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Editorial

Pulling health promotion and chronic disease prevention from the margins of the global public health agenda—again

Robert Geneau, PhD, Editor-in-Chief, HPCDP Journal

One year into the coronavirus pandemic, and with the rollout of vaccines underway, hope of a gradual return to "normal" life grows by the day. However, what normal will really look like is uncertain, as evidenced by the steady stream of publications speculating about our post-COVID lives, from the future of office work to forthcoming changes to the way we design and build our cities, deliver health care services, and deal with climate change and economic inequalities. "Building back better" is a common refrain among governments and international agencies.[1,2]

There is optimism that the "building back better" mantra will also apply to public health systems, in part through stronger global science diplomacy and, hopefully, new and sustained investments in disease prevention post-COVID. There are calls to reclaim "comprehensive public health" principles,[3] and proposals to further apply and implement a One Health approach[4] and use more integrative thinking by considering how the current pandemic is interlinked with other health conditions and broader determinants of health.[5]

On that ground, arguments have been proposed that COVID-19 should be approached as a syndemic[6,*] rather than as a pandemic, recognizing that "conditions are clustering within social groups according to patterns of inequality deeply embedded in our societies" and that in the case of COVID-19, "attacking [chronic diseases] will be a prerequisite for successful containment."[7,p.874] The most recent report of Canada's Chief Public Health Officer presented well the case for a stronger health equity approach in tackling COVID-19, and noted that "the COVID-19 pandemic has jolted our collective consciousness into recognizing that equity is vital for ensuring health security."[8,p.2]

But there is an air of déjà vu. These calls for renewing our approach to noncommunicable diseases (NCDs) and implementing a more integrated global health agenda have intensified since the first United Nations High-level Meeting on NCDs in 2011, but progress is slow. In 2018, *Time to deliver: report of the WHO Independent High-level Commission on Noncommunicable Diseases* concluded that, globally, we are not on track to reduce, by one-third, premature mortality from NCDs by 2030 (Sustainable Development Goal 3, target 3.4).[9] The Commissioners noted that "there is still a sense of business-as-usual rather than the urgency that is required"[9,p.4] and that, consequently, national and international investments have been insufficient.

If COVID-19 is to bring a new lens or sense of urgency to tackling chronic diseases and the broader determinants of health, what principles or strategies might guide our next steps? A starting point could include the following.

- *We must reframe the conversation around chronic diseases and their underlying causes, and do away with the artificial divide between chronic and infectious diseases.* This is clearly a long journey. The fact that the United Nations Sustainable Development Goals are deeply interconnected is already well recognized, at least among scientists. Increased investments in infectious diseases prevention and control—and these investments are necessary—should not end up causing a decrease in funding for addressing other conditions and the broader determinants of health. A zero-sum game approach would be shortsighted. Promoting and using the term "syndemic" to describe COVID-19 may take us a little further.
- *We need better data.* This statement requires qualification. While we do have data showing that chronic diseases are one of the critical factors associated with COVID-19 deaths and demonstrating the severity of the disease, the gap in the availability of quality disaggregated data about vulnerable populations (e.g. lack of ethnicity-based data) to inform decisions has been exposed. In investigating the wider impact of COVID-19, including the impact of public health measures (e.g. on mental health, problematic substance use, etc.), the importance of longitudinal studies to answer complex research questions has also been on full display. Raised awareness about current gaps may provide momentum to address these shortcomings head on.
- *We can't let the quest for innovation be a distraction from the old, tried-and-true of public health.* While we clearly need vaccines to help us get out of the current COVID-19 crisis—and we should celebrate vaccine innovation in the era

[*] The syndemics model of health focusses on the biosocial complex, which consists of interacting, co-present or sequential diseases and the social and environmental factors that promote and enhance the negative effects of disease interaction.[6]

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of COVID-19—we are also being reminded that vaccines are a vital tool, but not a silver bullet.[10] The same advice holds true in the field of health promotion and chronic disease prevention. A slew of strategies based on mobile technology—under the umbrella of "innovation"—have been used to help people improve health behaviours. These strategies are part of a toolkit, but they must not detract from adopting evidence-based policies for chronic disease prevention. A stronger focus on individual behaviours and responsibility can sometimes detract attention away from addressing more upstream and structural determinants of health.

- *We should be solutions-oriented.* The COVID-19 crisis lends itself to natural experiment studies, for example, on the effects of nonpharmaceutical interventions on the incidence of COVID-19, the wider effects of public health measures or the effects of interventions designed to mitigate the negative consequences of these measures. Natural experiments are still an underused tool to improve public health evidence. The vast majority of the manuscripts submitted to the HPCDP Journal aim to describe the "problem"—measures of disease burden, economic cost of disease, etc.—and this is, of course, of critical importance. What is still lacking is more rigorous studies about the impact of natural policy experiments and population-level interventions. Public health research efforts in the era of COVID-19 may help to solidify the field of population health intervention research.

This is by no means a full and comprehensive assessment of how to ensure that the field of health promotion and chronic disease prevention evolves as part of a wider movement to strengthen public health systems. The COVID-19 series of the HPCDP Journal (with an online-first publication model) remains open. This is a renewed invitation for colleagues in Canada to send us additional manuscripts related to COVID-19, from forward-looking editorials and commentaries to original research papers about the wider impacts of public health measures.

References

1. Bakker P, Elkinton J. To build back better, we must reinvent capitalism. Here's how [Internet]. Geneva (CH): World Economic Forum; 2020 [cited 2021 Jan 25]. Available from: https://www.weforum.org/agenda/2020/07/to-build-back-better-we-must-reinvent-capitalism-heres-how/

2. Department of Finance Canada. Building back better: a plan to fight the COVID-19 recession [Internet]. Ottawa (ON): Government of Canada; 2020 [cited 2021 Jan 25]. Available from: https://budget.gc.ca/fes-eea/2020/themes/building-back-better-rebatir-mieux-en.html

3. Loewenson R, Accoe K, Bajpai N, et al. Reclaiming comprehensive public health. BMJ Glob Health. 2020;5(9): e003886. https://doi.org/10.1136/bmjgh-2020-003886

4. Ruckert A, Zinszer K, Zarowsky C, Labonté R, Carabin H. What role for One Health in the COVID-19 pandemic? Can J Public Health. 2020;111(5): 641-4. https://doi.org/10.17269/s41997-020-00409-z

5. The Lancet. COVID-19: a new lens for non-communicable diseases. Lancet. 2020;396(10252):649. https://doi.org/10.1016/S0140-6736(20)31856-0. Erratum in: Lancet. 2020;396(10254):818. https://doi.org/10.1016/S0140-6736(20)31902-4

6. Singer M, Bulled N, Ostrach B, Mendenhall E. Syndemics and the biosocial conception of health. Lancet. 2017;389(10072):941-50. https://doi.org/10.1016/S0140-6736(17)30003-X

7. Horton R. Offline: COVID-19 is not a pandemic. Lancet. 2020;396(10255): 874. https://doi.org/10.1016/S0140-6736(20)32000-6

8. Public Health Agency of Canada. From risk to resilience: an equity approach to COVID-19. Ottawa (ON): Government of Canada; 2020. 86 p. [Catalogue No.: HP2-10E-PDF].

9. World Health Organization (WHO). Time to deliver: report of the WHO Independent High-level Commission on Noncommunicable Diseases. Geneva (CH): WHO; 2018. 44 p. https://apps.who.int/iris/handle/10665/272710

10. BBC World News. Coronavirus: WHO warns of 'no silver bullet' amid vaccine search [Internet]. London (UK): BBC; 2020. Available from: https://www.bbc.com/news/world-53643455

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Original quantitative research

Are closed campus policies associated with adolescent eating behaviours?

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Abstract

Introduction: The effectiveness of school nutrition regulations may be undermined by food environments surrounding schools. Given challenges in regulating external retail, some have recommended policies that ensure students are unable to leave school property during the day (closed campus policies; CCP). We aimed to examine whether CCP are associated with student eating behaviours.

Methods: We used student and school-administrator survey data from the 60 610 Grades 9 to 12 students and 134 Canadian secondary schools that participated in Year 7 (2018/19) of the COMPASS study. Multiple ordinal regression models tested school CCP as a predictor of weekday dietary behaviours (0–5 days), controlling for student-level (grade, sex, spending money, ethnicity) and school-level (urbanicity, province, area median household income, vending machines) covariates.

Results: CCP were reported by 16 schools. Students who attended CCP schools reported eating lunch purchased from fast food outlets or other restaurants and drinking sugar-sweetened beverages (SSBs; soft drinks and sports drinks; sweetened coffee or tea drinks) on fewer weekdays, but consumed snacks from school vending machines on more weekdays, relative to students at open campus schools. No significant differences were observed in student reports of eating home-packed or school cafeteria lunches or snacks purchased off-campus.

Conclusion: CCP may help improve adolescent diets by reducing SSB and lunchtime fast food consumption on weekdays; however, students already purchasing food may shift from off-campus to within-school options, highlighting the importance of ensuring healthy school food environments and encouraging students to bring home-prepared lunches. Future studies using experimental longitudinal designs are needed to determine the effect of CCP on various health behaviours and outcomes.

Keywords: *school, nutrition policies, open campus policies, adolescents, students, closed campus policies, diet*

Highlights

- This study is the first to explore adolescent dietary behaviours in relation to open and closed campus policies in Canadian schools.
- 16 of 134 participating Canadian secondary schools reported policies prohibiting students from leaving school property during school hours.
- Closed campus policies may improve adolescent diet quality through reduced weekday consumption of sugar-sweetened cold or hot beverages and lunches purchased from fast food or other off-campus restaurant outlets.
- The impact of CCP likely depends on the healthfulness of food available for sale within schools, as students at closed campus schools may shift to purchasing snacks from school vending machines on weekdays.

Introduction

Adolescents represent a key target for population nutrition initiatives. Lifelong health habits become more established over adolescence, a period of increasing autonomy. Relatedly, declines in diet quality occur with age and transitions to secondary school.[1] Few Canadian adolescents meet nutritional guidelines.[2,3] Based on national dietary intake surveys, adolescents aged 14 to 17 years report the poorest nutritional profiles across all age groups.[2,3] Adolescent diets are commonly characterized by fewer servings of fruit, vegetables and whole grains, while "other" foods (i.e. low nutrient, high energy foods) comprise a higher proportion of their total daily caloric intake.[4,5] The primary nutritional concerns for adolescents—including inadequate calcium and fibre, and excess sodium and sugar[5,6]—place them at increased risk of multiple chronic health conditions including diabetes, cardiovascular disease, osteoporosis, dental caries, fatty liver disease and various types of cancer.[5]

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If a socioecological model is applied, factors at multiple levels interact to shape adolescent dietary behaviours, from proximal (e.g. food preferences, family meals, parental role models) to more distal influences (e.g. social norms, family socioeconomic level).[7,8] Determined across levels, the availability and accessibility of food are among the strongest correlates of food choices among adolescents.[9-11] Accordingly, environmental measures (i.e. policies and regulations) appear most effective for promoting population-level change in dietary patterns.[12] School nutrition policies primarily focus on restricting minimally nutritious items and increasing the availability of healthy options for sale in the school environment. Schools are widely recognized as a key context for equitable delivery of interventions, since they are the location where most children and adolescents spend the majority of their waking weekday hours and consume at least one meal per day. In Canada, school nutritional policies are the responsibility of provincial/territorial governments.[4] All 10 Canadian provinces have issued school nutrition policies, but wide variation exists across them (e.g. whether they are voluntary or mandatory in nature).[13]

School nutrition policies are limited to food sold within schools, yet most Canadian secondary schools have an open campus policy, according to which some or all students are permitted to leave the campus during lunchtime. Schools are often within walking distance of food retailers,[14] primarily selling the foods that policies intend to restrict (i.e. low in nutrients, and high in sugar, fat, salt and calories). There tends to be a greater density of fast food restaurants and convenience stores compared to healthier retail food establishments around schools.[15,16] Easy access to fast food restaurants in school areas has been linked with poor dietary intake among adolescents,[17] including increased intake of sugar sweetened beverages (SSB)[18] and fast food,[19,20] although evidence is mixed.[21] Therefore, the effectiveness of school nutrition regulations may be undermined by the surrounding food environment.[20,22]

The off-campus environment is particularly relevant to adolescents, as they are less likely to eat lunch at school.[20,22] A recent study found over one-third of Ontario secondary school students ate meals prepared by fast food restaurants at least once per week.[22] Similarly, in an online survey of youth from seven Canadian provinces, 27.4% reported buying lunch out three or more days a week and another 56.7% on one or two days, while 36.5% bought lunch at school at least once a week.[23] Only 15.9% of students did not buy lunch from a fast food restaurant, convenience store or other off-campus option at all in the previous school week.[23]

Home-prepared lunches are generally the most nutritious option, relative to meals purchased from fast food restaurants and convenience store outlets.[22,23] Among Canadian secondary school students, those who bring a home-packed lunch report better total diet quality, and consume fewer SSBs[24] and more fruit and vegetables[25] and whole grain servings, compared to their peers who purchase lunch from school or off campus.[23,26] For purchased lunches, most studies support school cafeteria food as the healthier alternative to food purchased at fast food or other restaurant or retail options.[22,23,27] Students who eat lunch or snacks purchased at fast food outlets or restaurants report higher consumption of SSBs[24,25,27] and fried foods and greater sodium, sugar and total caloric intakes, than their peers who eat home-packed or school cafeteria lunches.[22,23,27] However, some evidence suggests school-obtained lunches are generally equivalent to food purchased off of school property.[23,26]

Concerns about the external food environment have led to new calls for nutrition regulations to be extended to retail settings in the communities surrounding schools.[20,22] Given the barriers to implementing healthy eating zones around schools, CCP that restrict students from leaving school property during the day have been proposed. While such a policy does not prevent students from purchasing food at nearby food retailers before or after school, adolescents consume approximately one-third of their total energy intake during school hours,[26-28] providing considerable potential to improve student nutrition.

To our knowledge, only one study has examined CCP in association with food purchasing and consumption patterns. In a randomly selected sample of 1088 students from 20 suburban high schools in Minnesota, students at schools with CCP during lunchtime were found to be less likely to eat lunch at a fast food restaurant and consume food purchased at convenience stores than students at schools with open campus policies.[29] Otherwise, the limited number of studies comparing open and closed campus policies have focussed on factors unrelated to diet, including using conditional incentives for academic performance[30] and motor vehicle accident prevention.[31]

Given significant cross-national differences in school and surrounding food environments, further evaluation in the Canadian context is necessary. This study explored student lunch, snack and beverage purchase and consumption patterns on weekdays among a large cohort of Canadian adolescents based on whether they attended secondary schools with open or closed campus policies. We hypothesized that students attending CCP schools would report lower consumption of SSBs and food purchased from off-campus retail outlets, as well as higher purchasing of food from school cafeterias and vending machines (VMs), or, ideally, bringing home-packed lunches more often.

Methods

Design

This study used cross-sectional student- and school-level data from Year 7 (2018/19 school year) of the Cannabis, Obesity, Mental health, Physical activity, Alcohol, Smoking, Sedentary behaviour (COMPASS) study. COMPASS collects hierarchical prospective health data once annually from students in Grades 9 to 12 and the Canadian secondary schools they attend.[32] School boards were purposefully selected based on whether they permitted active-information passive-consent parental permission protocols,[32] which reduce school burden and collect more robust adolescent data.[33] All Grades 9 to 12 students attending participating schools were eligible and could decline at any time. Student-level data were collected using a paper-based survey completed during one classroom period by whole school samples. School-level data were collected via an online survey (COMPASS School Program and Policy Scan [SPP]) at the same time as student data collections. The SPP was designed to assess the presence or absence of policies, practices and resources relevant to student health behaviours in the school environment.[32] The school administrators most knowledgeable about the school program and policy environment

were emailed a link to the survey, and encouraged to consult with other staff members and have a small group complete the SPP to support accuracy of reports. COMPASS staff followed up by phone or email if any data were missing or unclear.

COMPASS received ethics approval from the University of Waterloo, Brock University and participating school boards. Additional details regarding COMPASS recruitment methods[34] and study methods can be found online (www.compass.uwaterloo.ca) or in print.[32]

Weekday dietary behaviours

Students were asked, "In a usual school week (Monday to Friday), on how many days do you do the following? (i) Eat lunch purchased at a fast food place or restaurant; (ii) Eat lunch at school—lunch packed and brought home; (iii) Eat lunch at school—lunch purchased in the cafeteria; (iv) Eat snacks purchased from a VM, corner store, snack bar, or canteen off school property; (v) Eat snacks purchased from a VM in your school; (vi) Drink sugar-sweetened beverages (soda pop, Kool-Aid, Gatorade, etc.) (do not include diet/sugar-free drinks); and (vii) Drink coffee or tea with sugar (include cappuccino, Frappuccino, iced-tea, iced-coffees, etc.)." Response options "None" to "5 days" were coded 0 to 5 as an ordinal outcome.

School-level measures

To classify schools as either open or closed campuses, the SPP included the following item: "Does your school have a CCP whereby students are generally not allowed to leave school property during breaks in the day (except for school-related activities/events, or personal appointments)?" Schools responding "yes" were classified as having CCP. Schools responding "no" were assumed to have an open campus.

Covariates

Student-level covariates included sex (male, female, no response), grade (9, 10, 11, 12, no response), ethnicity (White, Black, Asian, Latinx, other/mixed/missing) and money available weekly for spending or saving from allowance or part-time employment (zero; $1–$20; $21–$100; $100 + ; I do not know).

School-level covariates included province (Alberta, British Columbia, Ontario, Quebec), urbanicity and school-area median household income. School postal codes were cross-referenced with data from Statistics Canada to determine median average household income (≤ CAD 50 000; 50 001–75 000; 75 001–100 000; > 100 000) and urbanicity of the school location. Schools were classified as located in rural (with a population < 1000 or a density < 400 people per square kilometre), small urban (with a population from 1000–29 999), medium urban (30 000–99 999) or large urban (100 000 +) areas. Given that the number of fast food retailers differs according to population size and density, with more retailers with increasing levels of urbanicity,[19,35,36] urbanicity was included as a proxy of the food retail environment surrounding schools. Models for SSB intake (including soft drinks and sports drinks, and sugar-sweetened coffee and tea drinks) and snack purchasing outcomes also controlled for the number of snack and beverage VMs available to students and located within schools, which were assessed by trained research staff during school data collections.

Statistical analysis

All analyses were implemented in SAS version 9.4 (SAS Institute Inc., Cary, NC, USA). Descriptive statistics were calculated for students attending schools with and without CCP by using procedures PROC FREQ and PROC TTEST. Regression models were used to test whether attending schools with CCP predicted student weekday eating behaviours, controlling for student-level (i.e. sex, grade, ethnicity, weekly spending money) and school-level (i.e. urbanicity, median household income, province) covariates.

Outcomes were treated as ordinal, since the provided response options were naturally ordered, and smaller Akaike Information Criterion (AIC) values indicated that multiple ordinal regression models were more appropriate than multiple linear regression models. Also, using PROC GLM to analyze data as continuous, the residual plots failed to meet the normality assumption. To test the proportional odds assumption, we assumed different slopes by specifying the UNEQUALSLOPES option and tested whether those slopes were the same in PROC LOGISTIC. The results for five of eight models indicated that this assumption was upheld, but it was violated for the lunch brought from home, school cafeteria lunch and snacks from school vending machine outcomes. However, the estimates under EQUALSLOPES and UNEQUALSLOPES were found to be comparable for these three outcomes. Ordinal models were chosen for ease of interpretation, using the same model for the eight separate outcomes.

Intraclass correlation coefficients (ICCs) were estimated by treating the outcomes as continuous to indicate the variance explained by school clustering. The school-level ICCs were as follows: 0.105 for lunch brought from home, 0.136 for school cafeteria lunch, 0.102 for fast food/restaurant lunch, 0.061 for school VM snack, 0.028 for snacks purchased off of school property, 0.018 for sugar-sweetened soft drinks and sports drinks and 0.049 for coffee or tea with sugar. PROC GENMOD was used for regression analyses, with school ID identified as the clustering variable and specifying independent working correlation structure to account for within-school correlations.

Adjusted results are reported for all models. No interactions by grade and urbanicity were found when tested (results not shown).

Results

Sample

Sample descriptives are presented in Table 1. A total of 74 501 students at 134 secondary schools (15 British Columbia [BC], 8 Alberta, 61 Ontario, 52 Quebec) participated in Year 7 (2018/19) of the COMPASS study (84.2% response rate). Quebec students in Secondary I/II (equivalent to Grades 7/8) were removed (n = 13 891), leaving 60 610 students. Quebec students in Secondary III, IV and V were classified as Grades 9, 10 and 11, respectively. Students with missing outcome data were removed from the relevant model, thus the number of missing students removed from models varied by the outcome (3049 were missing data on home-packed lunches; 2646 for cafeteria lunches; 2479 for fast food or other restaurant lunches; 2319 for school VM snacks; 2483 for snacks purchased off of school property; 2504 for sugar-sweetened soft drinks and sports drinks; 2462 for sugar-sweetened coffee or tea). Students with missing covariates (n = 1175) were retained in the analysis

TABLE 1
Descriptive statistics for students in 134 Canadian secondary schools with open and closed campus policies, 2018/19

Sociodemographic variables		Campus policies		
		Open	Closed	*p*-value
		% (N)	% (N)	
Sex	Female	49.1 (26 495)	49.1 (3241)	0.6952
	Male	49.6 (26 804)	49.8 (3287)	
	No response	1.3 (705)	1.2 (78)	
Grade	9	28.4 (15 323)	29.8 (1971)	0.002
	10	28.5 (15 369)	27.7 (1832)	
	11	26.2 (14 149)	27.1 (1791)	
	12	15.6 (8427)	14.1 (930)	
	No response	1.4 (736)	1.2 (82)	
Ethnicity	White	65.1 (35 154)	64.2 (4242)	< 0.0001
	Black	3.9 (2120)	5.8 (384)	
	Asian	12.2 (6615)	10.0 (662)	
	Latinx	2.8 (1535)	2.7 (177)	
	Other/mixed/missing	15.9 (8580)	17.3 (1141)	
Weekly money available for spending/saving	None	15.2 (8104)	16.6 (1082)	< 0.0001
	$1–$20	22.4 (11 954)	22.4 (1459)	
	$21–$100	24.5 (13 062)	23.9 (1555)	
	> $100	22.8 (12 121)	19.2 (1250)	
	I don't know	15.1 (8029)	17.9 (1168)	
Province	Alberta	3.7 (244)	5.7 (3057)	< 0.0001
	British Columbia	3.8 (250)	18.8 (10 152)	
	Ontario	63.6 (4204)	49.0 (26 471)	
	Quebec	28.9 (1908)	26.5 (14 324)	
Urbanicity	Large urban	57.3 (30 920)	42.5 (2806)	< 0.0001
	Medium urban	12.0 (6502)	16.2 (1071)	
	Rural	1.1 (603)	17.6 (1164)	
	Small urban	29.6 (15 979)	23.7 (1565)	
School area median household income (CAD)	$25 000–$50 000	14.0 (7537)	0.0 (2)	< 0.0001
	$50 001–$75 000	57.6 (31 126)	59.4 (3922)	
	$75 001–$100 000	23.9 (12 890)	14.7 (973)	
	> $100 000	4.5 (2451)	25.9 (1709)	
Number of school snack vending machines	0	25.4 (13 719)	19.2 (1268)	< 0.0001
	1	35.5 (19 165)	48.5 (3201)	
	2	32.6 (17 588)	20.5 (1357)	
	3	6.5 (3532)	0 (0)	
	4	0 (0)	11.8 (780)	
Number of school beverage vending machines	0	9.9 (5336)	6.2 (409)	< 0.0001
	1	23.5 (12 713)	38.1 (2520)	
	2	30.5 (16 464)	17.9 (1181)	
	3	18.4 (9940)	9.8 (645)	
	4	10.9 (5905)	0 (0)	
	5	4.5 (2429)	28.0 (1851)	
	6	2.3 (1217)	0 (0)	

Note: Data are from Year 7 (2018/19) of the COMPASS Study.[32]

and their missing responses were coded as missing/nonresponse.

