approach will necessarily exclude and miss out on important patterns occurring in other jurisdictions and lessons from their experience in tackling this problem.

Conclusion

This report summarizes existing evidence and knowledge about effective strategies to achieve continued compliance with public health measures amongst youth and young adults who may be experiencing COVID-19-related isolation and fatigue. Important thematic areas have revealed key messages to help with mitigating efforts:

- Public health messaging should aim to improve the understanding of what important public health measures are (e.g. vaccination, physical distancing, masking), reinforce the efficacy of public health measures to mitigate risk, and should be targeted to less compliant groups including youth and young adults. As well, messaging should be consistent and unified, clear, accurate, timely, and actionable.
- Youth and young adults specifically are more receptive to public health measures if the tone and style is more hopeful, succinct, and highly visual. Positive reinforcement is important for this cohort.
- The pandemic has disrupted and fatigued youth leading to non-compliance with public health measures as coping with changes in lifestyle and routines are challenging, especially during a crucial developmental stage for them.
- There is emerging agreement of the association between COVID-19 public health measures and deleterious effects on mental health including conditions such as anxiety, depression, disturbances in sleep, appetite, loneliness, and digital overuse.
- There are overarching conceptual models focused on behaviour change and contextual understanding that can play an important role in improving continued compliance to public health measures, these should be incorporated in public health messaging and intervention strategies.

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Appendix

Methods continued

Three CanCOVID researchers including a PhD Candidate (NB), a medical student (COZ), and the Knowledge Translation Manager (RS), held team meetings and agreed upon a search strategy and approach. NB and COZ then performed the search and various search terms were included to focus on the central research question, which are summarized in the list below:

- Concept 1 – Public Health Measures; Keywords: COVID-19 vaccin*, masking, social distancing, screening
- Concept 2 – Compliance and adherence; Keywords: compliance, low compliance, adherence, hesitancy, fatigue
- Concept 3 – Isolation, social isolation, loss of interaction: Keywords: isolation, fatigue, loneliness, lockdown, social, emotional
- Concept 4 – Youth and young adults; Keywords: youth, young adults, adolescents, teenage, adults

In order to chart the studies of relevance, a multi-step process was followed. First, titles and abstracts were screened to make sure they focused on the central research question and related to the topic. Deduplication was also performed for any inclusions that may have been repeated. In the second step, abstracts, methods, and conclusions were screened in order to apply a hierarchy of evidence to the literature. This hierarchy of evidence was used to rank the relative strength of the results, and there is broad agreement that this proceeds along the following path: systematic reviews, evidence syntheses, randomized controlled trials, cohort studies, case studies, and expert opinions.

In the third step of the selection process, stricter *apriori* inclusion and exclusion criteria were applied to the list of studies that remained. Inclusion criteria were full-text, peer-reviewed articles, written in English.

They also had to focus primarily on youth (ages 12-17) and young adults (ages 18-30). Studies were also included if conducted in relevant jurisdictions for application and transferability purposes, and this focused on COVID-19 in advanced industrialized economies such as North America, Europe, and Australia. Finally, primary, and secondary studies were used. Exclusion criteria were studies that involved too many confounding factors with other health conditions, was out of scope of the central research question and topic, and did not address key areas of COVID-19 public health measures compliance, and/or social isolation and fatigue amongst youth and young adults. Studies were also excluded if they fell outside the relevant geographic area. After the selection process was applied, 25 studies were included and consisted of 10 reviews, 10 studies, and 5 evidence syntheses.
The selection process is summarized here:

- Title and abstract screening (including deduplication): 120 returns
- Abstract, methods, and conclusions screened with hierarchy of evidence: 50 returns
- Strict inclusion and exclusion criteria applied with relevant studies charted in a data extraction process (see appendix): 25 returns
- Full-text review and charting

Table 1. Included studies from Literature Review[25]

Author (Study Type)	Title	Key Points
Abdullahi, L et al. (Review)	• Improving vaccination uptake among adolescents	• Various strategies including education, financial, mandates, class-based school delivery have low to moderate certainty.
Krishnaratne, S et al. (Review)	Measures implemented in the school setting to contain the COVID-19 pandemic: a rapid scoping review (Review)	• A wide range of school-based measures designed to contain COVID-19 have been evaluated.
Nussbaumer-Streit, B et al. (Review)	• Quarantine alone or in combination with other public health measures to control COVID-19: a rapid review (Review)	• Quarantine is important in reducing incidence and mortality; early implementation of quarantine and combining with other PH measures help ensure effectiveness.
Bekalu, M et al. (Study)	• Adherence to COVID-19 mitigation measures among American adults: the need for consistent and unified messaging	• Lack of consensus in communications and media polarization has brought additional challenges for public health communications; need to target with unified message.
Yang, XY et al. (Study)	• Risk Perception of COVID-19 Infection and Adherence to Preventive Measures among Adolescents and Young Adults	• Self-perceived risk and desire to protect others were significantly associated with adherence to preventive measures among youth; may help inform public health messaging.
Zysset, A et al. (Study)	• Students' experience and adherence to containment measures during COVID-19 in Switzerland	• High degree of adherence observed with considerable differences by gender and information source; more targeted communication may increase adherence.
Alberta Health Services (Evidence Synthesis)	• COVID-19 Scientific Advisory Group Rapid Evidence Report	• There is importance of engaging community partners in developing messaging; ongoing assessment of public information needs, attitudes,

