

Advancing Strategies for Agenda Setting by Health Policy Coalitions:
A Network Analysis of the Canadian Chronic Disease Prevention Survey

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Abstract

Health in all policies can address chronic disease morbidity and mortality by increasing population-level physical activity and healthy eating, and reducing tobacco and alcohol use. Both governmental and non-governmental policy influencers are instrumental for health policy that modifies political, economic, and social environments. Policy influencers are informed and persuaded by coalitions that support or oppose changing the status quo. Empirical research examining policy influencers' contact with coalitions, as a social psychological exposure with health policy outcomes, can benefit from application of health communication theories.

Accordingly, we analyzed responses to the 2014 Chronic Disease Prevention Survey for 184 Canadian policy influencers employed in provincial governments, municipalities, large workplaces, school boards, and the media. In addition to contact levels with coalitions, respondents' jurisdiction, organization, and ideology were analyzed as potential moderators. Calculating authority score centrality using network analysis, we determined health policy supporters to be more central in policy influencer networks, and theorized their potential to impact health policy public agenda setting via priming and framing processes. We discuss the implications of our results as presenting opportunities to more effectively promote health policy through priming and framing by coordinating coalitions across risk behaviors to advance a societal imperative for chronic disease prevention.

Introduction

Chronic diseases (cardiovascular and respiratory illness, diabetes mellitus, and cancers) are leading causes of morbidity and mortality in almost every jurisdiction (Mathers, Stevens, & Mascarenhas, 2009). Modifiable health-related risk behaviors, including physical inactivity, unhealthy eating, tobacco consumption, and misuse of alcohol, substantially contribute to the burden of chronic disease (Bauer, Briss, Goodman, & Bowman, 2014) and have been successfully targeted for health promotion interventions at the policy level (Jepson, Harris, Platt, & Tannahill, 2010). Contrary to popular misconceptions that responsibility for risk behaviors rests on personal choice, there is long-standing international consensus that broader political, economic, and social environments shape individual decisions and actions, rooted in the Ottawa Charter for Health Promotion (World Health Organization [WHO], 1986). The Adelaide Statement on Health in All Policies (WHO, 2010) has further explicated the role of health promotion in facilitating joined-up inter-sectoral action when aiming to modify these broader environments, and thus to improve population-level health outcomes, especially in the domain of chronic diseases (Davies et al., 2014).

In Canada, provinces hold the constitutional responsibility for inter-sectoral action in the areas of health, education, municipal administrations, incorporation of companies, property and civil rights, and some taxation (Atkinson et al., 2013). Accordingly, health promoters typically pursue health in all policies (or simply *health policy*, referring to both health care system and public health objectives) (De Leeuw, Clavier, & Breton, 2014) as sub-national initiatives to target political, economic, and social environments exceeding federal jurisdiction, and most often beyond the scope of formal health care systems. Many examples of health policies (such as subsidizing organized physical activity for low-income youth, banning toys in unhealthy

restaurant meals, smoking and tobacco use restrictions, and limiting availability of alcohol) require uptake at the sub-national levels of provincial governments (municipalities), regional administrations (school boards), or the private sector (workplaces). Building multi-level consensus (or at least majority support) to prioritize health policy relevant to physical activity, healthy eating, tobacco consumption, and alcohol misuse is strategically challenging, not least owing to the social psychology of competing interests, ideologies, and information among policy influencers inside and outside of the health sector (Raphael, 2015).

Policy influencers are stakeholders “placed in positions of authority or [who] embody representation ... in multiple policy arenas,” such as members of legislatures, municipal authorities, school boards, large workplaces, and the media (Nykiforuk, Wild, & Raine, 2014, p. 1684). In crafting the public agenda, policy influencers face extensive pressures from lobbyists or, more generally, *coalitions* who represent “invisible participants” in the policy making process (Tan & Weaver, 2009, p. 454). Coalitions may comprise formally registered professional lobbies, like the *Canadian Federation of Agriculture* or *Global Automakers of Canada*, as well as individuals and groups, like anti-smoking activist Barb Tarbox or *Mothers Against Drunk Driving Canada*, whose interests coalesce around particular policy issues and outcomes (Kim & Roh, 2008). These so-called invisible participants may nevertheless exercise political sway, or policy capture, impacting public policy agenda setting through the social psychology of persuasion with policy influencers (Burstein & Linton, 2002). Indeed, growing concern about the undue influence, power, and authority of lobbies, in particular, has led *The Lancet Non-Communicable Diseases Action Group* to urge that “unhealthy commodity” industries be altogether excluded from health policy development (Moodie et al., 2013, p. 670).

Regarding various types of coalitions, proponents or supporters of health policies typically represent the interests of civil society (health promoters; charities and non-profits; community, citizen, and cultural groups; professional, trade, and service organizations; or health/recreation associations) while opponents represent those of industries (property developers; automotive producers; food and beverage manufacturers; or tobacco and alcohol manufacturers/retailers) (Freudenberg & Galea, 2008). Health policy supporters advocate for modifying political, economic, and social environments to improve population-level physical inactivity, unhealthy eating, tobacco use, and alcohol consumption. Opponents often have a vested interest in maintaining the status quo (eg. sprawling residential development, junk food served on school menus, candy-store flavorings in tobacco, and cultural and sporting events sponsored by the alcohol industry). Occasionally, health policy may be opposed by civil society, and supported by industry, such as avoiding government rules through voluntary ingredient self-regulation by food manufacturers. Across proposed health policies (eg. transit-oriented developments, school nutrition guidelines, new tobacco product moratoriums, and alcohol advertising restrictions) coalitions typically do not collaborate with one another in their advocacy efforts, and so can be conceptualized as *nominal* (informal, uncoordinated) versus *substantive* (formal, coordinated) (Kim & Roh, 2008). Distinguishing coalitions by their supporter or opponent status, focus on population-level risk behaviors, and extent of coordination has implications for public agenda setting, owing to the intense issue competition (Zhu, 1992) that currently limits the development, implementation, and evaluation of health policies (Davies et al., 2014).