CCP were reported by 16 secondary schools, including 8 in Ontario (2 private, 6 public), a private school in BC, a public school in Alberta and six Quebec schools (3 private, 3 public). The 16 secondary schools were located in rural (n = 3) and small (n = 4), medium (n = 3) and large (n = 6) urban areas.

Ordinal regression models

Figure 1 shows student-reported dietary measures by presence or absence of CCP. Tables 2 to 4 show adjusted regression model results with student- and school-level covariates.

Differences by student- and school-level covariates

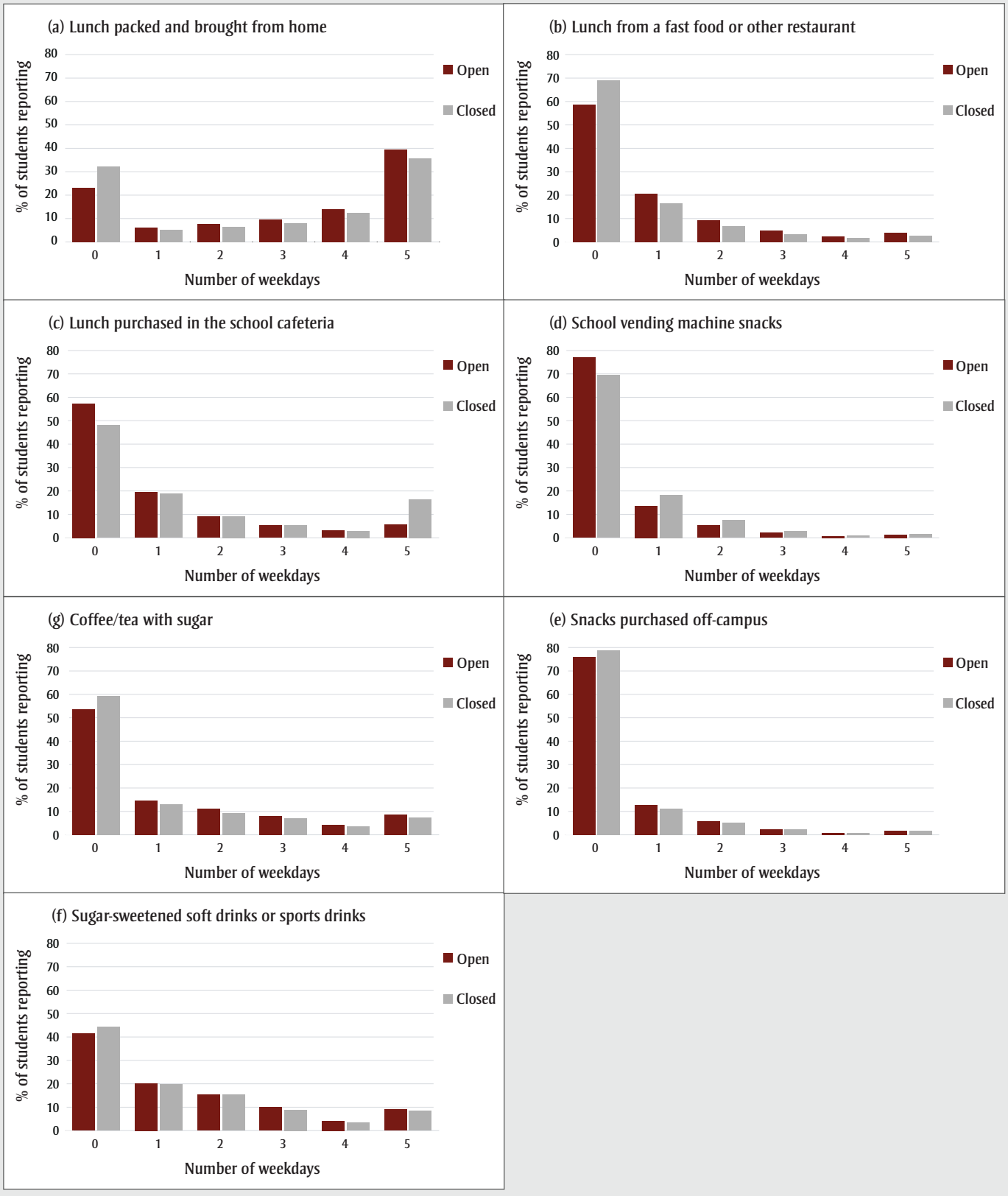
Students in Grades 11 and 12 were more likely to purchase lunch from external sources, and less likely to eat home-packed or cafeteria lunches and to purchase snacks from retailers off of school property, on more weekdays than Grade 9 students. Students in Grade 10 were less likely to eat cafeteria lunches than Grade 9 students. In terms of SSB, students in Grades 10 to 12 were more likely to consume sweetened tea or coffee drinks, but less likely to consume soft drinks or sports drinks, on more weekdays than Grade 9 students.

Students identifying as Black, Latinx or other/mixed ethnicity were less likely than White students to eat a home-packed lunch and more likely to eat lunch from fast food restaurants and snacks from school VMs. Students of Black or other/mixed ethnicity were also more likely to consume SSB and snacks from off-campus retail locations on more weekdays than White students.

Males were less likely to bring a home-packed lunch and more likely to consume fast food lunches, school VM snacks and soft drinks or sports drinks, while females consumed sweetened coffee or tea drinks on more weekdays.

Students with any amount of spending money were less likely to bring a home-packed lunch, and more likely to purchase lunch and snacks within school or off-campus and to consume SSBs on more weekdays than their peers without spending money.

FIGURE 1
Percentage of students reporting frequency (0-5 weekdays) of selected eating behaviours at open and closed campus schools, 2018/19



Note: Data are from Year 7 (2018/19) of the COMPASS Study.[32]

TABLE 2
Models examining attending closed campus schools (versus open) and weekday lunch behaviours (0–5 days) in students at 134 Canadian secondary schools, 2018/19

	Ate home-packed lunch at school		Purchased lunch in school cafeteria		Purchased lunch in a fast food or other restaurant	
	Est.	95% CI	Est.	95% CI	Est.	95% CI
Sex (ref: Female)						
Male	−0.12***	−0.17, −0.07	−0.01	−0.08, 0.07	0.40***	0.35, 0.46
No response	−0.33**	−0.55, −0.11	−0.02	−0.23, 0.19	0.29	0.04, 0.55
Grade (ref: 9)						
10	−0.02	−0.07, 0.03	−0.09**	−0.16, −0.02	0.05	−0.03, 0.12
11	−0.07*	−0.12, −0.02	−0.14***	−0.22, −0.07	0.11*	0.02, 0.20
12	−0.25***	−0.33, −0.17	−0.42***	−0.54, −0.31	0.35***	0.23, 0.46
No response	−0.22	−0.44, 0.00	−0.06	−0.26, 0.15	0.43***	0.19, 0.67
Ethnicity (ref: White)						
Black	−0.63***	−0.75, −0.50	0.65***	0.51, 0.79	0.82***	0.68, 0.96
Asian	−0.08	−0.22, 0.05	0.55***	0.39, 0.71	−0.01	−0.18, 0.16
Latinx	−0.22***	−0.33, −0.12	0.31***	0.19, 0.43	0.33***	0.20, 0.47
Other/mixed/missing	−0.34***	−0.40, −0.27	0.25***	0.14, 0.35	0.32***	0.24, 0.41
Weekly spending money (CAD) (ref: $0)						
$1–$20	−0.31***	−0.37, −0.25	0.63***	0.55, 0.71	0.79***	0.71, 0.87
$21–$100	−0.62***	−0.70, −0.53	0.87***	0.78, 0.96	1.19***	1.11, 1.28
> $100	−0.71***	−0.80, −0.63	0.80***	0.69, 0.90	1.39***	1.32, 1.47
I don't know	−0.16***	−0.22, −0.10	0.45***	0.36, 0.53	0.64***	0.56, 0.72
School-area median household income (CAD) (ref: $25 000–$50 000)						
$50 001–$75 000	−0.35**	−0.59, −0.10	0.47***	0.23, 0.72	−0.07	−0.48, 0.33
$75 001–$100 000	−0.15	−0.42, 0.13	0.33*	0.02, 0.64	−0.14	−0.63, 0.36
> $100 000	−0.28	−0.58, 0.02	0.25	−0.19, 0.69	−0.22	−0.76, 0.32
Province (ref: Ontario)						
Alberta	−0.05	−0.29, 0.18	−0.02	−0.40, 0.37	0.24	−0.10, 0.58
British Columbia	0.34***	0.14, 0.54	−0.25	−0.52, 0.01	−0.37**	−0.64, −0.10
Quebec	0.62***	0.39, 0.85	−0.16	−0.43, 0.11	−0.95***	−1.27, −0.64
Urbanicity (ref: Large urban)						
Medium urban	−0.03	−0.28, 0.21	−0.08	−0.46, 0.31	0.20	−0.13, 0.52
Rural	−0.01	−0.42, 0.39	0.04	−0.66, 0.75	−0.16	−0.94, 0.63
Small urban	−0.35**	−0.56, −0.13	0.36**	0.11, 0.61	0.27	0.00, 0.55
Closed campus policy (ref: No)						
Yes	−0.23	−0.62, 0.16	0.46	−0.04, 0.97	−0.45**	−0.75, −0.14

Abbreviations: CAD, Canadian dollars; CI, confidence interval; Est., estimate.

Note: All models adjusted for school clustering. Adjusted results are reported. Data are from Year 7 (2018/19) of the COMPASS Study.[32]

*$p < 0.05$

**$p < 0.01$

***$p < 0.001$

At the school level, the number of snack VMs was positively associated with students purchasing snacks from school VMs on more days, but not with snacks purchased from off-campus options. Conversely, school drink VMs were not associated with weekday SSB consumption.

Geographically, frequently eating a home-prepared lunch was more common in BC and Quebec schools than in Ontario, while purchasing lunch at a fast food outlet or other restaurant was less frequent. Relative to Ontario, at Quebec, BC and Alberta schools, students purchased snacks from school VMs on more weekdays, and students in Alberta and BC schools also purchased off-campus snacks more often. Students in Alberta schools were more likely than Ontario students to report soft drink or sports drink consumption, while students in BC and Quebec schools were

TABLE 3
Models examining attending closed campus schools (versus open) and weekday snack behaviours (0–5 days) in students at 134 Canadian secondary schools, 2018/19

	Purchased snacks from school vending machines		Purchased snacks from off-campus retail	
	Est.	95% CI	Est.	95% CI
Sex (ref: Female)				
Male	0.11**	0.04, 0.18	0.38***	0.31, 0.44
No response	0.29*	0.04, 0.55	0.51***	0.24, 0.79
Grade (ref: 9)				
10	−0.20***	−0.27, −0.12	−0.06	−0.13, 0.00
11	−0.39***	−0.48, −0.30	−0.22***	−0.29, −0.15
12	−0.70***	−0.84, −0.56	−0.38***	−0.48, −0.29
No response	0.28*	0.03, 0.53	0.27**	0.07, 0.48
Ethnicity (ref: White)				
Black	0.63***	0.51, 0.75	0.64***	0.53, 0.75
Asian	0.06	−0.12, 0.25	0.03	−0.10, 0.16
Latinx	0.27***	0.13, 0.40	0.12*	0.00, 0.25
Other/mixed/missing	0.22***	0.11, 0.33	0.24***	0.16, 0.32
Weekly spending money (CAD) (ref: $0)				
$1–$20	0.61***	0.52, 0.69	0.65***	0.58, 0.73
$21–$100	0.75***	0.66, 0.84	0.80***	0.72, 0.88
> $100	0.70***	0.61, 0.78	0.87***	0.87, 0.79
I don't know	0.43***	0.34, 0.52	0.47***	0.39, 0.55
School-area median household income (CAD) (ref: $25 000–$50 000)				
$50 001–$75 000	0.32*	0.02, 0.61	−0.06	−0.30, 0.17
$75 001–$100 000	0.34	−0.07, 0.75	−0.29	−0.61, 0.03
> $100 000	0.17	−0.30, 0.63	−0.39	−0.77, 0.00
Province (ref: Ontario)				
Alberta	0.97***	0.53, 1.41	0.62***	0.35, 0.89
British Columbia	0.64**	0.21, 1.06	0.42**	0.16, 0.67
Quebec	0.50***	0.25, 0.74	0.08	−0.13, 0.29
Urbanicity (ref: Large urban)				
Medium urban	−0.08	−0.43, 0.26	−0.05	−0.29, 0.20
Rural	0.10	−0.39, 0.59	0.00	−0.76, 0.75
Small urban	0.19	−0.04, 0.43	0.00	−0.20, 0.21
Number of school VMs				
Snack VMs (0–4)	0.34***	0.20, 0.48	0.01	−0.10, 0.12
Beverage VMs (0–6)	0.03	−0.08, 0.13	−0.02	−0.08, 0.04
Closed campus policy (ref: No)				
Yes	0.42**	0.11, 0.74	0.00	−0.37, 0.37

Abbreviations: CAD, Canadian dollars; CI, confidence interval; Est., estimate; VMs, vending machines.
Notes: All models adjusted for school clustering. Adjusted results are reported. Data are from Year 7 (2018/19) of the COMPASS Study.[32]
*$p < 0.05$
**$p < 0.01$
***$p < 0.001$

less likely. Similarly, consumption of sugar-sweetened coffee or tea was more often reported by Alberta students and less often by Quebec students, relative to students in Ontario schools. No provincial differences resulted in the likelihood of students eating a cafeteria-prepared lunch.

Students in small urban areas were less likely to bring a home-packed lunch and more likely to consume cafeteria-purchased lunches and soft drinks or sports drinks on more weekdays than those attending schools in larger urban areas. Urbanicity had no impact on snack purchases, fast food or other restaurant lunches or sweetened coffee or tea drinks.

Finally, students attending schools in areas with median household incomes of $50 001 to $75 000 were less likely to bring home-packed lunches and more likely to buy cafeteria lunches on more weekdays than those attending schools in lower-income areas.

Closed versus open campus policies

There was no difference in the number of weekdays on which students would be likely to eat home-packed lunches (estimate [est.] −0.23, 95% CI: −0.62 to 0.16) or snacks purchased off of school property (est. 0.00, 95% CI: −0.37 to 0.37), based on whether they attended a school with open or closed campus policies. Attending a CCP school was associated with a higher likelihood of eating snacks purchased from school VMs on more days (est. 0.42, 95% CI: 0.11 to 0.74), and a lower likelihood of eating lunch purchased from a fast food place or other restaurant off of school property (est. −0.45, 95% CI: −0.75 to −0.14). Finally, students attending CCP schools were less likely to consume SSBs, including soft drinks and sports drinks (est. −0.18, 95% CI: −0.29 to −0.07) and coffee or tea drinks with sugar (est. −0.17, 95% CI: −0.28 to −0.07]) on more weekdays than their peers at open campus schools.

Discussion

Only 16 of the 134 Ontario, Alberta, Quebec and BC participating secondary schools reported CCP, under which students were not allowed to leave school property during breaks in the day. Consistent with our hypotheses, students at CCP schools were more likely to eat snacks from school VMs, and less likely to

TABLE 4
Models examining attending closed campus schools (versus open) and weekday sugar-sweetened beverage consumption (0–5 days) in students at 134 Canadian secondary schools, 2018/19

	Sugar-sweetened soft drinks or sports drinks		Sugar-sweetened coffee/tea drinks	
	Est.	95% CI	Est.	95% CI
Sex (ref: Female)				
Male	0.60***	0.56, 0.64	−0.63***	−0.67, −0.58
No response	0.60***	0.39, 0.81	−0.36**	−0.60, −0.13
Grade (ref: 9)				
10	−0.12***	−0.16, −0.08	0.09***	0.04, 0.14
11	−0.22***	−0.27, −0.17	0.19***	0.14, 0.25
12	−0.33***	−0.38, −0.27	0.32***	0.25, 0.39
No response	0.00	−0.19, 0.19	0.46***	0.25, 0.67
Ethnicity (ref: White)				
Black	0.58***	0.47, 0.68	0.06	−0.05, 0.18
Asian	−0.07	−0.16, 0.01	−0.05	−0.14, 0.03
Latinx	0.06	−0.04, 0.17	0.12	−0.01, 0.25
Other/mixed/missing	0.16***	0.10, 0.23	0.25***	0.19, 0.31
Weekly spending (CAD) money (ref: $0)				
$1–$20	0.36***	0.31, 0.41	0.35***	0.29, 0.41
$21–$100	0.48***	0.42, 0.54	0.59***	0.53, 0.66
> $100	0.52***	0.46, 0.59	0.74***	0.67, 0.80
I don't know	0.31***	0.25, 0.37	0.31***	0.24, 0.37
School-area median household income (CAD) (ref: $25 000–$50 000)				
$50 001–$75 000	0.08*	0.00, 0.16	0.05	−0.08, 0.17
$75 001–$100 000	0.03	−0.06, 0.12	0.00	−0.14, 0.13
> $100 000	0.05	−0.11, 0.20	−0.01	−0.19, 0.16
Province (ref: Ontario)				
Alberta	0.23*	0.03, 0.43	0.24**	0.09, 0.39
British Columbia	−0.27***	−0.37, −0.16	−0.05	−0.18, 0.08
Quebec	−0.24***	−0.32, −0.16	−0.90***	−1.00, −0.80
Urbanicity (ref: Large urban)				
Medium urban	0.11*	0.01, 0.21	0.06	−0.06, 0.18
Rural	0.18	−0.02, 0.37	−0.14	−0.35, 0.08
Small urban	0.17***	0.09, 0.26	0.08	0.00, 0.17
Number of school VMs				
Beverage VMs (0–6)	−0.02	−0.04, 0.00	−0.01	−0.04, 0.02
Closed campus policy (ref: No)				
Yes	−0.18***	−0.29, −0.07	−0.17***	−0.28, −0.07

Abbreviations: CAD, Canadian dollars; CI, confidence interval; Est., estimate; VMs, vending machines.

Notes: All models adjusted for school clustering. Adjusted results are reported. Data are from Year 7 (2018/19) of the COMPASS Study.[32]

*$p < 0.05$

**$p < 0.01$

***$p < 0.001$

drink SSBs (soft drinks, sports drinks or sweetened coffee/tea drinks) and purchase lunch from fast food or other restaurants on weekdays, than their peers attending schools with open campuses. However, the likelihood of bringing a home-packed lunch to school, purchasing lunch in the school cafeteria or eating snacks from convenience stores or similar off-campus retailers did not differ significantly based on attendance at open or closed campus schools. Therefore, while prospective studies are needed to examine within-student changes after policy implementation, cross-sectional results align with evidence from the United States[29] suggesting CCP may help improve adolescent diets by preventing the external food retail environment from compromising school nutrition policies.

Given the increased likelihood of purchasing snacks from school VMs, but no association with the frequency of home-prepared lunches, CCP may lead only those students already purchasing food to shift from buying lunch at off-campus sources to options available for sale in schools. Consequently, the influence of the school food environment on student diets is likely heightened in CCP schools. However, existing research indicates many schools are not compliant with nutrition policies on the food and beverages for sale in cafeterias or VMs.[3,37-40] In Canada, with school food regulation purely market-based in school cafeterias and restricted to within-school sales, student access to external retail is recognized as a key barrier to healthful school nutrition environments;[41] hence, CCP may serve to support policy adherence by reducing competitive sources that undermine financial viability of school cafeterias. Moreover, CCP represent a cost-effective intervention for schools, with potential revenue gains for school cafeterias (but also potential losses for surrounding businesses).

Results also suggest that spending money is the largest determinant of adolescent dietary behaviours on school days among the variables considered. Students with any amount of spending money were less likely to bring a home-packed lunch and more likely to consume SSBs and purchase lunch or snacks from in-school or off-campus sources on more weekdays than their peers without spending money. Results support the importance of considering students' purchasing power, in addition to household or area-level socioeconomic

status, as lower family socioeconomic status has typically been associated with poorer adolescent diet quality (e.g. greater fast food[19] and SSB[42] intake). Canada remains one of the few industrialized countries without a national universal school food program, which would give all students access to healthy food during the school day at no cost to them.

Consistent with previous research,[29] VM availability within schools was positively associated with students purchasing snacks from school VMs. Conversely, school drink VMs were not associated with weekday SSB consumption, which may be expected given the regulation of school SSB sales, yet issues with compliance appear common.[39] Previous studies have found greater SSB consumption in association with availability in schools.[18,43]

As expected, with increased autonomy, students in Grades 10 to 12 were more likely to purchase lunch from outside sources on more days, and less likely to eat a home-packed or cafeteria lunch; however, contrary to expectation, they purchased snacks from convenience stores and external retail options less often than Grade 9 students. Unlike lunch, it is plausible that weekday snacks may have been purchased before or after school. Purchasing behaviours outside of school hours may also explain the lack of association between CCP and snack purchases from off-campus retail. In contrast, Neumark-Sztainer et al. found students at suburban US schools with CCP during lunchtime were less likely to eat food purchased at convenience stores than students at open campus schools.[29] Other researchers have noted that CCP would not be effective in preventing students from purchasing food at nearby food retailers before or after school.[20] While this may be the case, particularly for snacks, these preliminary cross-sectional results suggest an overall reduction in SSB consumption and fast food or other restaurant lunches during the school week; and given that at least one-third of students' total caloric consumption occurs during school hours,[27,44,45] improving their lunchtime meal has considerable potential to advance population nutrition.

Home-prepared lunches are generally associated with healthier diets than purchased options from either school cafeterias or fast food or other restaurants;[25] however, prohibiting students from leaving campus does not appear to encourage more students to bring their lunch from home. In a photovoice study, high school students who brought a home-packed lunch perceived it to be a healthier, affordable and convenient option that permitted autonomy, while students who went off campus to purchase food reported the proximity, low cost, space for social interaction and perceived higher food quality as reasons.[46] Youth voice a desire for healthier options at schools and to be involved in the decision making about what foods are offered for sale in schools,[46] which could be a critical consideration for policy implementation. Schools considering CCP should explore how they can engage students in the process.

Beyond food, students emphasize the importance of the places and spaces available to eat and socialize safely and comfortably during lunch.[46] School cafeterias are considered loud and chaotic,[46] with long lines to purchase food or use microwaves deterring students from staying at school for lunch.[47] In response, some researchers have suggested changing staggered lunch hours and creating more youth-friendly spaces outside.[47] In fact, one reason for open campus polices is to reduce cafeteria congestion during lunch.[31] Schools with walkable neighbourhoods and food retailers in close proximity are more likely to have open campuses.[48] Another motive is to support adolescents' autonomy and independence. In US schools that switched from closed to open campus environments, Grade 11 and 12 students felt more control over their environment than their peers at closed campuses; however, some students also reported disciplinary problems, poorer grades, less school spirit and reductions in their social life both in and out of school.[49] Future research is needed to compare positive and negative effects of open and closed campus policies on various behavioural, social and mental outcomes.

Strengths and limitations

This study is the first to evaluate adolescent dietary behaviours in relation to open or closed campus policies in Canadian schools. A key strength of this study is the data at student- and school-levels in varied contexts in four Canadian provinces. However, several limitations require consideration.

First, while the large sample and favourable response rate support generalizability, COMPASS was not designed to be representative.

Second, missing data for the outcomes may have biased the results. Given the large sample size, minimal amount of missing data, and the non-sensitive nature of the eating behaviour questions, however, we believe that the impact of these missing data was minimal. We were also able to retain many students in the analysis by including missing covariate data (sex, grade, ethnicity) as valid response options.

Third, additional confounders that were not controlled for may have contributed to the differences found in this study. For instance, while area urbanicity, province, median household income and the number of within-school VMs were controlled for, the study does not account for differences in the surrounding food environment. Urbanicity may not perfectly represent the variation in food retail environments surrounding schools.

Fourth, the primary limitations of this study are the use of cross-sectional data and self-reported dietary measures. Future studies should use prospective and quasi-experimental designs to test whether students transition from purchasing food off-campus to within the school after a closed campus policy is implemented. Student-reported behaviours and school administrator–reported policies introduce possible recall and social desirability biases. Also, the dietary measures are limited to assessing the number of days that students engaged in the behaviour indicated, and do not account for frequency per day.

