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Inside this issue

Original quantitative research

Original qualitative research

Commentary

Announcement

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Original quantitative research

Reciprocal associations between positive emotions and resilience predict flourishing among adolescents

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Abstract

Introduction: The broaden and build theory of positive emotions maintains that positive emotions serve to broaden individuals' thoughts and behaviours, resulting in the accrual of resources (e.g. resilience) that catalyze upward spirals of well-being. However, there is a relative dearth of research examining the upward spiral hypothesis in the context of adolescence.

Methods: Adolescents (n = 4064) in participating Canadian high schools were surveyed annually for three years as part of the COMPASS study. Reciprocal associations between positive emotions and resilience were examined as predictors of flourishing.

Results: Adolescents who experienced positive emotions more frequently than usual reported higher levels of resilience one year later. Similarly, adolescents who had higher levels of resilience than usual reported more positive emotions the following year. Higher than usual levels of resilience and positive emotions positively predicted flourishing.

Conclusion: Positive emotions result in a cascade of beneficial outcomes including increased resilience and enhanced well-being, catalyzing an upward spiral towards flourishing. Opportunities to enhance positive emotions early on in adolescence may help build resources that can set students on the path towards increased well-being.

Keywords: *random-intercept cross-lagged panel model, RI-CLPM, emotions, broaden and build theory, flourishing, well-being*

Highlights

- Positive emotions are associated with increased resilience one year later, and these increases in resilience result in subsequent increases in positive emotions.
- These experiences catalyze an upward spiral towards greater flourishing.
- Positive emotions, although fleeting, result in a more resilient version of the self that subsequently contributes to enhanced well-being over time.
- Opportunities to enhance positive emotions early on in adolescence may help build resources that can set students on the path towards increased well-being.

Introduction

Psychological well-being in adolescence often carries into adulthood, marking adolescence as a developmentally important period for establishing optimal functioning. Psychological well-being during adolescence confers a host of benefits including decreased depressive symptoms and conduct problems and better psychosocial outcomes, interpersonal relationships and school experiences as well as better overall health and fewer risky health behaviours in adulthood.[1,2] Of concern is that estimates of psychological well-being among youth are low and tend to decrease from early to late adolescence.[2]

Positive emotions are integral to the promotion of well-being. Positive emotions are multicomponent response tendencies that arise in response to favourable appraisals of a person's circumstances.[3] One theory that provides insight into how positive emotions promote greater well-being is the broaden and build theory.[4] Positive emotions broaden individuals' momentary thought-action repertoires, prompting them to pursue a variety of thoughts and behaviours, including exploring and learning, being creative and playful, etc.[4,5] Over time, this broadened perspective builds enduring physical (e.g. physical literacy), social (e.g. social connectedness), cognitive (e.g. self-efficacy) and psychological (e.g. resilience) resources that are themselves not emotional in nature.[6] In this way, positive emotions are valuable because their effects outlast the transient experience of the emotion. The resources built through positive emotions help individuals function more effectively in daily life, leading to enhanced well-being. Moreover, the resources accrued from experiencing positive emotions also increase the odds of experiencing subsequent positive emotions, thus creating a mutually reinforcing upward spiral of enhanced well-being.[3]

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The broaden and build theory has often been used as a framework for examining resilience as a resource that both accrues from, and leads to, positive emotions and enhanced well-being.[3,7,8] Both prospective observational studies and experimental designs have demonstrated support for associations between positive emotions and resilience in the enhancement of well-being.[6,9] For example, among undergraduate students, daily experiences of positive emotions over one month predicted increases in resilience, and changes in resilience were associated with increases in life satisfaction.[9] In an experimental test of the broaden and build theory, Fredrickson et al.[10] assigned working adults to a nine-week intervention designed to increase positive emotions. Increases in positive emotions across the duration of the intervention predicted increases in resilience, but the change in resilience from baseline to the end of the intervention did not predict changes in life satisfaction. It is possible that nine weeks was too short a time to observe significant changes for resilience, as other resources did significantly predict improved life satisfaction at the end of the intervention.[6] Taken together, these studies provide evidence of a central assertion within the broaden and build theory, namely that positive emotions result in the accrual of resources (i.e. resilience), and provide some evidence to suggest that this accrual of resources in turn promotes enhanced well-being.[6,10]

Support for the opposite pattern of effects has also been documented.[11] Individuals higher in resilience experienced more frequent positive emotions in the weeks following the September 11 terrorist attacks in the United States, and individuals reporting more frequent experiences of positive emotions following the attacks reported better mental health than those who experienced positive emotions less frequently.[11]

Although these studies provide support for central tenets of the broaden and build theory, empirical evidence of the upward spiral towards increased well-being is lacking.

The upward spiral outlined in the broaden and build theory reflects reciprocal relations between positive emotions and resilience that accumulate and compound over time, subsequently resulting in increased well-being. Tests of the upward spiral dynamic require study designs that allow for repeated assessments of positive emotions and resilience across multiple occasions and enough time for resources (i.e. resilience) to accrue. Reciprocal relationships between positive emotions and other resources have been noted across several studies.[12-15] However, the upward spiral dynamic between positive emotions and resilience has not been investigated. Furthermore, with few exceptions, researchers have not captured how these mutually reinforcing relationships between positive emotions and resources predict subsequent well-being.

The purpose of the present study was to examine (1) within-person reciprocal relationships between positive emotions and resilience, and (2) how these relationships predict well-being as a test of the upward spiral outlined in the broaden and build theory. We defined well-being as flourishing—a state of optimal human functioning.[2] We hypothesized that positive emotions would be associated with greater subsequent resilience; that resilience would be positively associated with subsequent positive emotions; and that both positive emotions and resilience would predict flourishing.

Methods

Procedure

We used data from a longitudinal sample of adolescents participating in the COMPASS (Cannabis, Obesity, Mental health, Physical activity, Alcohol, Smoking, Sedentary behaviour) study. COMPASS is a prospective cohort study (2012–2021) that collects data from full school samples of students (i.e. all students in the school are eligible to participate) in Grades 9 through 12 (Secondaire I–V in the province of Quebec) attending participating secondary schools across Canada. The data are collected annually during the school year via a self-reported paper-based questionnaire covering multiple content domains. COMPASS uses purposeful sampling based on the active-information, passive-consent parental permission protocols with active student assent. A full description of the COMPASS host study methods is available in print[16] or online (http://www.compass.uwaterloo.ca/). All procedures were approved by the University of Waterloo Office of Research Ethics (ORE 30118), and appropriate school board committees.

Participants

As of 2017, questions about students' mental health were integrated into the COMPASS questionnaire. Because of the longitudinal nature of the study, only students in Grades 9 or 10 (corresponding to Secondaire III and IV in Quebec schools) in 2017 were included in the analyses to allow for three years of data (i.e. 2017/18, 2018/19 and 2019/20 school years). At Wave 1 (2017/18), 32 023 students in Grades 9 and 10 participated in the study, while 33 141 Grade 10 and 11 students participated in Wave 2 (2018/19) and 10 294 Grade 11 and 12 students participated in Wave 3 (2019). For Wave 3, only those participants who completed the questionnaire in the first half of the school year (October–December 2019) were included. The final sample comprised 4064 students in Grades 9 and 10 in British Columbia (7 schools), Alberta (5 schools) and Ontario (37 schools) or Secondaire III and IV in Quebec (20 schools) who participated in all three waves.

Data were linked between consecutive years based on responses from participants to six questions; these responses were used to create a unique code for each student. The linkage algorithm could not match 6230 individuals. Respondents were missing across the three years primarily because of inability to follow-up during school closures in effect during the COVID-19 pandemic as well as scheduled spares or absenteeism during data collection or unmatched unique codes across waves of data collection.

Measures

Descriptive statistics

Study participants provided self-reported information specific to sex (male/female), school grade, province, ethnicity (White, Black, Asian, Latin American/Hispanic, Other/Mixed) and weekly spending money (used as a proxy for socioeconomic status).

Positive emotions

Two items assessing hope and happiness were used to measure the presence of positive emotions at each wave. Participants indicated on how many days in the past week they felt hopeful about the future and on how many days in the past week they were happy. Response options were 1 ("None or less than 1 day"), 2 ("1–2 days"), 3 ("3–4 days") and 4 ("5–7 days"). A composite score was created by summing responses to the two items and calculating an average score at each wave. Higher scores represented more frequent experiences of positive emotions. The Spearman–Brown internal consistency estimate for the two items was .74.

Resilience

We adapted a single-item measure of resilience from the Brief Resilience Scale[17] to use in all three waves of data collection. Response options to the item, "I generally recover from setbacks quickly," ranged from 1 ("Strongly agree") to 5 ("Strongly disagree"). Scores were reverse-scored to aid in interpretation such that higher values indicate greater resilience.

Flourishing

The Flourishing Scale[18] consists of eight items designed to assess dimensions of psychological well-being, which include positive relationships, competence and meaning in life (e.g. "I am competent and capable in the activities that are important to me"). To accommodate inclusion in the COMPASS survey, we modified the original scaling of responses from a 7-point to a 5-point Likert scale, from 1 ("Strongly agree") to 5 ("Strongly disagree"). Scores were reverse-scored to aid interpretation. A single score was derived by summing participant responses across the eight items. Possible scores ranged from 8 to 40 with higher scores indicating greater flourishing. Support for the construct validity of test scores and estimates of score reliability have been reported in adolescents, including adolescents in the COMPASS study.[19-21] Cronbach alpha for scores in this sample was .90.

Data analysis

To test the research questions, we analysed scores for positive emotions and resilience at each of the three waves of data collection and the flourishing scores from Wave 3 (2019). We calculated descriptive statistics and correlations with corresponding confidence intervals between study variables. Confidence intervals that do not include zero are indicative of significant correlations. We calculated intraclass correlations (ICCs) for positive emotions and resilience across each of the three waves to determine the proportion of variance attributable to differences between people relative to variance attributable to variation in people over time.

We also calculated intraclass correlations for positive emotions, resilience and flourishing at the school level to determine the proportion of variance attributable to clustering at this level. Given the longitudinal nature of the design, measurement invariance of positive emotions was assessed across the three waves of data collection.

Finally, we used a random-intercept cross-lagged panel model (RI-CLPM)[22] to characterize reciprocal relations between positive emotions and resilience. These models are appropriate for examining within-person reciprocal effects while accounting for stable between-person differences.[23] The RI-CLPM is an extension of traditional cross-lagged panel model (CLPM) that separates variances due to changes within persons (within-person variability) from differences between persons (between-person variability). The model simultaneously examines (1) the autoregressive effects that reflect within-person stability in positive emotion and resilience over time (i.e. greater positive emotion and resilience scores for an individual at one time point predict greater scores at a subsequent time point), and (2) cross-lagged effects that reflect the degree to which changes in positive emotions are predicted by prior deviation from an individual's own score on resilience and vice versa. The model was implemented in a structural equation framework and estimated using full-information maximum likelihood to account for missing data.[24,25]

To confirm if the RI-CLPM was a better fit to the data than the traditionally used CLPM, we estimated both models and compared model fit. Model fit was assessed using the following fit indices: adjusted Bayesian information criterion (aBIC; the lower the value, the better the fit); root mean square error of approximation (RMSEA; optimal values $< .06$); square root mean residual (SRMR; optimal values $\leq .08$); and the comparative fit index (CFI; optimal values $> .95$).[26]

Results

Participant characteristics at baseline (Wave 1) are shown in Table 1. Descriptive statistics and correlations between study variables are presented in Table 2.

The intraclass correlations for positive emotions and resilience across the three waves were .47 and .52, respectively, indicating that approximately half of the variability in positive emotions and resilience is attributable to stable between-person differences and half is attributable to within-person variation. When the clustering of students within schools was taken into account, the intraclass correlations for positive emotions, resilience and flourishing were .04, .03 and .01, respectively, indicating that this clustering contributed little variability in the scores. As such, the clustering of schools was not considered in the analyses.

TABLE 1
Study participant characteristics at Wave 1 (2017/18 school year) (n = 4064)

Characteristic	n	%
Sex		
Male	1706	42.1
Female	2350	57.9
Province		
Alberta	270	6.6
British Columbia	707	17.4
Ontario	2611	64.2
Quebec	476	11.7
School grade		
9	2426	59.7
10	1638	40.3
Ethnicity		
White	2825	69.5
Black	107	2.6
Asian	495	12.2
Latin American/Hispanic	71	1.8
Other/Mixed	566	13.9
Weekly spending money, $		
0	894	22.1
1–20	1366	33.8
21–100	773	19.2
>100	318	7.9
Don't know	685	17.0

Note: Secondaire III and IV in Quebec schools were categorized as Grade 9 and 10, respectively.

Longitudinal measurement invariance of positive emotions was supported. A chi-square test comparing a constrained model in which the factor loadings were identical over time and an unconstrained model in which the factor loadings were free to vary was not significant ($p > 0.05$), suggesting that the latent structure is invariant over time.

Both a CLPM and RI-CLPM were fit to the data to determine that a RI-CLPM was

TABLE 2
Descriptive statistics and bivariate correlations with corresponding confidence intervals between study variables

Variable	Mean (SD)	1. Positive Emotions – Wave 1	2. Positive Emotions – Wave 2	3. Positive Emotions – Wave 3	4. Resilience – Wave 1	5. Resilience – Wave 2	6. Resilience – Wave 3
1. Positive Emotions – Wave 1	2.76 (0.88)	–					
2. Positive Emotions – Wave 2	2.74 (0.87)	0.42 (0.39–0.44)	–				
3. Positive Emotions – Wave 3	2.69 (0.88)	0.35 (0.31–0.38)	0.42 (0.39–0.45)	–			
4. Resilience – Wave 1	3.64 (0.98)	0.26 (0.23–0.29)	0.23 (0.19–0.25)	0.20 (0.16–0.23)	–		
5. Resilience – Wave 2	3.58 (1.00)	0.22 (0.18–0.25)	0.30 (0.27–0.32)	0.24 (0.21–0.28)	0.46 (0.43–0.48)	–	
6. Resilience – Wave 3	3.54 (1.02)	0.17 (0.14–0.21)	0.22 (0.19–0.26)	0.33 (0.29–0.36)	0.39 (0.35–0.42)	0.49 (0.46–0.52)	–
7. Flourishing – Wave 3	33.16 (12.64)	0.09 (0.05–0.13)	0.14 (0.10–0.18)	0.27 (0.24–0.31)	0.18 (0.14–0.21)	0.17 (0.13–0.21)	0.35 (0.32–0.38)

Abbreviation: SD, standard deviation.

Notes: Wave 1 = 2017/18 school year; Wave 2 = 2018/19 school year; Wave 3 = October–December 2019, as only those participants who completed the questionnaire in the first half of the school year were included.

Confidence intervals that do not include zero are indicative of significant correlations.

indeed the most parsimonious model. Inspection of the fit indices provided support for the RI-CLPM (aBIC = 77 090; CFI = .997; RMSEA = .02) being the better fit to the data than the CLPM (aBIC = 77 287; CFI = .948; RMSEA = .08). A model with the autoregressive and cross-lag parameters freely estimated failed to converge. As a result, both the autoregressive and cross-lagged parameters were constrained to be invariant over time. The specified model showed excellent fit to the data ($\chi^2(7) = 18.29$, $p = 0.011$, aBIC = 77090.43; RMSEA = .02; CFI = .99; SRMR = .01).

Standardized estimates of the RI-CLPM are shown in Figure 1.

At the between-person level, positive emotions and resilience were positively associated (β = .44; 95% CI = 0.36–0.53). In other words, on average, people who reported more positive emotions also reported greater resilience. There was a significant within-person contemporaneous association between positive emotions and resilience in 2017/18 (β = .16; 95% CI = 0.10–0.21), 2018/19 (β = .20; 95% CI = 0.15–0.26) and 2019 (β = .26; 95% CI = 0.21–0.31). There were significant within-person autoregressive associations for both positive emotions (β = .11; 95% CI = 0.05–0.17) and resilience (β = .17; 95% CI = 0.10–0.22).

Of primary interest are the cross-lagged relationships. We examined the cross-lagged relationship between adolescents' positive emotions at a given time point and their resilience at the subsequent time point to test the premise that positive emotions function to build resources over time and that greater accrual of personal resources should lead to more positive emotions. The findings supported these suppositions. Greater positive emotions positively predicted resilience at the subsequent wave (β = .07; 95% CI = 0.02–0.12). Cross-lagged associations were also supported from resilience and positive emotions at the subsequent wave (β = .10; 95% CI = 0.05–0.15).