		and barriers to guidelines compliance is important.
Desveaux, L et al. (Science Brief)	• Behavioural Science Principles for Enhancing Adherence to Public Health Measures	• Ontario needs a refreshed approach to maintaining adherence to public health measures; promising strategies include persuasion, enablement, modeling behaviour, and clear education.
Research, Analysis and Evaluation Branch - Ontario (Evidence Synthesis)	• Youth Compliance with COVID-19 Public Health Measures	• Strategies for increasing compliance include focusing on communication and messaging, and behavioural changes and skill development.
Olusanya, OA et al. (Review)	• Addressing Parental Vaccine Hesitancy and Other Barriers to Childhood/Adolescent Vaccination Uptake During the Coronavirus Pandemic	• Healthcare providers are uniquely positioned to offer effective recommendations to increase vaccination rates and address parental vaccine hesitancy; best practices include coaching, reminder recall systems, safety protocols, hand hygiene, telehealth, drive through services, and public health surveillance systems.
Kaiser, S et al. (Study)	• Adolescents' experiences of the information they received about the coronavirus in Norway: a cross-sectional study	• Efficient dissemination of information is important; newspapers are key source, internet is source used most, and digital platforms are important.
Hawke, LD et al. (Study)	• Impacts of the COVID-19 pandemic on youth mental health among youth with physical health challenges	• Physical health concerns appear to constitute risk factors for heightened mental health responses to the pandemic situation; need to consider youth with physical health conditions for support.
Cost, KT et al. (Study)	• Mostly worse, occasionally better: Impact of COVID-19 pandemic on the mental health of Canadian children and adolescents	• Children/adolescents reported deterioration; associated with increased stress from social isolation, thus social interaction is an important mitigation strategy.
McKinley, DW and Ghaffarifar S (Review)	• The necessity of examining patients' social behaviour and teaching behaviour change theories: curricular innovations induced by the COVID-19 pandemic	• Educators and researchers can design and implement interventions based on teaching behavioural change theories; can change practice, health behaviour, and outcomes.
Meherali, S et al. (Review)	• Mental Health of Children and Adolescents Amidst COVID-19 and Past Pandemics: A Rapid Systematic Review	• Although infection among young children and adolescents is low, the stress confronted by them poses their condition as highly vulnerable; the impact of the pandemic on mental health is inevitable.

Masaeli, N and Farhadi H (Review)	• Prevalence of Internet-based addictive behaviours during COVID-19 pandemic: a systematic review	• There has been an increase in Internet-based addictive behaviours during the pandemic due to financial hardships, isolation, substance abuse, and mental health issues including depression, anxiety, and stress.
Imran, N et al. (Review)	• Psychological burden of quarantine in children and adolescents: A rapid systematic review and proposed solutions	• Most common diagnoses include acute stress disorder, adjustment disorder, grief, and post-traumatic stress disorder; can be addressed through multilevel interventions.
Loades, ME et al. (Review)	• Rapid Systematic Review: The Impact of Social Isolation and Loneliness on the Mental Health of Children and Adolescents in the Context of COVID-19	• Children and adolescents are more likely to experience high rates of depression and anxiety during or after isolation ends; clinical services should offer preventive support and early interventions and be prepared for an increase in mental health problems.
Couturier, J et al. (Review)	• The COVID-19 pandemic and eating disorders in children, adolescents, and emerging adults: virtual care recommendations from the Canadian consensus panel during COVID-19 and beyond	• Several gaps for future work were identified including the impact of sex, gender, race, and socioeconomic status on virtual care among children, adolescents, and emerging adults with eating disorders.
Ryan, RE et al. (Evidence Synthesis)	• What are relevant, feasible, and effective approaches to promote acceptance, uptake, and adherence to physical distancing measures for COVID-19 prevention and control?	• Public needs information that is clear, accurate, and timely and provides actionable messages; practical support also needed, and information needs to convey consistent messages using understandable language.
Dennis, AS et al. (Study)	• Assessment of the Effectiveness of Identity-Based Public Health Announcements in Increasing the Likelihood of Complying with COVID-19 Guidelines: Randomized Controlled Cross-sectional Web-Based Study	• Using social media to deliver COVID-19 public health announcements customized to individuals' identities is a promising measure to increase compliance with public health guidelines
Benham, JL et al. (Study)	• Attitudes, current behaviours and barriers to public health measures that reduce COVID-19 transmission: A qualitative study to inform public health messaging	• Framing public health messaging carefully, taking into consideration different audiences, and providing evidence for public health measures was suggested to increase efficacy.
Brankston G et al. (Study)	• Socio-demographic disparities in knowledge, practices, and ability to comply with COVID-19 public health measures in Canada	• Policies to help address public adherence include targeted messaging for men and younger age groups, social supports, changes in workplace policies, provincially coordinated masking, and safe school policies.
Gouin, JP et al. (Study)	• Socio-demographic, social, cognitive, and emotional correlates of adherence to physical distancing during the COVID-19 pandemic: a cross-sectional study	• There is importance in health beliefs and perceived social norms in shaping responses to directives; offers insights into framing public