Fifth, the SSB and snack measures assess weekday consumption and purchasing, but do not indicate when during the day the purchase was made (i.e. during school hours or before or after school); however, knowing overall weekday consumption is more important to determine nutritional impact.

Conclusion

In Canada, the food environments surrounding schools are key barriers to successful implementation of school nutrition policies, as these spaces fall outside the

jurisdiction of provincial/territorial regulations.[14,41] CCP have the potential to protect adolescents from food environments in close proximity to schools and improve their diet quality, including reduced weekday consumption of SSB and lunches from fast food or other restaurants, but otherwise, the impact on diet quality may depend on the food available for sale within schools. Students already purchasing food may shift from off-campus retail choices to within-school options, highlighting the importance of ensuring healthy school food environments and/or encouraging students to bring home-prepared lunches. Future studies using experimental longitudinal designs are needed to determine the effect of school CCP on student nutrition, various other health behaviours and social, mental and academic outcomes.

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Conflicts of interest

The authors declare that they have no conflicts of interest.

Authors' contributions and statement

KAP and AGC conceptualized the manuscript. KAP led the writing and wrote the first draft. MM assisted with the literature review. WQ conducted the statistical analysis. STL is the lead of the COMPASS study. All authors (KAP, AGC, WQ, MM, MV, STL) informed the design of the study, contributed to the interpretation of results, provided feedback on drafts and approved the final version of the manuscript.

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References

1. Winpenny EM, Corder KL, Jones A, Ambrosini GL, White M, van Sluijs EM. Changes in diet from age 10 to 14 years and prospective associations with school lunch choice. Appetite. 2017;116:259-67. https://doi.org/10.1016/j.appet.2017.05.012

2. Garriguet D. Canadians' eating habits. Health Rep. 2007;18(2):17-32. Available from: https://www150.statcan.gc.ca/n1/fr/pub/82-003-x/2006004/article/habit/9609-eng.pdf?st = CioNZJZP

3. Garriguet D. Diet quality in Canada. Health Rep. 2009;20(3):1-12. Available from: https://www150.statcan.gc.ca/n1/fr/pub/82-003-x/2009003/article/10914-eng.pdf?st = f7n9d-UF

4. Tugault-Lafleur CN, Black JL. Differences in the quantity and types of foods and beverages consumed by Canadians between 2004 and 2015. Nutrients. 2019;11(3):526. https://doi.org/10.3390/nu11030526. Erratum in: Nutrients. 2019;11(9);2160. https://doi.org/10.3390/nu11092160

5. Manson H, Rabeneck L, Leatherdale ST, Hyndman B, Allison K, Drayton M, Cancer Care Ontario, Ontario Agency for Health Protection and Promotion (Public Health Ontario). Taking action to prevent chronic disease: recommendations for a healthier Ontario. Toronto (ON): Queen's Printer for Ontario; 2012. 104 p.

6. Critch JN. School nutrition: support for providing healthy food and beverage choices in schools. Paediatrics & Child Health. 2020;25(1):33-38. https://doi.org/10.1093/pch/pxz102

7. Bronfenbrenner U. Ecology of the family as a context for human development: research perspectives. Dev Psychol. 1986;22(6):723-42. https://doi.org/10.1037/0012-1649.22.6.723

8. Story M, Neumark-Sztainer D, French S. Individual and environmental influences on adolescent eating behaviors. J Am Diet Assoc. 2002;102(3):S40-S51. https://doi.org/10.1016/S0002-8223(02)90421-9

9. Neumark-Sztainer D, Story M, Perry C, Casey MA. Factors influencing food choices of adolescents: findings from focus-group discussions with adolescents. J Am Diet Assoc. 1999;99(8):929-37. https://doi.org/10.1016/S0002-8223(99)00222-9

10. Neumark-Sztainer D, Wall M, Perry C, Story M. Correlates of fruit and vegetable intake among adolescents: findings from Project EAT. Prev Med. 2003;37(3):198-208. https://doi.org/10.1016/s0091-7435(03)00114-2

11. Terry-McElrath YM, O'Malley PM, Johnston LD. Accessibility over availability: associations between the school food environment and student fruit and green vegetable consumption. Child Obes. 2014;10(3):241-50. https://doi.org/10.1089/chi.2014.0011

12. Story M, Kaphingst KM, Robinson-O'Brien R, Glanz K. Creating healthy food and eating environments: policy and environmental approaches. Annu Rev Public Health. 2008;29:253-72. https://doi.org/10.1146/annurev.publhealth.29.020907.090926

13. Godin K, Kirkpatrick SI, Hanning RM, Stapleton J, Leatherdale ST. Examining guidelines for school-based breakfast programs in Canada: a systematic review of the grey literature. Can J Dietetic Pract Res. 2017;78(2):92-100. https://doi.org/10.3148/cjdpr-2016-037

14. Holmes, S. 2019. The incompatibility of nutrition regulation and market-based internal school food environments in English-speaking Canada. Int J Soc Agric Food. 2019;25(1):59-78. https://doi.org/10.48416/ijsaf.v25i1.14

15. Austin SB, Melly SJ, Sanchez BN, Patel A, Buka S, Gortmaker SL. Clustering of fast-food restaurants around schools: a novel application of spatial statistics to the study of food environments. Am J Public Health. 2005;95(9):1575-81. https://doi.org/10.2105/AJPH.2004.056341

16. Day PL, Pearce JR. Obesity-promoting food environments and the spatial clustering of food outlets around schools. Am J Prev Med. 2011;40(2):113-21. https://doi.org/10.1016/j.amepre.2010.10.018

17. Davis B, Carpenter C. Proximity of fast-food restaurants to schools and adolescent obesity. Am J Public Health. 2009;99(3):505-10. https://doi.org/10.2105/AJPH.2008.137638

18. Godin KM, Chaurasia A, Hammond D, Leatherdale ST. Food purchasing behaviors and sugar-sweetened beverage consumption among Canadian secondary school students in the COMPASS Study. J Nutr Educ Behav. 2018;50(8):803-12.e1. https://doi.org/10.1016/j.jneb.2017.12.014

19. Laxer RE, Janssen I. The proportion of excessive fast-food consumption attributable to the neighbourhood food environment among youth living within 1 km of their school. Appl Physiol Nutr Metab. 2014;39(4):480-6. https://doi.org/10.1139/apnm-2013-0208

20. Seliske L, Pickett W, Rosu A, Janssen I. The number and type of food retailers surrounding schools and their association with lunchtime eating behaviours in students. Int J Behav Nutr Phys Act. 2013;10:19. https://doi.org/10.1186/1479-5868-10-19

21. Williams AJ, Henley WE, Williams CA, Hurst AJ, Logan S, Wyatt KM. Systematic review and meta-analysis of the association between childhood overweight and obesity and primary school diet and physical activity policies. Int J Behav Nutr Phys Act. 2013;10:101. https://doi.org/10.1186/1479-5868-10-101

22. Hanning RM, Luan H, Orava TA, Valaitis RF, Jung JKH, Ahmed R. Exploring student food behaviour in relation to food retail over the time of implementing Ontario's school food and beverage policy. Int J Env Res Public Health. 2019;16(14):2563. https://doi.org/10.3390/ijerph16142563

23. Acton RB, Nguyen N, Minaker LM. School food policies and student eating behaviors in Canada: examination of the 2015 Cancer Risk Assessment in Youth survey. J School Health. 2018;88(12):936-44. https://doi.org/10.1111/josh.12702

24. Godin KM, Hammond D, Chaurasia A, Leatherdale ST. Examining changes in school vending machine beverage availability and sugar-sweetened beverage intake among Canadian adolescents participating in the COMPASS study: a longitudinal assessment of provincial school nutrition policy compliance and effectiveness. Int J Behav Nutr Phys Act. 2018;15(1):121. https://doi.org/10.1186/s12966-018-0754-5

25. Jones AC, Hammond D, Reid JL, Leatherdale ST. Where should we eat? Lunch source and dietary measures among youth during the school week. Can J Diet Pract Res. 2015;76(4):157-65. https://doi.org/10.3148/cjdpr-2015-019

26. Tugault-Lafleur CN, Black JL, Barr SI. Lunch-time food source is associated with school hour and school day diet quality among Canadian children. J Hum Nutr Diet. 2018;31(1):96-107. https://doi.org/10.1111/jhn.12500

27. Woodruff SJ, Hanning RM, McGoldrick K. The influence of physical and social contexts of eating on lunchtime food intake among southern Ontario, Canada, middle school students. J Sch Health. 2010;80(9):421-28. https://doi.org/10.1111/j.1746-1561.2010.00523.x

28. Briefel RR, Wilson A, Gleason PM. Consumption of low-nutrient, energy-dense foods and beverages at school, home, and other locations among school lunch participants and nonparticipants. J Am Diet Assoc. 2009;109(2 Suppl):S79-S90. https://doi.org/10.1016/j.jada.2008.10.064

29. Neumark-Sztainer D, French SA, Hannan PJ, Story M, Fulkerson JA. School lunch and snacking patterns among high school students: associations with school food environment and policies. Int J Behav Nutr Phys Act. 2005;2(1):14-7. https://doi.org/10.1186/1479-5868-2-14

30. Lichtman-Sadot S. Improving academic performance through conditional benefits: open/closed campus policies in high school and student outcomes. Econ Educ Rev. 2016;54(Complete):95-112. https://doi.org/10.1016/j.econedurev.2016.07.001

31. Stone LM, Runyan CW. High school off-campus lunch policies and adolescent motor vehicle crash risks. J Adolesc Health. 2005;36(1):5-8. https://doi.org/10.1016/j.jadohealth.2003.12.009

32. Leatherdale ST, Brown KS, Carson V, et al. The COMPASS study: a longitudinal hierarchical research platform for evaluating natural experiments related to changes in school-level programs, policies and built environment resources. BMC Public Health. 2014;14:331. https://doi.org/10.1186/1471-2458-14-331

33. White VM, Hill DJ, Effendi Y. How does active parental consent influence the findings of drug-use surveys in schools? Eval Rev. 2004;28(3):246-60. https://doi.org/10.1177/0193841X03259549

34. Reel B, Bredin C, Leatherdale ST. COMPASS Year 5 and 6 School Recruitment and Retention [Internet]. COMPASS Technical Report Series, volume 5, no. 1. Waterloo (ON): University of Waterloo; 2018 [cited 2020 Jul 30]. Available from: https://uwaterloo.ca/compass-system/publications/compass-year-5-and-6-school-recruitment-and-retention

35. DuBreck CM, Sadler RC, Arku G, Gilliland JA. Examining community and consumer food environments for children: an urban-suburban-rural comparison in Southwestern Ontario. Soc Sci Med. 2018;209:33-42. https://doi.org/10.1016/j.socscimed.2018.05.004

36. Browning HF, Laxer RE, Janssen I. Food and eating environments: in Canadian schools. Can J Diet Pract Res. 2013;74(4):160-6. https://doi.org/10.3148/74.4.2013.160

37. Rideout K, Levy-Milne R, Martin C, Ostry AS. Food sales outlets, food availability, and the extent of nutrition policy implementation in schools in British Columbia. Can J Public Health. 2007;98(4):246-50. https://doi.org/10.1007/BF03405396

38. Vine MM, Leatherdale ST, Laxer RE. Priority setting for school nutrition research: developing a collaborative research agenda. Can J Public Health. 2020. https://doi.org/10.17269/s41997-020-00331-4

39. Vine MM, Harrington DW, Butler A, Patte K, Godin K, Leatherdale ST. Compliance with school nutrition policies in Ontario and Alberta: an assessment of secondary school vending machine data from the COMPASS Study. Can J Public Health. 2017;108(1):e43-e48. https://doi.org/10.17269/cjph.108.5701

40. Orava T, Manske S, Hanning R. Beverages and snacks available in vending machines from a subset of Ontario secondary schools: do offerings align with provincial nutritional standards? Can J Public Health. 2016;107:e417-e423. https://doi.org/10.17269/cjph.107.5326

41. McIsaac J-LD, Spencer R, Chiasson K, Kontak J, Kirk SF. Factors influencing the implementation of nutrition policies in schools: a scoping review. Health Educ Behav. 2019;46(2):224-50. https://doi.org/10.1177/1090198118796891

42. Bolt-Evensen K, Vik FN, Stea TH, Klepp K-I, Bere E. Consumption of sugar-sweetened beverages and artificially sweetened beverages from childhood to adulthood in relation to socioeconomic status – 15 years follow-up in Norway. Int J Behav Nutr Phys Act. 2018;15:8. https://doi.org/10.1186/s12966-018-0646-8

43. Mâsse LC, de Niet-Fitzgerald JE, Watts AW, Naylor P-J, Saewyc EM. Associations between the school food environment, student consumption and body mass index of Canadian adolescents. Int J Behav Nutr Phys Act. 2014;11(1):29. https://doi.org/10.1186/1479-5868-11-29

44. Briefel RR, Crepinsek MK, Cabili C, Wilson A, Gleason PM. School food environments and practices affect dietary behaviors of US public school children. J Am Diet Assoc 2009;109(2Suppl):S91-S107. https://doi.org/10.1016/j.jada.2008.10.059

45. Tugault-Lafleur CN, Black JL, Barr SI. Examining school-day dietary intakes among Canadian children. Appl Physiol Nutr Metab. 2017;42(10):1064-72. https://doi.org/10.1139/apnm-2017-0125

46. Spencer RA, McIsaac J-LD, Stewart M, Brushett S, Kirk SF. Food in focus: youth exploring food in schools using photovoice. J Nutr Educ Behav. 2019;51(8):1011-19. https://doi.org/10.1016/j.jneb.2019.05.599

47. Beaulier D, Godin G. Factors predicting staying in school to eat lunch. Health Educ. 2011;111(1):20-33. https://doi.org/10.1108/09654281111094955

48. Budd EL, Liévanos RS, Amidon B. Open campus policies: how built, food, social, and organizational environments matter for Oregon's public high school students' health. Int J Environ Res Public Health. 2020;17(2):469. https://doi.org/10.3390/ijerph17020469

49. Rosen CE. The impact of an open campus program upon high school students' sense of control over their environment. Psychol Schools. 1977;14(2):216-9. https://doi.org/10.1002/1520-6807(197704)14:2<216::AID-PITS2310140218>3.0.CO;2-V

https://doi.org/10.24095/hpcdp.41.3.03

Evidence synthesis

Structural determinants of stigma across health and social conditions: a rapid review and conceptual framework to guide future research and intervention

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This article has been peer reviewed.

Abstract

Introduction: Stigma has been identified as a key determinant of health and health inequities because of its effects on access to health-enabling resources and stress exposure. Though existing reports offer in-depth summaries of the mechanisms through which stigma influences health, a review of evidence on the upstream drivers of stigma across health and social conditions has been missing. The objective of this review is to summarize known structural determinants of stigma experienced across health and social conditions in developed country settings.

Methods: We conducted a rapid review of the literature. English- and French-language peer-reviewed and grey literature works published after 2008 were identified using MEDLINE, Embase, PsycINFO, Google and Google Scholar. Titles and abstracts were independently screened by two reviewers. Information from relevant publications was extracted, and a thematic analysis of identified determinants was conducted to identify broad domains of structural determinants. A narrative synthesis of study characteristics and identified determinants was conducted.

Results: Of 657 publications identified, 53 were included. Ten domains of structural determinants of stigma were identified: legal frameworks, welfare policies, economic policies, social and built environments, media and marketing, pedagogical factors, health care policies and practices, biomedical technology, diagnostic frameworks and public health interventions. Each domain is defined and summarized, and a conceptual framework for how the identified domains relate to the stigma process is proposed.

Conclusion: At least 10 domains of structural factors influence the occurrence of stigma across health and social conditions. These domains can be used to structure policy discussions centred on ways to reduce stigma at the population level.

Keywords: *stigma, discrimination, structural determinants, social conditions, health conditions*

Highlights

- A review of known structural determinants of stigma operating across health and social conditions has been missing from existing literature.
- This study reviewed and synthesized existing literature and identified 10 domains of structural determinants of stigma.
- The 10 domains identified were: legal frameworks, welfare policies, economic policies, social and built environments, media and marketing, pedagogical factors, health care policies and practices, biomedical technology, diagnostic frameworks and public health interventions.
- The proposed conceptual framework of the 10 domains of structural determinants of stigma can be used to structure future policy discussions on ways to address stigma at the population level.

Introduction

Stigma has been defined as a process enabled by social, economic and political power inequities, through which negative labels, beliefs and perceived differences between groups can culminate in discrimination and status loss.[1] As Link and Phelan wrote, "…stigma exists when elements of labelling, stereotyping, separation, status loss and discrimination occur together in a power situation that allows them."[1,p.377] A key social determinant of health, stigma is a cause for concern in many substantive areas of public health practice.[2] Stigma-related discrimination and status loss influence health by restricting affected populations' access to health-enabling resources such as housing,

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employment, social ties and health care, and by increasing exposure to stress.[2]

In Canada, the Public Health Agency of Canada's Chief Public Health Officer (CPHO)'s 2019 report *Addressing Stigma: Towards a More Inclusive Health System*[3] has proposed a conceptual summary of the myriad pathways through which stigma can affect health and health inequities. This and previous frameworks[4,5] are helpful for understanding the theoretical underpinnings of the effects of stigma on health and for identifying potential areas for health and social policy intervention.

However, with their in-depth focus on the downstream effects of stigma on health, existing reports typically lack a thorough exploration of the upstream factors that drive stigma,[6] particularly those operating at a structural level. Existing literature on structural determinants of stigma tends to focus on stigma pertaining to specific stigmatized experiences, identities, behaviours or health conditions.[7,8] A general summary of determinants of stigma across affected populations is currently missing from the literature. This review seeks to fill these gaps in the extant literature by contributing a summary of known structural determinants of stigma across stigmatized populations.

Described as "contextual factors" in the World Health Organization's Social Determinants of Health Model,[9] and structural "practices" in the CPHO's 2019 report's Stigma Pathways Model,[3] structural determinants can be defined as factors that operate outside the locus of control of individuals,[10] such as elements of physical, social, policy or legal environments.[11] For example, structural determinants can include various forms of legislation (or lack thereof) to protect individuals' rights,[12] or wealth redistribution policies.[9,13] Structural factors are distinct from but tightly influence more proximal, individual-level determinants of health, such as individuals' access to income, housing, food or safe working conditions.[9]

The scope of this review is restricted to examining the structural determinants of stigma for several reasons. First, according to public health research and theory, structural factors are considered to be those that create and perpetuate social and economic stratification within societies.[9] They are often identified as "root causes" of negative health and social outcomes and health inequities, and therefore merit particular attention from the perspective of population health and health equity promotion.[9]

Second, in the context of public health practice, structural factors tend to exert influence across multiple social contexts and populations.[14] Structural factors are therefore particularly relevant to consider when aiming to understand the determinants of stigma occurring across a multitude of health and social conditions—particularly when many forms of stigma intersect.[3]

Third, though it is difficult to achieve and often requires intersectoral collaboration,[9] structural determinants can theoretically be modified through changes in health and social policy.[15] When successful, structural-level interventions are often more impactful and far-reaching than more proximal (i.e. individual-level) interventions at reducing population-level health inequities.[9]

This review therefore was intended to provide a knowledge summary that, in the Canadian context, can complement the knowledge synthesis of the Canadian CPHO's report on stigma's effects on health[3] and, more broadly, can be used to structure policy discussions on ways to orient public health interventions to reduce stigma in Canada and abroad. The specific objective of this rapid review was to identify and summarize known structural determinants of stigma in Canada and in similar settings, such as those in other member countries of the Organisation for Economic Co-operation and Development (OECD).

Methods

We used a rapid review design.[16] Used most frequently within governmental policy contexts when time-related resources are limited,[17] a rapid review consists of an evidence review strategy that follows the structure of a systematic review process with abridged components to allow research questions to be addressed in a shorter time frame than is typically needed for a systematic review.[16] A defining feature of the rapid review design is its restricted evidence search component,[17] which involves a non-exhaustive search of available evidence pertaining to the research question. First, a search strategy to identify presynthesized evidence summaries (reviews, summary reports, conceptual frameworks) is applied. If identified synthesis documents are insufficient, because identified publications are not sufficiently recent or methodologically rigorous, a search for less synthesized evidence, including individual studies, is then conducted based on study relevance. Individual studies are collected until additional works fail to offer new information needed to address the research question or until other time or resource constraints prohibit future searches.[16]

For this review, a first search strategy was designed to prioritize the identification of presynthesized evidence such as conceptual summaries and literature reviews (Table 1, rows A and B).[18] A secondary search strategy was then applied to identify relevant individual studies, using general title and abstract search terms pertaining to the theme of "structural determinants of stigma" (Table 1, row C).[18] This secondary search was non-exhaustive. It was done to fill potential data gaps and identify domains missing from identified syntheses, and was ceased after the search strategy no longer yielded studies that reported new types of structural determinants or forms of stigma.

Eligibility criteria

Works included were those documenting conceptual frameworks, reviews and individual quantitative, qualitative or mixed-methods studies of structural determinants of stigma. We restricted our review to works in English or French (due to the authors' languages of expertise), published since January 2008, in peer-reviewed or grey-literature sources and set in Canada or other OECD nations. We excluded works without a research design (e.g. commentaries, letters to editors, fact sheets), as well as those that were not available through the Health Canada Health Library network.

Search strategy

MEDLINE, Embase, PsycINFO, Google and Google Scholar databases were searched

TABLE 1
Summary of components and search strings used to identify relevant references in the literature search on structural determinants of stigma

Components of search	Search string in titles or abstracts	French terms
A. Conceptual frameworks of determinants of stigma and mechanisms explaining stigma's effect on health	(stigma OR stigmatization OR stigmatisation OR "stigmatized status") AND (determinants OR cause OR "social factors" OR theory OR process OR pathway OR mechanism) AND ("conceptual framework" OR framework)	Stigmatisation, stigmatisé déterminant, cause, « facteur social » théorie, processus, mécanisme, « cadre conceptuel »
B. Systematic reviews of determinants of stigma	(Stigma OR stigmatization OR stigmatisation OR discrimination OR "stigmatized status") AND (determinants OR cause OR "social factors" OR theory OR process OR pathway OR mechanism) AND ("systematic review" OR review)	« Revue systématique », revue, « recension des écrits » stigmatisation, stigmatisé déterminant, cause, « facteur social »
C. Individual studies of structural, upstream, system-level, population-level social determinants of stigma	(Stigma OR stigmatization OR stigmatisation OR "stigmatized status") AND (determinants OR cause OR factor) AND (structural OR upstream OR "population-level" OR "system-level" OR structure OR structural OR infrastructural OR legal OR legislation OR policy OR "social environment" OR "built environment")	Structurel, structure, amont, populationnel, système, systémique, infrastructure, légal, législation, « environnement social », « environnement bâti »

Note: The first search strategy was designed to prioritize the identification of presynthesized evidence such as conceptual summaries and literature reviews (rows **A** and **B**). A secondary search strategy was then applied to identify relevant individual studies, using general title and abstract search terms pertaining to the theme of "structural determinants of stigma" (row **C**). This secondary search was non-exhaustive. It was done to fill potential data gaps and identify domains missing from identified syntheses, and was ceased after the search strategy no longer yielded studies that reported new types of structural determinants or forms of stigma.

to ensure appropriate coverage of international health research and social science literature.[19] Table 1 presents a summary of the search string components. Search strings were also applied in French in Google and Google Scholar, of which the first three pages of results were reviewed. A snowball search approach[20] was also used to identify reviews or conceptual summaries that were mentioned in reviewed studies but were not captured through our search strategy.

Study identification, data extraction and quality appraisal

Two reviewers independently screened titles and abstracts of all identified works, and, based on eligibility criteria, selected works for full-text review through consensus. Four reviewers conducted full-text screening and extracted data on publications' authors, year of publication, title, country setting, study population and identified structural-level determinants of stigma (Table 2). All data elements were recorded in the data extraction table to enable synthesis of study features and thematic analysis of structural determinants. Two reviewers evaluated the quality of included works using an adaptation of Dixon-Woods et al.'s framework for critical appraisal of works with varied design.[21] Seven questions requiring yes-or-no answers were applied to evaluate the quality of each publication (Table 3).