Finally, temporal deviations in both positive emotions (β = .17; 95% CI = 0.11–0.23) and resilience (β = .25; 95% CI = 0.20–0.31) at Wave 3 predicted variation in flourishing at Wave 3. Stable between-person differences in positive emotions (β = .08; 95% CI = 0.02–0.14) and resilience (β = .19; 95% CI = 0.13–0.25) also significantly predicted variation in flourishing. Overall, the model accounted for 17% of the variance in flourishing.

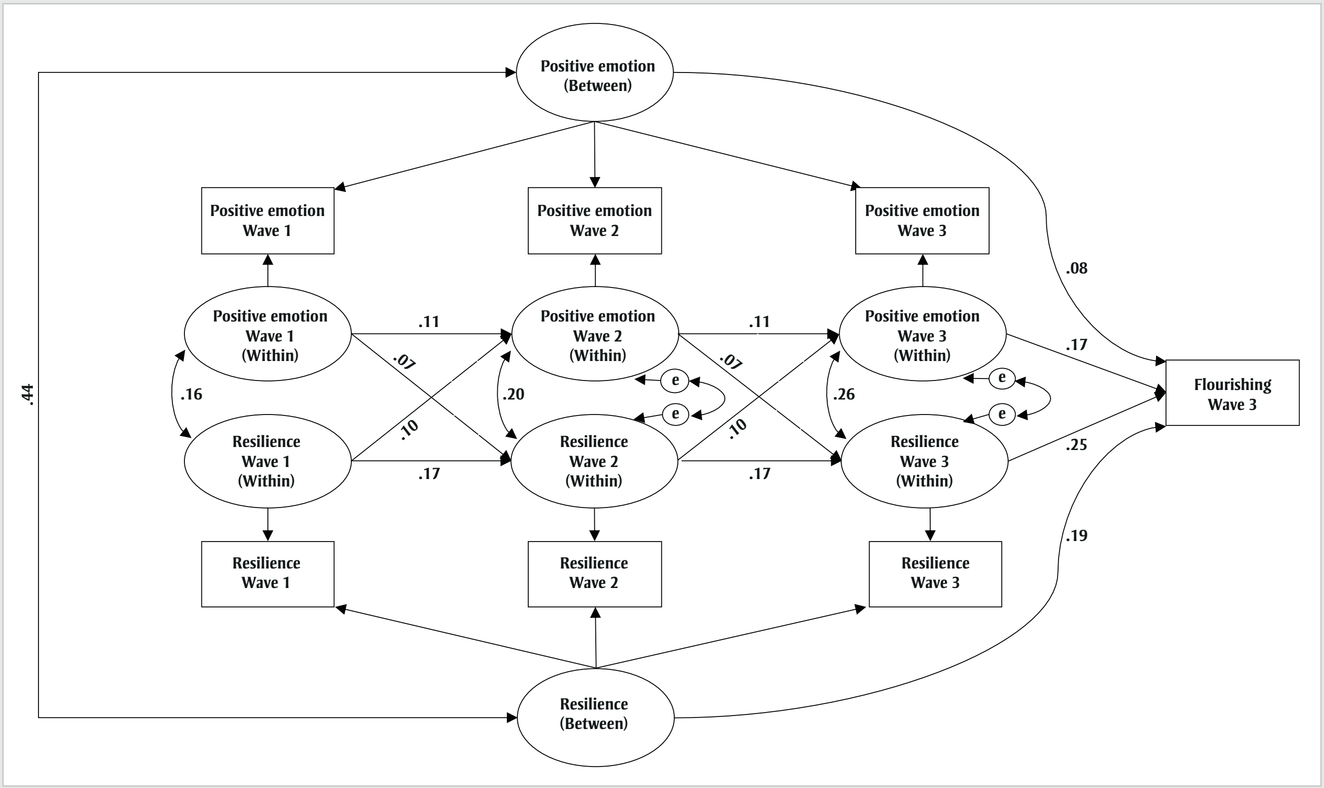
Discussion

Since the broaden and build theory was introduced in 1998, nearly all theoretical tests have examined between-person differences.[3] As a result, the current state of knowledge is limited to an understanding of individual differences in this process. Our aim in this study was to examine the upward spiral towards well-being by examining both between- and within-person associations.

Our findings support our hypothesis. When individuals experienced more positive emotions than they usually do, they experienced an increase in resilience one year later. Similarly, higher levels of resilience were subsequently associated with more frequent experiences of positive emotions. Higher levels of resilience and of positive emotions predicted enhanced flourishing. At the between-person level, both positive emotions and resilience were positively related and predicted greater flourishing.

Our results are consistent with the central premise of the broaden and build theory

FIGURE 1
Standardized results of RI-CLPM between positive emotions and resilience predicting flourishing



Abbreviations: e = measurement error; RI-CLPM, random-intercept cross-lagged panel model.

Note: Wave 1 = 2017/18 school year; Wave 2 = 2018/19 school year; Wave 3 = October–December 2019, as only those participants who completed the questionnaire in the first half of the school year were included.

that experiences of positive emotions, even if fleeting, build enduring psychological resources and trigger upward spirals towards enhanced well-being. By examining within-person associations, the results of the current study provide initial support for the causal process hypothesized in the broaden and build theory of positive emotions. Our results also provide a deeper and more robust understanding of the upward spiral and important theoretical and applied contributions to the study of adolescent well-being.

The upward spiral dynamic towards increased well-being is best captured by prospective, reciprocal associations. Although researchers have previously examined experimental and prospective associations between positive emotions and resilience, this is the first study to examine the upward spiral between positive emotions and resilience. Unlike prospective observational studies, tests of reciprocal relationships can provide stronger evidence of the upward spiral effect by demonstrating that positive emotions and resilience mutually reinforce one another to enhance well-being, and that this is a process that unfolds within individuals over time.

At the between-person level, positive emotions and resilience were moderately positively associated. This finding is consistent with prior studies that also found relationships between positive emotions and resilience of similar magnitudes when assessed at the between-person level.[9-11,28] In the present study, we found smaller associations between positive emotions and resilience when these were assessed both contemporaneously and prospectively at the within-person level. The difference in the magnitude of these relationships is in line with Burns et al.,[27] who found that the CLPM results are overestimated relative to RI-CLPM results. Smaller estimates are expected relative to prior estimates as autoregressive and lagged relationships pertain only to within-person associations in the RI-CLPM, while the CLPM does not separate out between-person differences from the within-person associations.[22]

Although effect sizes are smaller than those reported in previous studies employing between-person designs, dismissing small effect sizes has been cautioned against.[29] Small effect sizes can yield important theoretical advances and hold considerable impact. This is particularly true for effects that accumulate or compound over time, such as the reciprocal nature of the associations we documented in this study.[30]

This study supports not only the broaden and build theory but also the upward spiral dynamic;[4,5] positive emotions were associated with increased resilience one year later, illustrating that positive emotions function to build personal resources (i.e. resilience). Furthermore, experiences of positive emotions and resilience were mutually reinforcing and predicted increased flourishing across three years, illustrating the upward spiral dynamic. These findings are notable given that participants reported their positive emotions over the previous two weeks and resilience was assessed one year later. On average, participants reported experiencing positive emotions a few times in the previous two weeks. That the meaningful variance was accounted for is notable, particularly in the absence of any intervention and the partitioning of variance into within- and between-person variance, which leaves less variance to predict year-to-year.

Schools are one of the most important developmental contexts in adolescents' lives. Schools afford key opportunities for adolescents to develop the skills and competencies that support their capacity for successful development into adulthood. Coinciding with the rise of positive psychology, many schools have begun shifting from focussing on negative experiences and deficits to prioritizing the implications of positive school experiences on student flourishing.[31,32] Positive psychology interventions implemented in schools have demonstrated promise for promoting both positive emotions and resilience among youth.[33,34] The findings of this study could be integrated into existing positive education programs in schools to promote optimal functioning among youth.

Strengths and limitations

Although we assessed only a limited number of positive emotions, feelings of hope are thought to be the positive emotion most central to resilience processes. Hope is theorized to build resilience, and early empirical research substantiates this claim.[3,35-37]

Another limitation of this study is that resilience was assessed using a single indicator. As a result, the ability to capture the full breadth of the construct is limited. The decision to use a single-item indicator of resilience was made in response to concerns about participant burden, survey space and adequate time to complete the survey in the time provided by the schools.

Only data collected in the fall of 2019 were used in Wave 3. This may result in biased estimates given the noted seasonal differences in mental health and well-being in Canada. The statistical approach used to model the longitudinal data has limitations, including the assumption of linear relationships between time-invariant variables and the inability to capture more complex processes. Finally, since the schools analyzed in the study were chosen for convenience, the findings cannot be generalized beyond the sample. Nevertheless, by implementing a passive-consent protocol, the study was able to achieve high participation rates and minimize selection bias within schools. Moreover, because of the large sample size, the conclusions drawn from this research are likely to be applicable to a considerable number of high school students in Canada.

Several strengths of the current study should also be considered. This is the first study to examine the upward spiral towards enhanced well-being in a sample of adolescents. The longitudinal design allowed for the investigation of reciprocal relationships and for the disaggregation in variance at the between and within-person levels as well as sufficient time for resources to accrue and affect well-being. This allowed for a more accurate test of the broaden and build theory, and responds to a recent call for researchers to employ more advanced statistical modelling when evaluating the broaden and build theory to allow for disaggregation in within- and between-person variance.[23]

Conclusion

Much of the research on adolescent mental health has adopted a pathological approach, investigating mental illness at the expense of understanding factors that lead to optimal psychological functioning. Estimates indicate that flourishing decreases across adolescence.[2] Strategies that can mitigate this decline need to be identified. The findings from this study provide evidence that even fleeting experiences of positive emotions are associated with increases in resilience one year later, which subsequently result in further increases in positive emotions. These experiences catalyze an upward spiral towards flourishing. Opportunities to enhance emotions early on in adolescence may help build resources that can set students on the path towards increased well-being.

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Authors' contributions and statement

JG: Conceptualization, Methodology, Writing – Original draft, Writing – Review & Editing.

MG: Data curation, Formal analysis, Visualization.

LB: Conceptualization, Writing – Review & editing.

KP: Funding acquisition, Investigation, Project administration, Resources, Writing – Review & Editing.

SL: Funding acquisition, Project administration, Resources, Supervision, Writing – Review & Editing.

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Conflicts of interest

None.

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Original quantitative research

Availability of health-promoting interventions in high schools in Quebec, Canada, by school deprivation level

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Abstract

Introduction: School-based health-promoting interventions (HPIs) foster adolescent health and well-being. Access to HPIs may differ by the socioeconomic advantage of students at each school (school deprivation). We assessed the importance of health issues and availability of HPIs and extracurricular activities by school deprivation in high schools in Quebec, Canada.

Methods: In 2016/17, 2017/18 and 2018/19, we interviewed school principals or a designee in 48 public high schools classified as disadvantaged (33%) or advantaged (67%). Schools rated whether 13 common health-related issues were important (i.e. warranted intervention) in their student population and reported whether HPIs to address these or other health issues and/or sports or special interest extracurricular activities had been available in the past year.

Results: 84% of disadvantaged schools offered one or more HPIs in the past year compared to 73% of advantaged schools. Higher proportions of disadvantaged schools perceived most of 13 health-related issues as important. HPIs for bullying/exclusion, sex education and physical activity (issues subject to government mandates) were available in most schools. Higher proportions of disadvantaged schools offered non-mandated HPIs (i.e. for healthy eating, mental health/well-being and substance use). Higher proportions of advantaged schools offered extracurricular activities in all areas other than non-competitive sports, which was offered by equal proportions of advantaged and disadvantaged schools.

Conclusions: Government mandates appear to facilitate universal availability of HPIs in schools, possibly boosting equity in school-based health promotion. Further investigation of possible differences in the content, implementation and/or effects of HPIs based on school deprivation is warranted.

Keywords: *adolescents, social inequalities, cross-sectional studies, physical activity, sex education, healthy eating, substance use*

Highlights

- Higher proportions of disadvantaged schools considered unhealthy eating, alcohol use, cigarette smoking, aggressive behaviour and sexually transmitted infections (STIs) as important health issues; higher proportions of advantaged schools considered suicide risk and self-harm as important health issues.
- 84% of disadvantaged schools reported offering one or more health-promoting interventions (HPI) in the past year, compared to 73% of advantaged schools.
- HPIs for bullying/exclusion, sex education and physical activity (themes subject to government mandates) were available in most schools.
- Notably higher proportions of disadvantaged schools offered HPIs related to healthy eating, mental health and well-being and substance use.
- Most schools offered different extracurricular activities, but a higher proportion of advantaged schools offered extracurricular activities of all types except non-competitive sports, which were offered by equal proportions of advantaged and disadvantaged schools.

Introduction

After decades of being considered secondary to maternal and child health, the promotion and protection of adolescent health are now recognized as warranting specific consideration and government funding. Attitudes, beliefs and habits that impact health and well-being in adulthood often become entrenched during adolescence, and early health promotion efforts can positively influence these attributes.[1] The World Health Organization underscored the importance of developing and implementing health-promoting interventions (HPIs) for youth in its call to action to "improve and maintain the health of the world's one billion adolescents."[2,p.1]

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Schools are ideal settings for promoting adolescent health because most youths attend school. In 2020/21, 96%, 94% and 78% of Canadians aged 15, 16 and 17 years, respectively, attended high school.[3] In the Canadian province of Quebec, in 2019/20, 98%, 97%, 97% and 93% of adolescents aged 14, 15, 16 and 17 years, respectively, were enrolled in school (Ministère de l'Éducation et de l'Enseignement supérieur du Québec, internal data, 25 August 2022).

Drawing on the principles of the Ottawa Charter for Health Promotion, the Health-Promoting Schools framework is increasingly recognized for its potential to support positive development and healthy behaviours in adolescents.[4,5] This framework aims to promote health and learning using three main approaches: health promotion through the school curriculum and activities, health promotion through the social and physical environment, and involvement of families and the community.[6]

Inherent in these approaches is the importance of adaptation to school context. School stakeholders are intended to identify needs in their school and introduce interventions to address these needs so that all interventions are tailored to the school context.[7] Delivering HPIs to foster adolescent health through schools optimizes universal access across all socioeconomic settings and supports the goals of the World Health Organization initiative of "making every school a health promoting school."[8] Health and education ministries in all Canadian provinces and territories have committed to promoting health in schools.[9]

Government mandates may be key to ensuring equitable access to HPIs. In 2012, all schools in Quebec were required to address bullying and exclusion through HPIs and/or school policies.[10] In 2018, the provincial government mandated delivery of school-based HPIs targeting sex education,[11] and in 2017, a province-wide policy was adopted encouraging adolescents to engage in physical activity for at least 60 minutes/day.[12]

To fulfil these mandates, school boards and schools have broad discretion in HPI content, format and delivery. In addition to the health issues signalled as important by government mandates, schools can identify other areas of concern and develop or adopt HPIs to address these additional concerns.

School-sponsored extracurricular activities complement the educational curriculum and provide opportunities for students to engage voluntarily in pursuits such as individual and team sports, music and art, and special interest clubs.[13] Participation in extracurricular activities can help young people learn new skills, boost academic performance, broaden social skills and improve time management skills.[14] We considered extracurricular activities as well as HPIs on the premise that these activities could complement each other in creating a health-promoting school.

The Health Promoting Schools framework, which guided this study, is recognized as the most promising approach to building healthy school communities.[15] Nevertheless, although the framework supports equity by emphasizing a whole-school approach, it does not explicitly mention the equitable distribution of HPIs across schools. Despite known challenges in disadvantaged schools (e.g. lack of resources, work overload)[16,17] and government mandates, there is little empirical evidence that school-based HPIs are equitably available across different socioeconomic settings.[18,19]

Our objectives were to describe the perceived importance of student health issues among school staff and the availability of related HPIs and extracurricular activities in Quebec public high schools, according to school deprivation.

Methods

Project Prome*SS* comprises two cross-sectional surveys that investigate social inequalities in HPI availability in primary and high schools across Quebec. In phase 1 (2016–2019), data were collected via a telephone survey of elementary and high school administrators.[19,20] The second phase (2023–2024) extends phase 1 in a second cross-sectional survey to determine whether the availability of HPIs and extracurricular activities has changed since the start of the COVID-19 pandemic.[20] In the current study, we drew data from the first survey to address our study objectives.

