ABSTRACT

This study is a survey of administrative divisions involved in tobacco programs in Canadian public health units. It aims to identify correlates of public health units' contacts and collaborations with external agencies, as predisposing factors in their capacity to innovate. Heads of 124 divisions involved in tobacco control completed a questionnaire about their budgets, staff, and management practices. In each of these divisions, professionals involved in tobacco programs also completed a questionnaire about their characteristics and experience. Results showed a high level of contacts and collaborations with external agencies. Four variables emerged as correlates of external communications: professionals' degree of access to public health information sources, the diversity of disciplines within the administrative division, the decentralization of authority, and the level of professionals' participation in decision-making. Because of the potential relationship between innovation and external communication, public health units should consider fostering external communication by management practices and policies, such as favouring professional diversity, increasing access to sources of information, and adopting more decentralized, participatory management.

ABRÉGÉ

Cet article rapporte les résultats d'une enquête effectuée auprès des organisations de santé publique canadiennes, plus précisément auprès de leurs unités administratives œuvrant à la réduction du tabagisme ($n = 124$). Son objectif est de cerner les facteurs associés au maintien de contacts et de liens de collaboration entre ces unités et les organisations externes et, partant, à leur capacité d'innover. Deux types de questionnaires ont été acheminés dans chaque unité. Un premier questionnaire s'adressait au cadre responsable et portait sur diverses caractéristiques organisationnelles de l'unité (budget, personnel, pratiques de gestion, etc.). Le second visait les professionnels des programmes de lutte antitabac afin de documenter leur caractéristiques et leur expérience. Les résultats révèlent un niveau élevé de contacts et de collaboration avec les organisations externes. Les facteurs associés à ce phénomène sont les suivants : degré d'accès des professionnels aux sources d'information en santé publique, diversité des disciplines professionnelles représentées au sein de l'unité, décentralisation des pouvoirs et participation des professionnels à la prise de décision. De ces résultats se dégagent des pistes d'action utiles pour stimuler les communications externes et créer des conditions potentiellement propices à l'innovation dans les organisations de santé publique.

Organizational and Professional Characteristics Predicting External Communications in Canadian Public Health Units

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Public health systems in Canada, as elsewhere, are currently facing challenges imposed by the "shifting landscape" of public health practice. Within the changing parameters of their evolving environments, public health units must be able to adapt and innovate in order to meet these challenges.^{1,2} While some research has led to the development of frameworks and tools necessary to conceptualize and measure the performance of public health units (e.g., Miller et al.³ and Studnicki⁴), the intra-organizational structures and practices which can support and enhance their capacity to adapt and innovate have not been examined.

Outside the public health context, research shows a relationship between organization characteristics and the likelihood of adopting innovative modes of practice. Among the most important of these characteristics are the networks of connections the organization maintains with external sources of information and ideas, and the partnerships that result from these exchanges: organizations with more external contacts and partners tend to be more innovative.⁵⁻⁹ Gatekeepers, or key individuals with many external contacts, often facilitate these connections.¹⁰ In the public health domain, the importance of strong inter-organizational links is already widely acknowledged.^{4,11} At least one study

has shown that innovative public health units are more likely to maintain close ties with other institutions and agencies.¹² In addition, the creation of partnerships is recommended as a key strategy for developing the new public health practice^{13,14} and for the effective dissemination of programs.¹⁵

Inter-organizational communication, in turn, may be influenced by several organizational characteristics such as decentralized or less hierarchical structures, greater organizational complexity, greater professional autonomy and greater professional participation in decision-making.^{5,8,16-18} Of interest also is the greater professional participation in decision-making in those organizations with greater professional diversity.¹⁷ In Canada, increasing emphasis is placed on the need for multidisciplinary and networked approaches within public health units.^{19,20} In addition to the above-mentioned factors, unit size may be an important factor in promoting inter-organizational linkages. Indeed, there is some evidence to suggest that larger public health units with larger operating budgets have more diverse activities²¹ and also might be expected to have greater facility in establishing and maintaining relationships with external agencies. Finally, the support that these organizations provide to their professionals for the inflow of new ideas by maximizing access to relevant information may also be important, given the key role that professionals play in decision-making in innovative organizations. Although this issue has not received much research attention, indirect evidence from a study of a public health unit that greatly expanded its access to information found that heavier users of the expanded services were more likely to be cross-appointed to another unit.²²

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Using data from a research program on tobacco programming in Canadian public health units,²³ this study sought to identify organizational and professional characteristics associated with public health units' contacts and collaborations with external agencies as predisposing factors in their capacity to innovate. In particular, the study aimed to identify factors that could be influenced by management practices and policies within subunits or divisions of the public health units, above and beyond the level of resources, structure, and stability of these divisions.