Data analysis and synthesis

We performed a narrative synthesis of extracted data involving three analytic stages.[22] In the first stage, two authors conducted a thematic analysis of documented structural determinants of stigma.[23,24] Having become familiar with the data by generating initial summaries of structural determinants reported in included works during the data extraction process, these authors performed a thematic analysis, which involved identifying themes that linked structural determinants conceptually.[23,24] Themes were identified semantically (i.e. by interpreting factors that were explicitly mentioned in the texts rather than identifying underlying meanings) and inductively (i.e. without a predefined coding frame), through consensus.[25] We considered themes for which related structural factors were mentioned in at least two works, and that were internally coherent and conceptually distinct and definable.[24] Hereafter, these themes are described as "domains" of structural determinants.

At the second stage, we proposed a narrative synthesis of study types and characteristics and the identified domains and their relationship to the stigma process, as well as a visual conceptual framework of the domains and their relationship to the stigma process. The structuring of the elements in the conceptual framework was based both on the findings of included works and the structure of existing conceptual frameworks of the determinants of stigma.

The third and final stage consisted of summarizing the methodological quality of the included works. In order to provide a quantitative synopsis of quality appraisal results for this review, we considered studies with less than four "Yes" responses (< 60%) as weak, those receiving six or more "Yes" responses (> 85%) as strong, and the remainder as moderate. As these thresholds have not been validated, full annotated scoring results were also provided to complement quantitative summaries.

Results

The results of the narrative synthesis are presented here, beginning with a descriptive summary of study characteristics,

TABLE 2
Summary of reviewed publications (N = 53)

Author, year	Setting	Design	Population	Identified structural determinants of stigma	Structural determinant domains	Critical appraisal score
Clair et al. 2016[46]	United States	Mixed methods sequential design	People living with HIV, African Americans, and people labelled as obese	**Framework proposed:** cultural resources and actors contributing to de-stigmatization • Exclusionary laws and policies that do not protect individual rights. • Pedagogical initiatives that shift causal attributions (i.e. remove blame) and refute stereotypes.	Legal frameworks Pedagogy	Moderate
Coreil et al. 2010[48]	United States and Haiti	Mixed methods sequential design	Haitian immigrants (N = 95), TB patients (N = 126), health care providers (N = 126)	• Exclusionary immigration policies. • Conditions of poverty and malnutrition. • Media content discriminating against migrants, reinforcing negative stereotypes. • Lack of privacy in health care services. • Availability of effective treatment for TB influencing risk perception. • Infection and control policies mandating screening during immigration process.	Legal frameworks Social & built environment Media & marketing Health care practices Biomedical technology	Strong
Henderson et al. 2017[68]	United States (Alabama)	Mixed methods sequential design	College students aged 18–25 years, N = 38 to 212 based on study phase	• "War on Drugs"–related policies (policing, mass incarceration, severe sentencing). • Antidrug education curriculums (e.g. Drug Abuse Resistance Education [DARE]) that frame substance use as human weakness.	Legal frameworks Pedagogy	Strong
MacLean 2018[47]	Canada	Mixed methods sequential design	Individuals with STBBI experience (N = 20 individual interviews, N = 3 focus groups), provider survey (N = 410)	**Framework proposed:** conceptual framework of STBBI stigma (structural stigma: stigma confronted at policy/legal, institutional, community levels)	Legal frameworks	Weak
Arrey et al. 2017[55]	Belgium	Qualitative	Adult HIV+ women who migrated from sub-Saharan Africa to Belgium (N = 44)	• Limitations in health insurance coverage for migrants. • Negative media messaging regarding migrants. • Lack of training among health care professionals. • Absence of policies to limit HIV status disclosure in health settings.	Welfare policy Media & marketing Pedagogy Health care policy	Strong
France et al. 2015[41]	Ireland	Qualitative	Persons living with HIV (N = 17)	**Framework proposed:** conceptual framework of HIV self-stigma (social factors, self-factors, contextual factors) • Availability of social spaces fosters sense of belonging, which can help tackle HIV self-stigma. • Health professional interventions using inquiry-based stress reduction techniques may help address self-perceptions and beliefs relating to HIV.	Social & built environment Health care practices	Strong
Hansen et al. 2014[73]	United States (New York City)	Qualitative	Individuals who received psychiatric diagnoses and qualified for disability benefits (N = 4)	• Welfare reforms that make benefits contingent on the medicalization of disabilities.	Welfare policy	Strong

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TABLE 2 (continued)
Summary of reviewed publications (N = 53)

Author, year	Setting	Design	Population	Identified structural determinants of stigma	Structural determinant domains	Critical appraisal score
Paterson et al. 2013[65]	Canada (Nova Scotia)	Qualitative	Professionals in ERs (N = 25) or NGOs (N = 25) serving those who use illicit substances or living with hepatitis C	**Framework proposed:** analytic framework of structural stigmatization (institutional policies, cultural, protocols) • Lack of privacy in health care services due to physical settings or communication practices. • Limitations in services availability due to wait times, lack of trained staff.	Health care practices	Strong
Woodgate et al. 2017[40]	Canada (Winnipeg)	Qualitative	Indigenous people living with HIV since age 15–29 years (N = 21); service providers, elders (N = 14)	**Framework proposed:** social ecology of stigma and discrimination for Indigenous people living with HIV in Manitoba, Canada • Child welfare systems as a source of discrimination in HIV status. • Traditional educational initiatives and programming help to develop community support networks. • Lack of safe health services on- and off-reserve; potential for breaks in patient confidentiality. • Personal outreach initiatives (home visits) may help reduce stigma.	Welfare policy Pedagogy Health care practices	Strong
Jorm et al. 2008[79]	Australia	Quantitative (cross-sectional)	Adult (> 18 years), general population surveyed on mental health–related stigma (N = 3998)	• Attribution of disease to genetic factors may lead to greater perceptions of dangerousness. • Receipt of a medical diagnosis suggesting a "real medical illness" may be associated with lower social distancing from individuals living with mental health issues such as schizophrenia.	Biomedical technology Diagnostic frameworks	Moderate
Min et al. 2017[39]	South Korea	Quantitative (cross-sectional)	Persons living with mental illness who were users of community mental health centres (N = 532)	• Perceived neighbourhood disorder (feelings about the prevalence of graffiti, noise, vandalism, abandoned buildings, dirty streets and poor maintenance of buildings) associated with mental health stigma (Devaluation and Discrimination Scale and Experiences of Rejection Scale)	Social & built environment	Strong
Pachankis et al. 2017[69]	Europe	Quantitative (cross-sectional)	Immigrants to Europe who identify as MSM surveyed on HIV risk (N = 23 371)	• Anti-gay structural stigma measured using the International Lesbian, Gay, Bisexual, Trans, and Intersex Association's Rainbow Map Scale for the measurement of criminalization, protection, and recognition of same-sex relationships, based on states' laws and policies (death penalty for same-sex sexual acts, lifetime incarceration of sexual minorities for same-sex sexual acts; laws against the promotion of homosexuality; recognition of same-sex marriage)—associated with higher HIV risk.	Legal frameworks	Strong
Stringer et al. 2016[78]	United States (Southern states)	Quantitative (cross-sectional)	Health care workers surveyed on HIV-related stigma (N = 651)	• Prevalence of policies to protect patient living with HIV against discrimination. • Prevalence of policies that ensure consequences to providers that do not follow policies to protect patients living with HIV. • Prevalence of availability of HIV PEP and PrEP across health facilities.	Health care policy Biomedical technology	Strong
Stuber et al. 2008[64]	United States (New York City)	Quantitative (cross-sectional)	Current and former smokers in New York City (N = 816)	• Self-reported difficulties renting an apartment or finding housing; having been refused a job for which they were qualified; or having been refused or charged more for health insurance because of smoking—associated with smoker-related stigma measure (absence of rights protections)	Welfare policy Economic policy Social & built environment	Strong

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TABLE 2 (continued)
Summary of reviewed publications (N = 53)

Author, year	Setting	Design	Population	Identified structural determinants of stigma	Structural determinant domains	Critical appraisal score
Angermeyer et al. 2014[75]	Germany	Quantitative (longitudinal)	Adults (> 18 years) (Cycle 1, N = 5025; Cycle 2, N = 1232) surveyed on mental health stigma	• Lack of funding for mental health care or research as a form of structural discrimination. • Increases in prevalence of affective disorders believed to influence perceived risk and population support for mental health care funding.	Economic policy Social & built environment	Strong
Hatzenbuehler et al. 2015[70]	United States	Quantitative (longitudinal)	Youth (9–14 years) from the Growing Up Today Study cohort surveyed on illicit substance use (N = 12 723)	• State-level structural stigma index based on (1) policies preventing sexual orientation discrimination (e.g. same-sex marriage, employment non-discrimination); (2) density of same-sex partner households; (3) prevalence of Gay–Straight Alliances among public high schools; and (4) public opinion towards sexual minorities associated with sexual orientation disparities in illicit substance use.	Legal frameworks Social & built environment	Moderate
Arboleda-Florez et al. 2012[29]	No restriction	Review (narrative)	Persons living with mental health issues	Structural approaches are identified to curb attributions of blame, dangerousness, unpredictability and thereby reduce stigma: • Legislation to prohibit discrimination and offer accommodation in social domains such as housing, education and employment. • Educational initiatives (e.g. Mental Health First Aid, contact-based education) can improve awareness of mental health symptoms.	Legal frameworks Pedagogy	Moderate
Aste 2016[53]	United States	Review (narrative)	Adults with chronic pain	• Insufficient knowledge and training among providers about effective pain management (pain viewed as imagined or psychological) can lead to discriminatory beliefs and practices.	Pedagogy	Strong
Bell et al. 2016[63]	No restriction	Review (narrative)	Mothers of children born with fetal alcohol syndrome disorder (FASD)	**Framework proposed:** stigma "loads" experienced by those affected by FASD • A child's diagnosis of FASD can lead to mother's experience of blame in clinical and social settings. • Public health social marketing campaigns aiming to reduce maternal drinking can unintentionally increase blaming of mothers; threat of child protective services removing the child inhibits disclosure and treatment-seeking behaviour.	Diagnostic frameworks Public health interventions	Moderate
Benoit et al. 2018[60]	No restriction	Review (narrative)	Sex workers	• Derogatory labels (prostitute, hooker, whore) used in legislation, research and media associated with human trafficking, exploitation and victimization. • Criminalization of sex work based on moralistic/paternalistic principles vs. decriminalization (e.g. New Zealand removing prostitution from its criminal code and regulating the industry within a public health and safety framework). • Lack of police protection for sex workers; failure to respond to reports of violence; responding to reports of violence with criminal prosecution of the victim. • Over-policing of sex workers (verbal harassment, invasive searches, excessive force, unwarranted arrests) even when not working. • Delegitimization of sex work as an economic activity contributes to marginalization. • Media narratives are morally driven (rather than empirical), reducing diverse experiences and perspectives to stereotypical portrayals, sex workers identified as blameworthy for the harms they experience. • Denial of care, breach of confidentiality, lower quality of care in clinical settings following disclosure of occupation (lack of protective policies). • Community-led program to increase HIV screening among sex workers.	Legal frameworks Economic policy Media & marketing Health care practices Public health interventions	Moderate

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TABLE 2 (continued)
Summary of reviewed publications (N = 53)

Author, year	Setting	Design	Population	Identified structural determinants of stigma	Structural determinant domains	Critical appraisal score
Bonsack et al. 2013[31]	No restriction	Review (narrative)	Individuals living with mental illness	• Legislation promoting self-efficacy and independence (anti-discrimination laws, advance directives, laws mandating reasonable accommodation at work) as protective against discrimination, especially when individuals with lived experience are integrated in the legislative decision-making process. • Insufficient training of law enforcement and health personnel about mental health can contribute to discriminatory clinical practices. • Lack of patient confidentiality in health care settings can contribute to negative experiences and discrimination.	Legal frameworks Pedagogy Health care practices	Weak
Brewis 2014[62]	No restriction	Review (narrative)	Individuals labelled as obese	• Unequal access to career and educational opportunities. • Elements of the built environment, such as chairs that fit only smaller bodies, can represent sources of weight-based discrimination.	Economic policies Social & built environment	Moderate
Carroll 2017[61]	United Kingdom	Review (narrative)	Single mothers	• Various forms of legislation can contribute to the discrimination and status loss of single mothers, including policies regarding the legalization of divorce, and access to birth control and abortion. • Evolving welfare policies can create perceptions of deserving or undeserving single mothers, and policies that promote return to work (e.g. the United Kingdom's "Welfare to work" policies) can cause tension between single mothers' breadwinner and caregiver roles. • Social environments can contribute to the discrimination against and status loss of single mothers, including residence in more economically deprived areas due to lack of affordability of housing, and general community-level beliefs that mothers should provide care for their children instead of working. • Negative portrayals of single mothers in media can perpetuate negative beliefs and stereotypes, which can lead to discrimination and status loss.	Legal frameworks Welfare policy Social environment Media & marketing	Strong
Chaudoir et al. 2013[66]	No restriction	Review (narrative)	Individuals with visible or concealable stigmatized attributes	**Framework proposed:** the stigma mechanisms in health disparities framework • Legislation that restricts access to health and dental care, education, movement, marriage and employment, and leads to differential criminalization (e.g. "War on Drugs"–related policies) represents a source of discrimination and status loss. • Inequalities in high-quality health care access (insurance, a regular provider, transport time to hospital) represent a source of discrimination. • Differential exposure to hazardous environmental conditions (pollution, violence, infectious disease, unsafe work conditions) by sex, socioeconomic position and across racialized groups also represents a source of discrimination.	Legal frameworks Welfare policy Social & built environment	Moderate

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TABLE 2 (continued)
Summary of reviewed publications (N = 53)

Author, year	Setting	Design	Population	Identified structural determinants of stigma	Structural determinant domains	Critical appraisal score
Collins et al. 2013[32]	United States	Review (narrative)	Individuals living with mental illness	**Framework proposed:** conceptual model for reducing stigma associated with mental illness (individual, social, and policy/practice change) • Media campaigns presenting information about illness causes, effective treatments, and experiences led by individuals with lived experience can help shift population beliefs and stereotypes; media content can represent a proxy for direct social contact with stigmatized group. • Training promoting direct contact and providing factual information about mental illness (causes, symptoms, treatability, experiences), especially for key power groups (health professionals, employers, landlords, criminal justice, policy makers) may also help address negative beliefs and stereotypes.	Media & marketing Pedagogy	Weak
Livingston, JD (Commission de la santé mentale du Canada), 2013[37]	Canada	Review (narrative)	Individuals living with mental health issues	• Welfare policies that de-incentivize work, given that disability benefits are adjusted according to income can lead to internalized stigma. Further, parents living with mental health issues can often face more intensive scrutiny by social and child protective services. • Absence of policies that protect against discrimination in employment or housing access, participation in civil society (e.g. holding public office), family panning (e.g. adoption disqualification), health (e.g. forced sterilization), or immigration can represent structural determinants of stigma. • Geographic segregation of individuals living with mental health issues can contribute to status loss and inequities in resource access. • Media content can shape opinions and interpretations of mental illness. • Supportive policies within educational systems (e.g. specialized support services, accommodation policies) can help reduce stigma experiences. • Insufficient health care funding leading to gaps in care, policies disqualifying individuals for health insurance, and violations of patient privacy can represent structural determinants of discrimination. • Deficiencies in health services contribute to the use of law enforcement.	Welfare policy Economic policy Social & built environment Media & marketing Pedagogy Health care practices	Moderate
National Academies of Sciences, Engineering, Medicine (Committee on the Science of Changing Behavioral Health Social Norms) 2016[34]	No restriction	Review (narrative)	Individuals with mental and substance use disorders	• While forms of legislation may help reduce stigma, such as those accommodating students with disabilities or that ensure rights protections (e.g. *Americans with Disabilities Act*), other forms of legislation can be harmful, such as policies that treat substance use disorders as criminal issues rather than health concerns, or policies that restrict access to civil society and participation (e.g. to serve on juries). • Segregated housing of individuals with mental illness, community rejection of mental health facilities represent structural determinants of stigma. • Settings where there is inequality in access to high-quality health care services represent structural forms of discrimination and status loss. • Negative media portrayals of mental health symptoms or treatment effectiveness can reinforce negative societal beliefs and stereotypes. • Training for providers may help prevent misdiagnoses or improper treatment due to lack of knowledge about mental illness.	Legal frameworks Social & built environment Media & marketing Pedagogy Health care practices	Moderate
De Ruddere & Craig 2016[52]	No restriction	Review (narrative)	Individuals living with chronic nonmalignant pain	• Insufficient knowledge among health care providers about the nature of chronic nonmalignant pain (pain viewed as exaggerated or imagined, complaints dismissed) can influence their treatment of patients.	Pedagogy	Moderate

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TABLE 2 (continued)
Summary of reviewed publications (N = 53)

Author, year	Setting	Design	Population	Identified structural determinants of stigma	Structural determinant domains	Critical appraisal score
Désy et al. 2013[76]	Canada	Review (narrative)	Stigma in the context of public health actions	• Social support opportunities within communities can alleviate stigma. • Mass media campaigns can influence stigma by shaping public perceptions.	Social & built environment Media	Weak
Earnshaw et al. 2015[42]	United States	Review (narrative)	Individuals living with HIV	**Framework proposed:** Stigma and HIV Disparities Model • Residential segregation contributes to discrimination and status loss. • Structural interventions to improve neighbourhood-level access to resources relating to health and health promotion can help address structural discrimination.	Social & built environment Public health interventions	Moderate
Fernandes et al. 2011[51]	No restriction	Review (narrative)	Individuals living with epilepsy	• Forms of legislation have been identified as potentially protective against discrimination (e.g. *Americans with Disabilities Act*); alternatively, laws can be prohibitive against certain activities (e.g. driving or certain forms of employment). • Pedagogical interventions, designed in collaboration with, and which promote contact with, individuals with epilepsy have been identified as potential structures to reduce fear and ignorance, and thereby stigma.	Legal frameworks Pedagogy	Moderate
Golub 2018[26]	No restriction	Review (narrative)	Individuals who may be eligible for HIV pre-exposure prophylaxis (PrEP)	• Clinical PrEP eligibility assessment interviews ask individuals about their partnership status and sexual behaviour, potentially stigmatizing condomless anal sex. • Health care guidelines specifying that PrEP should be used by individuals at "very high risk of HIV infection" confers HIV-related stigma (and sexual stigma) on potential PrEP users—especially surrounding attributions of blame associated with perceived risky behaviours. • Availability of PrEP impacts risk perception.	Health care practices Biomedical technology	Moderate
Groulx 2011[59]	Canada	Review (narrative)	Individuals experiencing economic and social exclusion	• Accessing welfare noted as associated with high levels of surveillance of economic and social activities as well as discrimination, which can impact self-esteem. • Structural factors such as low minimum wage and the absence of employment policies to support a balance between work and family life can lead workers such as single mothers to turn towards welfare support, which is associated with both felt and perceived (self) stigma.	Welfare policy Economic policy	Strong
Hatzenbuehler 2016[8]	No restriction	Review (narrative)	Persons living with mental health issues and sexual minorities	• Legislation protecting rights to employment and marriage (or absence of these laws) influence likelihood of discrimination and stress.	Legal frameworks	Moderate
Hatzenbuehler 2014[57]	No restriction	Review (narrative)	Lesbian, gay, bisexual (LGB) populations	• Legislation protecting rights to employment and marriage (or absence of these laws) influence LBG discrimination. • Community-level prejudice against LGB, measured in relation to social conservatism, can contribute to both perceived and felt stigma among LBG populations.	Legal frameworks Social & built environment	Moderate
Holder et al. 2019[30]	United States	Review (narrative)	Individuals living with mental health issues	• Insufficient health care provider training about mental illness (symptom recognition, effective treatment strategies, challenging stigmatizing attitudes).	Pedagogy	Moderate
Kerr et al. 2016[45]	United States	Review (narrative)	Disparities in HIV risk across racialized communities in the context of drug policy	**Framework proposed:** the Drug War HIV/AIDS Inequities Model • "War on Drugs"–related policies led to the discrimination and status loss of African Americans through over-policing, mass incarceration, sentencing (inequitable fees, confiscation of resources) and welfare cuts (offenders disqualified from various social protections such as public housing, Section 8 benefits, Electronic Benefit Transfer vouchers).	Legal frameworks Welfare policies	Moderate

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TABLE 2 (continued)
Summary of reviewed publications (N = 53)

Author, year	Setting	Design	Population	Identified structural determinants of stigma	Structural determinant domains	Critical appraisal score
Knapp et al. 2014[54]	No restriction	Review (narrative)	Individuals living with cancer	• Legislation protecting cancer patients' rights regarding employment and housing (e.g. *Americans with Disabilities Act*) helps to counter potential discrimination. • Media shaping perceptions about cancer (perpetuation of beliefs that certain people are to blame for their cancer, depiction of cancer as a "battle" rather than a journey) may result in more stigmatizing attitudes. • Medical advances resulting in better understanding of the causes, treatments and outcomes of cancer can shape disease-related beliefs.	Legal frameworks Media & marketing Biomedical technology	Strong
Link & Hatzenbuehler 2016[72]	United States	Review (narrative)	General population	• Legislative factors including same-sex marriage bans, differential criminal sentencing, Jim Crow laws and immigration policies (mandatory verification of immigration documentation by police officers, restricted access to driver's licenses or welfare benefits) contribute to discrimination and status loss. Absence of protective policies is a form of policy. • Neighbourhood residential segregation and housing policies that reinforce segregation contribute to social beliefs and discrimination. • Potentially protective pedagogical policies include antibullying policies in schools, whereas reliance on standardized testing for admissions (SAT) can produce gaps in admission according for racialized and vulnerable populations.	Legal frameworks Social & built environment Pedagogy	Moderate
Ministère de la Santé et des Services sociaux du Québec, 2016[38]	Canada	Review (narrative)	Individuals with a history of mental illness accessing health care services	• Insufficient training for providers can result in stigmatizing behaviour (e.g. overlooking physical concerns of those with mental health issues). • Training opportunities for providers, especially those that promote contact with individuals with a history of mental illness, may help increase awareness and empathy, and shift clinical behaviours.	Pedagogy	Weak
Mirabito et al. 2016[67]	No restriction	Review (narrative)	Stigma occurring in the marketplace	**Framework proposed:** The Stigma Turbine of individual, societal and marketplace-based determinants of stigma. • Legislation that protects against marriage, employment, or housing discrimination on the basis of social identity can help reduce stigma by legitimizing stigmatized identities and ensuring equal resource access (e.g. same-sex marriage protections, *Equal Pay Act*, *Fair Housing Act*). • Social environments such as workspaces or residential areas with greater social diversity allow for greater social interaction and contact, which can mitigate negative stereotypes and beliefs. • Media-based marketing tactics and consumer segmentation strategies (e.g. advertisers engaging in objectification and fat-shaming to increase sales) can potentially perpetuate stigma whereas others (e.g. ads featuring unretouched models, or diverse family experiences) can attenuate negative social beliefs and shift cultural norms. • Public health social marketing campaigns (e.g. regarding breastfeeding, weight control, tobacco use, alcohol abstinence) can perpetuate victim blaming. Similarly, social programs that require group separation (i.e. separate cafeteria line for students accessing school lunch programs) can also perpetuate discrimination and self-stigma.	Legal frameworks Social & built environment Media & marketing Public health interventions	Moderate

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TABLE 2 (continued)
Summary of reviewed publications (N = 53)