Study population

Recruitment of schools occurred in two stages. First, we contacted 69 of the 72 school boards within the Ministère de l'Éducation et de l'Enseignement supérieur (MEES)[21] in 2016 for permission to invite schools under their purview to participate in Prome*SS*. Because the MEES does not assign a deprivation indicator from the Indice de milieu socio-économique (IMSE) to private schools, schools serving only special needs students or schools with 30 or fewer students, we did not include these schools in our study. The 69 school boards approached oversaw 436 high schools.

Approval was obtained from 32 school boards (46%) overseeing 170 high schools (39% of all public high schools in Quebec); 31 school boards declined and 6 did not respond. Once approval was obtained, we mailed/emailed an introductory letter advising each eligible school that we would be contacting them by telephone. One week later, a team member (i.e. a retired principal who had worked in the Quebec school system for three decades) contacted each school principal to ask for assent to participate. Contact was established with school principals in 77 high schools (42% of high schools in consenting school boards); 48 assented and completed the interview. These 48 schools represented 28% of high schools in the participating school boards and 11% of all eligible high schools in Quebec.

Procedures

Data were collected during the 2016/17, 2017/18 and 2018/19 school years via structured telephone interviews with school principals or a designee (who had to have been in their current position for at least 6 months). We had previously tested the interpretability of the questions by asking nine retired school principals to narrate their thoughts as they interpreted and formulated responses to the questions. Interviews (median length: 52 minutes) were conducted by trained interviewers in French or English.

Ethics approval

The Centre de recherche du Centre hospitalier de l'Université de Montréal Ethics Review Committee approved the study. The ethics approval certificate (2013-4130, CE 12.307) was submitted to all school boards and to school principals on request.

Interview questions

Perceived importance of health issues

We assessed the perceived importance of health issues based on responses to the question, “In the past year, how important was each of the following health issues for students? That is, would the issue require special attention or intervention within your school?” The question was followed by a list of 13 health issues common among high school students, selected from domains assessed in the Health Behaviour in School-aged Children study of Canadian adolescents in Grades 6 to 10 (i.e. physical activity/sedentary behaviour, mental health problems, healthy/unhealthy eating habits, substance use (including drugs, alcohol and tobacco), bullying/cyberbullying, aggressive behaviour, sexual health).[22] We also included attention deficit hyperactivity disorder (ADHD), which affects 5–7% of youth worldwide[23] and is associated with adverse outcomes academically and vocationally.[24]

Response options “extremely important,” “very important” and “important” were coded as important; “not very important” and “not at all important” were coded as not important.

Availability of health-promoting interventions

We assessed the availability of HPIs based on yes/no responses to the question, “In the past year, has your school offered any health-promoting interventions in which participation is expected at the group, class, grade or school-level to address…….?” The question was followed by a list of eight themes: physical activity/active living (not including physical education classes that are part of the curriculum); sex education (e.g. teen pregnancy, sexually transmitted infection [STI] prevention, etc.); bullying/exclusion; healthy eating; personal safety and injury prevention (e.g. potential risks at home, in community, outdoors; safe use of technology); mental health/well-being; substance use (including drugs, alcohol and tobacco); and other.

Availability of extracurricular activities

We assessed the availability of extracurricular activities with yes/no responses to the question, “In the past year, has your school offered any of the following types of extracurricular activities in which participation is voluntary?” The list of seven possible options included competitive sports (extramural); non-competitive sports (intramural); physical activities (e.g. dance, ski, martial arts, fitness class); free gym; special interest clubs (e.g. chess, math, computer coding, robotics); artistic clubs (e.g. music, theatre, art); and other.

School deprivation level

We based classification of school deprivation level on the IMSE school deprivation index assigned by the MEES to all public schools with 30 students or more. The IMSE reflects the degree to which students in each school are socioeconomically advantaged or disadvantaged. The index takes into account whether both parents are employed and whether mothers completed high school.[25] Schools are assigned a decile rank from 1 (least deprived/advantaged) to 10 (most deprived/disadvantaged). We classified schools with IMSE between 8 and 10 as disadvantaged and those with IMSE between 1 and 7 as advantaged.

Additional school characteristics included number of students (range: 13–2835), number of teachers (range: 4–225), teacher turnover in the past 3 years (none/few = low; some/several = high), turnover of the principal in the past 3 years (0–1 principal change = low; ≥2 = high), language of instruction (French, English) and proportion of students identified by school staff as being at risk of poor academic outcomes because of physical disabilities, behavioural difficulties, social maladjustment or learning difficulties that might affect learning or behaviour (range: 7.5–100%).

Using data from the 2016 Canadian Census, we matched school postal codes to population centres categorized as rural (population < 1000), small (1000–29999), medium (30000–99999) or large (≥100 000).[26] We grouped schools into two categories: rural/small or medium/large. School principal/designee characteristics included sex, level of education, current position (principal, vice-principal, teacher, other) and number of years working in their current positions.

Data analysis

We report the proportion of disadvantaged versus advantaged schools that viewed each health issue as important; that offered each HPI; and that offered each extracurricular activity. Because this is a descriptive study, we followed the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines to omit statistical testing.[27]

Results

The mean (standard deviation [SD]) age of interviewees was 46.6 (6.9) years; 56% were female, and 58% had a postgraduate diploma/certificate or degree. Most (n = 29) were school principals; 5 were vice-principals, 8 were teachers and 6 had other roles. On average, interviewees had worked in their current position for 8.5 (2.7) years; 63% had more than 10 years experience.

Of the 48 study schools, 16 (33.3%) were classified as disadvantaged (i.e. serving disadvantaged students). The remainder were classified as advantaged (i.e. serving moderately to highly advantaged students).

Table 1 presents characteristics of participating schools compared with all high schools in Quebec, when possible. Prome*SS* schools resembled all high schools across Quebec in school deprivation, language and number of students.

Importance of health issues

Regardless of school deprivation level, the top six health concerns that schools considered important (i.e. warranting special attention and/or intervention) were ADHD, mental health problems, bullying, lack of physical activity, unhealthy eating and substance use. ADHD and problems related to mental health were considered important by 90% and 83%, respectively (see Table 2). Fewer, although still a majority (65–69%), perceived bullying, lack of physical activity, unhealthy eating and drug use as problematic. Half of the schools considered alcohol use (48%), cigarette smoking (46%) and suicide risk (46%) as important problems. About one-third or less reported that aggressive behaviour (38%), self-harm (29%), STIs (27%) and teen pregnancy (17%) were important problems in their school.

Higher proportions of disadvantaged schools reported that unhealthy eating (75% vs. 59%), alcohol use (56% vs. 44%), cigarette smoking (56% vs. 41%), aggressive behaviour (50% vs. 31%) and STIs (38% vs. 22%) were important health issues. Higher proportions of advantaged schools reported that suicide risk (50% vs. 38%) and self-harm (34% vs. 19%) were important.

TABLE 1
Characteristics of high schools retained in the sample compared to all high schools in Quebec, Project Prome*SS*, 2016–2019

Characteristic	Prome*SS* schools (n = 48)	All high schools in Quebec (n = 436)
School deprivation, %[a,b,c]		
Advantaged schools	66.7	60.5
Disadvantaged schools	33.3	39.5
Language of instruction in school board, %[a,b]		
French	83.3	87.0
English	16.7	13.0
Median no. of students (IQR)	713 (799)	608 (726)
Median no. of teachers (IQR)	57 (56.5)	N/A
Size of school community, % [a]		
Rural/Small	45.8	N/A
Medium/Large	54.2	N/A
Mean per cent students in single-parent households, % (SD)	42.6 (17.3)	N/A
Mean per cent students in low-income families, % (SD)	39.7 (26.0)	N/A
Mean per cent students at risk, % (SD)	43.0 (24.2)	N/A
High teacher turnover, %[a,d]	54.2	N/A
High principal turnover, %[a,d]	14.6	N/A

Abbreviations: IQR, interquartile range; N/A, not available; SD, standard deviation.

[a] Denominators exclude missing data.

[b] Data extracted from published governmental reports.

[c] Based on the Indice de milieu socio-économique (IMSE) school deprivation index assigned by the Ministère de l'Éducation et de l'Enseignement supérieur (MEES).

[d] Some/several in the past 3 years.

HPI availability

The proportion of schools offering HPIs was higher for issues subject to government mandates. HPIs addressing sex education and bullying/exclusion were available in 94% and 89% of schools, respectively, and 79% offered HPIs relating to physical activity/active living (see Table 3). Although not mandated, HPIs addressing personal safety and injury prevention and healthy eating were offered by 81% and 77% of schools, respectively. Two-thirds of schools offered HPIs focussed on mental health/well-being and substance use. Only 57% of schools offered tobacco control HPIs.

The mean (95% CI) proportion of disadvantaged schools offering HPIs was 84% (75–93%) compared to 73% (64–82%) of advantaged schools. A higher proportion of disadvantaged schools offered HPIs related to healthy eating (88% vs. 71%), mental health/well-being (75% vs. 61%) and drug use (75% vs 59%) (see Table 3).

Availability of extracurricular activities

Most schools offered an array of extracurricular activities. Except for non-competitive sports, which was offered by equal proportions of advantaged and disadvantaged schools, a higher proportion of advantaged schools offered extracurricular activities in all areas (see Table 4).

Discussion

In this study, we sought to describe health issues that school personnel perceived as important enough to warrant intervention in their school and whether related HPIs and extracurricular activities were distributed equitably in high schools across Quebec. Five key findings emerged:

(1) Disadvantaged schools reported that unhealthy eating, alcohol use, cigarette smoking, aggressive behaviour and STIs were important, whereas advantaged schools reported that suicide risk and self-harm were important.

(2) A higher proportion (84%) of disadvantaged schools had offered one or more HPIs in the past year compared to 73% of advantaged schools.

(3) HPIs addressing bullying/exclusion, sex education and physical activity, that is, issues subject to government mandates, were available in most schools;

(4) Higher proportions of disadvantaged schools offered HPIs related to healthy eating, mental health and well-being and substance use.

(5) Most schools offered an array of extracurricular activities, but a higher proportion of advantaged schools offered activities in all areas other than non-competitive sports, which was offered by equal proportions of advantaged and disadvantaged schools.

Social inequalities

Despite marked differences in the perceived importance of numerous health issues in disadvantaged versus advantaged high schools in Quebec, we did not find evidence of inequalities in HPI availability. In fact, a higher proportion of disadvantaged schools offered one or more HPIs in the past year, and higher proportions of disadvantaged schools offered healthy eating, mental health/well-being and substance use/tobacco control HPIs. At least two explanations may underpin this finding.

First, regardless of school deprivation, most high schools in Quebec appear to meet their government-mandated responsibility to offer HPIs in specific areas, although the differences between the perceived importance of several health-related issues and HPI offerings are noteworthy. For example, 89% of schools offered bullying/exclusion HPIs, although only 67% cited bullying as important; and 79% of schools offered physical activity/active living HPIs, although only 69% cited lack of physical activity as important. It may be useful to explore the reasons for these discrepancies in perception and application.

Overall, data suggest that government mandates promote equitable access to HPIs across the spectrum of student socioeconomic advantage. However, we did not assess the frequency or intensity of the HPIs, their implementation or their impact.

TABLE 2
Proportion of schools that perceived specific health issues as important, by school deprivation level, Project Prome*SS*, 2016–2019

Health issue	Total, %	Disadvantaged schools[a] (n = 16) % (95% CI)[b]	Advantaged schools[a] (n = 32) % (95% CI)[b]
ADHD	90	88 (63–98)	91 (75–98)
Problems with mental health	83	88 (63–98)	81 (64–91)
Lack of physical activity	69	75 (50–90)	66 (48–80)
Bullying (including cyberbullying)	67	63 (40–83)	69 (51–82)
Unhealthy eating	65	75 (50–90)	59 (42–75)
Drug use	65	63 (40–83)	66 (48–80)
Alcohol use	48	56 (33–77)	44 (26–61)
Cigarette smoking	46	56 (33–77)	41 (25–58)
Suicide risk	46	38 (18–61)	50 (34–66)
Aggressive behaviour	38	50 (28–72)	31 (18–49)
Self-harm	29	19 (6–44)	34 (20–52)
STIs	27	38 (18–61)	22 (11–39)
Teen pregnancy	17	19 (6–44)	16 (6–32)

Abbreviations: ADHD, attention deficit hyperactivity disorder; CI, confidence interval; STI, sexually transmitted infection.

[a] All schools with ≥30 students across Quebec are ranked in deciles according to a province-wide school deprivation indicator (IMSE), with scores ranging from 1 (not deprived) to 10 (very deprived). Schools were grouped into two categories based on the IMSE score: “disadvantaged schools” (IMSE 8–10) serving disadvantaged students, and “advantaged schools” (IMSE 1–7) serving advantaged students.

[b] 95% Agresti–Coull (modified Wald) confidence intervals.

It is possible that despite equivalence in availability, these other aspects differ across student socioeconomic status.

Second, it is possible that the greater availability of several HPIs in disadvantaged schools reflects recognition by school personnel that students in their schools needed interventions in these areas and that they had the will and resources to implement HPIs that responded to these needs. This greater availability of HPIs in disadvantaged schools would have a positive impact if the offered interventions improved students’ health and well-being.

Sex education

Sex education was widely offered in Quebec high schools in response to government mandate, but STIs and teen pregnancy were generally perceived as unimportant issues, perhaps signalling some complacency regarding teen sexual health. Tremendous progress has been made on teen pregnancy in recent decades. The fertility rate among women in Canada aged 15 to 19 years fell from 17 per 1000 females in 2000 to 5.5 in 2020,[28] likely reflecting changes in social norms, better access and public acceptance of adolescents’ use of contraception and sex education (Institut national de santé publique du Québec, 2 May 2022, personal communication).

TABLE 3
Proportion of schools that offered health-promoting interventions in the past year according to school deprivation level, Project Prome*SS*, 2016–2019

Health-promoting intervention	Total,%	Disadvantaged schools[a] (n = 16) % (95% CI)[b]	Advantaged schools[a] (n = 32) % (95% CI)[b]
Physical activity/active living	79	75 (50–90)	81 (64–91)
Sex education	94	100 (77–103)	90 (74–97)
Bullying/exclusion	89	94 (70–101)	87 (71–95)
Healthy eating	77	88 (63–98)	71 (53–84)
Personal safety and injury prevention	81	81 (56–94)	81 (64–91)
Mental health/well-being	66	75 (50–90)	61 (44–76)
Substance use	65	75 (50–90)	59 (42–75)
Tobacco control	57	63 (40–83)	55 (38–71)

Abbreviation: CI, confidence interval.

[a] All schools with ≥30 students across Quebec are ranked in deciles according to a province-wide school deprivation indicator (IMSE), with scores ranging from 1 (not deprived) to 10 (very deprived). Schools were grouped into two categories based on the IMSE score: “disadvantaged schools” (IMSE 8–10) serving disadvantaged students, and “advantaged schools” (IMSE 1–7) serving advantaged students.

[b] 95% Agresti–Coull (modified Wald) confidence intervals were calculated.

However, the prevalence of STIs has risen sharply. Between 2008 and 2017, the prevalence of chlamydia, gonorrhea and infectious syphilis increased by 10%, 38% and 86%, respectively, among adolescent Canadians.[29] Motivating adolescents to protect themselves against STIs (e.g. through condom use) is vital. Although the Canadian Paediatric Society in 2018 endorsed long-acting reversible contraceptive methods as the primary option for youth contraception,[30] female high school students in the USA who used these methods were 60% less likely to also use condoms than peers who used oral contraceptives.[31] Moreover, 13% of adolescents reported difficulty accessing their preferred method of contraception, citing cost and access to confidential care as primary barriers.[32] Adequate sex education remains a key public health imperative in this vulnerable population, and health promotion efforts depend on universal delivery of effective school-based programs.[33]

Mental health and substance use

Most of the schools considered mental health problems to be important. Experiencing adversity (e.g. parental divorce, family violence, abuse and neglect, economic hardship) is common among youth. In a national sample of 10 000 US adolescents (aged 13–17 years), more than half encountered at least one childhood adversity and 70% to 98% reported multiple adversities, which were strongly associated with diagnoses of post-traumatic stress disorder, dysthymia and major depression, ADHD and alcohol abuse/dependence.[34] Although numerous school-based HPIs aimed at improving mental health have been evaluated,[35,36] one-third of high schools in our sample did not offer HPIs related to mental health/well-being or to alcohol, tobacco or drug use.