Given a complex landscape of coalitions mobilizing and counter-mobilizing their ideas and interests to policy influencers, empirical research in this area can greatly benefit from the application of health communication theories. Indeed, De Leeuw et al. (2014) have evidenced a

lack of theoretical coherence in health policy research, overall. As Frohlich (2007) indicates, although social psychological research is “the study of how social situations influence people” (p. 2), health promoters (and public health practitioners more generally) tend to misrepresent and misapply this disciplinary perspective by conflating social exposures and psychological outcomes. Explicit theoretical models could help researchers to avoid confusing the epidemiological exposure of coalition activities as an intervention (the social situation) with the outcome of policy influencers’ inclination toward health policy (a psychological state). Moreover, as Kim and Roh (2008) argue, an appropriate aim for research should be to identify “policy windows” (opportunities for change in the status quo) and refine “issue construction” (communication of health policy positions) (p. 672), since health policy is only in early stages for most jurisdictions. In light of these points, for study purposes, health policy is conceptually modeled according to Weaver’s (2007) theorization of agenda setting as comprising both *priming* (increasing the salience of issues) and *framing* (fostering interpretive schema for issues). Measuring policy influencers’ contact with coalitions as a social psychological *exposure*, we theorize priming and framing to be key mediating processes associated with health policy *outcomes*, according to our model. Strategies for these processes can be corroborated with respect to two established principles in agenda setting research, namely “the crowded agenda hypothesis” (that public agendas have a limited carrying capacity for issues, implicating *priming* to increase the priority of health policy) and “the two-sided hypothesis” (that public policymaking is frequently adversarial in nature, implicating *framing* to neutralize opposition to health policy) (Lowery, 2013, p. 10-11). From this theory-informed conceptualization, network analysis of an empirical survey data set provides some evidence that coordinating coalitions for actively *priming* health policy windows across risk behavior domains, and *framing* health policy

as fulfilling the societal imperative for chronic disease prevention, are two strategies to more effectively promote health policy.

Network analysis is an emerging tool in health policy and health communication research that provides measures of group processes by iteratively evaluating individual ties (Luke & Harris, 2007). As such, network analysis can facilitate studying how connections (or ‘edges’) between actors (or ‘nodes’) differentiate individual functions as part of a group, and how group processes can structure individual behavior. Network analysis can aid in the investigation of many health policy issues (Hawe, Webster, & Schiell, 2004), such as changing patterns of co-authorship in comparative effectiveness collaborations (Zickafoose, Kimmey, Tomas, Esposito, & Rich, 2014), strengthening collaboration between public and community organizations (Provan, Veazie, Staten, & Teufel-Shone, 2005), or middle managers’ roles in inter-agency governance (West, House, Keen, & Ward, 2015). We employed data collected in the 2014 Chronic Disease Prevention Survey to generate two-mode weighted and directed networks quantifying policy influencers’ relative exposure to nominal coalitions of health policy supporters versus opponents. We designated policy influencers to be primary nodes providing survey response information about coalitions as secondary nodes. The resulting networks characterize the centrality of each nominal coalition among all surveyed policy influencers, as well as networks defined by sub-national jurisdiction, organizational context, and political ideology, as potential moderators.¹

Methods

¹ Additionally, we provide descriptive analysis of survey responses characterizing policy influencers’ contact with substantive coalitions (in example, the *Canadian Diabetes Association* and *the food industry*).

Study Context

The *Policy Opportunity Windows: Enhancing Research Uptake in Practice!* (POWER-UP!) (2014-2016) was a Canadian partnership between health promotion and public health organizations based in Alberta, Québec, and the Northwest Territories, convened under the *Coalitions Linking Action and Science for Prevention* (CLASP) federal funding envelope of the *Canadian Partnership Against Cancer* (CPAC) (Manafò, Petermann, Lobb, Keen, & Kerner, 2011). Partners in the POWER UP! CLASP included the *Alberta Policy Coalition for Chronic Disease Prevention* (APCCP, comprising eighteen regional academic, health promotion, and public health affiliated groups), the *Coalition Poids* (Weight Coalition, a research and advocacy group sponsored by the Québec Public Health Association), and the *Northwest Territories Department of Health and Social Services* (a territorial government organization serving northern remote communities). Among five CLASP projects over the same period, POWER UP! focused on gathering evidence and fostering leadership to develop, implement, and evaluate health policies (CPAC, 2018). By formally coordinating its efforts in population-level health promotion, POWER UP! could be considered a *substantive* coalition for promoting health policy. POWER UP! administered the 2014 Chronic Disease Prevention Survey from June to mid-October, measuring policy influencers' relative contact with nominal and substantive coalitions supporting or opposing modification of political, economic, and social environments to improve population-level risk behaviors.