Author, year	Setting	Design	Population	Identified structural determinants of stigma	Structural determinant domains	Critical appraisal score
Morey 2018[56]	United States	Review (narrative)	Immigrants and racialized communities in the United States	• Policies limiting immigrants' eligibility for health and social services, whether undocumented (Social Security, federal education benefits, Medicaid, *Affordable Care Act*) or documented (5-year waiting period to qualify for public benefits) and discriminatory raids, deportation or detention represent structural forms of discrimination. • Xenophobic media-based rhetoric during election campaigns popularizing anti-immigrant attitudes, increasing bullying and violence against visible minorities.	Legal frameworks Welfare policy Media & marketing	Moderate
Mukolo et al. 2010[28]	No restriction	Review (narrative)	Children experiencing mental illness	**Framework proposed:** framework of the relationships among child mental disorder stigma dimensions, contexts and targets • Media portrayals of mental illness that reinforce negative stereotypes of dangerousness, criminality or unpredictability can promote discrimination. • Media coverage of celebrities with mental illness may normalize mental health issues as issues pertaining to health rather than weakness. • Lack of mental health professionals available to children, compared to professionals specializing in physical health, as indicative of the devaluing of mental health.	Media & marketing Health care practices	Moderate
Nairn et al. 2011[27]	No restriction	Review (narrative)	Individuals living with mental health issues	• Media portrayals (language, content) of mental health issues in relation to crime, violence and social incompetence, contribute to stigma by influencing society-level fear.	Media & marketing	Moderate
Pescosolido et al. 2008[33]	No restriction	Review (narrative)	Individuals living with mental illness	**Framework proposed:** framework integrating normative influence on stigma • Welfare eligibility shapes norms regarding entitlement to care, legitimizes conditions covered by health insurance policies. • Negative media portrayals of individuals with mental illness (as dangerous, unstable, unpredictable), affecting judgments made in everyday life about individuals with mental illness. • Innovations in treatment and advances in scientific knowledge (especially relating to biomedical or genetic causes, and availability of effective treatment) influence beliefs and practices.	Welfare policy Media Biomedical technology	Moderate
Phelan et al. 2014[77]	No restriction	Review (narrative)	General population	• Social segregation leads to infrequent interaction between stigmatized and nonstigmatized groups and social distance. • Media portrayal of stigmatized persons can shape societal attitudes; portrayals can represent a substitute for social interaction when direct contact with stigmatized persons is rare/unlikely. • Public health interventions that promote contact between stigmatized and other members of the public can potentially reduce negative beliefs and stereotypes.	Social & built environment Media & marketing Public health interventions	Strong
Schabert et al. 2013[50]	No restriction	Review (narrative)	Individuals living with diabetes	**Framework proposed:** a framework for understanding diabetes-related stigma (structural mitigating strategies: social marketing, education, counselling, health promotion) • Health promotion campaigns and media messaging based on modifying individual-level behaviours are identified as potential drivers of blame-induced stigma. • Education initiatives that promote contact with individuals living with stigmatized conditions may help build empathy.	Media & marketing Pedagogy Public health interventions	Strong

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TABLE 2 (continued)
Summary of reviewed publications (N = 53)

Author, year	Setting	Design	Population	Identified structural determinants of stigma	Structural determinant domains	Critical appraisal score
White Hughto et al. 2015[58]	United States	Review (narrative)	Individuals identifying as transgender	**Framework proposed:** modified social-ecological model of transgender stigma and stigma interventions (structural interventions: policies against discrimination, promoting access to care, or curricula on the health of trans people) • Policies that fail to protect the rights of trans people in public accommodation. • Inequalities in access to health insurance coverage for gender-affirming procedures. • Insufficient training of health care professionals on trans persons' health. • Biomedicalization of gender nonconformity (DSM diagnosis).	Legal frameworks Welfare policy Pedagogy Diagnostic frameworks	Moderate
Williams 2018[35]	United Kingdom	Review (narrative)	Individuals living with mental health issues	• The United Kingdom's *Equality Act* (2010) was designed to protect against disability-based discrimination in the workplace; however, limitations remain. • Investment in workplace support programs for individuals with disabilities are posited as protective against stigma. • Media representations that depict individuals experiencing mental health issues as dangerous or that correlate mental health issues with criminality can contribute to negative stereotypes. • Use of a biopsychosocial model to understand mental health issues, rather than a purely biological model, can lead to more holistic approaches of mental health care.	Legal frameworks Economic policy Media & marketing Diagnostic frameworks	Moderate
Clement et al. 2013[36]	No restriction	Review (systematic)	Individuals living with mental health issues	• Mass media campaigns aiming to influence behaviour have the potential to decrease or reinforce mental health stigma (intentionally or not)	Media & marketing	Strong
Craig et al. 2017[49]	Low TB–incidence countries	Review (systematic)	People living with TB in low-incidence countries (Western Europe, USA, Canada, Australia, New Zealand)	• Negative media portrayals of migrants with TB can contribute to negative stereotypes and discrimination, especially if there is low knowledge among the general population regarding TB transmission and curability. • Health care policies such as zero-tolerance policies regarding substance use and facilities that are not available to migrants, can lead to discrimination in relation to access to care. • TB public health control policies (contact tracing, quarantine) can lead to discrimination and fears of potential deportation of migrants.	Media & marketing Health care policy Public health interventions	Strong
Darlington et al. 2017[43]	United States	Review (systematic)	Women living with HIV	• Absence of legal protections against job or housing loss due to HIV status also represents structural determinants of discrimination and status loss. • Insufficient training regarding HIV transmission and curability among health care providers can lead to discriminatory beliefs and practices. • Absence of policies to prevent denial or delay of health care due to HIV status can contribute to HIV-related stigma.	Legal frameworks Pedagogy Health care policy	Strong
Katz et al. 2013[44]	United States	Review (systematic)	Individuals living with HIV	• Health systems promoting social support and trust between patients and staff can alleviate negative beliefs and discriminatory practices. • HIV health care–related costs can contribute to poverty and status loss.	Health care practices and policy	Strong

Abbreviations: AIDS, acquired immunodeficiency syndrome; DSM, Diagnostic and Statistical Manual of Mental Disorders; ERs, emergency rooms; FASD, fetal alcohol spectrum disorder; HIV, human immunodeficiency virus; LGB, lesbian, gay, bisexual; MSM, men who have sex with men; NGOs, nongovernmental organizations; PEP, post-exposure prophylaxis; PrEP, pre-exposure prophylaxis; SAT, scholastic assessment tests; STBBI, sexually transmitted and blood-borne infection; TB, tuberculosis.

TABLE 3
Summary of critical appraisal of identified works in the literature search on structural determinants of stigma

Author, year	Design	Are the aims and objectives of the research clearly stated?	Is the research design clearly specified?	Is the research design appropriate for the aims and objectives of the research?	Do the researchers provide a clear account of the process by which their findings were produced?	Do the researchers display enough data to support their interpretations and conclusions?	Is the method of analysis appropriate?	Is the method of analysis adequately explicated?	Total score (/7)
Clair et al. 2016[46]	Mixed methods sequential design	**Yes**, to examine how cultural constructions of stigmatized groups shift over time	**No**, the authors do not specify the study design	**Yes**, a narrative review is appropriate for an overview of current understanding	**No**, the review describes key concepts without sufficient details to reproduce the content	**Yes**, each concept is sufficiently referenced	**Yes**, the authors used a "systematic process analysis approach," which is appropriate for the objectives	**No**, the authors do not explain how they applied their "systematic process analysis approach"	4
Coreil et al. 2010[48]	Mixed methods sequential design	**Yes**, to investigate the influence of structural forces on TB-related stigma among Haitians living in the US and Haiti	**Yes**, the authors specify that they used a mixed-methods design, and clearly describe the two phases	**Yes**, the design is aligned with the questions asked by the researchers	**Yes**, the methods are clear and reproducible	**Yes**, results of each phase are clearly provided	**Yes**, the methods of analysis are appropriate for each phase and objective	**Yes**, the analyses pertaining to both phases of the study are well explained	7
Henderson et al. 2017[68]	Mixed methods sequential design	**Yes**, to examine how differences in understanding of the etiology of addiction influence stigma attribution	**Yes**, the authors use Z using a sequential design approach (with three phases, each building on the last), with each phase clearly described	**Yes**, the study builds on the results of each phase using a sequential approach	**Yes**, each of the data collection methods is well described	**Yes**, results of each phase are clearly described, and justification of qualitative coding was provided	**Yes**, analysis of the available data is appropriate	**Yes**, the authors provide sufficient detail on coding of qualitative themes and quantitative analyses	7
MacLean 2018[47]	Mixed methods sequential design	**No**, to identify determinants of STBBI-related stigma and propose a conceptual framework	**No**, the authors describe various components of the project without specifying a design	**Yes**, the activities conducted were appropriate for the objectives	**No**, data on each of the phases is lacking (e.g. selection approach, analysis, etc.)	**No**, very little data is presented for each of the sections	**No**, due to the lack of detail provided, it is impossible to judge whether the method of analysis is appropriate	**No**, very few details on the method of analysis are presented	1
Arrey et al. 2017[55]	Qualitative	**Yes**, to investigate stigma and discrimination among migrant sub-Saharan African women in health care settings in Belgium	**Yes**, the authors use a mixed-qualitative approach for data collection and analysis	**Yes**, the mixed-methods approach is appropriate for the objective	**Yes**, the sampling strategy and data collection methods are clearly described	**Yes**, the authors summarize the key themes identified, and provide direct quotes to support their observations	**Yes**, the method of analysis is appropriate for the available data and research question	**Yes**, the authors used an inductive thematic analysis approach	7
France et al. 2015[41]	Qualitative	**Yes**, to identify core beliefs underlying self-stigma in PLHIV in Ireland	**Yes**, the authors describe their data collection strategy and sample	**Yes**, qualitative research design is appropriate, especially to identify beliefs	**Yes**, they describe their method of data collection and coding	**Yes**, the authors summarize the key themes identified, and provide direct quotes to support their observations	**Yes**, the method of analysis is appropriate for the available data and research question	**Yes**, the coding strategy is well explained, as are approaches used to assess saturation	7

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TABLE 3 (continued)
Summary of critical appraisal of identified works in the literature search on structural determinants of stigma

Author, year	Design	Are the aims and objectives of the research clearly stated?	Is the research design clearly specified?	Is the research design appropriate for the aims and objectives of the research?	Do the researchers provide a clear account of the process by which their findings were produced?	Do the researchers display enough data to support their interpretations and conclusions?	Is the method of analysis appropriate?	Is the method of analysis adequately explicated?	Total score (/7)
Hansen et al. 2014[73]	Qualitative	**Yes**, to describe the experience of structural stigma imposed by medicalization of public support for the poor	**Yes**, the authors use an ethnographic interview-based design	**Yes**, the qualitative approach is appropriate for the objective	**Yes**, data collection and analyses were clearly described	**No**, the authors provide only one case study to illustrate each identified theme	**Yes**, the method of analysis is appropriate for the available data and research question	**Yes**, the authors used iterative thematic coding techniques	6
Paterson et al. 2013[65]	Qualitative	**Yes**, to identify structural determinants of stigma of patients in emergency departments who use illicit drugs and are HCV+	**Yes**, the authors use an inductive qualitative design approach	**Yes**, the qualitative approach is appropriate	**Yes**, they describe their method of data collection and coding	**Yes**, the authors summarize the key themes identified, and provide direct quotes to support their observations	**Yes**, the interpretive description design analytical approach is appropriate	**Yes**, the analytical approach is clearly described	7
Woodgate et al. 2017[40]	Qualitative	**Yes**, to understand the experiences and needs of Indigenous PLHIV who were diagnosed young	**Yes**, the authors clearly describe their sampling, data collection and analysis approach	**Yes**, the qualitative approach is appropriate for the objective and population	**Yes**, the authors clearly describe their sampling, data collection and analysis approach	**Yes**, the authors summarize the themes identified, and provide quotes to support them	**Yes**, the method of analysis is appropriate for the available data and research question	**Yes**, the authors explain their deductive thematic analysis approach	7
Jorm et al. 2008[79]	Quantitative (cross-sectional)	**Yes**, to assess whether social distance and belief in dangerousness are increased in those who believe in genetic causes of psychiatric illness; and whether social distance is reduced by belief in psychosocial causes	**Yes**, the authors clearly specify the design, including details on data collection and analysis	**No**, the design appears to be appropriate for the first objective, but not for the second objective, as it implies the effect of an intervention and the study was not designed to answer this question	**Yes**, the authors describe data available, the analyses conducted	**No**, it is unclear whether results are adjusted for known covariates, and the results of the linear models are difficult to interpret	**Yes**, analyses appear to be appropriate given available data and operationalization of study measures	**Yes**, the authors describe data available, the analyses conducted	5
Min et al. 2017[39]	Quantitative (cross-sectional)	**Yes**, to examine community factors as correlates of perceived and experienced stigma in a community sample of persons with mental illness	**Yes**, the authors clearly specify the design, including details on data collection and analysis	**Yes**, the cross-sectional design is appropriate for the objective	**Yes**, the authors describe data available, the analyses conducted	**Yes**, descriptive and analytic results are presented	**Yes**, the modelling strategy is appropriate given the nested nature of the data within health centres	**Yes**, the authors describe data available, the analyses conducted	7
Pachankis et al. 2017[69]	Quantitative (cross-sectional)	**Yes**, to investigate 6 structural determinants of stigma predicting lack of HIV-prevention in MSM migrants	**Yes**, cross-sectional study involving large-scale international survey	**Yes**, prospective data collection appropriate for the research question	**Yes**, operational definitions of all variables clearly provided, and resources provided for justification and validation	**Yes**, sufficiently large sample, sufficient variation in exposure to allow for analysis, and linkage to external measures	**Yes**, two-level cross-classified model reflecting hierarchical nature of the research question	**Yes**, statistical analysis plan and modelling strategy explained sufficiently to allow for reproduction	7

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TABLE 3 (continued)
Summary of critical appraisal of identified works in the literature search on structural determinants of stigma

Author, year	Design	Are the aims and objectives of the research clearly stated?	Is the research design clearly specified?	Is the research design appropriate for the aims and objectives of the research?	Do the researchers provide a clear account of the process by which their findings were produced?	Do the researchers display enough data to support their interpretations and conclusions?	Is the method of analysis appropriate?	Is the method of analysis adequately explicated?	Total score (/7)
Stringer et al. 2016[78]	Quantitative (cross-sectional)	**Yes**, to examine the relationship between HIV stigma and individual/clinic–level characteristics and policies among health care workers in the Southern US	**Yes**, the authors clearly specify the design, including details on data collection and analysis	**Yes**, the cross-sectional design is appropriate for the objective	**Yes**, the authors describe data available, the analyses conducted	**Yes**, descriptive and analytic results are presented	**No**, the modelling strategy did not take into consideration the nested nature of the data within health centres	**Yes**, the authors describe data available, the analyses conducted	6
Stuber et al. 2008[64]	Quantitative (cross-sectional)	**Yes**, to examine 5 domains of stigma contributing to stigma among smokers	**Yes**, cross-sectional study involving survey data	**Yes**, prospective data collection appropriate for the research question	**Yes**, participant selection and methodology clearly explained, question items listed verbatim	**Yes**, sample size sufficiently large, authors show data for each of their 5 proposed domains of stigma	**Yes**, the authors used a regression model, weighted to correct for sampling bias	**Yes**, the analytical methodology is explained sufficiently to allow for reproduction	7
Angermeyer et al. 2014[75]	Quantitative (longitudinal)	**Yes**, to investigate whether the individual and structural stigma develop similarly	**Yes**, the authors clearly specify the design, data collection and analysis	**Yes**, the repeat cross-sectional design is appropriate for the objective	**Yes**, the authors describe data available, the analyses conducted	**Yes**, descriptive and analytic results are presented	**Yes**, the modelling strategies and estimation of probabilities is appropriate	**Yes**, the authors describe data available, the analyses conducted	7
Hatzenbuehler et al. 2015[70]	Quantitative (longitudinal)	**No**, the authors do not explicitly state an objective, but studied sexual orientation–related disparities in past-year illicit drug use and the influence of structural stigma	**Yes**, the authors use an observational, cohort-based design based on survey data	**No**, the objective of the study is unclear, and it is not possible to assess appropriateness	**Yes**, the authors describe available data and analyses conducted	**No**, only two results tables are presented, and several results are missing	**Yes**, analyses appear to be appropriate given available data	**Yes**, the authors describe data available, the analyses conducted	4
Arboleda-Florez et al. 2012[29]	Review (narrative)	**Yes**, to describe stigma associated with mental illness, stigmatization by health providers, and approaches for stigma reduction	**Yes**, the authors describe this as a narrative review of psychological and social literature	**Yes**, a narrative review is appropriate for the descriptive aims	**No**, the authors do not provide any details explaining how they arrived at their narrative synthesis	**No**, the authors cite few studies, and the lack of research in this field is a major limitation	**Yes**, a narrative summary of results is appropriate for the aims	**No**, there are no details on how analysis was conducted or what elements guided the synthesis	4
Aste 2016[53]	Review (narrative)	**Yes**, to describe the literature on the sources of stigma for individuals with chronic pain	**Yes**, the author describes the review as an "exploratory literature review"	**Yes**, the scoping review approach is appropriate for the objectives	**Yes**, the search strategy is well described, including clear selection criteria	**Yes**, sufficient evidence has been identified to support each concept	**Yes**, each included study is described in detail	**No**, there are no details on how analysis was conducted or what elements guided the synthesis	6

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TABLE 3 (continued)
Summary of critical appraisal of identified works in the literature search on structural determinants of stigma

Author, year	Design	Are the aims and objectives of the research clearly stated?	Is the research design clearly specified?	Is the research design appropriate for the aims and objectives of the research?	Do the researchers provide a clear account of the process by which their findings were produced?	Do the researchers display enough data to support their interpretations and conclusions?	Is the method of analysis appropriate?	Is the method of analysis adequately explicated?	Total score (/7)
Bell et al. 2016[63]	Review (narrative)	**Yes**, to propose a descriptive model of FASD stigma, identify knowledge gaps, and discuss ethical implications of stigma	**No**, the authors do not specify their research design	**Yes**, a narrative synthesis is appropriate for the study aims	**No**, the authors do not describe how they selected or appraised supporting works for this framework	**Yes**, the authors provide a thorough theoretical foundation for included concepts	**Yes**, the authors have synthesized relevant literature to support their framework	**Yes**, the authors detail the process by which they identified domains in their framework	5
Benoit et al. 2018[60]	Review (narrative)	**Yes**, to review the state of research pertaining to the stigmatization of sex workers	**No**, the authors state that they are "reviewing evidence" but do not specify design	**Yes**, a narrative synthesis is appropriate for the descriptive aims	**No**, the authors do not describe how they selected or appraised supporting works for inclusion	**Yes**, the authors provide an in-depth synthesis of the state of research, and thoroughly cite all concepts	**Yes**, a synthesis of available evidence pertaining to the topic of interest is sufficient for the descriptive aims	**No**, there is no explanation of the analytical process or how synthesized information guided the summary	4
Bonsack et al. 2013[31]	Review (narrative)	**Yes**, to describe the concept of stigma and examine various interventions to reduce stigma	**No**, the authors do not specify their research design	**Yes**, a narrative summary is sufficient for the descriptive aims	**No**, there are no details of how relevant information was identified	**No**, very few works are cited as supporting evidence	**Yes**, a brief summary of the theory of mental health is sufficient for the aims	**No**, there are no details on how analysis was conducted or what elements guided the synthesis	3
Brewis 2014[62]	Review (narrative)	**Yes**, to identify mechanisms by which stigma may contribute to the perpetuation of obesity	**No**, the author simply describes their work as a review/synthesis	**Yes**, a narrative review is appropriate for the descriptive aims	**No**, the author does not detail the process by which supporting works were identified and included	**Yes**, the author provides support for each proposed mechanism	**Yes**, a narrative summary of results is appropriate for the descriptive aims	**No**, there are no details on how analysis was conducted or what elements guided the synthesis	4
Carroll 2017[61]	Review (narrative)	**Yes**, to investigate experiences of stigma among single mothers in diverse socioeconomic circumstances	**Yes**, the author conducts a narrative review of stigma theory as it applies to lone motherhood	**Yes**, a narrative summary of concepts followed by qualitative study supporting the author's conclusions is appropriate for the study aims	**Yes**, the author describes the literature review process, and details how identified works contributed to the design and content	**Yes**, the author has thoroughly cited the theoretical groundwork, and provided a robust qualitative study to support the conclusions	**Yes**, a narrative synthesis of relevant research and semi-structured interview is appropriate for the study aims	**Yes**, the author clearly describes the methods used to synthesize sources to guide the narrative review and the analytical process used to extract key themes	7
Chaudoir et al. 2013[66]	Review (narrative)	**Yes**, to propose a framework that describes how stigma leads to psychological and physical health disparities	**No**, the authors do not specify their research design	**Yes**, a theoretical summary is appropriate for the proposal of a novel framework	**No**, the authors do not describe how they selected or appraised supporting works for this framework	**Yes**, the authors provide sufficient citations to support the proposed the causal pathways in their framework	**Yes**, a summary of supporting evidence for the framework is appropriate for the study aims	**No**, the authors do not detail how supporting works were synthesized in order to generate the framework	4

Continued on the following page

TABLE 3 (continued)
Summary of critical appraisal of identified works in the literature search on structural determinants of stigma

Author, year	Design	Are the aims and objectives of the research clearly stated?	Is the research design clearly specified?	Is the research design appropriate for the aims and objectives of the research?	Do the researchers provide a clear account of the process by which their findings were produced?	Do the researchers display enough data to support their interpretations and conclusions?	Is the method of analysis appropriate?	Is the method of analysis adequately explicated?	Total score (/7)
Collins et al. 2013[32]	Review (narrative)	**Yes**, to review evaluations of mental illness stigma reduction efforts in order to inform policy in California	**No**, the authors do not specify their research design	**No**, as the review is aimed at guiding policy, a more systematic review would have been more appropriate	**No**, the authors specify databases and keywords used, but not in sufficient detail to know how works were selected	**Yes**, each concept is referenced, offering an overview of included sources	**Yes**, a synthesis of key types of interventions is appropriate for the aim of the review	**No**, there are no details on how analysis was conducted or what elements guided the synthesis	3
Livingston, JD. (Commission de la santé mentale du Canada), 2013[37]	Review (narrative)	**No**, the authors do not state a specific aim, they introduce structural stigma in the context of modern institutional and social systems and examine tools to address stigma	**No**, the authors describe this work simply as a "report"	**Yes**, a narrative review of the concepts and tools to address stigma is sufficient	**No**, the authors do not provide an explanation of how they identified works for inclusion	**Yes**, the authors provide a well-cited summary of the state of knowledge in the field and of the Canadian context in support of their conclusions	**Yes**, a narrative description of the state of knowledge is appropriate for the descriptive aims of this study	**No**, the authors do not provide details regarding how the supporting evidence was synthesized or contributed to recommendations	3
National Academies of Sciences, Engineering, and Medicine (Committee on the Science of Changing Behavioral Health Social Norms), 2016[34]	Review (narrative)	**Yes**, to review the current understanding of stigma, its determinants, and targets for intervention	**No**, the authors do not specify their research design	**Yes**, the narrative review approach is appropriate for the aims	**No**, the review describes key concepts without sufficient details to reproduce the content	**Yes**, each concept is referenced, offering an overview of included sources	**Yes**, synthesis of key theoretical concepts is appropriate for the aim of the review	**No**, there are no details on how analysis was conducted or what elements guided the synthesis	4
De Ruddere & Craig 2016[52]	Review (narrative)	**Yes**, to describe current understanding of stigma pertaining to chronic pain	**Yes**, the authors use the term "topical review" to describe the design	**Yes**, the narrative review approach is appropriate for the descriptive aim	**No**, the narrative review describes concepts without sufficient detail to reproduce results	**Yes**, each concept is referenced, offering an overview of included sources	**Yes**, synthesis of key theoretical concepts is appropriate for the study aim	**No**, there are no details on how analysis was conducted or what guided the synthesis	5
Désy et al. 2013[76]	Review (narrative)	**Yes**, to describe stigma, explore the ethical dimensions of stigma and propose a reflection tool to assist public health stakeholders	**No**, the authors do not specify their research design	**Yes**, a narrative review of evidence is appropriate for the aims and target audience of this report	**No**, the authors describe their search (databases, search terms), without sufficient detail to reproduce the content	**No**, the authors cite a very limited number of studies	**Yes**, a summary of the field of stigma and ethics research is appropriate for the objectives of this report	**No**, there are no details on how analysis was conducted or what elements guided the synthesis	3

Continued on the following page

TABLE 3 (continued)
Summary of critical appraisal of identified works in the literature search on structural determinants of stigma