TABLE 4
Proportion of schools that offered extracurricular activities in the past year according to school deprivation level, Project PromeSS, 2016–2019

Extracurricular activities	Total, %	Disadvantaged schools[a] (n = 16) % (95% CI)[b]	Advantaged schools[a] (n = 32) % (95% CI)[b]
Competitive sports	92	81 (56–94)	97 (83–101)
Non-competitive sports	81	81 (56–94)	81 (64–91)
Physical activities	88	75 (50–90)	94 (79–99)
Free gym	79	69 (44–86)	84 (68–94)
Special interest clubs	85	69 (44–86)	94 (79–99)
Artistic clubs	92	81 (56–94)	97 (83–101)

Abbreviation: CI, confidence interval.

[a] All schools with ≥30 students across Quebec are ranked in deciles according to a province-wide school deprivation indicator (IMSE), with scores ranging from 1 (not deprived) to 10 (very deprived). Schools were grouped into two categories based on the IMSE score: "disadvantaged schools" (IMSE 8–10) serving disadvantaged students, and "advantaged schools" (IMSE 1–7) serving advantaged students.

[b] 95% Agresti–Coull (modified Wald) confidence intervals.

Mandating school-based HPIs to promote mental health/well-being and prevent substance use may be pivotal to reducing the notably high health care and societal burden attributable to these issues.[37] Moreover, facilitating universal access across all socioeconomic settings to HPIs that focus not only on preventing mental illness but also on promoting resilience and general emotional well-being[38] will support recovery from the effects of the COVID-19 pandemic, which jeopardized adolescents' mental health/well-being and heightened socioeconomic inequalities.[39-41]

Suicide risk and self-harm reflect mental health and well-being. Suicide is the second leading cause of death among 15-to-34-year-old Canadians.[42] Although adolescents are less likely than young adults to die after attempting suicide, adolescent females are more likely than their older counterparts to be hospitalized with a self-inflicted injury.[42] Moreover, suicide attempts and deaths are related to socioeconomic disadvantage. Individual (e.g. low parental education) and contextual (e.g. characteristics of the neighbourhood or community) socioeconomic disadvantage increases the risk for suicidal ideation, attempts and deaths.[43-45] Development and implementation of school-based HPIs that increase emotional resilience, coping skills and self-efficacy might mitigate these risks.[46]

However, suicidal ideation and self-harming behaviours can be hidden from view,[47] and are more difficult to notice than risky behaviours (e.g. substance use, impaired or distracted driving) or other mental health concerns (e.g. inability to focus, anxiety, depression, aggression or conduct disorder problems) that school personnel can observe. This may have contributed to our finding that many schools, regardless of school deprivation level, did not identify suicide and self-harm as important issues. Schools may not have experienced a suicide or suicide attempt by a student, and more frequently observed issues might take precedence. Staff training around HPIs focussed on mental health/well-being should incorporate information that can help them identify adolescents at risk of suicide and self-harm and assist them in finding necessary help.[47]

Finally, two-thirds of schools cited drug use, and almost half cited alcohol use and cigarette smoking as important health issues. Similar proportions (two-thirds and half) reported that HPIs for drug use and tobacco control, respectively, had been offered in their school in the past year. Given the long-standing pervasiveness of "experimentation" with substance use among adolescents, the recent surge in e-cigarette use, cannabis legalization in Canada in 2018, as well as growing concerns about concurrent use of multiple psychoactive substances, it may be time to reflect on whether universal access to HPIs addressing substance use is a prudent public health policy.

Future research

Research is needed in other provinces and territories to document school personnel's perceptions of important student health issues and availability of related HPIs and extracurricular activities; to examine HPI implementation practices, barriers and facilitators; and to study student-level outcomes relevant to HPIs implemented in their schools. Continued research documenting differences in HPIs across disadvantaged and advantaged schools may help inform the content and targeting of school-based health promotion.

Limitations

The small sample size in Prome*SS* limits the precision of our findings. Prome*SS* recruited a convenience sample of high schools. Although similar in several characteristics to all high schools in Quebec, the Prome*SS* sample may not have been fully representative.

We interviewed a single person in each school who may not fully represent the organizational perspective. However, the questionnaire was sent to school principals before the interview so that they could consult their staff to prepare. Finally, we collected data prior to the COVID-19 pandemic, and the findings may not reflect the availability of HPIs during or post-pandemic.

Conclusion

Although our findings need replication in other provinces and territories to be generalizable, the results suggest that government mandates facilitate universal availability of HPIs in schools, possibly contributing to boosting equity in access to school-based health promotion. Further study is needed to investigate possible differences in the content, implementation and/or effects of HPIs based on school deprivation. If HPI availability and/or impact differ by school deprivation, this variation may need to be considered by program and policy planners.

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Conflicts of interest

The authors have no financial relationships relevant to this article and no conflicts of interest to disclose.

Authors' contributions and statement

JK: Conceptualization, Data curation, Writing – review & editing. TR: Project administration, Investigation, Data curation, Writing – review & editing.

RJW: Writing – original draft, Writing – review & editing.

JOL: Conceptualization, Funding acquisition, Resources, Investigation, Data curation, Formal analysis, Writing – review & editing.

KM: Writing – original, Writing – review & editing.

All authors read and approved submission of the final version of the manuscript and agree to be accountable for all aspects of the work.

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Original quantitative research

Lockdowns and cycling injuries: temporal analysis of rates in Quebec during the first year of the pandemic

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Abstract

Introduction: Cycling increased in popularity during the COVID-19 pandemic, but the impact on cycling injuries is not known. We examined the effect of lockdowns on cycling injury hospitalizations.

Methods: We identified hospitalizations for cycling injuries in Quebec, Canada, between April 2006 and March 2021. We used rate ratios (RR) and 95% confidence intervals (CI) to compare hospitalization rates by type of cycling injury and anatomical site during two waves of the pandemic. We performed interrupted time series regression to assess the effect of lockdowns on monthly cycling injury hospitalization rates, according to age, sex and other characteristics.

Results: There were 2020 hospitalizations for cycling injuries between March 2020 and March 2021, including 617 during the first lockdown and 67 during the second lockdown. Compared with the period before the pandemic, risk of cycling-related injuries during the first lockdown increased the most for fractures (RR = 1.44; 95% CI: 1.26–1.64) and head and neck injuries (RR = 1.59; 95% CI: 1.19–2.12). Cycling injury hospitalization rates increased significantly among adults, adolescents and individuals from socioeconomically advantaged neighbourhoods or those with low concentrations of racialized people every month of the first lockdown. The second lockdown was not associated with cycling injuries.

Conclusion: The first lockdown triggered a sharp increase in cycling injury hospitalizations, especially among adults, adolescents and individuals from socioeconomically advantaged and less racialized neighbourhoods.

Keywords: *bicycling, COVID-19, exercise, transportation, wounds, injuries, fracture, socioeconomic factors*

Highlights

- Cycling injuries in Quebec increased among adults and adolescents during the COVID-19 pandemic.
- Fractures and head and neck injuries increased the most.
- Most injuries were due to falls from a bicycle rather than due to collisions.
- People living in socioeconomically advantaged and less racialized neighbourhoods experienced the greatest increase in number of cycling injuries.

Introduction

Although cycling became more popular in cities around the world during the COVID-19 pandemic,[1-4] the impact of lockdowns on cycling injuries is unclear. This growth in popularity came about when lockdowns triggered a reduction in public transport and made people consider other means of transportation.[5] The closures of gyms and community centres led people to try other forms of physical activity, including cycling.[1] Many people went cycling with friends as a way to socialize while socially distancing.[4]

Cycling has numerous physical and mental health benefits,[6] but it is also associated with an estimated 3.1 injuries per 1000 hours travelled, with the greatest risk of injury occurring among less experienced cyclists.[7] Although many adults took up cycling during the pandemic, the relationship with cycling injuries has received little attention as injury research has been largely limited to children and adolescents.[8,9] A study of 1215 pediatric emergency department visits found that bicycle injuries among children and adolescents less than 18 years old increased significantly in Canada during the first eight months of the pandemic.[8] An Australian study reported a 43% increase in emergency department visits and a 49% increase in hospital admissions for bike-related injuries among children and adolescents 15 years old or younger during the first lockdown, compared with 2019.[9] The only study that examined adults' trauma-related injuries found an increase

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in emergency orthopaedic referrals during the first lockdown in the United Kingdom among those between 19 and 65 years old, but cycling and scooter injury data were combined.[10]

Owing to the paucity of data, we assessed the effect of pandemic lockdowns on cycling injury hospitalizations in a population of children, adolescents and adults in the province of Quebec, Canada.

Methods

Study population

We carried out a natural experimental study of hospitalization rates for cycling injuries between 1 April 2006 and 31 March 2021 in Quebec. We extracted hospitalization records from the Maintenance et exploitation des données pour l'étude de la clientèle hospitalière (MED-ÉCHO) dataset, a registry of discharge abstracts for admissions throughout Quebec.[11]

We received a waiver for a full ethical review from the institutional review board of the Centre hospitalier de l'Université de Montréal. Data used in the analysis were de-identified.

Measures

We considered three exposure periods in the analysis: two lockdown periods and a reopening period between them. In Quebec, the government declared COVID-19 a public health emergency on 13 March 2020.[12] The province was marked by two major lockdowns over the course of one year.[12] The first lockdown lasted from 13 March 2020 to 23 June 2020, and was followed by a period of partial reopening between 24 June 2020 and 14 December 2020. The second lockdown began on 15 December 2020 and continued past the end of the study on 31 March 2021. The lockdowns were characterized by stay-at-home orders, curfews and widespread closures of nonessential businesses and schools.[12] Restrictions eased during reopening.[12]

We used three periods from before the pandemic as comparison groups. The comparison period for the first lockdown extended from 13 March 2019 to 23 June 2019, for the reopening from 24 June 2019 to 14 December 2019, and for the second lockdown from 15 December 2019 to 12 March 2020. These comparison periods match the calendar dates of the pandemic, to take into account, in part, effects of seasonality.

The outcome measure was cycling injury hospitalization. We used accident codes from the *International Classification of Diseases, 10th Revision* (ICD-10), to capture cycling injuries. We assessed the type (fracture, superficial wound, open wound, other), anatomical site (head and neck, spine/thorax/pelvis, upper limb, lower limb), place (roadway, other location, unspecified) and mechanism of injury (collision, fall, unspecified).

We accounted for patient characteristics that were potential determinants of cycling injury: age (< 10, 10–19, 20–39, 40–59, ≥60 years), sex (male, female), neighbourhood socioeconomic disadvantage (very high, high, moderate, low, or very low) and racialized group concentration within neighbourhoods (very high, high, moderate, low, or very low). Both socioeconomic disadvantage and racialized group concentration were measured as composite indices, with socioeconomic disadvantage accounting for median income, education and unemployment, and racialized group concentration accounting for the proportion of racialized people, recent immigrants and refugees within local neighbourhoods.[13]

The indices are representative of the population, as they were developed from census data[13] and mapped to postal codes covering small areas with an average of 500 residents. Very high socioeconomic disadvantage and racialized group concentration represented the most deprived quintile of each index.

Statistical analysis

We examined the characteristics of patients hospitalized for cycling injuries before and during the pandemic. Sex-specific hospitalization rates for cycling injuries were computed using population estimates from the Institut de la statistique du Québec.[14] We estimated rate ratios (RR) and 95% confidence intervals (CI) for the first lockdown, reopening and second lockdown compared with their respective pre-pandemic periods.

We assessed trends over time using an interrupted time series analysis of monthly cycling injury hospitalization rates. Interrupted time series analysis is a quasi-experimental method designed to estimate the effect of a sudden intervention, such as a lockdown, on an outcome.[15] This method relies on the regression of a time series, while including an interaction term between time and the onset of each interruption (first lockdown, reopening, second lockdown).[15]

For this analysis, we used an autoregressive time series model to remove the effect of seasonal patterns in bike injuries, and to account for rates that may be correlated from month to month.[15] We stratified the time series by age, sex, socioeconomic disadvantage and racialized group concentration. In sensitivity analyses, weekly hospitalization rates were used in the time series to ensure that monthly rates did not mask week-to-week trends during the pandemic.

We carried out data analyses using statistical package SAS version 9.4 (SAS Institute Inc., Cary, NC, US). We assessed statistical significance through *p* values and 95% CIs.

Results

There were 2020 cycling injury hospitalizations between 13 March 2020 and 31 March 2021. Of these injury hospitalizations, 617 occurred during the first lockdown, 1336 during reopening and 67 during the second lockdown (see Table 1). The majority of patients hospitalized for cycling injuries before and during the pandemic were male, aged 40 to 59 years, and resided in neighbourhoods with low socioeconomic disadvantage and with low racialized group concentration. The proportion of patients aged 10 to 19 years who were hospitalized for cycling injuries increased during each phase of the pandemic compared with the corresponding pre-pandemic period.

Hospitalization rates for cycling-related fractures increased considerably during the first lockdown (RR = 1.44; 95% CI: 1.26–1.64) and in the reopening period (RR = 1.16; 95% CI: 1.06–1.26), compared with their respective pre-pandemic comparison periods (see Table 2). The rates for head and neck injuries increased the most, followed by spine/thorax/pelvis, lower limb and upper limb injuries. Both upper limb and spine/thorax/pelvis injuries remained elevated during reopening. The first lockdown and reopening were marked by a rise in cycling-related falls and injuries on roadways. There was

TABLE 1
Characteristics of patients hospitalized for cycling injuries before and during COVID-19 lockdowns, March 2020–March 2021, Quebec, Canada

Characteristic	Number of hospitalizations, n (%)					
	First lockdown[a]		Reopening[b]		Second lockdown[c]	
	Before	During	Before	During	Before	During
Age, years						
<10	31 (7.0)	49 (7.9)	57 (5.1)	46 (3.4)	0	<5
10–19	61 (13.8)	101 (16.4)	117 (10.4)	166 (12.4)	<5	7 (10.5)
20–39	86 (19.5)	126 (20.4)	275 (24.4)	363 (27.2)	13 (23.6)	9 (13.4)
40–59	135 (30.6)	175 (28.4)	399 (35.3)	430 (32.2)	26 (47.3)	34 (50.8)
≥60	128 (29.0)	166 (26.9)	281 (24.9)	331 (24.8)	15 (27.3)	13 (19.4)
Sex						
Male	309 (70.1)	421 (68.2)	783 (69.4)	913 (68.3)	41 (74.6)	53 (79.1)
Female	132 (29.9)	196 (31.8)	346 (30.7)	423 (31.7)	14 (25.5)	14 (20.9)
Socioeconomic disadvantage						
Very low	84 (19.1)	137 (22.2)	199 (17.6)	245 (18.3)	6 (10.9)	16 (23.9)
Low	112 (25.4)	192 (31.1)	356 (31.5)	402 (30.1)	15 (27.3)	16 (23.9)
Moderate	124 (28.1)	137 (22.2)	261 (23.1)	332 (24.9)	17 (30.9)	16 (23.9)
High	74 (16.8)	99 (16.1)	185 (16.4)	211 (15.8)	13 (23.6)	9 (13.4)
Very high	34 (7.7)	37 (6.0)	93 (8.2)	107 (8.0)	<5	9 (13.4)
Racialized group concentration[d]						
Very low	164 (37.2)	265 (43.0)	412 (36.5)	498 (37.3)	20 (36.4)	25 (37.3)
Low	137 (31.1)	160 (25.9)	346 (30.7)	379 (28.4)	18 (32.7)	21 (31.3)
Moderate	71 (16.1)	99 (16.1)	193 (17.1)	209 (15.6)	10 (18.2)	12 (17.9)
High	37 (8.4)	54 (8.8)	107 (9.5)	153 (11.5)	<5	<5
Very high	19 (4.3)	24 (3.9)	36 (3.2)	58 (4.3)	<5	<5
Total	**441 (100)**	**617 (100)**	**1129 (100)**	**1336 (100)**	**55 (100)**	**67 (100)**

[a] The first lockdown lasted from 13 March 2020 to 23 June 2020, and the pre-pandemic comparison period from 13 March 2019 to 23 June 2019.

[b] Partial reopening lasted from 24 June 2020 to 14 December 2020, and the pre-pandemic comparison period from 24 June 2019 to 14 December 2019.

[c] The second lockdown lasted from 15 December 2020 and continued past the end of the study on 31 March 2021; the pre-pandemic comparison period lasted from 15 December 2019 to 12 March 2020.

[d] Racialized group concentration refers to the proportion of racialized people, recent immigrants and refugees within neighbourhoods.

no difference in the type, site, place or mechanism of cycling injuries in the second lockdown compared with the previous calendar year.