Sample of Policy Influencers

The 2014 Chronic Disease Prevention Survey was conducted in the two POWER UP! partner provinces, Alberta (a natural resource-centered, western, Anglophone province) and Québec (a manufacturing and service-centered, eastern, Francophone province), aiming for the

broadest possible coverage and variation between Canadian provincial jurisdictions. Policy influencers were operationalized as provincial bureaucrats and members of the legislature, municipal authorities, school board members, upper level managers in workplaces larger than five hundred employees, and health reporters and editors (Nykiforuk et al., 2014). These categories were based on the legislative and policy capacity of provincial and municipal governments (Atkinson et al., 2013), public opinion influence of media (Burstein & Linton, 2002; Tan & Weaver, 2009), and emerging success of chronic disease prevention in schools and workplaces (Jepson et al., 2010). Publicly available email addresses were obtained from websites for provincial/municipal governments, school boards, media outlets, and large workplaces as a sampling frame devised to minimize selection bias by approaching a census of policy influencers (Choi & Pak, 2005). Potential participants received a letter of invitation discussing confidentiality and consent and containing an online survey link. Non-respondents were sent email reminders every two weeks until the survey closed. The completed survey data set comprised responses for over two hundred policy influencers, with 782 email invitations sent for 108 responses (13.8% response rate) in Alberta, and 2232 emails for 100 responses (98 in French and 2 in English; 4.5% response rate) in Québec. Within our data set of 208 policy influencers, approximately 11.5% ($n=24$) of respondents failed to complete any items relating to the primary variable of interest, namely contact with nominal coalitions supporting or opposing health policy. From the remaining policy influencers data set ($n=184$), a roughly equivalent proportion were sampled from Alberta ($n=96$) and Québec ($n=88$).

Survey Items and Study Variables

Survey items measuring contact with *substantive* and *nominal* coalitions were employed for descriptive analyses, with those relevant to nominal coalitions subsequently configured for

edge-weighted and directed network analyses. For descriptive analyses, policy influencers were asked to report their level of contact (“a lot”, “moderate”, “minimal”, or “none”) with substantive coalitions such as non-profit health organizations (eg. *Heart and Stroke Foundation of Canada*), medical or professional organizations (eg. *Canadian Medical Association*), dietetic organizations (eg. *Dieticians of Canada*), as well as the *food industry, non-alcoholic beverage industry, alcohol industry, tobacco industry, and tobacco retailers*. For network analyses, policy influencers were asked to report their level of contact with nominal coalitions supporting or opposing health policy by health-related risk behavior for chronic disease prevention (Table 1).

Table 1. 2014 Chronic Disease Prevention Survey items for policy influencers’ level of contact with nominal coalitions supporting or opposing health policies, with response options of “A Lot”, “Moderate”, “Minimal”, or “None”.

Thinking about your role in your organization, please indicate whether you have had contact with the groups listed below in the last 2 years. This can be contact initiated by you or them, and includes face-to-face contact, telephone conversations, e-mail, or postal mail. Please note- in each case, “people” refers to those individuals who try to influence your decisions in a professional setting.

People who SUPPORT measures designed to increase physical activity	People who OPPOSE measures designed to increase physical activity
People who SUPPORT measures designed to increase healthy eating	People who OPPOSE measures designed to increase healthy eating
People who SUPPORT measures designed to reduce tobacco use and/or exposure	People who OPPOSE measures designed to reduce tobacco use and/or exposure
People who SUPPORT measures designed to reduce alcohol use	People who OPPOSE measures designed to reduce alcohol use

This survey item structure regarding contact with nominal coalitions helped minimize any potential response bias, because survey respondents more easily recall general versus specific relationships within a given timeframe (Choi & Pak, 2005). Survey item responses were

reconfigured for network analysis by first designating each policy influencer as a primary node within the network, and then creating secondary nodes for each of the eight nominal coalitions, as identified in Table 1. Every policy influencer (primary node) was connected to each nominal coalition (secondary node) in the data set by directed edges with weights for reported contact levels (“a lot”=3, “moderate”=2, “minimal”=1, or “none”=0), resulting in a two-mode directed and weighted network (comprising primary and secondary nodes of different types with stronger or weaker ties) (Opsahl, Agneessens, & Skvoretz, 2010). Missing data were assigned an edge weight of zero; however, missing data accounted for only 1.2% of responses.² Province (Alberta or Québec) and organization (municipal authority, large workplace, school board, media, or provincial government) were determined from the sampling frame, ideology was measured by a survey item asking policy influencers to report their political views as liberal (“very liberal” or “somewhat liberal”), neutral (“neutral”), or conservative (“somewhat conservative” or “very conservative”). From this survey data preparation, *authority scores* were calculated in the overall network and by province, organization, and ideology as potential moderators.

Network Analysis Measures

Network analysis measures were designed to gauge policy influencers’ contact with nominal coalitions, as a proxy for coalitions’ relative opportunity for priming and framing health policy in public agenda setting. Prior to conducting network analyses, we calculated descriptive statistics characterizing the proportion of policy influencers reporting any contact (“a lot”, “moderate”, or “minimal” responses) with the nominal coalitions (supporting or opposing physical activity, healthy eating, tobacco control, or alcohol reduction) across the entire data set,

² Missing data for policy influencers’ contact with substantive coalitions are reported in Table 2.

and for each jurisdiction, organization, and ideology (Table 2). Additionally, we examined the relative proportions of policy influencers reporting contact with substantive coalitions identified in the survey (Table 3). To quantify policy influencers' contact as a social psychological exposure across each of the networks, we calculated the *authority score* for nominal coalitions supporting or opposing health policies relevant to each of the four risk behaviors. Using Meerkat Lite,³ this measure was computed for the overall network of policy influencers ($n=184$), and the subsidiary networks for Alberta ($n=96$), Québec ($n=88$), municipal authorities ($n=97$), workplaces ($n=31$), school boards ($n=25$), media ($n=16$), and provincial governments ($n=15$), as well as policy influencers reporting themselves to be ideologically liberal ($n=73$), neutral ($n=44$), or conservative ($n=35$) (thirty-two respondents did not report their ideological affiliation) (Table 4).