METHODS

Participants and procedure

This study is a cross-sectional survey of administrative divisions involved in tobacco programs for youth in Canadian public health units. In the summer and fall of 1996, all of the 158 public health units located in the 10 provinces were invited to participate; 129 agreed to do so. Of these units, a total of 188 relevant administrative divisions were inventoried. Two parallel data collection processes were implemented in these divisions. First, we sent a questionnaire assessing organizational characteristics and communication patterns to the heads of these administrative divisions. Of the 170 managers we successfully located, 124 returned the questionnaire for a response rate of 73%. Second, up to 11 professionals involved in the tobacco programs carried by these divisions were randomly selected and sent a questionnaire to collect personal and work-related data. Out of 659 questionnaires sent, 536 were returned for a response rate of 81%. Administrative divisions for which the response rate on the professional questionnaire did not reach 50% were eliminated from the study. Overall, a total of 113 administrative divisions provided both managerial and professional data. Because of its outlier profile, one unit was removed from the database which finally included 112 units. Although little information is available on the characteristics of non-responders, the proportion of responding organizations varies across provinces, as shown in Table I. The Atlantic provinces are somewhat under-represented in the sample.

TABLE I
Number of Responding, Eligible Public Health Organizations* Per Province

Province	Number of Responding Organizations/ Total Eligible Organizations
British Columbia	10/20
Alberta	11/17
Saskatchewan	14/23
Manitoba	4/6
Ontario	34/42
Quebec	13/18
New Brunswick	2/7
Nova Scotia	2/4
Prince Edward Island	0/5
Newfoundland	3/6

* Eligible organizations contained at least one tobacco program during the study period; 10 organizations (1 in Alberta, 2 in Manitoba, and 7 in Saskatchewan) reported that they had no such programs.

Measures

Dependent Variables

External communications were assessed by two scales included in the questionnaire administered to the division heads. First, the **frequency of external contacts** was assessed by nine items asking respondents to rate the frequency with which professionals in their divisions have contacts (including letters, telephone calls or meetings) with each of the following organizations: universities, provincial or federal health ministries, other provincial or federal ministries, public health organizations, regional governments, municipal governments, community-based groups, school boards and the private sector. A five-point scale, ranging from "very frequent" to "no contact" was used to assess the responses ($\alpha = 0.76$).^{*} Second, a similar item and response format was used to rate the **frequency of external collaborations**. Organizations considered here were the same as those listed above for the assessment of external contacts (9 items; $\alpha = 0.77$).

Independent Variables

Division resources: Division heads rated the ease of **accessing public health information sources** in their division, on four-point scales ranging from "very easy" to "very difficult". Information sources included audio-visual documents, profes-

* This and all subsequently described scales were formed after factor analyses confirmed the expected unidimensional factor structure of the measures. Items that failed to show expected loading patterns or contribute to internal consistency were eliminated from the scales.

TABLE II
Characteristics of Participating Administrative Units (n = 112)

Characteristic	% of Units
Total number of employees	
< 10	26.8
10-19	31.3
20-29	16.1
≥ 30	25.9
Total number of physicians	
0	75.9
≥ 1	24.1
Total number of nurses	
0	36.6
≥ 1	63.4
Annual operating budget (n = 88)	
< \$500,000	26.1
\$500,000 – \$1,000,000	34.1
\$1,000,000 – \$2,000,000	23.4
> \$2,000,000	15.9
Budgetary surplus in last year (n = 105)	
Yes	61.0
No	39.0

sional journals, regular seminar programs, interlibrary loan services, reference databases, and documentation on innovative programs (7 items; $\alpha = 0.83$). Respondents also provided their division's total annual operating **budget** (log transformed for the analyses), including research grants and other sources of funds, as well as the proportion of their budgets remaining unallocated (**budgetary slack**) and the proportion devoted to **continuing education budget**. We recoded the latter two variables as present (>0%) or absent (0%). Finally, division heads provided the total number of full- and part-time **employees**, as well as the number of **physicians and nurses** (recoded as none or at least one).