		health communications to promote physical distancing
Badr, H et al. (Study)	• Sociodemographic and Health Belief Model Factors Associated with Nonadherence to COVID-19 Mitigation Strategies in the United States	• Public health messaging that targets men and provides clear, consistent guidance on what individuals can do to decrease their risk for COVID-19 may be effective in increasing mitigation adherence.

Table 2. Upcoming studies from CIHR Database[5]

Author(s)	Title	Focus
Campbell TS, Bacon SL, Campbell DJ, Corace KM, Lavoie K, Lutes LD, Presseau J, Rash JA, Saunders WC.	Developing and evaluating an online intervention to improve the uptake and maintenance of protective behaviours against COVID-19 among young adults in Canada	• Program designed to motivate people to physically distance and wear masks. An interactive online program will be used to understand behaviours and based on responses, this will provide feedback about motivation and adherence. Findings can help increase motivation to follow public health guidance and navigate the pandemic more safely.
Sylvestre MP, Belanger M, O'Loughlin JL, Ferlatte O, Gariepy G, Maximova K,Plourde V,Thombs BD.	Coping strategies and mental health: quantitative and qualitative insight into the COVID-19 experience in young adults	• Understandings of how mental health has evolved among Canadian youth during COVID-19 is lacking. Data collected on cohorts in Quebec and New Brunswick along with newly collected quantitative and qualitative data and ongoing consultations will inform discussion on developing, repurposing, and scaling up mental health interventions targeting young adults during pandemics.
Stewart SH, Baron J-L, Conrod P, Keough MT, Krank MD, Thompson KD, Nogueira R.	Personality as a predictor of emerging adults' poor adherence and psychological distress to public health measures for controlling COVID-19 viral spread: Empirical evidence and intervention efficacy	• Little is known about factors that contribute to non-adherence in response to public health measures especially among emerging adults, and research suggests personality factors may be involved. The study will involve an intervention to students with results potentially having important implications for service delivery on campus to help with public health measures and response to COVID-19.
Hassan G, McCoy JS, Perry B, Rousseau C, El-Hage H, Ellis H, Frounfelker R, Inguglia C, Levinsson A, Mekki-Berrada A, Miconi D, Morin D, Moscardino U,	Social polarization and behavioural intentions during the COVID-19 pandemic: A multi-site study of risk and protective factors in Canadian youth	• College and university students in cities of the provinces of Quebec, Ontario, and Alberta will participate in an online survey on social polarization, violent radicalization and COVID-19. Results will inform public health communication strategies to promote engagement in

Musso P, Oulhote Y, Venkatesh V, d'Haenens LS.		public health measures such as uptake of vaccine. This can also help design intervention programs in education and health sectors and inform institutional and policy decision makers during and after the pandemic.
Hall PA, Fong GT, Hitchman SC.	Mitigating COVID-19 variant spread by leveraging social psychological and neurobiological markers to optimize public health communications during the first vaccine rollout	• This project will use state-of-the-art theory and methods to identify optimal strategies for motivating COVID-19 mitigation behaviours in the pandemic's post-acute phase. The study will identify COVID-19 public service announcements that are most effective in promoting vaccination and mitigation measures for the current and future pandemics. This study focuses on adults but may also apply to youth and young adult populations.

Key informants

Name, post-nominal letters	Affiliations and focus
Tracie Afifi, PhD	Professor Max Rady College of Medicine Community Health Sciences University of Manitoba Winnipeg, MB Focus: COVID-19 Vaccine uptake and decrease in hesitancy in young people; public health strategies
Rod Knight, PhD	Assistant Professor Department of Medicine University of British Columbia Vancouver, BC Focus: Youth recovery from COVID-19 pandemic; pan-Canadian large-scale study