Authority scores provided the measure of centrality for use in our two-mode directed and weighted networks. As a variant of eigenvector centrality developed as part of the Hyperlink-Induced Topic Search (HITS) algorithm (sometimes referred to as *Kleinberg centrality*), authority scores provide an iteratively determined ranking of focal nodes in a network by the weight of their in-directed and out-directed edges relative to the weight of in-directed and out-directed edges for each of all the other nodes in a network (Kleinberg, 1999; Opsahl, 2013). The HITS algorithm was developed for applications like internet search engine optimization, such that the most “authoritative” web pages could be established by the number and weight of “hub” web pages linking to them. According to Kleinberg (1999), such an *authority score* can be calculated such that each node has both a non-negative in-directed authority weight $x^{(p)}$ and a non-negative out-directed hub weight $y^{(p)}$ determined by the direction and strength of its links to

³ Meerkat Lite is a software application designed to quantify and visualize networks developed at the Alberta Innovates Centre for Machine Learning (Chen et al., 2010).

other nodes in a network. The authority weight of a focal node p is the sum of hub weights $y^{(q)}$ pointing to it, calculated as a ratio of the number of other nodes q to the weight of each of the in-directed edges $(q, p) \in E$ (indicating a link from q to p for the set of edges E) (Formula 1). Similarly, the hub weight $y^{(p)}$ of the focal node p is the sum of authority weights $x^{(q)}$ to which it points, calculated as a ratio of the number of other nodes q to the weight of out-directed edges $(p, q) \in E$ (indicating a link from p to q for the set of edges E) (Formula 2). For the HITS algorithm, these two operations are iterated maintaining as invariant that the sum of the squared authority and hub weights is equal to one for each node in the network. The resulting authority scores (equal to the square root of the squared hub weight subtracted from one) are thus normalized for comparisons over the entire set of nodes in the network.

$$\text{(Formula 1)} \quad x^{(p)} \leftarrow \sum_{q:(q,p) \in E} y^{(q)}$$

$$\text{(Formula 2)} \quad y^{(p)} \leftarrow \sum_{q:(p,q) \in E} x^{(q)}$$

Authority scores were considered most appropriate for the networks in our study because (unlike eigenvector centrality) Kleinberg's measure incorporates all of the network data points to avoid the issue of awarding null centrality to weakly connected nodes in two-mode directed and weighted networks (Boldi & Vigna, 2013). *Authority scores* for the nominal coalitions are thus provided as a relative rank within each network from 0 (least central) to 1 (most central), but are not scaled for comparisons across multiple networks. In addition to reporting numerical values (Table 4), we depict the relative ranking of nominal coalitions by their authority scores in graphical form as a dartboard diagram, in which higher authority scores result in nodes placed

closer to the centre of the dartboard (each concentric ring representing an authority difference of 0.020) (Figure 1).

Results

A substantial proportion of policy influencers reported contact with health policy coalitions in the two years previous to the survey (Table 2 and Table 3). Whereas a minority of all policy influencers reported contact with nominal coalitions opposing health policy for physical activity (34.2%), alcohol reduction (39.1%), healthy eating (39.7%), and tobacco control (47.3%), most had contact with those supporting alcohol reduction (64.7%), tobacco control (70.7%), healthy eating (86.4%), and physical activity (89.1%). This pattern held across almost all subsidiary networks, excepting a majority of policy influencers reporting contact with tobacco control opponents in the workplace (58.1%), school board (56.0%), and media (56.3%) networks, and with healthy eating opponents in the school board (60.0%) network. Across every network, the greatest number of policy influencers reported contact with nominal coalitions supporting physical activity (above 74.3%) and healthy eating (above 71.4%). For the substantive coalitions, the majority of policy influencers reported contact with non-profit health organizations related to tobacco control (52.2%), healthy eating (67.4%), and physical activity (75.0%), as well as dietetic associations (62.0%), and the food industry (51.6%). Only a minority reported contact with medical associations (45.1%), the alcohol industry (34.2%), the non-alcoholic beverage industry (33.2%), tobacco retailers (26.1%), and the tobacco industry (20.7%) (Table 3).

Table 2. 2014 Chronic Disease Prevention Survey number (n) and percent (%) of policy influencer reporting any contact* with nominal coalitions supporting (subscript s) or opposing (subscript o) health policies across four modifiable health-related risk behaviors (PA=Physical Activity, HE=Healthy Eating, TC=Tobacco Control, and AR=Alcohol Reduction).

	Total Responses	Percent of Respondents Reporting Any Contact with Nominal Coalitions**							
		Supporting (s)				Opposing (o)			
		PA _s	HE _s	TC _s	AR _s	PA _o	HE _o	TC _o	AR _o
<i>Overall</i>									
Total	184 (100.0)	164 (89.1)	159 (86.4)	130 (70.7)	119 (64.7)	63 (34.2)	73 (39.7)	87 (47.3)	72 (39.1)
<i>Province</i>									
Alberta	96 (52.2)	84 (87.5)	83 (86.5)	68 (70.8)	64 (66.7)	36 (37.5)	46 (47.9)	45 (46.9)	40 (41.7)
Québec	88 (47.8)	80 (90.9)	76 (86.4)	62 (70.5)	55 (62.5)	27 (30.7)	27 (30.7)	42 (47.7)	32 (36.4)
<i>Organization</i>									
Municipality	97 (52.7)	90 (92.8)	85 (87.7)	68 (70.1)	61 (62.9)	30 (30.9)	30 (30.9)	41 (42.3)	40 (41.2)
Workplace	31 (16.8)	24 (77.4)	25 (80.7)	20 (64.5)	21 (67.7)	13 (41.9)	14 (45.2)	18 (58.1)	14 (45.2)
School Board	25 (13.6)	25 (100.0)	25 (100.0)	23 (92.0)	21 (84.0)	13 (52.0)	15 (60.0)	14 (56.0)	10 (40.0)
Media	16 (8.7)	13 (81.3)	13 (81.3)	12 (75.0)	10 (62.5)	3 (18.8)	8 (50.0)	9 (56.3)	4 (25.0)
Province	15 (8.2)	12 (80.0)	11 (73.3)	7 (46.7)	6 (40.0)	4 (26.7)	6 (40.0)	5 (33.3)	4 (26.7)
<i>Ideology</i>									
Liberal	73 (48.0)	70 (95.9)	64 (87.7)	52 (71.2)	45 (61.6)	14 (19.2)	17 (23.3)	33 (45.2)	25 (34.3)
Neutral	44 (29.0)	41 (93.2)	42 (95.5)	34 (77.3)	30 (68.2)	17 (38.6)	21 (47.7)	22 (50.0)	30 (68.2)
Conservative	35 (23.0)	26 (74.3)	25 (71.4)	20 (57.1)	20 (57.1)	13 (37.1)	14 (40.0)	16 (45.7)	14 (40.0)

*Any contact as “A Lot”, “Moderate”, or “Minimal” responses to the survey; **Missing data interpreted as “None”

Table 3: 2014 Chronic Disease Prevention Survey number (n) and percent (%) of policy influencers reporting contact with substantive coalitions.