Interrupted time series analysis indicated that there was a sharp decline in cycling injuries the first month of the pandemic, with 11.4 fewer hospitalizations per 100 000 individuals in March 2020 (see Figure 1). During the remainder of the first lockdown, however, cycling injury hospitalization rates rose by 6.5 per 100 000 individuals each month. These trends were the same for both males and females.

The trends were also superimposed onto a general pattern of increasing cycling injury rates over time that began well before the start of the pandemic. Cycling injury hospitalization rates declined and gradually returned to pre-pandemic levels during the reopening period. There were too few cycling injuries to estimate trends during the second lockdown.

Trends in cycling injury hospitalizations depended on patient age (see Figure 2). Before the pandemic, the 20 to 39, 40 to 59, and 60 years and older age groups all had steady increases in hospitalization rates for cycling injuries over time. In contrast, children aged 0 to 9 and adolescents aged 10 to 19 years had a steady decrease in hospitalization rates. In March 2020, rates fell significantly for all age groups except children less than 10 years old and adolescents 10 to 19 years old. The remainder of the first lockdown was marked by a sharp rise in cycling injury hospitalization rates among individuals 10 years and over, and particularly those aged between 10 and 19 years and between 40 and 59 years. Hospitalization rates declined for most age groups during reopening.

The impact of the pandemic on cycling injury hospitalizations depended on socioeconomic status and neighbourhood racialized group concentration (see Figure 3). Hospitalization rates for cycling injuries decreased in March 2020, but increased during the remainder of the first lockdown for individuals from neighbourhoods with very low socioeconomic disadvantage and

TABLE 2
Type, site, place and mechanism of cycling injuries, before and during COVID-19 lockdowns, March 2020–March 2021, Quebec, Canada

Cycling injury characteristic	First lockdown[a]			Reopening[b]			Second lockdown[c]		
	Hospitalization rate per 100 000		RR (95% CI)[d]	Hospitalization rate per 100 000		RR (95% CI)[d]	Hospitalization rate per 100 000		RR (95% CI)[d]
	Before	During		Before	During		Before	During	
Type of injury									
Any	18.4	25.6	1.39 (1.23–1.57)	27.9	32.8	1.18 (1.09–1.27)	2.6	2.7	1.01 (0.71–1.44)
Fracture	15.3	22.1	1.44 (1.26–1.64)	23.9	27.7	1.16 (1.06–1.26)	2.1	1.5	0.73 (0.47–1.13)
Superficial wound	1.6	2.3	1.43 (0.95–2.15)	2.3	2.7	1.17 (0.89–1.54)	0.0	0.1	1.65 (0.15–18.24)
Open wound	1.3	1.3	1.06 (0.64–1.74)	1.8	1.8	0.98 (0.71–1.36)	0.0	0.2	4.13 (0.48–35.39)
Other	5.6	7.5	1.33 (1.07–1.67)	8.2	9.8	1.20 (1.04–1.39)	0.8	1.1	1.45 (0.78–2.67)
Anatomical site									
Head and neck	3.1	4.9	1.59 (1.19–2.12)	5.2	5.7	1.09 (0.90–1.31)	0.2	0.4	1.49 (0.50–4.44)
Spine, thorax, pelvis	3.5	4.9	1.39 (1.05–1.84)	4.9	6.0	1.23 (1.02–1.48)	0.2	0.2	0.99 (0.30–3.25)
Upper limb	11.1	14.7	1.33 (1.13–1.55)	17.8	20.5	1.16 (1.05–1.28)	1.0	1.4	1.42 (0.83–2.43)
Lower limb	5.0	6.8	1.35 (1.07–1.71)	6.6	7.6	1.16 (0.98–1.36)	1.2	0.9	0.73 (0.41–1.29)
Place of injury									
Roadway	11.8	16.1	1.37 (1.17–1.59)	17.0	19.0	1.12 (1.01–1.24)	1.6	1.7	1.05 (0.67–1.64)
Other location	1.8	3.4	1.85 (1.28–2.67)	4.4	5.6	1.27 (1.05–1.55)	0.7	0.3	0.41 (0.17–1.02)
Unspecified	4.5	5.8	1.29 (1.00–1.65)	5.9	7.9	1.32 (1.12–1.56)	0.3	0.6	2.20 (0.86–5.63)
Mechanism									
Collision	3.0	3.5	1.16 (0.85–1.59)	4.4	5.3	1.21 (0.99–1.48)	0.4	0.5	1.34 (0.56–3.24)
Fall	14.2	20.8	1.47 (1.28–1.68)	21.9	25.5	1.16 (1.06–1.27)	2.1	2.1	1.00 (0.67–1.50)
Unspecified	1.2	1.2	1.06 (0.64–1.78)	1.6	2.0	1.26 (0.91–1.76)	0.2	0.1	0.41 (0.08–2.26)

Abbreviations: CI, confidence interval; RR, rate ratio.

[a] The first lockdown lasted from 13 March 2020 to 23 June 2020, and the pre-pandemic comparison period from 13 March 2019 to 23 June 2019.

[b] The reopening lasted from 24 June 2020 to 14 December 2020, and the pre-pandemic comparison period from 24 June 2019 to 14 December 2019.

[c] The second lockdown lasted from 15 December 2020 and continued past the end of the study on 31 March 2021; the pre-pandemic comparison period lasted from 15 December 2019 to 12 March 2020.

[d] Rate ratio is for the first lockdown, reopening or second lockdown vs. the corresponding pre-pandemic comparison period for each type, site, place and mechanism of injury.

racialized group concentration. Individuals from neighbourhoods with very low socioeconomic disadvantage had 9.6 additional hospitalizations per 100 000 each month, and individuals living in neighbourhoods with very low racialized group concentration had 19.2 additional hospitalizations per 100 000 each month. In contrast, rates increased only slightly for patients from socioeconomically disadvantaged neighbourhoods and those with very high racialized group concentration. During reopening, rates returned to pre-pandemic levels in all groups. In sensitivity analyses of weekly rates, trends resembled monthly rates.

Discussion

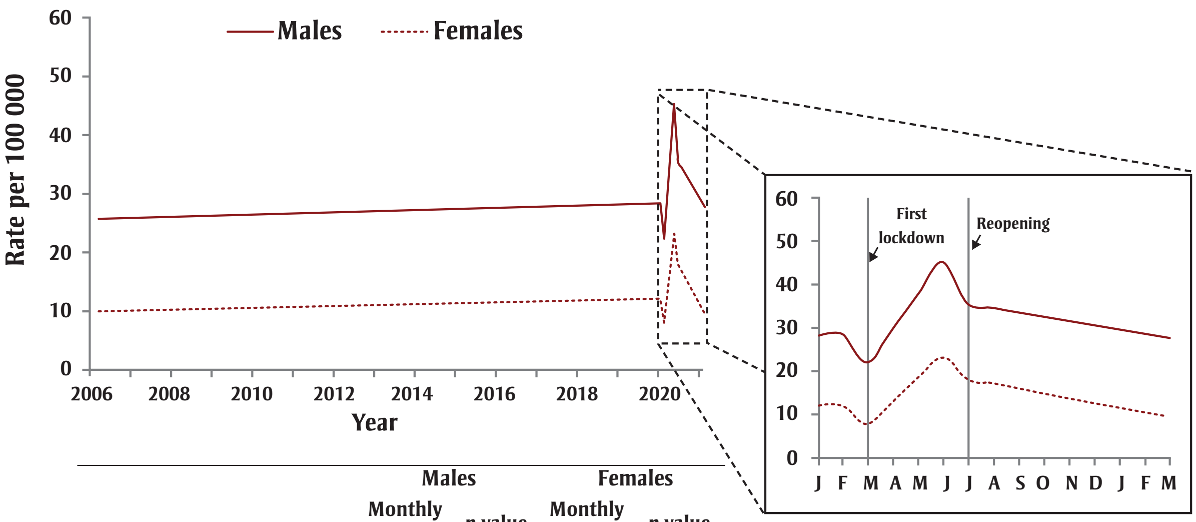
In this study of data from Quebec, hospitalization rates for cycling injuries increased significantly during the first COVID-19 lockdown. The increase in cycling injury hospitalizations was highest among adolescents and adults, and among individuals from socioeconomically advantaged neighbourhoods with low racialized group concentration.

The lockdown was marked by a predominance of cycling-related fractures and injuries to the head and neck. Most of the increase in the number of cycling injuries was due to falls rather than collisions. The findings suggest that cycling behaviours and associated injuries changed considerably during the pandemic, and that cycling should be included in injury prevention policies to reduce morbidity during lockdowns.

A number of studies have examined bike injuries experienced by children and adolescents less than 18 years old during the pandemic, as this group was thought to be most at risk of sustaining cycling accidents.[8,9] Between March and October 2020, the average number of emergency department visits for cycling injuries in this population reached 84.5 per month in Canada, an amount considerably greater than the average of 33.7 visits per month seen in the two years preceding the pandemic.[8] Children aged 6 to 10 years were more likely to present to emergency rooms for bike injuries than younger children (0–5 years) or older children and adolescents (11–18 years).[8]

In Australia, pediatric emergency department visits and hospital admissions for cycling-related injuries among individuals younger than 16 went up by 43% and 49%, respectively, during the first lockdown compared with the previous year.[9] We found that cycling injury hospitalization rates increased primarily for adolescents aged 10 to 19 years.

FIGURE 1
Interrupted time series of monthly hospitalization rates for cycling injuries before and during the first COVID-19 lockdown and during reopening, 2006–2021, Quebec, Canada[a,b]



	Males		Females	
	Monthly change	*p* value	Monthly change	*p* value
Pre-pandemic	0.016	0.15	0.012	0.10
First month of lockdown	−13.93	0.02	−9.45	0.01
Remainder of first lockdown	7.70	<0.01	5.15	<0.01
First month of reopening	−8.59	0.14	−3.92	0.25
Remainder of follow-up	−0.98	0.29	−1.08	0.03

[a] The left vertical line corresponds to start of first lockdown in March 2020; the right vertical line corresponds to start of reopening in July 2020. As hospitalization rates are monthly, the interruptions are set as the first of the month.

[b] There were too few cycling injuries to estimate trends during the second lockdown (15 December 2020–31 March 2021).

Adults' cycling injuries have received less attention. A multicentre study from the United Kingdom found that emergency referrals for scooter and bike injuries increased for patients aged 19 to 65 years between March and June 2020.[10] Bike injuries, however, were not specifically examined.[10] Rajput et al.[16] observed a significant increase in bike injuries during lockdown among adults, but examined only road traffic collisions. In Ireland, Foley et al.[17] reported no difference in emergency room visits for cycling injuries during the first lockdown compared with 2019, although the data combined adults and adolescents. Other studies of cycling injuries in the general population did not report rates separately for adults and adolescents.[18,19]

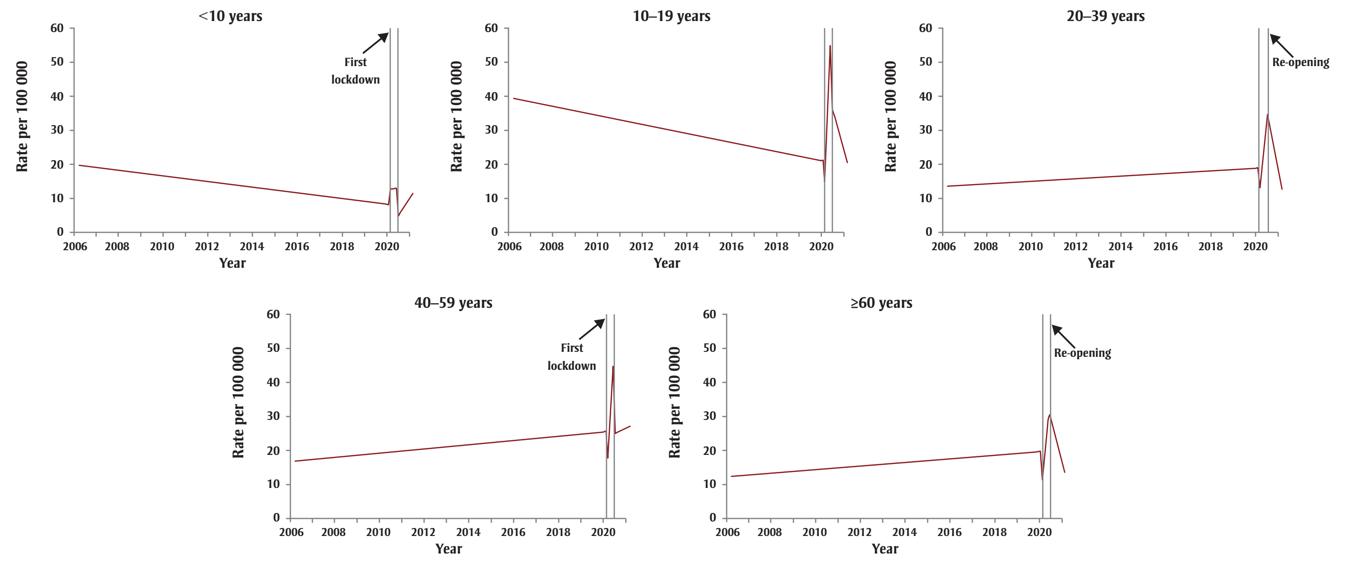
Our data show that adults' cycling injury hospitalization rates increased considerably during the first lockdown. As exercise facilities were closed during lockdowns,[1] cycling may have been the sport of choice for many adults as a way of complying with social distancing measures.[4] Adults may also have used bikes to ride to work or to run errands as a way of avoiding public transportation.

During the pandemic, many cities promoted cycling by closing streets to motor vehicle traffic.[4] This, together with an expanded network of bike paths, as documented in Montréal,[4] the largest city in Quebec, may have enticed more people to try cycling. Bicycle sales increased by 39%,[4] and it is possible that many individuals took up cycling for the first time or after a long break. One study found that less experienced cyclists were 69% more likely to sustain injuries requiring medical attention.[7] These factors together may have resulted in a higher number of inexperienced cyclists and exacerbated cycling injury hospitalizations, particularly among adults.

Increased availability of bike lanes along with reduced motor vehicle traffic may have led to more fall-related injuries rather than collisions. A study in Ireland found that emergency department visits decreased for injuries due to motor vehicle collisions, while those due to isolated cycling crashes increased substantially.[17] Similarly, a multicentre study from Scotland reported a decrease in the number of cycling injuries involving car collisions, while the number of orthopaedic interventions for falls from bikes increased compared with the period preceding the pandemic.[18] Our study found that patients admitted to hospital for cycling injuries during the first lockdown were 47% more likely to have had isolated falls; collisions were rare. Efforts to increase the safety of bike paths may be needed to decrease the burden of injury not due to collisions.

Other factors may have contributed to the overall increase in cycling hospitalizations, as the risk of injury was not evenly distributed across racialized and socioeconomic backgrounds at the neighbourhood level. The first lockdown was marked by an increase in cycling injuries in neighbourhoods with low racialized group

FIGURE 2
Interrupted time series of age-specific hospitalization rates for cycling injuries, 2006–2021, Quebec, Canada[a,b]



	<10 years		10–19 years		20–39 years		40–59 years		≥60 years	
	Monthly change	*p* value	Monthly change	*p* value	Monthly change	*p* value	Monthly change	*p* value	Monthly change	*p* value
Pre-pandemic	−0.069	0.04	−0.108	<0.01	0.032	0.04	0.052	<0.01	0.045	<0.01
First month of lockdown	4.33	0.51	−19.46	0.06	−10.96	0.04	−16.90	<0.01	−14.44	0.02
Remainder of first lockdown	0.08	0.97	13.30	<0.01	5.07	0.01	8.94	<0.01	5.89	0.01
First month of reopening	−8.83	0.16	−16.57	0.10	9.12	0.08	−19.70	<0.01	3.43	0.58
Remainder of follow-up	0.82	0.36	−1.95	0.19	−2.72	<0.01	0.27	0.76	−2.09	0.06

[a] The left vertical line corresponds to start of first lockdown in March 2020; the right vertical line corresponds to start of reopening in July 2020. As hospitalization rates are monthly, the interruptions are set as the first of the month.