Author, year	Design	Are the aims and objectives of the research clearly stated?	Is the research design clearly specified?	Is the research design appropriate for the aims and objectives of the research?	Do the researchers provide a clear account of the process by which their findings were produced?	Do the researchers display enough data to support their interpretations and conclusions?	Is the method of analysis appropriate?	Is the method of analysis adequately explicated?	Total score (/7)
Earnshaw et al. 2015[42]	Review (narrative)	**Yes**, to propose a framework that describes how societal stigma can lead to physical and psychological health disparities	**No**, the authors do not specify their research design	**Yes**, a theoretical summary and review of supporting evidence is appropriate for the proposal of a novel framework	**No**, the authors do not describe how they selected or appraised supporting works for this framework	**Yes**, the authors conduct a thorough assessment of the supporting evidence, and each component of the framework is well referenced	**Yes**, a summary of supporting evidence for the framework is appropriate for the study aims	**No**, there is no explanation of how included works were synthesized in order to generate the framework	4
Fernandes et al. 2011[51]	Review (Narrative)	**Yes**, to describe epilepsy stigma, and consider the influence of legislation on power imbalances	**No**, the authors do not specify their research design	**Yes**, a narrative review is appropriate for the descriptive aims	**No**, the authors provide no explanation of how information for this review was obtained/selected	**Yes**, theories are supported with sufficient citations and consider the availability and quality of evidence	**Yes**, a synthesis of existing research is appropriate for the generation of a conceptual novel framework	**No**, there is no explanation of how included works were synthesized	4
Golub 2018[26]	Review (narrative)	**Yes**, to review the role of PrEP-related stigma in access and adherence to PrEP, and examine its antecedents and consequences	**No**, the design is not clearly specified	**Yes**, a narrative review is appropriate for the descriptive aims	**No**, the authors do not specify how they selected works to include in their review	**Yes**, the authors have cited a wide range of literature, lending support to their conclusions	**Yes**, synthesis of key theoretical concepts is appropriate for the objectives	**No**, no detail is provided regarding how the included works were synthesized	4
Groulx 2011[59]	Review (narrative)	**Yes**, to summarize the factors driving social exclusion, and describe their manifestations in Canadian society	**Yes**, the authors state that they will use a narrative review design	**Yes**, the narrative review approach is appropriate	**Yes**, the search strategy is well described, including a description of inclusion criteria	**Yes**, each concept is referenced, offering an overview of included sources	**Yes**, synthesis of key theoretical concepts is appropriate for the aim of the review	**No**, there are no details on how analysis was conducted or what elements guided the synthesis	6
Hatzenbuehler 2016[8]	Review (narrative)	**Yes**, to review structural stigma related to mental illness and sexual orientation	**No**, the author simply describes the work as a review	**Yes**, a narrative review is appropriate for the descriptive aims	**No**, the author does not describe how works were selected for inclusion	**Yes**, concepts are well supported by theoretical evidence and empirical research	**Yes**, a narrative summary of theoretical and empirical research is appropriate for the descriptive aim	**No**, there are no details on how analysis was conducted or what elements guided the synthesis	4
Hatzenbuehler 2014[57]	Review (narrative)	**Yes**, to describe structural stigma as a risk indicator for psychiatric and physical-health morbidities among LGBT populations	**No**, the author describes the work as a review	**Yes**, a narrative review is appropriate for the descriptive aims	**No**, the author does not describe how works were selected for inclusion	**Yes**, the assertions are supported by citing a varied body of research, and comments on the methodological rigour of studies	**Yes**, a narrative summary of results is appropriate for the study aims	**No**, there is no explanation of the analytical process that contributed to the synthesis of included works	4

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TABLE 3 (continued)
Summary of critical appraisal of identified works in the literature search on structural determinants of stigma

Author, year	Design	Are the aims and objectives of the research clearly stated?	Is the research design clearly specified?	Is the research design appropriate for the aims and objectives of the research?	Do the researchers provide a clear account of the process by which their findings were produced?	Do the researchers display enough data to support their interpretations and conclusions?	Is the method of analysis appropriate?	Is the method of analysis adequately explicated?	Total score (/7)
Holder et al. 2019[30]	Review (narrative)	**Yes**, to describe how mental health stigma discourages treatment-seeking	**No**, the authors describe it only as a "theoretical paper based on literature"	**Yes**, a narrative review is appropriate given the descriptive aim	**No**, the authors do not describe how works were selected for inclusion	**Yes**, the authors cite a wealth of resources from academic and grey literature	**Yes**, a theoretical review of literature is appropriate for the aim and design	**No**, there is no explanation of the analytical process contributing to the overall synthesis	4
Kerr et al. 2016[45]	Review (narrative)	**Yes**, to propose a novel conceptual framework and examine mechanisms leading to disparities in HIV risk for racialized communities	**No**, the authors do not specify their research design	**Yes**, a narrative review of evidence and proposed framework is appropriate for the proposal of a novel framework	**No**, the authors do not describe how they selected or appraised supporting works for this framework	**Yes**, the authors are proposing a complex model, and cite a large and diverse body of research to support their claims	**Yes**, a summary of supporting evidence for the framework is appropriate for the study aims	**No**, there is no explanation of how included works were synthesized in order to generate the framework	4
Knapp et al. 2014[54]	Review (narrative)	**Yes**, to describe the identity-threat model of stigma and adapt it to cancer stigma	**Yes**, the authors describe this as a review and application of stigma theory	**Yes**, the narrative review design is appropriate for the descriptive aims	**Yes**, the authors are adapting an established theory, however they do not describe the identification of supporting works	**Yes**, all concepts in the article are thoroughly cited, and the authors' analysis is based on a well-known theory of stigma	**Yes**, the authors have synthesized and summarized the salient points in the literature to support their conclusions	**No**, the authors do not describe how their synthesis was guided by included works	6
Link & Hatzenbuehler 2016[72]	Review (narrative)	**Yes**, to explore the impact of stigma on health via processes of social disadvantage	**No**, the authors do not specify their research design	**Yes**, a narrative review is appropriate for the descriptive aims	**No**, the authors describe concepts in the literature without detailing how they identified relevant works	**Yes**, all concepts are thoroughly cited, and the first author is an authority in this field of research	**Yes**, the authors have provided a theoretical conceptualization based on existing research	**No**, there are no details on how analysis was conducted or what elements guided the synthesis	4
Ministère de la Santé et des Services sociaux Québec, 2016[38]	Review (narrative)	**Yes**, to summarize anti-stigma strategies for use in health care settings, in order to guide intervention	**No**, the authors do not specify their research design	**No**, a more systematic review with a quality assessment would have been more appropriate	**No**, the review describes key concepts without sufficient details to reproduce the content	**No**, the authors cite a very limited number of studies	**No**, synthesis of key theoretical concepts is not appropriate to guide intervention	**No**, there are no details on how analysis was conducted or what elements guided the synthesis	1
Mirabito et al. 2016[67]	Review (narrative)	**Yes**, to propose a novel conceptual framework and analyze its contribution to the understanding of marketplace stigma	**No**, the authors do not specify their research design	**Yes**, a summary of supporting theories and explanation of the proposed framework is appropriate	**No**, the authors do not describe how they arrived at this formulation of their conceptual framework	**Yes**, the authors provide an adequate explanation of their framework, with citations supporting each of the components	**Yes**, the authors have conducted an analysis of the implications of their framework on the understanding of stigma	**No**, there are no details on how analysis was conducted or what elements guided the synthesis	4

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TABLE 3 (continued)
Summary of critical appraisal of identified works in the literature search on structural determinants of stigma

Author, year	Design	Are the aims and objectives of the research clearly stated?	Is the research design clearly specified?	Is the research design appropriate for the aims and objectives of the research?	Do the researchers provide a clear account of the process by which their findings were produced?	Do the researchers display enough data to support their interpretations and conclusions?	Is the method of analysis appropriate?	Is the method of analysis adequately explicated?	Total score (/7)
Morey 2018[56]	Review (narrative)	**Yes**, to describe the mechanisms by which anti-immigrant stigma exacerbates ethnic health disparities	**No**, the author does not specify a research design	**Yes**, a short description of the research on this topic is sufficient for the objectives	**No**, there is no description of how these findings were identified	**Yes**, the proposed mechanisms are well cited	**Yes**, a narrative summary of supporting evidence is appropriate	**No**, no explanation of how supporting information was analyzed or integrated is provided	4
Mukolo et al. 2010[28]	Review (narrative)	**Yes**, to describe the literature on stigma associated with children's mental disorders and highlight gaps in empirical work	**No**, the authors simply call this paper a "review," and it is not clear if they mean to be systematic	**Yes**, a narrative review is appropriate for the descriptive aims	**Yes**, the authors detail their search strategy (databases, date ranges, search terms) and inclusion/exclusion criteria	**No**, the concepts introduced are thoroughly cited, but many of their sources are from literature on adults	**Yes**, a narrative summary of results is appropriate for the aims	**Yes**, the authors describe how they appraised the convergence of definitions of critical dimensions of stigma	5
Nairn et al. 2011[27]	Review (narrative)	**Yes**, to provide a framework of the role of cultural mechanisms in media depictions of mental illness	**No**, the design is not clearly specified	**Yes**, the narrative review approach is appropriate for the objectives	**No**, the narrative review describes concepts without sufficient detail to reproduce the content	**Yes**, each concept is referenced, offering an overview of included sources	**Yes**, synthesis of key theoretical concepts is appropriate for the aim of the review	**No**, there are no details on how analysis was conducted or what elements guided the synthesis	4
Pescosolido et al. 2008[33]	Review (narrative)	**Yes**, to propose a novel conceptual framework describing the determinants of stigma, focussing on mental health	**No**, the authors do not specify their research design	**Yes**, a narrative review of existing evidence and of the components of the proposed framework is sufficient	**No**, the authors do not describe how they selected or appraised supporting works for this framework	**Yes**, each concept that the authors included in their framework is well referenced	**Yes**, a narrative summary of supporting evidence is sufficient	**No**, there is no explanation of how included works were synthesized in order to generate the framework	4
Phelan et al. 2014[77]	Review (narrative)	**Yes**, to propose a novel theory of stigma focussing on systemic aspects of stigma and their impact on health	**Yes**, the authors propose a narrative review of extant theories	**Yes**, a narrative summary is appropriate for the descriptive aims	**No**, the authors do not describe how the key works in stigma and status theory were identified	**Yes**, all concepts are thoroughly cited, and the first author is an authority in this field of research	**Yes**, a narrative summary of supporting evidence is sufficient for the descriptive aims	**Yes**, the authors describe their assessment process by identifying theoretical convergence	6
Schabert et al. 2013[50]	Review (narrative)	**Yes**, to develop a framework of the experiences, causes and consequences of diabetes stigma	**Yes**, the authors state that this is a narrative review	**Yes**, the narrative review approach is appropriate for the objective	**No**, the authors describe the search strategy (databases, search terms) but do not specify inclusion criteria	**Yes**, each concept is referenced, offering an overview of included sources	**Yes**, synthesis of key theoretical concepts is appropriate for the aim of the review	**Yes**, the authors explain how the extant literature was categorized	6
White Hughto et al. 2015[58]	Review (narrative)	**Yes**, to review the multiple levels of transgender stigma and how they influence health	**No**, the design is not clearly specified, it is defined simply as a "review"	**Yes**, the narrative review approach is appropriate for the objectives	**No**, the narrative review describes concepts without sufficient detail to reproduce the content	**Yes**, each concept is referenced, offering an overview of included sources	**Yes**, synthesis of key theoretical concepts is appropriate for the aim of the review	**No**, there are no details on how analysis was conducted or what elements guided the synthesis	5

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TABLE 3 (continued)
Summary of critical appraisal of identified works in the literature search on structural determinants of stigma

Author, year	Design	Are the aims and objectives of the research clearly stated?	Is the research design clearly specified?	Is the research design appropriate for the aims and objectives of the research?	Do the researchers provide a clear account of the process by which their findings were produced?	Do the researchers display enough data to support their interpretations and conclusions?	Is the method of analysis appropriate?	Is the method of analysis adequately explicated?	Total score (/7)
Williams 2018[35]	Review (narrative)	**Yes**, to assess how personal, cultural and structural oppression affect individuals with affective distress, and the experience of self-stigma	**No**, the design is not clearly specified	**Yes**, the narrative review approach is appropriate for the objectives	**No**, the author does not describe how works were identified or selected	**Yes**, each concept is referenced, offering an overview of included sources	**Yes**, synthesis of key theoretical concepts is appropriate for the objectives	**No**, there are no details on how analysis was conducted or what elements guided the synthesis	4
Clement et al. 2013[36]	Review (systematic)	**Yes**, to assess the effects of mass media interventions on reducing mental health stigma	**Yes**, the authors conducted a systematic review of published literature	**Yes**, a systematic review is appropriate for the study aims	**Yes**, the authors list and justify selection criteria, list databases and provide a complete search strategy	**Yes**, the authors have identified and included a sufficient number of works to support their conclusions	**Yes**, a narrative synthesis and meta-analysis are appropriate for the study aims	**Yes**, the authors conducted a narrative synthesis of qualitative studies and meta-analysis of qualitative studies	7
Craig et al. 2017[49]	Review (systematic)	**Yes**, to explore the inclusion and conceptualization of stigma in research about TB in low incidence settings	**Yes**, the authors conducted a systematic mapping review to map/categorize the existing body of TB research	**Yes**, the systematic mapping review is appropriate for the goals of this study	**Yes**, clear description of search strategy (databases, search terms, inclusion criteria)	**Yes**, the authors use a detailed search strategy, and sufficient studies were identified to support each category in the mapping process	**Yes**, systematic mapping review of literature on TB-related stigma appropriate for the authors' objectives	**Yes**, the authors list specific analytical questions and provide an overview of the articles that addressed each question	7
Darlington et al. 2017[43]	Review (systematic)	**Yes**, to analyze the state of knowledge regarding HIV-related stigma among women in the Southern US	**Yes**, the authors conducted a systematic review of published literature	**Yes**, a systematic review is appropriate for the study aims	**Yes**, the authors list databases, provide rough details about search strategy and list clear selection criteria	**Yes**, the authors thoroughly cite each concept they introduce with qualitative and quantitative studies	**Yes**, the narrative synthesis of studies is appropriate for the study aims	**No**, the authors do not mention how the contents of the included studies were analyzed or appraised in order to inform the synthesis	6
Katz et al. 2013[44]	Review (systematic)	**Yes**, to assess the relationship between the experience of HIV-related stigma and ART adherence	**Yes**, a systematic review and meta-analysis of published and unpublished literature	**Yes**, a systematic review is appropriate to describe a hypothesized causal mechanism	**Yes**, the authors provide a detailed description of their search (databases, search strategy, inclusion criteria, quality assessment)	**Yes**, the analysis was robust and well reported, and they identified sufficient works to conduct a meta-analysis	**Yes**, a meta-analysis and thematic meta-synthesis is appropriate for the objectives	**Yes**, the authors conducted a thematic meta-synthesis of qualitative studies, and meta-analysis of quantitative studies	7

Abbreviations: ART, antiretroviral therapy; FASD, fetal alcohol spectrum disorder; HCV+, hepatitis-C-virus positive; HIV, human immunodeficiency virus; LGBT, lesbian, gay, bisexual, transgender; MSM, men who have sex with men; PLHIV, people living with human immunodeficiency virus; PrEP, pre-exposure prophylaxis; STBBI, sexually transmitted and blood-borne infection; TB, tuberculosis.

followed by a summary of identified structural determinants.

Descriptive results

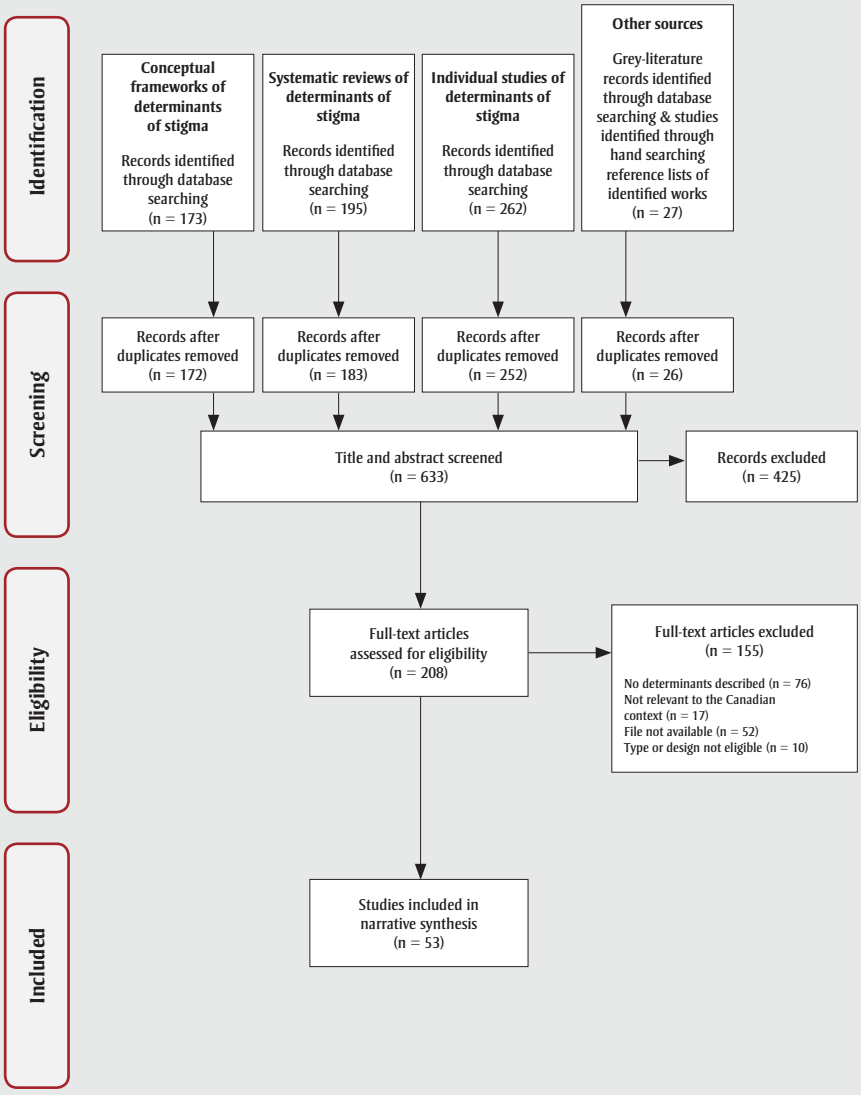
Study selection

Overall, 657 works were identified through the search strategy. Figure 1 provides a summary of works identified. Four works—all grey literature sources—were written in French. After applying inclusion and exclusion criteria, 53 works were retained (Table 2). Most rejected works were those that did not document determinants of stigma that operate at a structural level. The retained works consisted of literature reviews (n = 37; 69%), and individual mixed-method (qualitative and quantitative; n = 4; 8%), qualitative (n = 5; 9%) and quantitative (n = 7; 13%) studies. Most reviews were not limited to a specific country setting, while individual studies were predominantly based in specific geographic regions including the United States (n = 14), Canada (n = 8) and Europe (n = 5) (Table 2).

Quality appraisal

Most publications were moderate or strong in quality. The weakest element of the publications was a lack of detail on the design processes by which findings and interpretations were produced (Table 3). This element tended to be absent from works from the social sciences, which made up a large proportion of the included literature. This is a limitation of extant reviews of structural determinants of stigma. Figure 2A provides a summary of the mean score on each of the quality appraisal questions by study type, and Figure 2B provides an overview of the quality of works supporting each identified structural domain, described later on.

FIGURE 1
Flow diagram[a] of data identification, selection and extraction



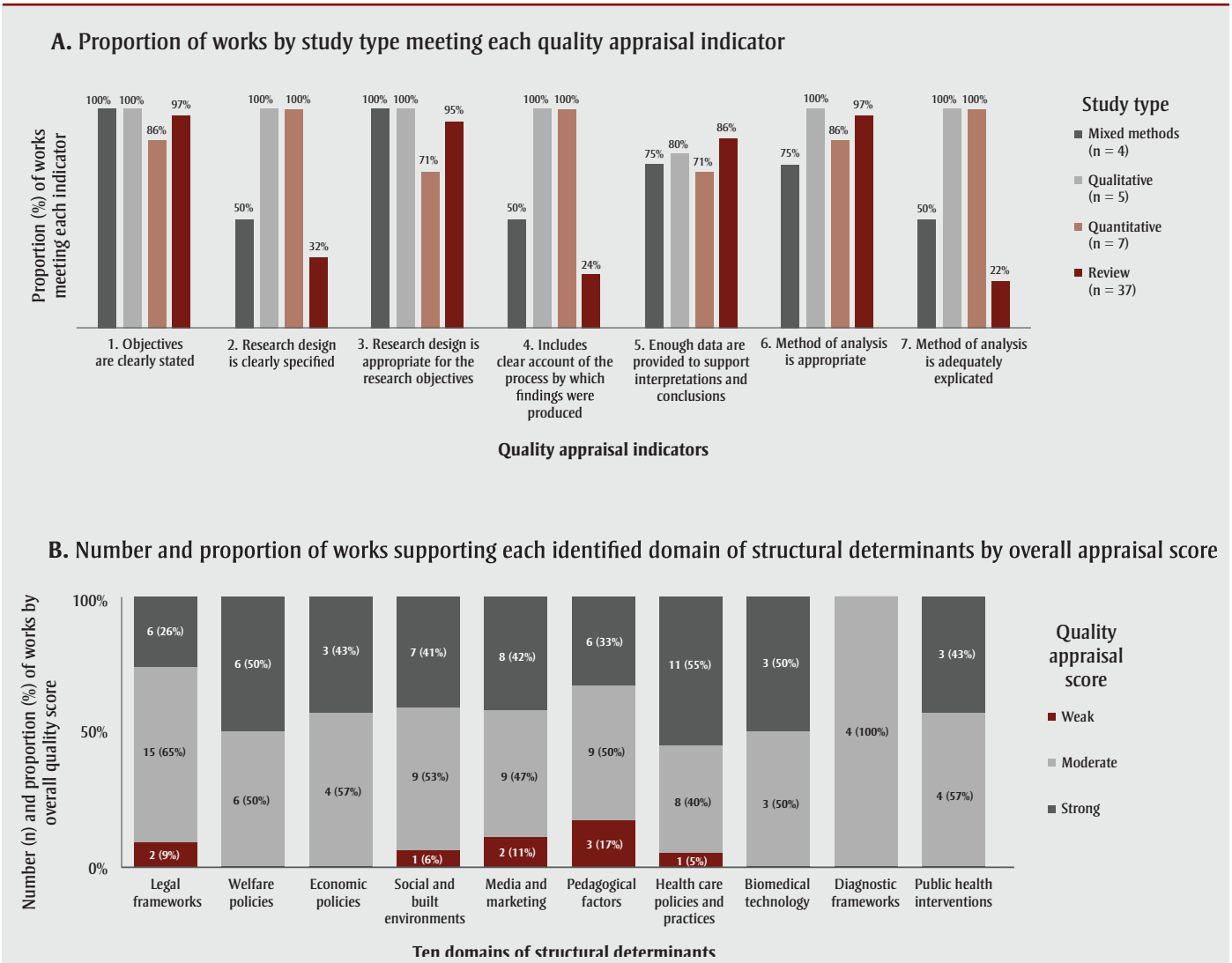
[a] See Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group. Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. BMJ. 2009;339:b2535. https://doi.org/10.1136/bmj.b2535. For more information, visit www.prisma-statement.org.