	Missing Data n (%)	Amount of Contact n (%)			
		A Lot	Moderate	Minimal	None
Non-profit health organizations on physical activity issues ¹	5 (2.7)	18 (9.8)	62 (33.7)	53 (28.8)	46 (25.0)
Non-profit health organizations on food-related issues ²	6 (3.3)	13 (7.1)	48 (26.1)	57 (31.0)	60 (32.6)
Non-profit health organizations on tobacco-related issues ³	4 (2.2)	11 (6.0)	39 (21.2)	42 (22.8)	88 (47.8)
Medical or professional associations on tobacco-related issues ⁴	3 (1.6)	8 (4.3)	24 (13.0)	48 (26.1)	101 (54.9)
Dietetic associations on food-related issues ⁵	5 (2.7)	11 (6.0)	37 (20.1)	61 (33.2)	70 (38.0)
The food industry	8 (4.3)	8 (4.3)	40 (21.7)	39 (21.2)	89 (48.4)
The non-alcoholic beverage industry	10 (5.4)	4 (2.2)	8 (4.3)	39 (21.2)	123 (66.8)
The tobacco industry	6 (3.3)	1 (0.5)	2 (1.1)	29 (15.8)	146 (79.3)
Tobacco retailers	7 (3.8)	3 (1.6)	9 (4.9)	29 (15.8)	136 (73.9)
The alcohol industry	13 (7.1)	3 (1.6)	8 (4.3)	39 (21.2)	121 (65.8)

¹ Exact survey wording “Representatives from non-profit health organizations, such as the Canadian Cancer Society or the Heart and Stroke Foundation of Canada, about physical activity issues”

² Exact survey wording “Representatives from **non-profit health organizations**, such as the Canadian Diabetes Association or the Heart and Stroke Foundation of Canada, about **food-related** issues”

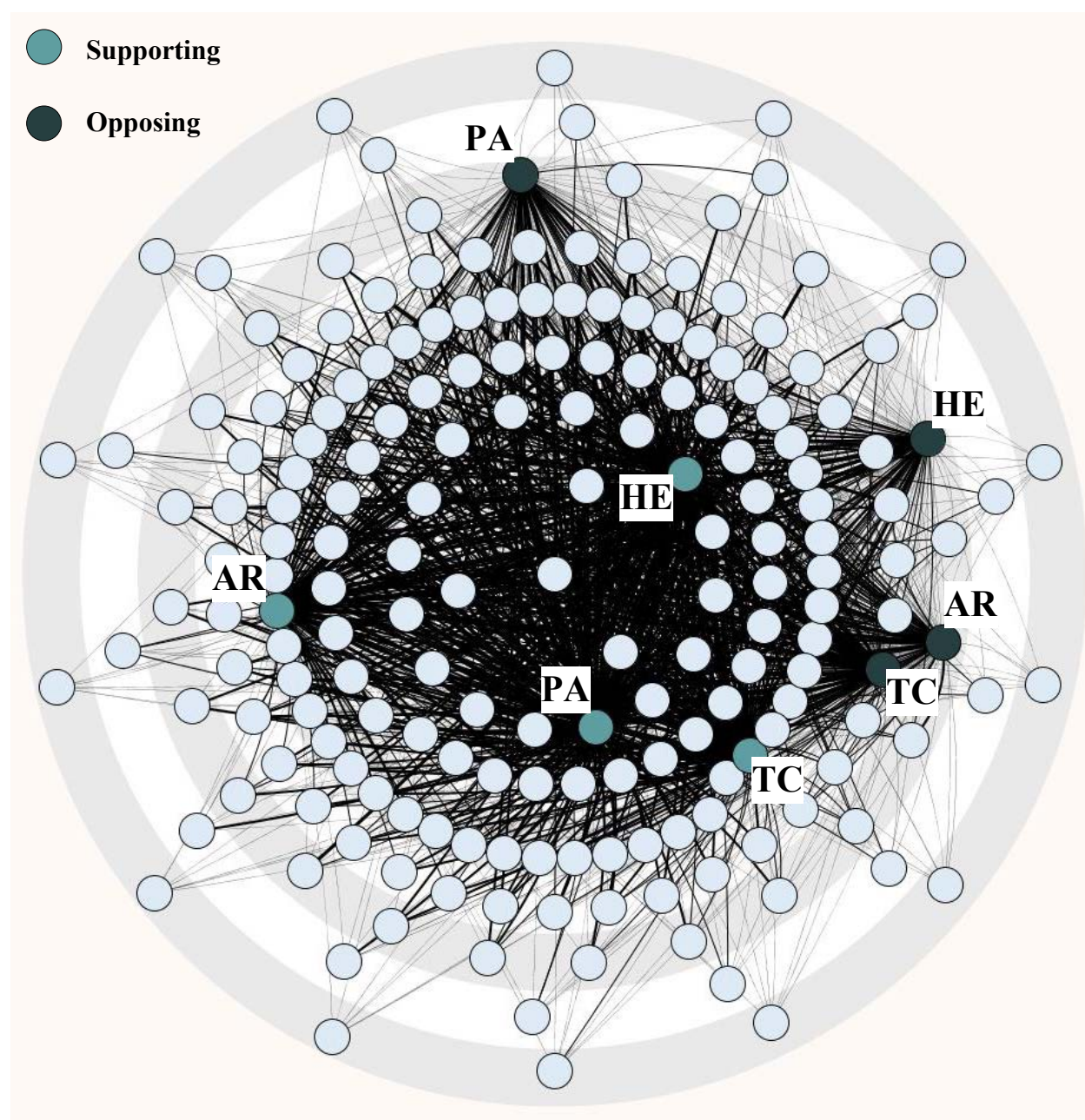
³ Exact survey wording “Representatives from **non-profit health organizations**, such as the Non Smokers Rights Association (NSRA), the Canadian Cancer Society or provincial anti-tobacco coalitions, about **tobacco-related issues**”