Division structural complexity: Division heads indicated the number of subgroups

TABLE III
Pearson Correlation Coefficients Between External Communications Variables
and Potential Organizational and Professional Predictors
(n = 112 Public Health Unit Administrative Divisions)

Variable	Frequency of Contacts	Frequency of Collaborations
Block 1: Division resources		
Access to public health information sources	-0.18***	0.37***
Operating budget	0.08	0.15**
Budgetary slack	0.11*	0.15**
Continuing education budget	-0.14**	0.03
Total number of employees	0.02	0.14**
Total number of physicians	-0.03	-0.07
Total number of nurses	-0.01	0.08
Block 2: Complexity and changes		
Organizational complexity	0.13*	0.06
Presence of major organizational changes	0.08	0.03
Block 3: Professionals' characteristics		
Presence of gatekeepers	0.20***	0.16**
Professional experience diversity	0.10*	0.02
Professional discipline diversity	0.32***	0.26***
Professionals' age	0.01	0.10*
Block 4: Work centralization/formalization		
Formalization (general)	-0.03	-0.06
Formalization of program planning	0.10*	0.11*
Professional autonomy	0.12*	0.10*
Hierarchy of authority	-0.22***	-0.23**
Professionals' participation in decision-making	0.18***	0.11*
Centralization of decision-making for program planning	-0.14**	-0.12*

* p < 0.20 ** p < 0.10 *** p < 0.05
The greater the score, the greater the level of the variable

(projects, teams, modules, etc.) present within their division. This was recoded into a dichotomous variable, representing one and more than one subgroup within the division.

Presence of major organizational changes. As a measure of recent organizational instability, division heads rated, on a four-point scale ranging from "yes, to a great extent" to "no, not at all," the degree to which their division had experienced: budget cuts, staff or management turnover, and changes in priorities or work methods in the last two years (5 items; $\alpha = 0.70$).

Work formalization: Division heads completed two scales pertaining to the level of work formalization in their division. In the first scale, assessing **formalization in general**, respondents rated their level of agreement with a series of items related to the adoption of formal work procedures by the professionals. Scale items derived from Hage & Aiken²⁴ investigated aspects related to job descriptions, work rules, and professional evaluation. These items were assessed using a four-point response scale ranging from "very well" to "not at all" (9 items; $\alpha = 0.81$). In the second scale, **formalization in pro-**

gramming was assessed using 5 items that indicated the extent to which procedures concerning the design of objectives, project reporting, and project diffusion were formalized. Items were measured on a four-point response scale ranging from "always" to "never" ($\alpha = 0.70$).

Work centralization: Work centralization was assessed using the responses of division heads on four distinct scales. Based on Aiken & Hage,¹⁶ **professional participation in decision-making** was assessed using 5 items referring to professional participation in decisions about hiring and promoting other professionals, establishing procedures and organizational priorities, and use of surplus funds. Respondents rated the items using the following four responses: "not at all", "consulting role", "minor decision-making role", and "major decision-making role" ($\alpha = 0.69$). **Centralization of decision-making in program planning**, or the extent to which health promotion projects are initiated, planned, and supervised by professionals' supervisors, was assessed using a four-item scale ranging from "always" to "never" ($\alpha = 0.57$). Finally, respondents were invited to rate the extent to which they agreed with a series of items

pertaining to professional autonomy and authority in their division. **Professional autonomy** was assessed using 11 items that examined the autonomy of professionals in developing new projects or communicating with external partners, for example ($\alpha = 0.81$). **Hierarchy of authority** was assessed using 5 items that related to the approval of professional decision-making and plans by supervisors ($\alpha = 0.74$).

Characteristics of professionals: Three indicators pertaining to the characteristics of professionals were derived from questionnaires answered by the professionals. First, an indicator of the level of **diversity of experience** held by professionals within the divisions was constructed from their responses to a question asking if they had volunteer or paid experience in the following settings: community-based groups, educational institutions, private companies, hospitals, private or community health clinics, or health ministries. The average number of settings across the professionals within each division was attributed to the division; these scores were then split at the median to obtain either high (two settings or more) or low (less than one setting) levels of professional experience diversity. Second, **professional discipline diversity** of the division staff was calculated as the number of different disciplines represented by professionals (nurses, physicians, dentists, or graduates of post-graduate programs) working in the division. The data on this variable showed that 50% of public health units had only one discipline represented, while 35% had two, and 12% had three or more. These scores were therefore split at the median to obtain either some (more than one discipline) or no (one discipline only) professional discipline diversity. Third, the average **age of professionals** in the division was attributed to the divisions. And last, a fourth professional characteristic related to the presence of professionals playing a role of **gatekeeper** in the division was assessed in the questionnaire to the division heads. Respondents rated on a four-point scale from "less than 25%" to "more than 75%", the proportion of professionals who bring in new ideas as a result of their many contacts outside the organization.