Study characteristics

The identified works overwhelmingly cited Link and Phelan's[1] conceptualization of stigma as a process driven by social, economic and political power inequities, through which attitudes, negative stereotypes and a sense of separation between groups can lead to discrimination and status loss. The reviewed literature explored many stigmatized experiences, identities, behaviours and health conditions (Table 2). Comprehensively, these were: individuals with mental health and substance use disorders;[26-39] individuals living with human immunodeficiency virus (HIV)[26,40-46] or other sexually transmitted or blood-borne infections (STBBI),[47] tuberculosis (TB),[48,49] diabetes,[50] epilepsy,[51] chronic pain[52,53] or cancer—particularly types whose etiology may be attributable to patients' behaviours;[54] vulnerable subpopulations such as migrants and racialized communities;[55,56] lesbian, gay, bisexual, transgender, queer and other (LGBTQ+) populations;[57,58] individuals experiencing poverty;[59] sex workers;[60] single mothers;[61] individuals labelled as obese or fat;[46,62] biological mothers of children diagnosed with fetal alcohol spectrum disorder;[63] and individuals who smoke.[64] Some authors highlighted that, although their research may have focussed on stigma pertaining to a specific condition or identity, individuals can experience multiple sources of stigma due to the intersection of multiple complex identities and life experiences.[47,60] These authors acknowledged that restricted study scope could represent a potential limitation to their studies.

Lastly, among the works reviewed, 15 proposed conceptual frameworks that graphically represented at least one upstream determinant of stigma (Table 2).[28,32,33,40-42,45-47,50,58,63,65-67] However, none were intended to provide a comprehensive summary of known structural determinants of stigma across populations. Identified frameworks were heterogeneous in form and content.

FIGURE 2
Summary of the quality appraisal assessment of identified works (N = 53), across study types and domains of structural determinants of stigma



However, most frameworks included an acknowledgement that stigma could be enacted at many levels, such as the individual (internalized), interpersonal, community, institutional and societal levels. Many frameworks also acknowledged that stigma is influenced by historical social inequities, such as those relating to systemic racism.[46]

Structural determinants of stigma

Thematic analysis of the reviewed literature yielded 10 overall domains of structural determinants of stigma (Table 2): (1) legal frameworks; (2) welfare policies; (3) economic policies; (4) social and built environments; (5) media and marketing; (6) pedagogical factors; (7) health care practices and policies; (8) biomedical technology; (9) diagnostic frameworks; and (10) public health interventions. A narrative synthesis of these domains and their relationship with stigma follows.

Legal frameworks

The domain of "legal frameworks" refers to factors pertaining to enacted or proposed legislation, including broad bills of rights, as well as downstream elements of criminal justice systems such as factors pertaining to policing, courts and corrections. Twenty-four works referenced terms that fell under this domain.[29,31,32,34,35,43,45-48,51,54,56-58,60,61,66-72] Examples of terms describing structural determinants under this domain include (but are not limited to) "laws,"[32] "legislative action,"[43] "legal protections,"[46] "Acts" (e.g. the United Kingdom's *Mental Health Act* or *Equality Act*),[35] "policing" and "sentencing."[45] Terms related to legal frameworks were mentioned in six existing frameworks.[32,45-47,58,67]

Overall, legal frameworks were identified as potential levers to prevent the discrimination and status loss components of the stigma process. Legislation that enshrines individual rights in relation to employment,[57,60] housing,[43] marriage,[66,69] or immigration[56]—to name some of the areas referenced in reviewed works—can prevent inequitable access to health and social resources.[67] On the other hand, factors relating to legal frameworks can also enable discrimination. This can occur when existing legislation fails to protect the rights of certain populations (people living with HIV are one prominent example[43]), when legislation restricts rights for certain groups (e.g. barring individuals with

mental illnesses from serving on juries,[34] or prohibiting individuals with epilepsy from driving[51]), or when components of the criminal justice system such as policing or sentencing affect certain populations more than others.[46] The laws introduced during North America's "War on Drugs," referenced in several studies, are one of the most illustrative examples of the latter. These laws were described as influencing the stigma process by perpetuating negative stereotypes of individuals who committed drug-related crimes (e.g. using or selling illicit substances)[34] and enabling status loss of Indigenous, Black and racialized communities through disproportionate policing and incarceration.[45,66]

Welfare policies

The domain of "welfare policies" refers to factors relating to the presence of, eligibility for and relative coverage or "generosity" of government-based structures, services and benefit programs that offer social, health or economic support for those in need. A non-exhaustive list of terms that led to the categorization of this domain included "welfare state," "insurance,"[33] "child welfare system,"[40] "benefits"[73] and "social security."[56] Twelve works used terms related to welfare policy,[33,37,40,45,55,56,58,59,61,64,66,73] of which two also referred to these terms in proposed conceptual frameworks.[33,40]

Overall, the provision and coverage of social supports (or lack thereof) was noted across the included works as contributing to the stigma process via two principle mechanisms: by shaping societal beliefs about service or benefit recipients, and by influencing vulnerable populations' access to protective and life-sustaining resources. Two examples of these welfare-related mechanisms include policies that disqualify individuals from welfare benefits or services based on certain statuses, such as those limiting immigrants' eligibility for social services based on documentation status or length of time since immigration,[56] and "War on Drugs" policies that disqualify offenders from social protections such as access to public housing.[45] Both types of policies were identified as reinforcing negative societal perceptions of those who do not "merit" societal support, therefore legitimizing exclusion and negative stereotypes.[33] Similar processes can occur if welfare coverage is restricted for certain conditions, such as when health insurance coverage is limited for mental health services[37] or gender-affirming procedures,[58] to name two examples. Policies that disqualify certain populations from access to social supports contribute to the stigma process by creating systematic gaps in care and status loss for affected populations.

Economic policies

The domain of "economic policies" refers to factors pertaining to governmental influence on features of economic landscapes, including policies relating to labour market wage, income redistribution policies or budgetary funding allocation across sectors. Though minimum wage limits are set through legislation, they are grouped under this domain because of their effects on economic conditions such as hiring practices and labour market participation—factors connected to the economic landscape of political jurisdictions.[74] Eight works referred to terms pertaining to this domain,[33,35,37,59,60,62,64,75] including one which integrated the concept of economic policies in its proposed conceptual framework.[33] Examples of terms relating to this domain included "funding,"[75] "tax,"[37] "investment,"[37] "economic development"[33] and "minimum wage."[59]

Overall, governmental influence on economic environments was described as influencing the stigma process by determining how equitably (or inequitably) economic resources are distributed within a population—thereby both influencing socioeconomic positioning of groups and sending the implicit message to disenfranchised groups that their disadvantaged state is not worth addressing through public investment. One example of how economic policies can influence status loss was that limited budgetary resource allocation to health services and workplace support programs for those experiencing mental health issues can lead to gaps in care and social and economic exclusion for those affected.[35,37,75]

Social and built environments

The domain of "social and built environments" refers to the characteristics of communities and places, at an aggregate level, in which individuals live, work or play—including population prevalence of certain health, social or economic conditions or elements of physical environments. Although they are likely influenced by elements that fall under preceding domains, such as economic or welfare policies, we consider socioecological environmental characteristics as a distinct domain. Seventeen works included terms pertaining to this domain,[34,37,39,41,42,48,53,57,61,62,64,66,67,70,72,75-77] including three conceptual frameworks.[41,42,66] A non-exhaustive list of terms relating to this domain included "environmental hazards,"[66] "residential segregation,"[42] "neighborhood disorder,"[39] "prevalence" of a health or social condition (e.g. depression)[75] and availability of social meeting "spaces."[41]

Overall, studies describe how characteristics at the level of the local area and the community can influence the stigma process by contributing to both real and perceived social separation between groups and by generating social stratification in resource access. One example of these mechanisms is the way racialized and lower-income communities are segregated across residential neighbourhoods, which can reduce contact between stigmatized and nonstigmatized groups and reinforce perceptions of social differentiation.[42,77] These exclusionary structures can contribute to economic deprivation,[48] differential exposure to hazardous environmental conditions such as unsafe work conditions, pollution or infectious disease,[66] and inequalities in access to health care facilities[34] or places of education and employment for excluded groups.[37] In contrast, social environments such as workplaces or residential areas with greater social diversity can foster more interactions between population subgroups, shift societal perceptions and beliefs and reduce inequities in resource access.[67,75]

Media and marketing

The domain of "media and marketing" refers to factors pertaining to the content development and regulation of communications strategies of various forms, such as news media, broadcasting or advertising, designed for the purposes of entertainment and sales, or to promote changes in individuals' behaviours. Nineteen works used terms pertaining to this domain.[27,28,32-37,48-50,54-56,60,61,67,76,77] Examples of terms relating to this domain included "media portrayals,"[32] "media coverage,"[37] "media context,"[33] "commercial"[67] and "social marketing."[50] Five of the identified conceptual frameworks explicitly mentioned media- and marketing-related terms.[32,33,46,50,67]

Media content and social marketing endeavours can influence the stigma process by shaping societal attitudes and beliefs, and by reinforcing or countering negative stereotypes, interpretations and attributions of blame. Media content can also serve as

a proxy for social interaction with stigmatized groups. If direct contact with stigmatized populations is rare, media may act as the primary or sole source of information that impacts judgments made in everyday life about these individuals.[32,77] To illustrate, one example is media portrayals of people with mental illnesses that depict these individuals as dangerous, unpredictable and criminal, thereby inciting fear and perceptions of social differentiation (or "othering").[27,28,37] Another example is media portrayals that reinforce beliefs that certain groups are to blame for the harms they experience, and are therefore less deserving of social support and inclusion.[48,54,60] These narratives can legitimize discrimination towards marginalized groups.[27,32,35,77]

Media content can also reduce stigma by normalizing and promoting a greater understanding of certain behaviours or conditions.[28,48] Media content presenting positive and inclusive messaging, and including factual information about the causes, treatments and experiences of individuals with mental illness, can shift population-level misconceptions and negative stereotypes.[32]

Pedagogical factors

The domain of "pedagogical factors" pertains to the structure, design and implementation of educational content (e.g. curricula) and teaching initiatives, as well as educational institutions. A sample of terms relating to this domain included "trainings,"[58] "curricula"[37] and "educational programs."[68] Eighteen works referenced terms that fell under this domain.[29-32,34,37,38,40,43,46,50-53,55,58,68,72] Pedagogical factors were referenced in three conceptual frameworks.[32,50,58]

These works described how both the form and the content of educational material can influence the stigma process. Overall, much like media content, pedagogical factors can influence the stigma process by shaping societal attitudes and beliefs. Across studies, it was noted that pedagogical material that promotes or enables direct contact between the public and stigmatized individuals,[38,50,51] that tackles misinformation[32] including negative stereotypes[29] and that normalizes stigmatized behaviours can reduce stigma by increasing awareness and empathy.

In contrast, the absence of training regarding certain health or social conditions can influence how care and services are delivered by professionals working in these fields, thereby contributing to discriminatory practices.[38] One salient example is the way insufficient training among health care providers on HIV transmission risk can lead to insensitive and discriminatory practices towards patients living with HIV.[43,55]

Health care policies and practices

The domain of "health care policies and practices" refers to health system–level factors that pertain to the delivery of health care, including facility presence, accessibility and internal operational policies. Seventeen individual works referenced terms associated with this domain.[26,28,31,33,34,37,40,41,44,45,48,49,55,60,64-66] Of these, five proposed conceptual frameworks that referenced terms relating to this domain.[33,40,45,65,66] A non-exhaustive list of terms used included "health care system,"[33] "linkage to care,"[45] "healthcare quality"[66] and "institutional [health care] protocols."[65]

Overall, structural determinants relating to health care policies tended to fall under two categories: factors relating to the availability and relative accessibility of high-quality health care services, and factors pertaining to internal policies on health service organization and delivery. An example of the former is systemic differences in the availability of prompt,[28,65] high-quality health care across communities, according to region of residence,[40,66] financial capacity,[44] and linguistic or cultural background.[34] Examples of health care initiatives that may reduce stigma are programs that improve the accessibility of services, such as policies that help patients navigate health systems and adhere to treatment plans,[44] and outreach activities (e.g. home visits) for underserved populations.[40]

Within clinical settings, institutional policies and structures can also contribute to discrimination against certain populations. Salient examples include physical structures, such as open-plan waiting rooms, and inter-staff communication policies that fail to protect patient's confidentiality by allowing diagnoses to be overhead by others. These kinds of policies and structures can deter vulnerable populations from seeking care and can lead to the mistreatment of patients with stigmatized health conditions such as HIV[55] or TB.[48]

Biomedical technology

The domain of "biomedical technology" refers to structural determinants that pertain to the development, existence, use and effects of technology or medical products that are provided to patients in clinical health settings to treat diagnosed health conditions. A sample of terms relating to this domain include "advent of effective treatment,"[48] "control of disease"[33] and "treatment side effects."[54] Six works—including one conceptual framework[33]—referenced determinants relating to this domain.[26,33,48,54,78,79]

Overall, studies documented how the existence of biomedical technologies that can prevent, manage or treat health conditions such as HIV,[26] TB,[48] or cancer,[54] to name some examples, can influence the stigma process by changing the visibility of the condition, or by shifting societal beliefs around the dangerousness, severity and permanence of the disease as well as the risk of transmission. Studies also identified how the targeted promotion of biomedical treatments to certain populations because of their behaviours or risk profiles may lead to increased stigma. For example, guidelines that recommend that individuals engaging in riskier sexual activities use pre-exposure prophylaxis (PrEP) to prevent HIV infection may cause people to conflate the use of this technology with sexual promiscuity, resulting in potential and current users fearing and experiencing discrimination.[26]

Diagnostic frameworks

The domain of "diagnostic frameworks" refers to structural determinants that pertain to developments in the understanding of disease etiology and classification. Seven works described determinants that relate to this domain,[33,35,46,50,58,63,79] two of which[33,46] proposed a conceptual framework that referenced terms relating to this domain. Examples of terms falling under this domain included "diagnostic practices,"[63] "DSM" (Diagnostic and Statistical Manual of Mental Disorders),[79] "genetic causal information"[50] and "medicalization."[58]

Overall, developments in societal understanding of how diseases emerge can contribute to the stigma process by influencing societal perceptions of where responsibility for disease emergence should be placed. One example of this has been research findings that certain conditions such as mental health disorders or diabetes can be linked to underlying genetic

factors. These developments in scientific knowledge can shift how societies attribute blame for incidence of these conditions.[33,50]

Developments in societal understanding of how health and social conditions should be classified can contribute to the stigma process by influencing perceptions of what is considered abnormal. By labelling certain conditions as "disorders" or "diseases," clinical diagnoses can imply the need for corrective treatment and facilitate the ostracizing of affected individuals. One illustrative example is how previous editions of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM) pathologized homosexuality and gender nonconformity, contributing to negative stereotypes of and discrimination against LGBTQ+ communities.[58]

Public health interventions

The domain of "public health interventions" refers to policies, programs and initiatives led or mandated and financially supported by public health stakeholders. Seven works, including one conceptual framework,[50] described determinants relating to this domain.[42,49,50,60,63,67,77] Terms used in these studies included "health promotion initiatives,"[50] "public health initiatives"[63] and "community-based outreach interventions."[42]

Overall, studies described how public health interventions can influence the stigma process by shaping societal norms and beliefs both positively and negatively. For example, health promotion interventions that perpetuate messaging around the need to change certain individual behaviours (e.g. weight control, substance consumption) can have unintentional negative influences on societal beliefs by reinforcing narratives of blame and responsibility for individuals engaging in these behaviours or experiencing resulting health conditions.[26,50] One illustration of this was public health messaging of zero-tolerance of alcohol consumption during pregnancy. This messaging can perpetuate negative societal beliefs of pregnant individuals who drink or of mothers of children with fetal alcohol spectrum disorder, and can lead to hesitancy among pregnant individuals who do drink to consult health and social services.[63]

Community-based public health interventions can also influence the discrimination and status loss components of the stigma process by intervening on resource distribution. One example of such interventions is community-based public health initiatives designed to improve access to health and harm reduction services for populations that may have less trust in medical establishments due to historical discrimination, such as individuals living with HIV or sex workers.[42,60] These types of interventions are believed to be protective against stigma as they promote respect and inclusivity, and represent sources of empowerment for vulnerable populations.[42]

Conceptual framework

The ten domains of structural determinants are summarized in Figure 3. This figure is a simplified conceptual framework that depicts the structural determinant domains identified in the reviewed literature, and how they were described in relation to the stigma process as defined by Link and Phelan.[1] Three large arrows flow from the structural determinants to the stigma process. These arrows indicate how structural factors can influence the stigma process overall, and more precisely by shaping the psychosocial "drivers" of the stigma process, which include societal beliefs and stereotypes based in fear, normative judgment or blame as well as lived experiences of discrimination and status loss.[3,72]

In line with the reviewed conceptual frameworks and models, including the CPHO's Stigma Pathways Model,[3] Figure 3 also includes a graphical representation of the levels of population interaction at which stigma can be enacted, from the individual (internalized) to the systems level. Further, many studies and existing frameworks acknowledged that stigma processes are influenced by historical social inequities and discrimination,[3,46,72] thus creating feedback loops between structural practices and stigma processes through time. To represent these dynamics, Figure 3 includes a large arrow that flows from the stigma process back to structural determinants.

Since this review did not involve an exhaustive literature search and further research is needed to confirm both the causal associations between factors and the effectiveness of various stigma-reduction interventions across populations and settings, Figure 3 should not be interpreted as providing a comprehensive summary of all possible structural determinant domains, nor as depicting firm causal ties between each of the domains and elements of the stigma process. Instead, it was designed to provide a visual summary of the narrative synthesis presented in this review that can be used as a tool to structure policy discussions on ways to orient public health interventions to reduce stigma in Canada and abroad.

Discussion

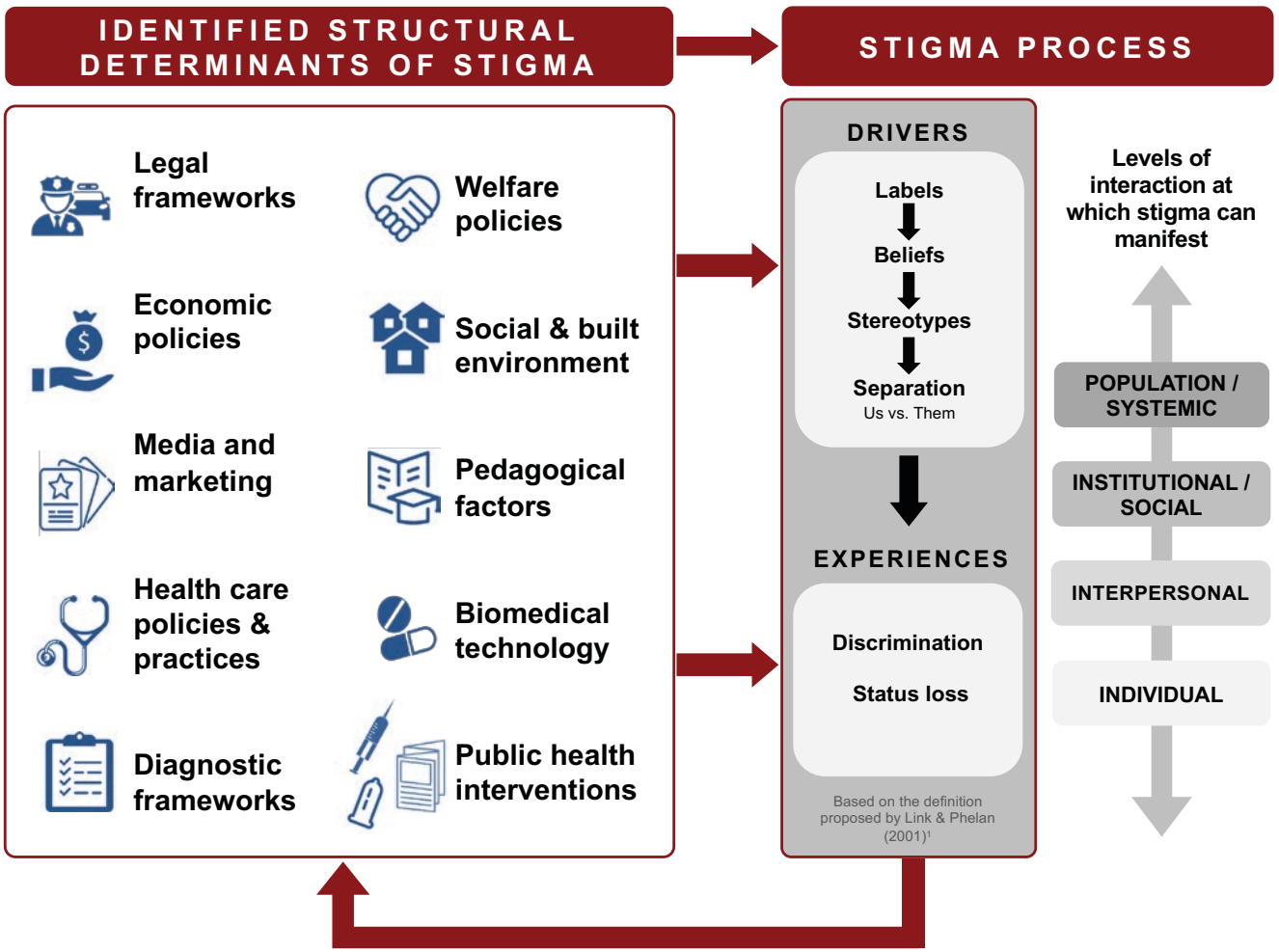
This rapid review was designed to identify and summarize structural determinants of stigma in Canada and other OECD settings, in order to guide future research and intervention. An analysis of findings from 53 works from peer-reviewed and grey-literature sources, 15 of which included proposed conceptual frameworks that mentioned at least one type of structural determinant of stigma, this review is the first known summary and conceptual framework of structural determinants of stigma across health and social conditions. Applying a thematic analysis of structural-level factors documented in the literature, we identified and defined 10 distinct domains of structural determinants of stigma. These domains were legal frameworks, welfare policies, economic policies, social and built environments, media and marketing, pedagogical factors, health care practices and policies, biomedical technology, diagnostic frameworks, and public health interventions.

This summary fills an important gap in the existing literature by bringing together findings from a wide range of fields of stigma research, and elucidating types of factors that operate at the contextual level to influence societal beliefs, negative stereotypes, discrimination or status loss across multiple social contexts and populations.[14] This review and the proposed conceptual framework are tools that can be used to structure future policy conversations; the ten domains of factors and the governance sectors to which they relate can be systematically considered when seeking to address and prevent stigma. As structural-level factors can contribute to social stratification and health inequities,[9] each identified domain merits attention.

Strengths and limitations

One strength of this rapid review is its focus on determinants of stigma across health outcomes and physical or social attributes. The resulting summary is therefore applicable to a wide range of substantive

FIGURE 3
Conceptual framework of identified domains of structural determinants and their relationship with the stigma process



Note: This figure provides a visual summary of the narrative synthesis presented in this review. It should not be interpreted as providing a comprehensive summary of all possible structural determinant domains, nor as depicting firm causal ties between each of the domains and elements of the stigma process.

domains of public health and social policy. Another strength is its focus on structures that could theoretically be modified through intersectoral public health intervention, with potential population-level impacts on the stigma process.[9,15]

Nonetheless, this review has certain limitations. Due to the non-exhaustive search strategy of the rapid review design, relevant studies—particularly individual qualitative or quantitative studies—may have been missed by our search strategy, and thus, certain examples of structural determinants may have been missed as well. However, given that the majority of published works included in this review are evidence summaries and frameworks of structural determinants, we expect that the contribution of missed studies is likely to be minimal.

Another limitation is that many of the works reviewed here did not include sufficient detail about the process by which their results were obtained and synthesized. The opacity of the data-generating process of these works calls into question the comprehensiveness of their findings. The resulting summary should therefore be used primarily as a conceptual guide rather than an exhaustive review. Including this element in future texts will be a necessary step for strengthening public health literature on stigma.

Finally, this review summarizes findings for the general context of OECD nations. We did not seek to explore structural determinants within a specific jurisdiction. Since the impacts of structural determinants on the stigma process may be heterogeneous across local contexts, future research and policy conversations on ways to address stigma should consider how local eco-social or political environments may influence the structural determinants of stigma or the effects of potential interventions on stigma reduction.

Conclusion

This review complements previously published summaries of the influence of stigma as a determinant of health. Here, the structural determinants of stigma as a social outcome occurring across health and social conditions were explored. A rapid review of existing evidence suggests

that there are at least ten domains of structural determinants of stigma. The present review's conceptual framework of these domains can be used as a tool to structure future policy conversation across sectors on ways to reduce stigma at a population level.

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Conflicts of interest

The authors have no conflicts of interest to declare.