⁴ Exact survey wording “Representatives of medical or professional associations, such as the Canadian Medical Association, about tobacco-related issues”

⁵ Exact survey wording “Representatives of dietetic associations, such as Dietitians of Canada, about food-related issues”

The network analyses produced a similar pattern, with health policy supporters consistently receiving higher authority scores (thus ranking more centrally) than opponents. These results can be graphically illustrated using a dartboard diagram (Figure 1). Across all of the subsidiary networks, including both provinces (Alberta and Québec), five organizational contexts (municipal authorities, workplaces, school boards, the media, and provincial governments), and three ideologies (liberal, neutral and conservative), nominal coalitions supporting health policies to modify political, economic, and social environments for physical activity, healthy eating, tobacco control, and alcohol reduction received higher authority scores (ranked *first to fourth* of eight nominal coalitions) than nominal coalitions opposing such policies (ranking *fifth to eighth*) (Table 4). Nominal coalitions supporting health policies for physical activity ranked first and had the highest authority scores overall and in every subsidiary network except for school boards (where healthy eating ranked first above physical activity). Healthy eating supporters ranked second to physical activity in every other network except the media, where they were surpassed by tobacco control health policy supporters. In all of the other (non-media) subsidiary networks, supporters of tobacco control and alcohol reduction ranked third and fourth, respectively. Among health policy opponents, tobacco control consistently ranked first, except for the school board network (where healthy eating opponents ranked first). There were no discernable patterns in authority scores for opposing nominal coalitions across the remainder of the subsidiary networks.

Figure 1. Dartboard diagram graphically depicting authority scores for nominal coalitions supporting or opposing health policies across four modifiable health-related risk behaviors (PA=Physical Activity; HE=Healthy Eating; TC=Tobacco Control; AR=Alcohol Reduction).*



* Policy influencers are represented by the light grey nodes, nominal coalitions supporting health policies by the medium grey nodes, and nominal coalitions opposing health policies by the dark grey nodes. Each nominal coalition is annotated with an appropriate abbreviation for its health policy focus. Thickness of the edges illustrates the level of contact between policy influencer (primary) and nominal coalition (secondary) nodes; more central nodes represent higher authority scores by 0.020 increments per ring.

Table 4. 2014 Chronic Disease Prevention Survey rank (1 to 8) and authority scores (α) for policy influencers' contact with nominal coalitions supporting (subscript s) or opposing (subscript o) health policies across four modifiable health-related risk behaviors (PA=Physical Activity, HE=Healthy Eating, TC=Tobacco Control, and AR=Alcohol Reduction).

	Rank (1 to 8) and Authority Scores (α) for Nominal Coalitions							
	Supporting (s) Rank (α)				Opposing (o) Rank (α)			
	PA _s	HE _s	TC _s	AR _s	PA _o	HE _o	TC _o	AR _o
<i>Overall</i>								
Total	1 (0.115)	2 (0.108)	3 (0.084)	4 (0.073)	8 (0.029)	7 (0.034)	5 (0.048)	6 (0.035)
<i>Province</i>								
Alberta	1 (0.155)	2 (0.148)	3 (0.115)	4 (0.098)	8 (0.045)	6 (0.061)	5 (0.064)	7 (0.048)
Québec	1 (0.161)	2 (0.150)	3 (0.116)	4 (0.102)	7 (0.036)	8 (0.034)	5 (0.067)	6 (0.048)
<i>Organization</i>								
Municipality*	1 (0.158)	2 (0.145)	3 (0.104)	4 (0.095)	7 (0.038)	7 (0.038)	5 (0.061)	6 (0.049)
Workplace	1 (0.247)	2 (0.239)	3 (0.193)	4 (0.181)	8 (0.073)	7 (0.085)	5 (0.134)	6 (0.110)
School Board	2 (0.237)	1 (0.256)	3 (0.201)	4 (0.160)	7 (0.079)	5 (0.098)	6 (0.090)	8 (0.057)
Media	1 (0.330)	3 (0.275)	2 (0.289)	4 (0.202)	8 (0.053)	6 (0.107)	5 (0.111)	7 (0.061)
Province	1 (0.367)	2 (0.303)	3 (0.245)	4 (0.222)	8 (0.072)	6 (0.090)	5 (0.213)	7 (0.088)
<i>Ideology</i>								
Liberal	1 (0.173)	2 (0.160)	3 (0.124)	4 (0.095)	8 (0.029)	7 (0.031)	5 (0.059)	6 (0.037)
Neutral	1 (0.212)	2 (0.205)	3 (0.164)	4 (0.145)	7 (0.068)	6 (0.080)	5 (0.101)	8 (0.066)
Conservative*	1 (0.263)	2 (0.234)	3 (0.180)	4 (0.160)	7 (0.086)	6 (0.099)	5 (0.112)	7 (0.086)

*More than one nominal coalition received the same authority score in these networks.