[b] There were too few cycling injuries to estimate trends during the second lockdown (15 December 2020–31 March 2021).

concentration and high socioeconomic advantage. A recent study of 22 major American cities found that the presence of dedicated cycling lanes correlated strongly with bike commuting in neighbourhoods with high socioeconomic status and few Hispanic residents.[20] Remote work during lockdowns was more prevalent among individuals with high socioeconomic status and may have increased the leisure time available for cycling,[21] as commuting was no longer needed. Thus, cycling routes may have benefited socioeconomically advantaged groups during the pandemic, but also led to more injuries in this population. Individuals in socioeconomically disadvantaged neighbourhoods with high concentrations of racialized people may have been less likely to cycle, despite the overall greater availability of bike paths during the pandemic.[4]

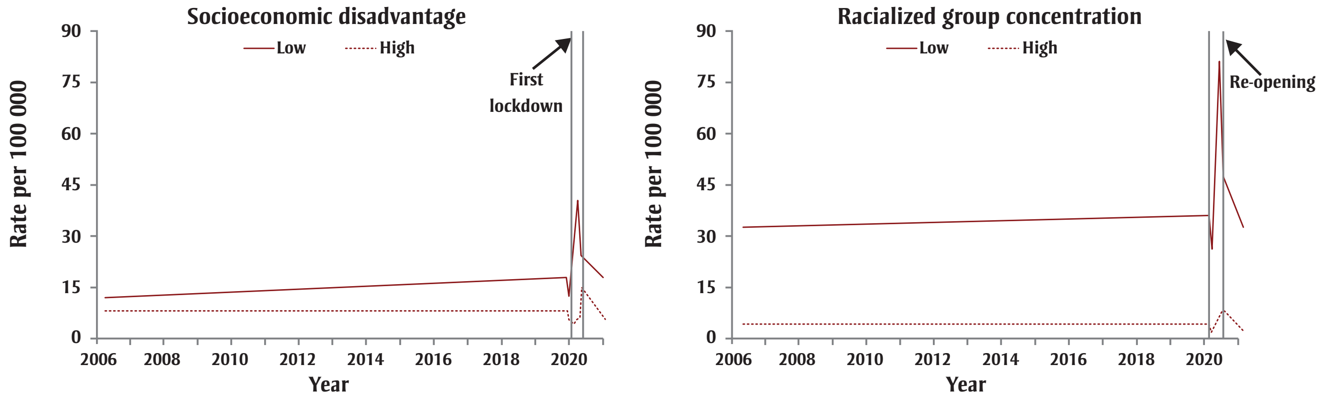
The type and anatomical site of cycling injuries during the pandemic appears to have changed. A single-centre study from the U.S. found that fractures from pediatric bike accidents increased during the first month of the pandemic,[22] while other Canadian and Australian investigations found no difference.[8,9] In Scotland, the proportion of cycling injuries requiring surgery for fractures increased in the general population.[18] The first lockdown also led to an increase in fractures in our study population. However, head and neck injuries increased more than those of spine/thorax/pelvis, lower limb and upper limb. This differs from Ireland, where head injuries decreased.[17] In both Ireland and Scotland, upper limb injuries increased more.[17,18] Some of the difference may be due to helmet laws in Quebec, where cyclists are not required to wear helmets except while using electric bikes.[23] Greater emphasis on use of helmets and other safety equipment while cycling may be beneficial.

Prior studies have not considered long-term trends in cycling injuries. The pandemic has only been compared with the period immediately preceding it.[8-10,16-19] Yet, our data suggest that cycling injuries began increasing many years prior to the pandemic. As a result, it is not clear if some of the increase reported in other studies reflects secular trends in cycling injuries,[15] rather than the pandemic itself. We eliminated the effect of secular trends by using an autoregressive interrupted time series,[15] allowing us to attribute the increase in cycling injuries seen at the beginning of the pandemic to the first lockdown.

Strengths and limitations

This study has a number of limitations. The data we used are rigorously validated,[11] but coding errors can occur, resulting in misclassification of outcomes or other characteristics. We could not identify minor cycling injuries that did not require hospital admission, and we did not have information on the number of hours spent cycling per day, the types of roads used for travel, the use of reserved bike lanes and the extent to which cycling

FIGURE 3
Interrupted time series of cycling injury hospitalization rates according to neighbourhood socioeconomic status and racialized group concentration, 2006–2021, Quebec, Canada[a,b]



	Low disadvantage		High disadvantage		Nonracialized		Racialized	
	Monthly change	*p* value	Monthly change	*p* value	Monthly change	*p* value	Monthly change	*p* value
Pre-pandemic	0.035	0.07	0.000	0.98	0.023	0.36	−0.003	0.71
First month of lockdown	−15.19	<0.01	−4.28	0.24	−31.90	<0.01	−3.89	0.15
Remainder of first lockdown	9.60	<0.01	0.56	0.68	19.22	<0.01	1.57	0.12
First month of reopening	−15.77	<0.01	10.32	<0.01	−29.36	<0.01	3.43	0.18
Remainder of follow-up	−0.85	0.28	−1.19	0.03	−2.13	0.12	−0.85	0.02

[a] The left vertical line corresponds to start of first lockdown in March 2020; the right vertical line corresponds to start of reopening in July 2020.

[b] There were too few cycling injuries to estimate trends during the second lockdown (15 December 2020–31 March 2021).

routes were expanded during the pandemic. Data on helmet use or other protective equipment were also not available.

Statistical power was limited for the second lockdown, although this limitation may be because winter conditions decreased the number of cyclists. Our study reflects the situation in the population of Quebec, where cycling is a common means of transportation.[24] Data from other provinces were not available. It remains unclear whether our findings can be applied to regions where cycling is less prevalent.

Conclusion

The first COVID-19 lockdown led to a significant rise in cycling injury hospitalizations among adolescents and adults in Quebec, while the reopening period and second lockdown had a more limited effect. Individuals from socioeconomically advantaged and less racialized neighbourhoods were most affected by cycling injuries. Falls not involving a collision were the principal mechanism of injury. Fractures and injuries to the head and neck also increased. Awareness campaigns promoting bike safety and helmet use to prevent severe cycling injuries should be ongoing, even during public health crises such as a pandemic.

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Conflicts of interest

The authors have no conflicts of interest to declare.

Authors' contributions and statement

NA – Conceptualization, Study design, Writing – Original Draft; AL – Conceptualization, Writing – Review & Editing; ÉB – Conceptualization, Study design, Formal analysis, Visualization, Writing – Original Draft; AA – Conceptualization, Study design, Writing – Review & Editing; CB – Conceptualization, Writing – Review & Editing; TML – Conceptualization, Writing – Review & Editing.

All authors read and approved the final manuscript.

The content and views expressed herein are those of the authors and do not necessarily reflect those of the Government of Canada.

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Original qualitative research

People with lived and living experience of methamphetamine use and admission to hospital: what harm reduction do they suggest needs to be addressed?

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Abstract

Introduction: People who use substances may access hospital services for treatment of infections and injuries, substance use disorder, mental health issues and other reasons. Our aim was to identify the experiences, issues and recommendations of people who use methamphetamine and have accessed hospital services.

Methods: Of the 114 people with lived and living experience of methamphetamine use recruited for a mixed-methods study conducted in southwestern Ontario, Canada, 104 completed the qualitative component. Interviews were conducted from October 2020 to April 2021. Participants were asked open-ended questions and the responses were analyzed using an ethnographic thematic approach.

Results: Negative patient–staff interactions included stigma and a lack of understanding of addiction and methamphetamine use, leading to distrust, avoidance of hospital care and reduced help-seeking and health care engagement. The consequences can be infections, unsafe needle use, discharge against medical advice and withdrawal. Almost all participants were in favour of in-hospital harm reduction strategies including safe consumption services, provision of sterile equipment and sharps containers, and withdrawal support. Clinical implications include education to reduce knowledge gaps about methamphetamine use and addiction and address stigma, which could facilitate the introduction of harm reduction strategies.

Conclusion: Although the strategies identified by participants could promote a safer care environment, improving therapeutic relationships through education of health care providers and hospital staff is an essential first step. The addition of in-hospital harm reduction strategies requires attention as the approach remains uncommon in hospitals in Canada.

Keywords: *harm reduction, methamphetamine, hospitals, substance-related disorders, illicit drugs, stigma*

Highlights

- Using open-ended questions, we interviewed 104 people with lived experience of methamphetamine use.
- Interviewees reported stigma and a lack of knowledge about addiction and substance use among health care providers and other hospital staff.
- Stigma and lack of trust can result in avoiding hospitals, reduced help-seeking and health care engagement, and, potentially, infections, discharge against medical advice and withdrawal.
- Safe consumption services, provision of sterile equipment and sharps containers, and withdrawal support were some of the recommended harm reduction strategies.
- Clinical implications include further education for health care providers to enhance therapeutic relationships, which could help introduce harm reduction strategies into hospitals.

Introduction

Methamphetamine use is associated with various negative health effects that have implications for chronic illnesses—dehydration and malnourishment,[1] bloodborne diseases,[2] respiratory diseases and increased hospitalizations,[3] dental issues,[4] seizures,[5] heart failure,[6] overdoses and mortality.[7]

There is a growing call for harm reduction services to be provided in hospitals, particularly as this is the first point of care for many people.[8-10] But hospitals usually require that patients maintain abstinence,[11] which results in a conflict of interest when providing care to individuals who use substances. Safety for this particular patient population, as well as those around them, can be compromised if their needs are not addressed. Safety issues include discharge against medical advice, improper discarding of substance use equipment, pain and withdrawal.[8,11]

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The mandate of security services for the safety of hospital staff and patients can be a further challenge because of the high frequency of interactions and searches of personal belongings, which can reinforce distrust and stigma.[8] People who use substances often describe negative experiences with law enforcement or security, both inside and outside the hospital.[12] These negative experiences range from criminalization due to substance use, to being asked to leave the hospital regardless of medical needs.[12]

People hospitalized for substance-related issues have been found to be at greater risk for discharge from hospital against medical advice in Canada[12-14] and in the United States,[13,15,16] particularly when there was no substance use intervention or service.[17] In one Canadian study, just over half of the participants who reported daily methamphetamine use discharged themselves against medical advice.[13] Comorbid substance use and mental illness have also been linked with shorter lengths of hospital stay in Canada,[18] the United States[19] and the United Kingdom[20] than for the general patient population. On the other hand, people referred to psychiatric services demonstrated longer lengths of stay in Canada[21] and Australia.[22] One study in Switzerland revealed that length of stay decreases with increases in number of hospitalizations, indicating difficulties transitioning to outpatient care.[23]

Stigma persistently discourages people who use substances from seeking care. Perceived judgment or negative attitudes[24] and lack of attention[25] have been reported and exemplify stigma. Stigma can also perpetuate the desire to use substances secretly and/or avoid accessing health services[26,27] or result in discharges against medical advice, which can lead to poor quality practice and follow-up.[10] Stigma can also create barriers to care and inhibit help-seeking and self-reporting of substance use, especially among females[28-30] and transgender individuals.[31] Women and women who are pregnant have also reported these barriers to care as a result of heightened fears of the involvement of the child welfare service.[30,32]

Unlike in hospitals, harm reduction is well established in community agencies such as safe consumption sites. Without access to harm reduction approaches, people may reuse or share needles[33] or reuse pipes.[34] Harm reduction in the hospital is warranted to provide safer access options: a key study conducted in London, Ontario, found that people who inject substances have a significantly higher incidence of new bloodstream infections when receiving inpatient treatment than outpatient treatment.[35] Tan et al.[35] also noted that people receiving outpatient treatment likely have lower risk behaviours or comorbidities, although a possible explanation is the lack of harm reduction supports in hospitals compared with the community. Furthermore, overdoses at a hospital-based overdose prevention site have been found to be significantly more likely to occur among people admitted as inpatients than among community-based clients.[36]

Harm reduction practices seek to reduce the risks and harms associated with substance use through the provision of tools and services.[37] Supervised consumption facilities that provide designated spaces for people to use substances while supervised by trained staff are associated with reduced equipment sharing,[38,39] public usage[38] and syringe litter.[39] Reductions in syringe littering have also been reported in cities with needle exchange programs that provide sterile supplies to people in exchange for used supplies.[40]

It is also important for individuals who use substances to accept and want to use these harm reduction services. Previous studies have reported that harm reduction strategies have enhanced understandings of safety and have been positively viewed by people who use substances.[9,41] Furthermore, except for in Toronto,[42] Edmonton[43] and Vancouver,[36,44] harm reduction services in Canada are utilized and evaluated in community settings rather than in hospital settings. Scotland[45] and Australia[46] allow the provision of harm reduction services such as needle exchange programs on hospital grounds, but this is not commonplace internationally. When supervised consumption services are successfully implemented in hospital settings, patients are supervised by trained staff (often with lived experience) in a personal injecting booth and are offered sterile supplies as well as education for safe use.[36,42-44]

The current literature on harm reduction in hospitals is limited. Understanding what is needed and what needs to be addressed in order to fill this research gap is a key aim of this study. We seek to record the experiences of people who use methamphetamine and learn what can be done to improve the hospital care they receive, the methamphetamine-specific harm reduction strategies they suggest for hospitals, and other issues that need to be resolved. In this article, we focus on the findings from the qualitative component of a mixed-methods study.

Methods

Design

This study was conducted in a large city in southwestern Ontario, Canada. Interviews commenced in October 2020 and were completed in April 2021. A qualitative component consisted of open-ended questions.

Data were collected once from a purposive sample of individuals with past or current experience of methamphetamine use and of hospital service use. The study developed a purposive sampling frame in order to maximize diversity by age, gender and service agencies accessed. Service agencies included hospitals, those serving people experiencing homelessness, primary care health services, and community mental health and addiction services.

We used a sampling frame to recruit a similar number of participants from the various agencies as well as similar numbers identifying as male and female. People who identified as nonbinary or other genders could also participate. Age groups were constructed (16–19, 20–29, 30–39, 40–49, 50–59, 60–69, 70–79 and 80–85 years) in order to track participants' ages and inform recruitment as the study progressed (with the goal of recruiting at least one participant in each age group). Participants identifying as marginalized were prioritized in order to provide sufficient access to these groups to participate and be represented in the sample. Marginalized populations targeted were Indigenous people, Two-Spirit, Lesbian, Gay, Bisexual, Transgender, Queer, Intersex, plus (2SLGBTQI+) people, and members of ethnic minority groups.

As this qualitative study was part of a mixed-methods study, our aim was to recruit at least 104 participants (with a maximum of 180) with past or current lived experience of methamphetamine use, including those in recovery. This minimum is in keeping with the sample size calculation set out by Bartlett et al.[47] A maximum of 180 participants was determined by the study's funding. This also meant the study would surpass the number of participants for qualitative saturation as detailed by Morse.[48]

To be included, participants had to be between 16 and 85 years old; to have received services at a hospital; and to speak English sufficiently well to participate in the interview. Participants were excluded if they did not report any current or prior use of methamphetamine, even if they had used other substances. All participants provided informed consent.

Ethics approval was obtained from Lawson Health Research Institute and Western University's Health Sciences Research Ethics Board (Reference number: #115779).

Recruitment

The research team reached out to many programs across four hospitals in southwestern Ontario and community agencies. Research staff provided agency staff with the research protocol and recruitment posters to help them promote the project among clients. Prospective participants could call or email the research coordinator (JS) to arrange a time and place for the interview to be conducted. The research team also arranged specific days to visit drop-in services sites (e.g. shelters for people experiencing homelessness and a safe consumption site) to conduct outreach with potential participants.

To recruit as diverse a sample as possible, we relayed information about shortfalls in the purposive sampling frame to the hospital programs and community agencies to try to recruit participants who were lacking representation, and contacted agencies that served underrepresented populations such as youth, older adults, 2SLGBTQI+ and Indigenous people. Hospital personnel spoke to patients in their care about the project if they knew that they had a current or lived experience of methamphetamine use.

Procedure

As part of a larger mixed-methods study, interviewees participated in a qualitative discussion consisting of open-ended questions. Interviews were conducted by the three authors as well as three research coordinators (SH, SM, AP) and seven research assistants (SA, TA, NF, EG, CH, AJ, AY), all of whom had received training in qualitative methods and interviewing techniques. Interviews lasted approximately 60 minutes.

Interview questions were designed to elicit participants' accounts of their experiences in hospital settings, issues regarding harm reduction (or lack thereof), suggestions for changes and what aspects of care should not be changed, recommendations and goals. The aim was to record a variety of viewpoints in order to capture unexpected and contrasting responses for inclusion in the analyses:

1. What is your experience with the way things are currently within the hospitals for harm reduction and methamphetamine use?
2. What are some of the issues with the current approach within the hospitals for harm reduction and methamphetamine use?
3. What do you think should be changed regarding the current approaches to harm reduction?
4. What are some aspects you would not change regarding the current approaches to harm reduction?
5. How should a new approach help you with your goals?
6. Do you have any other recommendations that may be useful to you or others who use methamphetamine?