TABLE IV
Summary of Regression Analysis for Variables Predicting External Contacts and Collaborations
(n = 112 Public Health Unit Administrative Divisions)

Variable	B	Contacts SE B	β	B	Collaborations SE B	β
Access to public health information sources	0.21	0.09	0.22*	0.36	0.09	0.34**
Professional discipline diversity	0.34	0.09	0.32**	0.30	0.10	0.26**
Hierarchy of authority	-0.19	0.08	-0.21*	-0.24	0.08	-0.24**
Professional participation in decision-making	0.15	0.08	0.17*	—	—	—
R ²		0.26			0.26	

* $p < 0.05$ ** $p < 0.01$
The greater the score, the greater the level of the variable

Analysis

Correlates of external contacts and collaborations were identified through bivariate and multivariate analyses. Those variables whose bivariate test had a p -value lower than 0.20 were retained for block-wise multiple regression analyses and entered into one of the following four blocks: 1) division resources, 2) structural complexity and organizational change, 3) work formalization/centralization, and 4) professional characteristics.

RESULTS

Characteristics of administrative divisions

The findings reveal considerable variation in division size, with a mean number of employees of 25.1 (SD = 24.1). A large majority (74%) of the divisions had less than 30 employees. The mean annual operating budget for the divisions was \$CAN 1,266,000 (SD = \$CAN 137,000). These and other characteristics of the participating units are presented in Table II.

The level of external contacts and collaborations with external organizations was high with mean scores of 3.9/5 (SD = 0.6) and 3.2/5 (SD = 0.6) obtained on those scales assessing frequency of external contacts and collaboration, respectively.

Bivariate and multivariate analyses

The Pearson correlation coefficients between the dependent variables on one hand and organizational and professional characteristics on the other, are shown in Table III. Table IV presents the results obtained for the multivariate analyses.

The results of the regression analyses are relatively similar for the two forms of external communications studied. Over and above the size and resources of the

public health unit, its degree of access to public health information sources was a strong predictor of the frequency of external contacts and collaborations. Thus, the more access that professionals within an administrative division of a public health unit had to information sources, the more frequently they communicated with and collaborated with external departments and agencies. None of the other indicators of organizational resources significantly predicted the frequency of external communications, suggesting that it was not solely the relative richness of the public health unit that predisposed it to maintaining links with outside agencies.

Professional discipline diversity emerged as another predictor of frequency of both external contacts and collaborations. Divisions that employed professionals from more than one background (i.e., not just public health nurses or physicians) had more external communications, independent of the number of professionals within the division.

Administrative divisions in which authority was centralized and hierarchical had less frequent external contacts and collaborations. In addition, the frequency of formal contact was also predicted by the degree to which professionals within the division participated in decision-making.

DISCUSSION

This study confirms previous relationships between external communications and organizational and professional characteristics,^{5,8,16-18} but within the context of contemporary public health units. Given the changing practice context of public health and the potential association between external contacts and collabora-

tions and organizational innovation,⁵⁻⁹ the results may provide some hypotheses about how to create and support a climate for innovation within public health units. Our emphasis in the search for predictors of external communications was on organizational and professional characteristics that are amenable to improvement through organizational development interventions or management policies. Several such factors were identified. First, the results suggest that regardless of the level of resources and opportunities afforded to the unit, those which equip their professional staff with as many sources of information as possible may contribute to the stimulation of external contacts and collaborations. The results also suggest that management styles and practices that are characterized by decentralization and professional participation in decision-making may foster external communications. To the extent that the relationships created and maintained through these communications are of high quality, they may facilitate inflow of new ideas and therefore innovation capacity. This type of management style, where professionals are given broad decision latitude and authority within the general parameters of public health objectives, principles, and budgets, should thus be encouraged and rewarded by public health units over and above more traditional, hierarchical, and centralized styles.

The results of this study also underscore previous calls for increased professional diversity within public health.^{19,20} In half of the Canadian public health divisions surveyed for this study, only one professional discipline – most often, public health nursing – was represented. Recruitment and professional development policies that favour multidisciplinary may

enhance number and diversity of external links, factors which have been shown to be associated with capacity for innovation.

This study clearly is limited by its cross-sectional nature, its single-country context, and by its lack of an independently validated assessment of innovation capacity within public health units. Longitudinal studies, such as that of Miller et al.,² following the capacity of public health units to adapt and respond to their changing environments would be invaluable for furthering understanding of how they can contribute optimally to the health of their populations.

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