Discussion

Though specific to POWER UP! and its sub-national jurisdictions as a Canadian Partnership Against Cancer *CLASP*, our results indicate a broader predicament in health policy development, implementation, and evaluation, more generally. Despite health promoters' and allied coalitions' efforts to inform and persuade policy influencers of the need for health policies to modify political, economic, and social environments to change the status quo, there has been only limited movement toward population-level approaches for chronic disease prevention. Our research provides some empirical evidence to inform continuing public health responses to this predicament, in order to facilitate policy window actions and issue construction for health policy outcomes. Considering policy influencers' contact with coalitions as a social psychological exposure (and proxy for coalitions' opportunity to mobilize their ideas and interests), we consider two potentially mediating processes. These two processes consist of the nature and extent of *priming* (increasing the salience of issues competing for space on a crowded public agenda) and *framing* (fostering issue interpretation to counter opposition in the two-sided advocacy space). Distinguishing coalitions by supporter or opponent status, health-related risk behavior focus, and degree of nominal or substantive coordination, results from our network analysis implicate key priming and framing strategies for health policy agenda setting. Namely, these strategies comprise *priming health policy as substantive coalitions for chronic disease prevention*, and *framing the societal imperative of chronic disease prevention*.

Priming Health Policy as Substantive Coalitions for Chronic Disease Prevention

Our network analysis provides some evidence that building substantive coalitions (coordinating supporters' contact with policy influencers across population-level risk behaviors for chronic diseases) might help promote health policy as a *priming* strategy. *Priming* in this case

refers to increasing the priority and salience of issues, with subsequent behavioral effects (Molden, 2014), specifically on legislation and/or policymaking. Priming as a mediator is closely related to both the *policy window* concept and the *crowded agenda hypothesis*. Policy windows refer to time-limited opportunities to leverage issues in politically favorable circumstances (Kim & Roh, 2008); the crowded agenda hypothesis maintains that issues must compete for limited space on public agendas (Lowery, 2013). Empirical research in this area has investigated how timing and coordination predict policy development, implementation, and evaluation. For instance, Burstein and Linton's (2002) systematic review found the policy impact of interest groups and social movement organizations on government agendas was restricted to instrumental concerns for re-election within voting cycles. In terms of coordination impacts, Zhu (1992) experimentally demonstrated exceptions to the crowded agenda hypothesis whereby attention to some issues can increase the priority and salience of others through "one-way attraction" (p. 835). With these considerations in mind, our theory-informed evidence suggests that the timely coordination of substantive coalitions across health-related risk behaviors might be an effective strategy to expedite policy windows in competition for limited space on the public agenda.

Substantive coalitions can employ *priming* processes to leverage contact with policy influencers for increasing the priority and salience of health policy issues across physical activity, healthy eating, tobacco control, and alcohol reduction domains. In our research, nominal coalitions supporting health policy consistently received the first to fourth highest authority scores for all networks (Table 4); two-thirds to three-quarters of policy influencers reported contact with non-profit health organizations on food-related and physical activity issues (Table 3), and over 85% of policy influencers reported contact with physical activity and healthy eating supporters (Table 2). Coordinating substantive coalitions for chronic disease prevention could

promote health policy through priming by avoiding issue competition between health policy supporters. Potential benefits might include synergistic mobilization of ideas and interests during electoral cycles, economies of scale, enhanced opportunities for social learning, increased sustainability of incremental gains, and greater agility for responding to inevitable shifts in issue priority and salience over time. Furthermore, among the supporter coalitions, the level of contact and authority scores indicate physical activity and healthy eating, specifically, may have high positive valence (Cox & Béland, 2013), or appeal to policy influencers, enabling substantive coalitions to take advantage of the potential one-way attraction of these issues to additionally promote tobacco control and/or alcohol reduction health policy.

Framing the Societal Imperative of Chronic Disease Prevention

This network analysis provides further evidence for coalitions more effectively promoting health policy by strategically *framing* the societal imperative of chronic disease prevention (countering adversarial expropriation of the advocacy space by their opponents). *Framing* involves “construct[ing] an argument about problems and their causation, evaluation, and/or solution” (Entman, 1993, p. 53) to provide compelling interpretive schema that garner support and neutralize opposition (Benford & Snow, 2000). As a potential mediator in our study, framing relates to both the *issue construction* concept and the *two-sided hypothesis*. The two-sided hypothesis maintains that policy debates tend to produce dichotomous (‘for’ or ‘against’) rather than nuanced or gradated resolutions (Lowery, 2013); issue construction refers to fostering diagnostic, prognostic, and motivational perspectives that in this case would be amenable to policy, and resistant to counter-arguments by opponents (Benford & Snow, 2000). Research in this area is typically informed by Sabatier and Jenkins-Smith’s advocacy coalition framework (Jenkins-Smith, Nohrstedt, Weible, & Sabatier, 2014), which conceptualizes policy development

as a long term social competition between individuals and organizations with conflicting belief systems. In illustration, Breton, Richard, Gagnon, Jacques, & Bergeron's (2008) account of Quebec's passage of provincial tobacco control legislation documents oncologists and other medical specialists staging press conferences to maintain the policy as primarily responding to a health issue, countering opponents' attempt to frame advertising restrictions as contrary to freedom of expression and arts/culture/sporting event sponsorships. Similarly, Payán, Lewis, Cousineau, & Nichol's (2017) documented legislative processes for mandatory restaurant menu labelling in California, where industry association framing of the policy as prohibitively costly to implement was countered by arguments for informed choices by consumers. Reflecting such strategies, results of the network analysis provide some evidence how framing chronic disease prevention as a societal imperative implicates arguments for both collective action and individual responsibility to counter two-sided issue construction by opponents.