Interviewers kept notes during the interview to help them follow up and elicit further information on a particular experience or opinion or ask for clarification. The qualitative component of the interview was audio-recorded and then transcribed by research staff for subsequent analyses (SA, NF, EG, CH, AJ, AL, ML).

Interviews were conducted via telephone or in-person. In-person interviews only occurred if both interviewer and interviewee could follow COVID-19 protocols and procedures. These in-person interviews were conducted in a spare meeting room at the service agencies. Interviewees who were inpatients at the time of the interview were interviewed over the telephone in accordance with hospital pandemic protocols. All participants received an honorarium of CAD 20 upon completion of the interview.

Data analysis

We used a thematic ethnographic method of analysis[49] to examine the broader cultural and social contexts surrounding participants with lived experience of methamphetamine use. The three authors conducted and reviewed the initial open coding and axial coding. We grouped the interview responses thematically and identified the themes, subthemes and suggestions for future considerations expressed by the participants. We colour-coded quotes based on the type of response and copied these into a document specified for that particular theme. The identified themes were then reviewed and critically appraised by all three authors working as a group.

All 104 transcripts were analyzed. Further analyses explored the influence of themes on one another to identify the sequence of issues that participants have experienced. The three authors collaborated to identify the themes and to then develop a model of the current state of care versus a preferred state. Quotes were reviewed and placed into a theme after the three authors had discussed and reached consensus as to the most appropriate fit for each; this ensured credibility and trustworthiness. Reflexivity activities included routine updates and discussions of the findings to date with the study's Advisory Group and Research Subcommittee, a team consisting of other researchers and analysts, to reduce any researcher bias.

Results

Demographics

Of the 114 participants recruited for this study, 104 completed the qualitative component of the study. The majority of the sample identified as male (n = 67) (see Table 1). Although the researchers targeted an equal number of males and females, fewer females reported substance use. A total of 13 participants identified as 2SLGBTQI+. The mean age of the sample was 35.5 years (range: 17–66), but no one aged over 70 years was identified for recruitment. A total of 52 participants reported that they were currently experiencing homelessness, and almost all (n = 102) reported experiencing homelessness in their lifetime.

TABLE 1
Mixed-methods study qualitative component sample demographics (n = 104)

Characteristic	No. of participants, n (%)
Mean age (SD), years	35.5 (12.5)
Gender	
Male	67 (64)
Female	36 (35)
Nonbinary	1 (1)
Identified as 2SLGBTQI+	13 (13)
Ethnicity	
White	61 (59)
Indigenous	24 (23)
Indigenous + White	8 (8)
Black	3 (3)
Latin American	2 (2)
Other	6 (6)
Marital status	
Single	75 (72)
Married/common law/engaged	16 (15)
Separated/divorced	11 (11)
Widowed	2 (2)
Education completed	
High school	45 (43)
Elementary/primary school	41 (39)
College/university	18 (17)
Housing status	
Homeless	52 (50)
Live alone	25 (24)
Live with other relative or parents	8 (8)
Inpatient	7 (7)
Live with spouse/partner	6 (6)
Live with unrelated person	6 (6)

Abbreviations: 2SLGBTQI+, Two-Spirit, Lesbian, Gay, Bisexual, Transgender, Queer, Intersex, plus; SD, standard deviation.

Thematic analysis findings

We identified a number of themes during the course of the interviews including stigma and a lack of knowledge, lack of trust and help-seeking, harm reduction strategies and negative consequences. Figure 1 illustrates the sequences and relationships between these themes.

Staff–patient interactions: stigma and lack of knowledge

Stigma was the issue most frequently mentioned during the interviews. Participants said that they felt they were less respected than the general patient population; were made to feel that their addiction was a "bad choice"; and had been shunned as a result. One participant said: "Where to start, who to ask and then I, and I try to ask or I try to approach it and I just get treated like, like just a piece of dirt, you know?"

The perceived stigma may be the result of a lack of knowledge about addiction and substance use, particularly methamphetamine use, on the part of health care providers and hospital staff. Many participants explained that there seemed to be a disconnect between themselves and the health care staff treating them, often citing differences in language. For example, people with lived experience may describe unregulated substances in terms of "points," while health care providers would ask about milligrams of usage.

Participants also described the lack of understanding of the lived experience. Some said that the broader understanding of addiction, such as traumatic events, are sometimes unacknowledged as a precursor for substance use. This lack of understanding can lead to their methamphetamine use being perceived as a morally "bad choice." Others noted that distinguishing between the clinical manifestation of methamphetamine use and a mental health crisis is problematic, leading to incorrect assumptions about them as a person.

> So I just feel like, um, yeah, it's just, I don't know if they don't understand or if they don't want to understand, or if they just, 'cause there's a difference between someone who's suffering from psychosis, from drugs as per psychosis, mental health.

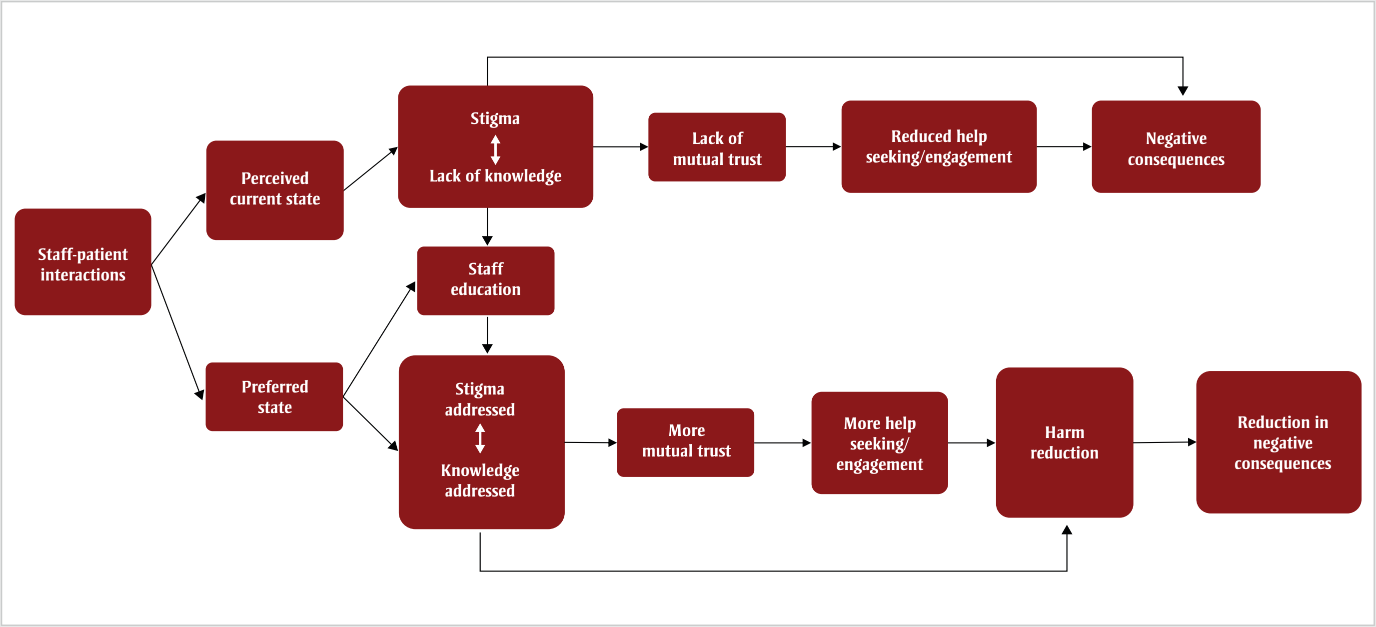
This lack of understanding of the clinical manifestations of methamphetamine use can lead to undertreatment of withdrawal symptoms. Participants found that health care providers either ignored their withdrawal symptoms or seemed unaware of symptoms and treatment. Regardless, participants considered that "…more focus needs to be put into withdrawal management."

Lack of trust and reduced help-seeking or health care engagement

The perceptions of stigma and lack of knowledge and understanding of substance use result in a lack of mutual trust between patient and health care provider. Participants expressed their general dissatisfaction with the health care they received, saying that they avoided disclosing their methamphetamine use. A large number were unwilling to seek help or engage with their health care.

Participants said that they did not seek health care in hospitals because of this combination of stigma, lack of understanding and trust, and medical needs (e.g. withdrawal) not being met. Some participants reported discharging themselves against medical advice. This could then lead to a worsening of symptoms and likely readmission. One participant explained: "Because a lot of us don't like hospitals. We won't, we won't go to the hospital for anything, because we get treated differently. We get like red flagged."

FIGURE 1
Model of perceived current state versus preferred state of hospital care[a]



[a] Based on themes identified in 104 interviews of people with lived experience of methamphetamine use participating in the qualitative component of a mixed-methods study conducted in southwestern Ontario, October 2020–April 2021.

The presence of an individual with lived experience of methamphetamine use, such as a peer supporter, could be the necessary bridge in the therapeutic relationship between the patient and the health care team: "As a recovering addict, I know the importance of an addict speaking to an addict."

Negative consequences

Not engaging in health care can result in poorer health, infections, unsafe use of needles, discharge against medical advice and even death. Withdrawal was discussed in many different contexts, including the various effects of not using methamphetamine in hospital or not receiving medication to stave off adverse reactions. Participants described the physical and mental health consequences of withdrawal without any harm reduction strategies:

> Withdrawal, there's been the possibility of people going violent, no self-awareness, you come down from the high and you're going like, I gotta get high again. They're forcing us to subdue to nothingness. It's like, how can you do that to us? It's like we're going through this addiction. They make you go through the withdrawal. They say, you should just toughen up.

Others recounted how lack of harm reduction can increase pain and risk of death and overdose:

> Because, like, if they don't have harm reduction and, like, safety plans and stuff like that in the hospitals in the hospitals and stuff … I feel like a lot more people could be … in a lot more pain and have a lot more happen to them.… Like, a lot more people could die, overdose, stuff like that.

Recommended harm reduction strategies to reduce negative consequences

Safe consumption

The participants frequently discussed the concept of a safe consumption service. Many talked about a monitored service with hospital personnel assisting individuals. Opinions differed as to how much control supervising staff would have (i.e. administering the injection, monitoring effects or supporting after use). This could indicate a difference in beliefs to do with autonomy and attitudes towards support personnel.

> They should have rooms like this [private consumption space] there in the hospital … paramedics have been through here 'cause like, people don't die here. A lot of people frown on this place and stuff, but you know, this place saves a lot of lives.

Many participants preferred the idea of a "safe space" where individuals could use methamphetamine privately, for their own safety and apart from the general patient population: "Just like make a little room for people who do, do stuff like that … just so that you feel safe, you know what I mean?"

Sterile equipment

Many participants described the need for sterile equipment to help prevent the spread of infection. Needle exchange programs at hospitals could be a way to prevent the reuse of needles and syringes:

> … we have like a needle exchange and shit, and we need to have something similar [in] our half of the hospital … maybe there could be a worker from rehab or something like that, they can provide clean needles or whatever drugs… like utensils and things like that.

Some participants also suggested offering clean pipes to individuals who smoke methamphetamine in an effort to prevent reuse of pipes and the spread of infections: "If you have people [who smoke] make sure they have clean pipes all the time … So, they're not constantly, constantly using the old paraphernalia … Cause it's a bad way of … catching disease and things."

Using damaged or self-made pipes can also result in injury that requires medical assistance. One participant suggested: "Probably they should give us … safe injection tools like needles, and [needle] dropboxes, and also … clean pipes so that we're not using … broken glass pieces and straws to inhale."

Sharps waste containers

Some participants pointed out the need for sharps containers for discarding needles, thereby reducing the risk of accidental infection. Having easily accessible sharps containers in hospitals could also decrease the risk of individuals going outside and injecting methamphetamine on hospital property and discarding their needles where members of the public could be put at risk. Alternatively, hospitals could "have maybe a needle bin in the washroom."

Support for withdrawal

Many participants reported using in hospitals or leaving the hospital (often against medical advice) to use because they needed to stave off the effects of withdrawal. Medications to reduce the effects of withdrawal and induce calmness can prevent agitation and adverse health reactions. When prescribed such medications, people may be more willing to receive care and mitigate negative health consequences. With improved therapeutic relationships and greater trust, people receiving hospital care may have more positive interactions and be less averse to seeking help in the future.

> 'Cause, I don't know, I've never [had] withdrawal [symptoms], like I've never had [withdrawal symptoms coming] off crystal, but I guess some people do, like they get antsy or you know what I mean. So everyone's different in a way. But yeah, maybe medication that could help make someone obviously not as [antsy]. 'Cause an addict is an addict right. If they want to use, they're going to want to use. So … if you want them to stay in the hospital and get their treatment you're going to have to do something to take that edge off.

Discussion

People with lived and living experience of methamphetamine use perceived the current state of hospital care as rooted in a lack of knowledge of addiction and methamphetamine use. This negative basis for interaction results in a lack of mutual trust and reduced help-seeking or health care engagement, with patients either discharging themselves against medical advice or avoiding hospitals altogether. This, in turn, leads to negative health consequences with people not receiving the care they need and not receiving harm reduction interventions that can also prevent further consequences.

Based on qualitative findings and analyses, a preferred state of care would address stigma and lack of knowledge by educating hospital staff about addiction. Key to establishing therapeutic relationships is mutual trust building. Harm reduction strategies would then be provided as an additional solution to the immediate negative consequences of methamphetamine use.

Addressing stigma and lack of knowledge

This study revealed a large number of issues related to the provision of care for people who use methamphetamine; these issues need to be addressed before harm reduction strategies can be considered. Stigma and health care providers' lack of knowledge frustrated study participants and led to communication difficulties and a sense of discontent. Service providers have reported that it is difficult to assist individuals who use methamphetamine because they lack the knowledge about their specific needs,[1] an issue that would have to be addressed to implement harm reduction strategies with staff understanding and support. Lived experience support could also remedy this situation.[8]

The lack of trust that results from these negative interactions, particularly when stigma was perceived, meant that individuals had to either hide their substance use or leave the hospital. Abstinence,[12] withdrawal symptoms including cravings, stigma, discrimination, hospital rules such as not leaving the hospital floor,[15] and recent intravenous substance use[13] have been given as reasons for discharge against medical advice; many of these reasons were brought up by study participants. Inevitably, not receiving or completing a course of treatment means that many people are at risk of worsening symptoms, readmission and even death. Risk of experiencing an overdose is heightened if using alone.[7,38]

Harm reduction strategies

Determining which harm reduction strategies to utilize can be challenging, particularly when they seem to contradict hospital policy and philosophy. Safe consumption and ways in which individuals can use safely in hospitals away from the general patient population were commonly discussed. Some participants liked the idea of monitored use with varying degrees of support, while others preferred full autonomy and the private use of a quiet room. In a 2019 qualitative study, Foreman-Mackey et al.[50] found the that use of a supervised consumption facility decreased the number of fatal overdoses.

Participants in the current study seemed to be aware of harm reduction strategies but collectively discussed a lack of access and availability. Many brought up the need for new equipment to prevent the spread of infection through sharing and/or reusing paraphernalia. A needle exchange program alone may not be appropriate as clients would have to leave the building and inject elsewhere.[9] Although a safe consumption site is a large step for a hospital to take, it may be necessary if there are concerns around unsupervised use in the vicinity. Previous research has revealed a number of benefits for safe consumption: an increase in referrals to addiction treatment services,[38,39,43,44] reductions in public injection use,[38,39] no fatalities[36,38,39,43] and no increases in substance-related crime.[39,43]

Participants stated that sharps containers should be available in washrooms, as this is where individuals who use methamphetamine often inject.[51] It was also suggested that clean pipes be offered to individuals who do not use intravenously, which would prevent the reuse of pipes or the use of makeshift pipes from aluminum cans, light bulbs[34] and plastic straws, which can produce toxic vapours when lit.[52]

Clinical implications

Taking these issues into account, a preferred state of care would have clinical implications. Addressing negative interactions, stigma and knowledge gaps through self-reflection and education may help begin establishing positive therapeutic relationships. Educational interventions have been found to reduce stigma pertaining to substance use disorder.[53,54] A greater understanding of addiction and harm reduction can enhance acceptance of strategies among staff and allow for a smoother introduction into practice. Previous research has indicated that further education on substance use and harm reduction can improve positive attitudes[55] and role adequacy in providing care[56] towards people with substance use disorder. Once trust has developed, people who use methamphetamine may gain the confidence to access harm reduction services.