Authors' contributions and statement

All authors contributed to the methodological design of the literature review. AB and BHMF conducted the literature review search and identified relevant works. All authors extracted data, analyzed identified works and drafted the article. AB and CBF revised the article.

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References

1. Link BG, Phelan JC. Conceptualizing stigma. Annu Rev Sociol. 2001;27(1):363-85. https://doi.org/10.1146/annurev.soc.27.1.363

2. Hatzenbuehler ML, Phelan JC, Link BG. Stigma as a fundamental cause of population health inequalities. Am J Public Health. 2013;103(5):813-21. https://dx.doi.org/10.2105/AJPH.2012.301069

3. Tam T. Addressing stigma: towards a more inclusive health system. Ottawa (ON): Government of Canada; 2019 [Catalogue No.: HP2-10E-PDF]. 78 p.

4. Major B, Dovidio JF, Link BG, Calabrese SK. Stigma and its implications for health: introduction and overview. In: Major B, Dovidio JF, Link BG, editors. Oxford library of psychology. The Oxford handbook of stigma, discrimination, and health. New York (NY): Oxford University Press; 2018:3-28.

5. Stangl AL, Earnshaw VA, Logie CH, et al. The Health Stigma and Discrimination Framework: a global, crosscutting framework to inform research, intervention development, and policy on health-related stigmas. BMC Med. 2019;17(1):31. https://doi.org/10.1186/s12916-019-1271-3

6. Gehlert S, Sohmer D, Sacks T, Mininger C, McClintock M, Olopade O. Targeting health disparities: a model linking upstream determinants to downstream interventions. Health Aff (Millwood). 2008;27(2):339-49. https://doi.org/10.1377/hlthaff.27.2.339

7. Sayer J. Structural stigma and health for persons with mental illness [thesis]. [Chicago (IL)]: University of Illinois at Chicago; 2018. 167 p. Available from: https://indigo.uic.edu/articles/thesis/Structural_Stigma_and_Health_for_Persons_with_Mental_Illness/10854335

8. Hatzenbuehler ML. Structural stigma and health inequalities: research evidence and implications for psychological science. Am Psychol. 2016;71(8):742-51. https://doi.org/10.1037/amp0000068

9. Solar O, Irwin A. A conceptual framework for action on the social determinants of health. Social Determinants of Health Discussion Paper 2. Geneva (CH): World Health Organization; 2007. 76 p.

10. Shannon K, Goldenberg SM, Deering KN, Strathdee SA. HIV infection among female sex workers in concentrated and high prevalence epidemics: why a structural determinants framework is needed. Curr Opin HIV AIDS. 2014;9(2):174-82. https://doi.org/10.1097/COH.0000000000000042

11. Diez Roux AV, Aiello AE. Multilevel analysis of infectious diseases. J Infect Dis. 2005;191(Suppl_1):S25-S33. https://doi.org/10.1086/425288

12. Greenwood M, De Leeuw S, Lindsay NM, Reading C, editors. Determinants of Indigenous peoples' health. Toronto (ON): Canadian Scholars' Press; 2015. 279 p.

13. Knight RE, Shoveller JA, Carson AM, Contreras-Whitney JG. Examining clinicians' experiences providing sexual health services for LGBTQ youth: considering social and structural determinants of health in clinical practice. Health Educ Res. 2014;29(4):662-70. https://doi.org/10.1093/her/cyt116

14. Link BG, Phelan J. Social conditions as fundamental causes of disease. J Health Soc Behav. 1995;Spec No:80-94.

15. Berkman LF, Kawachi I, Glymour MM, editors. Social epidemiology. 2nd ed. New York (NY): Oxford University Press; 2014. 640 p.

16. Khangura S, Konnyu K, Cushman R, Grimshaw J, Moher D. Evidence summaries: the evolution of a rapid review approach. Syst Rev. 2012;1:10. https://doi.org/10.1186/2046-4053-1-10

17. Ganann R, Ciliska D, Thomas H. Expediting systematic reviews: methods and implications of rapid reviews. Implement Sci. 2010;5(1):56. https://doi.org/10.1186/1748-5908-5-56

18. Dobbins M. Rapid review guidebook: steps for conducting a rapid review. Hamilton (ON): National Collaborating Centre for Methods and Tools; 2017. 25 p.

19. Primo Peña E, Vázquez Valero M, García Sicilia J. Comparative study of journal selection criteria used by MEDLINE and EMBASE, and their application to Spanish biomedical journals. In: 9th European Conference of Medical and Health Libraries. Unpublished conference paper delivered 20-25 September, 2004, Santander, Spain.

20. Greenhalgh T, Peacock R. Effectiveness and efficiency of search methods in systematic reviews of complex evidence: audit of primary sources. BMJ. 2005;331(7524):1064-5. https://doi.org/10.1136/bmj.38636.593461.68

21. Dixon-Woods M, Cavers D, Agarwal S, et al. Conducting a critical interpretive synthesis of the literature on access to healthcare by vulnerable groups. BMC Med Res Methodology. 2006;6:35. https://doi.org/10.1186/1471-2288-6-35

22. Popay J, Roberts H, Sowden A, et al. Guidance on the conduct of narrative synthesis in systematic reviews: a product from the ESRC Methods Programme (Version 1). Lancaster (UK): Lancaster University. 2006;1:b92. 92 p.

23. Guest G, MacQueen KM, Namey EE. Applied thematic analysis. Thousand Oaks (CA): Sage Publications; 2012. Chapter 1, Introduction to applied thematic analysis.

24. Braun V, Clarke V. Using thematic analysis in psychology. Qual Res Psych. 2006;3(2):77-101. https://doi.org/10.1191/1478088706qp063oa

25. Ryan GW, Bernard HR. Techniques to identify themes. Field Methods. 2003; 15(1):85-109. https://doi.org/10.1177/1525822X02239569

26. Golub SA. PrEP stigma: implicit and explicit drivers of disparity. Curr HIV/AIDS Rep. 2018;15(2):190-7. https://doi.org/10.1007/s11904-018-0385-0

27. Nairn R, Coverdale S, Coverdale JH. A framework for understanding media depictions of mental illness. Acad Psychiatry. 2011;35(3):202-6. https://doi.org/10.1176/appi.ap.35.3.202

28. Mukolo A, Heflinger CA, Wallston KA. The stigma of childhood mental disorders: a conceptual framework. J Am Acad Child Adolesc Psychiatry. 2010;49(2):92-103. https://doi.org/10.1097/00004583-201002000-00003

29. Arboleda-Florez J, Stuart H. From sin to science: fighting the stigmatization of mental illnesses. Can J Psychiatry. 2012;57(8):457-63. https://doi.org/10.1177/070674371205700803

30. Holder SM, Peterson ER, Stephens R, Crandall LA. Stigma in mental health at the macro and micro levels: implications for mental health consumers and professionals. Community Ment Health J. 2019;55(3):369-74. https://doi.org/10.1007/s10597-018-0308-y

31. Bonsack C, Morandi S, Favrod J, Conus P. Le stigmate de la «folie»: de la fatalité au rétablissement. Rev Med Suisse. 2013;9(377):588-92.

32. Collins RL, Wong EC, Cerully JL, Schultz D, Eberhart NK. Interventions to reduce mental health stigma and discrimination: a literature review to guide evaluation of California's mental health Prevention and Early Intervention initiative. Rand Health Q. 2013;2(4):3.

33. Pescosolido BA, Martin JK, Lang A, Olafsdottir S. Rethinking theoretical approaches to stigma: a Framework Integrating Normative Influences on Stigma (FINIS). Soc Sci Med. 2008; 67(3):431-40. https://doi.org/10.1016/j.socscimed.2008.03.018

34. National Academies of Sciences, Engineering, Medicine. Ending discrimination against people with mental and substance use disorders: the evidence for stigma change. Washington (DC): The National Academies Press; 2016. 158 p.

35. Williams B. The journey to self-stigma and its impact on 'recovery' in people experiencing mental distress: fighting back with stigma resistance. J Undergrad Res NTU. 2018;1(1):283-303.

36. Clement S, Lassman F, Barley E, Evans-Lacko, S. Mass media interventions for reducing mental health-related stigma. Cochrane Database Syst Rev. 2013;7(7):CD009453. https://doi.org/10.1002/14651858.CD009453.pub2

37. Livingston JD. Mental illness-related structural stigma: the downward spiral of systemic exclusion. Ottawa (ON): Mental Health Commission of Canada; 2013. 50 p.

38. Ministère de la Santé et des Services sociaux du Québec. La lutte contre la stigmatisation et la discrimination dans le réseau de la santé et des services sociaux - guide d'accompagnement. Québec (QC): Governement du Québec; 2016. 23 p.

39. Min SY, Wong YLI. Association between community contextual factors and stigma of mental illness in South Korea: a multilevel analysis. Psychiatr Q. 2017;88(4):853-64. http://dx.doi.org/10.1007/s11126-017-9503-1

40. Woodgate RL, Zurba M, Tennent P, Cochrane C, Payne M, Mignone J. "People try and label me as someone I'm not": the social ecology of Indigenous people living with HIV, stigma, and discrimination in Manitoba, Canada. Soc Sci Med. 2017;194:17-24. https://doi.org/10.1016/j.socscimed.2017.10.002

41. France NF, Mcdonald SH, Conroy RR, et al. "An unspoken world of unspoken things": a study identifying and exploring core beliefs underlying self-stigma among people living with HIV and AIDS in Ireland. Swiss Med Wkly. 2015;145:w14113. https://doi.org/10.4414/smw.2015.14113

42. Earnshaw VA, Bogart LM, Dovidio JF, Williams DR. Stigma and racial/ethnic HIV disparities: moving toward resilience. Stigma Health. 2015;1(S): 60-74. https://doi.org/10.1037/2376-6972.1.S.60

43. Darlington CK, Hutson SP. Understanding HIV-related stigma among women in the Southern United States: a literature review. AIDS Behav. 2017; 21(1):12-26. https://doi.org/10.1007/s10461-016-1504-9

44. Katz IT, Ryu AE, Onuegbu AG, et al. Impact of HIV-related stigma on treatment adherence: systematic review and meta-synthesis. J Int AIDS Soc. 2013;16(3 Suppl 2):18640. https://doi.org/10.7448/IAS.16.3.18640

45. Kerr J, Jackson T. Stigma, sexual risks, and the war on drugs: examining drug policy and HIV/AIDS inequities among African Americans using the Drug War HIV/AIDS Inequities Model. Int J Drug Policy. 2016;37:31-41. https://doi.org/10.1016/j.drugpo.2016.07.007

46. Clair M, Daniel C, Lamont M. Destigmatization and health: cultural constructions and the long-term reduction of stigma. Soc Sci Med. 2016; 165:223-32. https://doi.org/10.1016/j.socscimed.2016.03.021

47. MacLean R. Resources to address stigma related to sexuality, substance use and sexually transmitted and blood-borne infections. Can Comm Dis Rep. 2018;44(2):62-7.

48. Coreil J, Mayard G, Simpson KM, Lauzardo M, Zhu Y, Weiss M. Structural forces and the production of TB-related stigma among Haitians in two contexts. Soc Sci Med. 2010; 71(8):1409-17. https://doi.org/10.1016/j.socscimed.2010.07.017

49. Craig GM, Daftary A, Engel N, O'Driscoll S, Ioannaki A. Tuberculosis stigma as a social determinant of health: a systematic mapping review of research in low incidence countries. Int J Infect Dis. 2017;56:90-100. https://doi.org/10.1016/j.ijid.2016.10.011

50. Schabert J, Browne JL, Mosely K, Speight J. Social stigma in diabetes: a framework to understand a growing problem for an increasing epidemic. Patient. 2013;6(1):1-10. https://doi.org/10.1007/s40271-012-0001-0

51. Fernandes PT, Snape DA, Beran RG, Jacoby A. Epilepsy stigma: what do we know and where next? Epilepsy Behav. 2011;22(1):55-62. https://doi.org/10.1016/j.yebeh.2011.02.014

52. De Ruddere L, Craig KD. Understanding stigma and chronic pain: a state-of-the-art review. Pain. 2016; 157(8):1607-10. https://doi.org/10.1097/j.pain.0000000000000512

53. Aste JA. Chronic pain and stigma: a literature review [dissertation]. [Ohio]: Union Institute and University; 2016; 10113719. 85 p. Available from: https://pqdtopen.proquest.com/doc/1801982335.html?FMT = AI

54. Knapp S, Marziliano A, Moyer A. Identity threat and stigma in cancer patients. Health Psychol Open. 2014; 1(1):2055102914552281. https://doi.org/10.1177/2055102914552281

55. Arrey AE, Bilsen J, Lacor P, Deschepper R. Perceptions of stigma and discrimination in health care settings towards sub-Saharan African migrant women living with HIV/AIDS in Belgium: a qualitative study. J Biosoc Sci. 2017; 49(5):578-96. https://doi.org/10.1017/S0021932016000468

56. Morey BN. Mechanisms by which anti-immigrant stigma exacerbates racial/ethnic health disparities. Am J Public Health. 2018;108(4):460-3. https://doi.org/10.2105/AJPH.2017.304266

57. Hatzenbuehler ML. Structural stigma and the health of lesbian, gay, and bisexual populations. Curr Dir Psychol Sci. 2014;23(2):127-32. https://doi.org/10.1177/0963721414523775

58. White Hughto JM, Reisner SL, Pachankis JE. Transgender stigma and health: a critical review of stigma determinants, mechanisms, and interventions. Soc Sci Med. 2015;147:222-31. https://doi.org/10.1016/j.socscimed.2015.11.010

59. Groulx L-H. Les facteurs engendrant l'exclusion au Canada: survol de la littérature multidisciplinaire. Québec City (QC): Centre d'étude sur la pauvreté et l'exclusion; 2011. 116 p.

60. Benoit C, Jansson SM, Smith M, Flagg J. Prostitution stigma and its effect on the working conditions, personal lives, and health of sex workers. J Sex Res. 2018;55(4-5):457-71. https://doi.org/10.1080/00224499.2017.1393652

61. Carroll NJ. Lone mothers' experiences of stigma: a comparative study [doctoral thesis]. [Huddersfield, UK]: University of Huddersfield; 2017. 274 p. Available from: http://eprints.hud.ac.uk/id/eprint/34358/1/FINAL%20THESIS%20-%20Carroll.pdf

62. Brewis AA. Stigma and the perpetuation of obesity. Soc Sci Med. 2014; 118:152-8. https://doi.org/10.1016/j.socscimed.2014.08.003

63. Bell E, Andrew G, Di Pietro N, Chudley A, Reynolds J, Racine E. It's a shame! Stigma against fetal alcohol spectrum disorder: examining the ethical implications for public health practices and policies. Pub Health Ethics. 2016; 9(1):65-77. https://doi.org/10.1093/phe/phv012

64. Stuber J, Galea S, Link BG. Smoking and the emergence of a stigmatized social status. Soc Sci Med. 2008;67(3): 420-430. https://doi.org/10.1016/j.socscimed.2008.03.010

65. Paterson B, Hirsch G, Andres K. Structural factors that promote stigmatization of drug users with hepatitis C in hospital emergency departments. Int J Drug Policy. 2013;24(5):471-8. https://doi.org/10.1016/j.drugpo.2013.01.008

66. Chaudoir SR, Earnshaw VA, Andel S. "Discredited" versus "discreditable": understanding how shared and unique stigma mechanisms affect psychological and physical health disparities. Basic Appl Soc Psych. 2013;35(1):75-87. https://doi.org/10.1080/01973533.2012.746612

67. Mirabito AM, Otnes CC, Crosby E, et al. The stigma turbine: a theoretical framework for conceptualizing and contextualizing marketplace stigma. J Public Policy Mark. 2016;35(2):170-84. https://doi.org/10.1509/jppm.15.145

68. Henderson NL, Dressler WW. Medical disease or moral defect? Stigma attribution and cultural models of addiction causality in a university population. Cult Med Psychiatry. 2017;41(4):480-98. https://doi.org/10.1007/s11013-017-9531-1

69. Pachankis JE, Hatzenbuehler ML, Berg RC, et al. Anti-LGBT and anti-immigrant structural stigma: an intersectional analysis of sexual minority men's HIV risk when migrating to or within Europe. J Acquir Immune Defic Syndr. 2017;76(4):356-66. https://doi.org/10.1097/QAI.0000000000001519

70. Hatzenbuehler ML, Jun H-J, Corliss HL, Austin SB. Structural stigma and sexual orientation disparities in adolescent drug use. Addict Behav. 2015; 46:14-18. https://doi.org/10.1016/j.addbeh.2015.02.017

71. Hatzenbuehler ML, Pachankis JE. Stigma and minority stress as social determinants of health among lesbian, gay, bisexual, and transgender youth: research evidence and clinical implications. Pediatr Clin North Am. 2016;63(6):985-97. https://doi.org/10.1016/j.pcl.2016.07.003

72. Link B, Hatzenbuehler ML. Stigma as an unrecognized determinant of population health: research and policy implications. J Health Polit Policy Law. 2016;41(4):653-73. https://doi.org/10.1215/03616878-3620869

73. Hansen H, Bourgois P, Drucker E. Pathologizing poverty: new forms of diagnosis, disability, and structural stigma under welfare reform. Soc Sci Med. 2014;103:76-83. https://doi.org/10.1016/j.socscimed.2013.06.033

74. Neumark D. The econometrics and economics of the employment effects of minimum wages: getting from known unknowns to known knowns. Ger Econ Rev. 2019;20(3):293-329. https://doi.org/10.1111/geer.12184

75. Angermeyer MC, Matschinger H, Link BG, Schomerus G. Public attitudes regarding individual and structural discrimination: two sides of the same coin? Soc Sci Med. 2014;103:60-66. https://doi.org/10.1016/j.socscimed.2013.11.014

76. Désy M, Filiatrault F. Dimension éthique de la stigmatisation en santé publique: outil d'aide à la réflexion. Québec (QC): Institut national de santé publique du Québec; 2013. 47 p.

77. Phelan JC, Lucas JW, Ridgeway CL, Taylor CJ. Stigma, status, and population health. Soc Sci Med. 2014;103:15-23. https://doi.org/10.1016/j.socscimed.2013.10.004

78. Stringer KL, Turan B, McCormick L, et al. HIV-related stigma among healthcare providers in the Deep South. AIDS Behav. 2016;20(1):115-25. https://doi.org/10.1007/s10461-015-1256-y

79. Jorm AF, Griffiths KM. The public's stigmatizing attitudes towards people with mental disorders: how important are biomedical conceptualizations? Acta Psychiatr Scand. 2008;118(4):315-21. https://doi.org/10.111/j.1600-0447.2008.01251.x

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Call for papers – 2021 special issue
Tobacco and vaping prevention and control in Canada

Submission deadline extended!

Editors: Jennifer O'Loughlin (University of Montreal), Thierry Gagné (University College London) and Robert Geneau (Editor-in-Chief, *Health Promotion and Chronic Disease Prevention in Canada* Journal, Public Health Agency of Canada)

It is estimated that more than 45 000 Canadians die from a tobacco-related disease each year,[1] making tobacco use the leading preventable cause of premature death in Canada.[2] In recent years, the growing use of vaping products, especially among youth, has also raised significant public health concerns. There is emerging evidence that vaping products are not without risks for individual users, with more research needed to determine the long-term risks. The electronic cigarette market, if left to expand without an appropriate mix of regulations in place, could also threaten the "Tobacco Endgame."[3,4] Tobacco and vaping control policies are now largely intertwined.

Canada continues to implement comprehensive tobacco control policies and programs as part of its commitment to reach a national target of less than 5% tobacco use by 2035.[5] Regulations on vaping products have also been introduced in recent years at the federal level and across several provinces and territories, with one of the clear aims being to curb the use of vaping products among youth.

The objective of this special issue is to disseminate current and emerging scientific evidence on tobacco and vaping-related epidemiology, prevention and control, with a focus on youth. To this effect, *Health Promotion and Chronic Disease Prevention in Canada: Research, Policy and Practice* seeks relevant topical research articles that present new findings or synthesize existing evidence on:

- Policies, interventions and regulations related to tobacco and/or vaping initiation, use and consumption, and cessation, including tobacco and vaping-related policy gaps and implementation challenges;
- Health inequalities in tobacco/vaping use and related harms; and
- Associations between the use of vaping products, smoking cessation and harm reduction behaviours in both smokers and non-smokers.

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

Consult the journal's website for information on invited article types and detailed submission guidelines for authors. Kindly refer to this call for papers in your cover letter. All manuscript submissions, pre-submission inquiries and questions about suitability or scope should be directed to PHAC.HPCDP.Journal-Revue.PSPMC.ASPC@canada.ca.

Submission Deadline: April 30th, 2021.

References

1. Health Canada. Canada's tobacco strategy [Internet]. Ottawa (ON): Health Canada; [modified 2020 Jan 10; cited 2020 Nov 20]. Available from: https://www.canada.ca/en/health-canada/services/publications/healthy-living/canada-tobacco-strategy.html
2. Health Canada. Consultation on the future of tobacco control in Canada: what we heard. Ottawa (ON): Health Canada; 2017. Available from: https://www.canada.ca/en/health-canada/services/publications/healthy-living/consultation-future-tobacco-control-what-we-heard.html
3. McDaniel PA, Smith EA, Malone RE. The tobacco endgame: a qualitative review and synthesis. Tob Control. 2016;25:594-604. https://doi.org/10.1136/tobaccocontrol-2015-052356
4. The Tobacco Endgame Cabinet. Getting to less than 5% by 2035: the 2019 Tobacco Endgame report. Ottawa (ON): The Canadian Lung Association; 2019. Available from: https://www.lung.ca/sites/default/files/EndGameReport-final.pdf
5. Health Canada. Overview of Canada's tobacco strategy. Ottawa (ON): Health Canada; 2018. Available from: https://www.canada.ca/en/health-canada/services/publications/healthy-living/canada-tobacco-strategy/overview-canada-tobacco-strategy.html

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With thanks to our 2020 peer reviewers

We are grateful to the following individuals for their significant contribution to *Health Promotion and Chronic Disease Prevention in Canada* as peer reviewers in 2020. Their expertise ensures the quality of our journal and promotes the sharing of new knowledge among peers in Canada and internationally.

Amira Ali
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Michelle Vine

Other PHAC publications

Researchers from the Public Health Agency of Canada also contribute to work published in other journals. Look for the following articles published in 2020 and 2021:

Dufner TJ, Fitzgerald JS, **Lang JJ**, Tomkinson GR. A systematic analysis of temporal trends in handgrip strength of 2,584,978 adults from 13 countries between 1960 and 2017. Sports Med. 2020;50(12):2175-91.

Grywacheski V, Ali J, **Baker MM**, **Gheorghe M**, **Wong SL**, **Orpana HM**. Opioid and cannabis use during pregnancy and breastfeeding in relation to sociodemographics and mental health status: a descriptive study. J Obstet Gynaecol Can. 2020. https://doi.org/10.1016/j.jogc.2020.09.017

Maclean G, Cook P, **Lindsay LR**, et al. Low seroprevalence of Lyme disease among multiple sclerosis patients in New Brunswick. Can J Neurol Sci. 2020;47(6):842-4. https://doi.org/10.1017/cjn.2020.129

Wang Z, Zhou Y, Zhang Y, […] **Liu S**, et al. Association of change in air quality with hospital admission for acute exacerbation of chronic obstructive pulmonary disease in Guangdong, China: a province-wide ecological study. Ecotoxicol Environ Saf. 2021;208:111590. https://doi.org/10.1016/j.ecoenv.2020.111590

Williams GC, Burns KE, Battista K, **de Groh M**, **Jiang Y**, et al. A cross-sectional examination of the association between co-ed and gender-specific school intramural programs and intramural participation among a sample of Canadian secondary school students. Preventive Med Reports. 2020;20:101233. https://doi.org/10.1016/j.pmedr.2020.101233

Zutrauen S, McFaull S, Do MT. Soccer-related head injuries—analysis of sentinel surveillance data collected by the electronic Canadian Hospitals Injury Reporting and Prevention Program. Paediatr Child Health. 2020;25(6):378-84. https://doi.org/10.1093/pch/pxz116