Substantive coalitions can employ *framing* processes to provide policy influencers with interpretive schema for recognizing how health policy opponents obfuscate to obstruct chronic disease prevention as a societal imperative (Moodie et al., 2013). Among health policy opponents in the current research, nominal coalitions opposing tobacco control received the highest authority scores in all networks except for school boards (Table 4), with a majority of all policy influencers reporting contact with tobacco control opponents in the workplace (~58%), media (~56%), and school board (~56%) networks (Table 2); approximately one fifth reported contact with the tobacco industry and one fourth with tobacco retailers as substantive coalitions.⁴

⁴ That approximately one third of policy influencers reported contact with the non-alcohol beverage industry, more than half reported contact with the food industry, and healthy eating opponents had the highest authority scores among opposing nominal coalitions in the school board network provides further evidence of adversarial issue construction around healthy eating, as illustrated by our discussion of tobacco control.

These results are indicative of two-sided issue construction in tobacco control, providing evidence that from policy influencers' perspective, opponents are actively advocating in workplaces, schools, and the media as settings subject to numerous restrictions against tobacco use and/or exposure in Canada. Examples of such advocacy include contending the scientific consensus on tobacco health risks, enlarging corporate rights to "free expression" in product advertising and promotion, promoting the economic contribution of tobacco industries, and engineering increased social acceptability of smoking (Saloojee & Dagli, 2000). In addition to revealing the underhanded tactics of unhealthy commodity industries, another strategy for framing chronic disease prevention as a societal imperative is informed by our finding that only a minority of policy influencers (~45%) reported contact with professional medical associations on tobacco-related issues (Table 2), which presents an untapped opportunity to leverage medical authority and credibility in communicating the critical role of health policy (Gruen, Pearson, & Brennan, 2004). Employing concurrent collective action and individual responsibility framing, as Payán et al. (2017) describe, is another promising strategy for health policy.

Research Limitations and Strengths

Using data collected as part of the 2014 Chronic Disease Prevention Survey, this network analysis provides empirical evidence to help promote health policy within a theory-informed, but highly simplified model of agenda setting. Potential limitations of our survey instrument relate to the self-report measure of policy influencers' level of contact with coalitions, with its potential for social desirability bias among respondents, and reliance upon subjective recall for events over two years prior to data collection. Survey data collection produced a response rate similar to other studies sampling on the basis of geographical or organizational affiliation (see Scott et al., 2011; Sinclair, O'Toole, Malawaraarachi, & Leder, 2012), with a sample size exceeding other

research investigating sub-national policy influencers (for example, Brownson et al., 2007; Dodson et al., 2013). Our network analysis employed the *authority score* (or *Kleinberg centrality*) metric, which eliminated the potential for null centrality, but is less well known as a variant of eigenvector centrality in the research literature. From a conceptual standpoint, our study model provides a critical, but limited view of the many topics for research on the health policy landscape. Notably, we did not measure the nature or extent of priming and framing, instead modeling opportunity for these processes as a first step for advancing strategic health policy advocacy in our study jurisdictions. Diverse health policy settings (provinces, municipalities, school boards, large workplaces, and media) were collapsed into a single hypothesized issue arena, and we omitted modeling any potentially impactful linkages between policy influencers themselves. Despite these limitations, our study extends the research literature on health policy agenda setting by modeling and quantifying policy influencers' contact with coalitions across multiple population-level health-related risk behaviors, providing several potential avenues for future research.

Directions for Future Research

Based on the current study, future work employing network analysis to examine health policy agenda setting using our social psychological approach as an important step-wise approach to advancing the field might contribute to the research literature in several ways. Researchers could extend and refine the conceptual model for our study by developing comparable measures for categorizing coalitions as nominal versus substantive, by examining the nature and extent of priming and framing among health policy coalitions, or by quantifying the degree of one-way attraction between various issues in chronic disease prevention. Empirically testing the model (with any extensions or refinements) could serve to (in)validate its underlying

assumptions by measuring associations between policy influencers' contact with coalitions and defined health policy agenda setting outcomes. Complementary research could examine network linkages between policy influencers to understand how interdisciplinary diffusion of innovations (as a more sophisticated variable than jurisdiction, organization, or ideology) might moderate the hypothesized social psychological model. In any future research informed by this study, researchers should clearly delineate their conceptual models to provide a theoretical framework for any empirical evidence they generate, enabling other studies to more appropriately integrate and utilize findings.

Conclusion

While specific to the Canadian sub-national context, we situated our network analysis of the 2014 Chronic Disease Prevention Survey within a social psychological model of agenda setting to investigate policy influencers' contact with coalitions and associated health policy outcomes, permitting some potential generalizability for the evidence generated. Almost all of the policy influencers reported at least some contact with uncoordinated, informal nominal and/or coordinated, formal substantive coalitions in health policy, indicating the timeliness and importance of our topic for analysis. Notably, health policy supporters had uniformly higher authority scores (as a measure of centrality) than opponents, regardless of sub-national jurisdictions (Alberta or Québec), organizational context (municipal authorities, workplaces, school boards, the media, or provincial government), or ideology (liberal, neutral, or conservative). Given the limited development, implementation, and evaluation of health policy for chronic disease prevention, we have discussed our findings as potentially informing health promotion responses in this area. Two key strategies we have developed for this purpose include *priming health policy as substantive coalitions for chronic disease prevention* (coordinating

health policy supporters across risk behavior domains to facilitate policy windows) and *framing the societal imperative of chronic disease prevention* (facilitating issue construction to counter adversarial issue competition by opponents in the advocacy space). Contact with policy influencers is a scarce resource for health policy coalitions; networking substantive coalitions of supporters who can marshal collective resources and develop effective messaging to counter ideological retrenchment by unhealthy commodity industries and their allies may present a promising approach. As such, our research provides rigorous and practicable recommendations to help advance health policy for chronic disease prevention against the leading causes of morbidity and mortality, worldwide.

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