Figure 2 illustrates the clinical implications of facilitating the introduction and utilization of harm reduction strategies in the hospital setting. Implementing harm reduction without addressing the previous steps could result in these practices not being fully understood, being provided ineffectively or being underutilized.

Philosophy and culture of care

The switch from the perceived state to the preferred state would involve a shift in the philosophy and culture of care from abstinence.[12] A change in current training would need to be augmented to reduce the effects of stigma and provide health care providers and hospital staff with the knowledge required to support people who use methamphetamine.[53,54] The therapeutic relationship would need to change to encourage people to disclose their substance use, which many are afraid of doing in case they receive substandard care or even denial of services.[26] Suboptimal care has also been reported significantly more frequently among people who avoid care than those who do not,[57] and stigma has been found to be associated with both care avoidance and substandard care.[27] This reiterates the importance of engaging people with lived or living experience of methamphetamine use in care. In turn, the patient and health care provider can together develop a treatment plan that does not result in interpersonal or medical conflicts (e.g. medications interacting with consumed substances).

As highlighted in Figure 2, addressing stigma and enhancing therapeutic relationships must be addressed first so that people receiving hospital care want to access, and are able to access, available strategies. To advance straight to harm reduction implementation prior to addressing underlying issues in the health care system would likely lead to failure through lack of utilization and distrust.

Strengths and limitations

Analyzing the qualitative data of 104 people with lived experience, far exceeding saturation for a qualitative study, was a key strength of this study. This allowed for sharing a broad range of opinions, experiences and perspectives, all of which contributed to the findings of the study. Using an ethnographic lens also allows for the reporting of the collective experience of these 104 participants as opposed to individual accounts. This study comprehensively situates itself within the gap in the literature by highlighting the needs and difficulties faced by people with lived experience in the hospital setting. These findings oversee the overall experience rather than singular or individual issues.

This study also set out to recruit a diverse sample of participants in order to obtain representation from underrepresented populations. A total of 31% of the sample identified as Indigenous, which was larger than anticipated. Although the sample largely identified as male and White, the purposive sampling design of the study focussed on providing a voice to individuals who may not otherwise have had the chance to do so.

In terms of limitations, the study recruited largely from one city in Ontario, Canada, with five participants recruited from small towns outside of the city. There may be different experiences and issues to address in more rural locations as well as in larger cities. Other regions may have more resources and more accessible harm reduction services and sites, which would likely affect observations and experiences of study participants. It is therefore recommended that other regions within Canada explore issues prevalent in their communities.

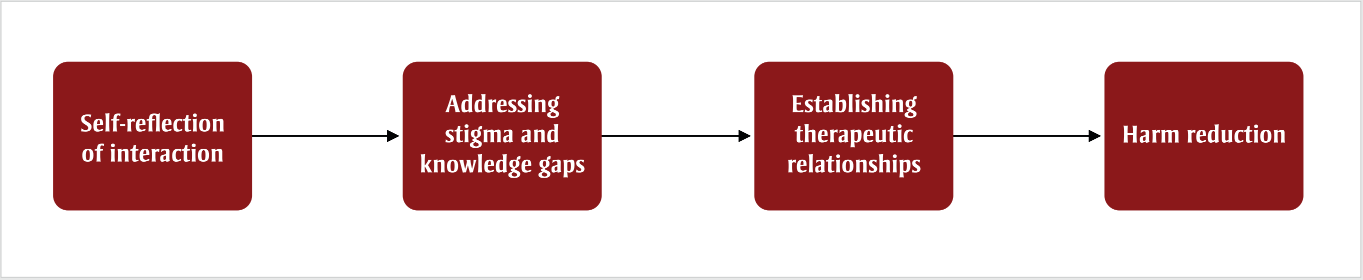
We focussed specifically on people with lived and living experience of methamphetamine use. Although participants reported polysubstance use, the findings could be different for people who use substances other than methamphetamine.

We had few female participants in our study, which may have been due to stigma around disclosure. Future studies that focus primarily on underrepresented or marginalized groups are recommended.

Conclusion

To improve the quality of care for people who use methamphetamine, there needs to be an emphasis on the interactions between patient and health care provider and hospital staff before any progress can be made. It is important that individuals need to feel heard and respected before they seek treatment and access harm reduction interventions. Once therapeutic relationships built through trust are strengthened, the health care system can

FIGURE 2
Flow diagram showing the clinical implications of introducing and utilizing harm reduction strategies in the hospital setting



begin to provide treatment and harm reduction in an effective and accessible way. Further research is required to explore the feasibility of harm reduction provided in hospital as the approach is still in its infancy.

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Conflict of interest

There are no conflicts of interest to declare.

Authors' contributions and statement

CF – Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing. JS – Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing. LS – Data curation, Formal analysis, Investigation, Methodology, Project administration, Resources, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing.

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Commentary

Disability—a chronic omission in health equity that must be central to Canada's post-pandemic recovery

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Introduction

As Canada begins to recover and learn from the COVID-19 pandemic, health equity and public health policies must be a central tenet of reform. Recent work has begun to provide guidance on an equitable pandemic recovery in Canada, which highlights many important groups that require specific consideration in recovery policies.[1] There is a key omission in many of these guidelines and, in fact, most health equity efforts—people with disabilities.

Canadians with disabilities make up approximately 22% of the population.[2] Globally, people with disabilities have experienced greater risk of SARS-CoV-2 infection and mortality.[3,4] A recent retrospective cohort study of 1297 COVID-19 hospital admissions in Ontario, Canada, found that 22.3% of admitted patients had a disability and that this patient population experienced longer hospital stays and higher rates of readmission.[5] A pan-Canadian study of 35 519 hospitalizations for COVID-19 found several chronic diseases and disabilities associated with excess risk of death from COVID-19, with people with Down syndrome who were over the age of 50 having 8.5 times higher odds of death from COVID-19.[6]

Beyond health outcomes, pandemic policies in Canada have overlooked accessibility in public health messaging, testing and vaccination locations, loss of critical services and employment, and effects of prolonged isolation.[7] However, while some studies have focussed on the impact of COVID-19 on Canadians with disabilities during the pandemic, little work on post-pandemic recovery has focussed on this population.

Considering the evidence that Canadians with disabilities are at higher risk of serious health outcomes from COVID-19 infection and the systemic lack of accessibility and inclusion in Canadian public health policies and practices, it is imperative to centre recovery practices on the needs of people with disabilities for an equitable pandemic recovery. Applying an intersectional and accessibility lens can guide and improve Canada's equitable post-pandemic recovery and devise greater emergency preparedness in the future.

Improving Canada's equitable post-pandemic recovery

Any post-pandemic recovery for Canadian health systems and public health should consider the four key tenets.

- Expand and improve the accessibility of health care services for Canadians with disabilities.
- Improve social determinants of health for Canadians with disabilities.
- Improve representation of people with disabilities in both public health and health systems.
- Include disability as a key priority in pandemic preparedness policies.

Expand and improve the accessibility of health care services for Canadians with disabilities

Several barriers exist for quality, rapid, equitable and affordable care for people with disabilities in Canada's universal health system.[8] Strengthening of health systems post-pandemic must focus on the rights of people with disabilities in order to correct these long-standing inequities. Many of the lessons from the COVID-19 pandemic can help achieve this goal. For instance, messaging on care rationing and mortality risk revealed deeply rooted and problematic assumptions on the value of disabled lives globally[9]—assumptions that

Highlights

- People with disabilities in Canada have experienced excess risk of COVID-19 infections and mortality but have not received adequate policy support throughout the pandemic.
- Canada's post-pandemic recovery for health care and public health must involve and include Canadians with disabilities.
- Any post-pandemic recovery should improve the accessibility of health care, address key social determinants of health for Canadians with disabilities (with an emphasis on housing and employment), increase representation of people with disabilities in health care and public health, and focus on disability considerations in future pandemic preparedness.

Keywords: *disability, COVID-19, pandemic recovery, health equity*

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often lead to worse outcomes and poor-quality care for people with disabilities. Improving disability training for health workers throughout their curricula can challenge these assumptions.[10]

Frameworks for accessible vaccination and testing offer key insights into improved accessibility for health care in general.[7] This could lead to widespread improvements in accessible communication, appointment booking, physical and environmental accessibility, data collection, specialized clinics and other dimensions.

Investments in new technology and data monitoring can also help make health care more accessible. For instance, the Long-Term In-Home Ventilator Engagement (LIVE) program expanded virtual monitoring during the pandemic.[11] These types of initiatives can be particularly important for stressed health systems with long waiting lists, allowing some care of at-risk populations to be conducted virtually, while simultaneously helping alleviate pressure on health systems.

It is vital that all technological advances be fully accessible to all health system users, including all providers and patients. The availability of virtual care was a particularly critical accommodation for many people with intellectual and developmental disabilities, who historically have had poor access to health care,[12] and other people who face barriers in accessing in-person care. Virtual care options must continue to be an available and accessible option for Canadians with disabilities.

Out-of-pocket costs for disability-related health expenses such as assistive technology and prescription drugs are high.[13] Investing in better access to essential medicines through a national pharmacare program, increased access to rare disease medications and expansion of medical device programs can all improve equity in health systems for Canadians with disabilities.

Together, health systems across Canada recovering and learning from the COVID-19 pandemic must centre accessibility and actively work to dismantle the many barriers that Canadians with disabilities face when interacting with health systems at every level.

Improve social determinants of health for Canadians with disabilities

In addition to improving health systems, there are social interventions, particularly housing and income support or employment that need to address the needs of people with disabilities.

Housing

Over 400 000 Canadian adults with significant disabilities live without adequate, affordable or quality housing.[14] This long-standing public health issue has contributed to high rates of homelessness in this population in Canada. Further, many people with a range of various disabilities require supports to be able to live independently at home, but safety is sometimes compromised for affordability and accessibility, leaving people with disabilities at risk of abuse or harm. Investments in affordable housing need to ensure that buildings conform to accessibility standards and provide safer and supported options to address the housing crisis for this population.

Income support and employment

Intrinsically tied to sustainable housing, higher costs of living—medication, devices and transportation, along with housing—contribute to the well-understood link between disability and poverty in Canada. Current disability supports are insufficient to cover many costs—and many people with disabilities reported having their work hours reduced, being furloughed or being laid off during the pandemic.[15] Statistics Canada reported that about one-third of the approximately 13 000 Canadians with disabilities or chronic health conditions surveyed lost employment, temporarily or permanently, during the first year of the COVID-19 pandemic, and roughly half reported difficulty with at least one essential need or financial obligation.[15] Further, media have reported that the Canada Emergency Response Benefit (CERB) and Canada Recovery Benefit (CRB) discriminated against Canadians with disabilities based on eligibility criteria.[16]

Any future employment programs must ensure eligibility and support for Canadians living with disabilities, including by expanding remote or virtual work possibilities and accommodations.

Finally, funding for medications and other disability-related health expenses must be available irrespective of work status, to allow people with disabilities to work without fear of losing vital disability-related benefits.

Improve representation of people with disabilities in public health and health systems

“Nothing about us, without us” has been used as a call to action for inclusion of people with disabilities. However, meaningful inclusion—where people with disabilities have an equal voice and are represented in research and on decision-making committees—continues to be lacking. Today, even as Canada pushes to administer primary series and subsequent boosters, accessible vaccination locations are limited and the National Advisory Committee on Immunization (NACI) has not adequately recognized the elevated risks of people with disabilities, except for older adults living in congregate settings, despite demonstrated risks.[17] Without the voices of people with a range of intersectional lenses bringing concerns forward, there will continue to be a gap in disability-inclusive policy. Prioritizing the voices of leaders with disabilities in medicine and public health can help address this critical gap.[18]

Pandemic preparedness

The impact of the COVID-19 pandemic on people with disabilities has highlighted the need for greater consideration of this population in pandemic preparedness efforts. In the wake of the pandemic, substantial work will be undertaken to review and improve Canada’s response to future health emergencies. Having people with disabilities as key stakeholders in this process will help correct for some of the preventable inequities that occurred during this pandemic. For example, when health system capacity surged, news outlets revealed that medical rationing was affecting people with disabilities.[19,20]

While no analogous work has been conducted in Canada, a Healthwatch England report found several shortcomings in rapidly rolled-out pandemic communications for people with disabilities in the United Kingdom.[21] These included limited easy-to-read information for people with intellectual or developmental disabilities, the widespread use of masks that prevented lipreading, and no sign language interpretation during the initial government briefings, among others.[21]

A 2021 Royal Society of Canada report made several policy recommendations to create a more accessible and disability-inclusive society for Canadians with intellectual and developmental disabilities for the remainder of the COVID-19 pandemic and the post-pandemic phase.[22] However, there are few guidelines for other disability groups, resulting in a gap in learning how to improve preparedness, response and recovery for all Canadians. If Canada had both improved health system preparedness and stringent policies on protecting the rights of people with disabilities during health emergencies, there could have been greater protection of the right to health of people with disabilities. When reviewing Canada's emergency preparedness in the coming years, updated preparedness policies must include revisions for greater health equity for Canadians with disabilities.

Beyond the pandemic, we need to overhaul our definition of health equity in Canada to consistently include people with disabilities. While medicine has long had a problem with ableism, research has repeatedly demonstrated inequities in care quality, treatment and outcomes among Canadians with disabilities[23] as well as accessibility issues, most recently during public health campaigns throughout the COVID-19 pandemic.[7] As Canadian health care and public health move beyond pandemic response, recovery must be rooted in initiatives that improve the accessibility, availability, acceptability and quality of care for people with disabilities. We must normalize disability within all our health equity work—anything short of concerted efforts to include people with disabilities will perpetuate inequity.

Conclusion

People with disabilities have faced higher rates of COVID-19 infections and mortality, yet these inequities and lack of policy supports received inadequate attention and action during the pandemic. To that end, any post-pandemic recovery for Canadian health systems and public health should consider the following four key tenets. First, we must expand and improve the accessibility of health care for all Canadians with disabilities, and address barriers to health care and public health, several of which were identified and exacerbated throughout the COVID-19 pandemic. Second, health-focussed post-pandemic recovery must address key social determinants of health for people with disabilities, particularly housing and income support or employment. Third, both public health and health systems must increase representation of persons with disabilities in Canada. Centring of disabled voices is also closely linked to the final tenet, that future pandemic-preparedness policies that arise must include disability as a key priority.

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Authors' contributions and statement

Both authors contributed equally to the conceptualization of this manuscript as well as to the writing of the original draft and the review and editing.

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Call for Papers: Social Prescribing in Canada

Tweet this article

Guest Editors: Sandra Allison (Island Health Authority), Kiffer Card (Simon Fraser University), Kate Mulligan (University of Toronto)

HPCDP Journal Editors: Robert Geneau and Margaret de Groh (Public Health Agency of Canada)

Social prescribing (SP) is a practical tool for addressing the social determinants of health through supported referrals to community services. This globally spreading intervention aims to promote health and prevent chronic disease by supporting individual and community self-determination and connecting participants to nonclinical supports in their communities, such as food and income support, parks and walking groups, arts and cultural activities or friendly visiting.[1]

Global evidence demonstrates that SP can support individual and population health, build the evidence base on the impacts of social interventions for health promotion and chronic disease prevention and integrate health and social care at the community level.[2] However, while SP practices continue to scale and spread across Canada, and knowledge mobilization is underway through the new Canadian Institute for Social Prescribing,[3] there is relatively little published literature on this novel intervention in Canadian contexts and by Canadian researchers, practitioners and participants.

The objective of this special issue is to identify and share the most current research and practice on SP by and for residents of Canada, particularly those facing inequities in access to health and its social and structural determinants. *Health Promotion and Chronic Disease Prevention in Canada: Research, Policy and Practice* therefore seeks relevant qualitative and quantitative research articles, as well as commentaries, that present new findings, synthesize existing evidence or imagine new ways forward on (for example)

- applications of SP, including those for specific populations or specific types of social interventions;
- policies and systems changes relevant to SP uptake;
- expertise and experiences of SP actors, including participants (patients), health care workers, community organizations and caregivers;
- training, workforce development, collaboration and knowledge mobilization for SP;
- technology, data tracking, evaluation and evidence building in SP; and
- understanding of SP through theoretical frameworks and systems trends.

International submissions will be considered if they include Canadian data, results (e.g. as part of multi-country studies or global comparisons) and/or evidence-based discussion of implications for community or population health in Canada.

Consult the Journal's website for information on article types and detailed submission guidelines for authors. Kindly refer to this call for papers in your cover letter.

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Submission deadline: July 31, 2023.

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