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Short Report

The effect of women in government on population health: An ecological analysis among Canadian provinces, 1976–2009

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ABSTRACT

Previous research finds connections between women in government, promotion of women's issues, and government spending. However, the connection between female politicians and population health warrants more significant attention. This study takes advantage of differences among Canadian provinces to evaluate the effect of women in government on age-standardized all-cause mortality rates, to assess the potential mediating role of government spending, and to determine the role played by political partisanship. Time-series cross-sectional data are retrieved from the Canadian Socio-Economic Information Management System II Tables for 1976–2009 (10 provinces and 34 years = 340 cases). Cumulative women in government is measured as the cumulative seats held by female politicians as a percentage of provincial seats since 1960. Political partisanship is measured as the cumulative seats held by female politicians in left-wing, centre, and right-wing parties as a percentage of provincial seats since 1960. Government spending is measured as the average of standard scores of four provincial expenditures: medical care, preventive care, other social services, and post-secondary education. Health is measured as total, male and female age-standardized mortality rates per 1000 population (all causes of death). Estimation techniques include the Prais-Winsten regressions with panel-corrected SEs, a first-order autocorrelation correction model, and fixed-unit effects, adjusted for alternative factors. We find that as the cumulative average percentage of women in government has historically risen, total, male, and female mortality rates tend to be lower, net of alternative explanations. Government spending partially mediates the effect of women in government on mortality rates. Moreover, increases in female politicians from left-wing, centre, and right-wing parties are all significantly associated with decreases in mortality rates. Women in government can bring about desirable changes in population health. Our work encourages more debate and research about quotas and other measures designed to level the political playing field for women.

1. Introduction

Over the last two decades, the percentage of women elected to national government among OECD countries increased by more than two-thirds (67.2%). Whereas in 1997, only 16.9% of all national parliamentarians were women, this number rose to 28.2% in 2016 (Inter-Parliamentary Union, 2016). Over the same period, the number of countries achieving the critical mass of 30 percent women in government climbed from five to fourteen (Inter-Parliamentary Union, 2016). These upward trends have generated scholarly interest about whether women in government have a systematic and predictable influence on population health. In this study, we contribute to this growing body of work by testing the relationship between women in government, government spending, political partisanship, and age-standardized mortality rates using time-series cross-sectional data among Canadian provinces from 1976 to 2009. Our paper is organized in the following manner. The next three sub-sections summarizes our theoretical location, reviews the extant literature, and states our research questions. Section 2 details our Methods, including our design, data sources and variables, and data analysis. We then present our descriptive, bivariate, and multivariate results in Section 3. In Section 4, we discuss our results and offer a concluding remark.

1.1. Theoretical location

1.1.1. Why should women in government matter to population health?

To understand how women in government might influence population health, we seek theoretical guidance from political sociology. Our theoretical location conceptualizes women in government as collective political actors, who are more committed to advancing women's interests, to achieving a more equal distribution of societal resources, and to triggering government spending in health-promoting ways.

First, women in government can be viewed as collective political actors with some measure of power and authority in formal politics. As such, they engage in various activities and actions that can have a significant influence on decisions, policies, and outcomes associated with a given conflict. According to the politics of presence theory, there is a causal link between the number of women elected (i.e., descriptive representation) and the advancement of women's interests (i.e., substantive representation) (Phillips, 1995). If elected, women are more

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likely to speak, advocate, symbolize, and act on behalf of women and children compared to their male counterparts. It follows that female politicians are better equipped to represent the interests of female voters because they, at least to some extent, share the same experiences. In addition to advancing women's interests, Brady (2009) argues that women in government are committed to a more equal distribution of valuable societal resources (e.g., income, education, and wealth). Compared to their male counterparts, female politicians are more likely to hold leftist attitudes (e.g., civil rights, social equality, and egalitarianism) and substantively advance women's issues (e.g., pay equity, violence against women, health care, family policy, and divisions in paid and unpaid work) (Dodson, 1991; Wängnerud, 2009).

The political sociology literature also offers a potential mechanism through which women in government might influence population health: government spending. Existing studies find connections between female politicians and spending preferences tied to health-promoting issues such as healthcare, family benefits, social services, and education (Bratton & Ray, 2002). Using cross-sectional time-series data among twelve OECD countries, Bolzendahl and Brooks (2007) find that a single standard unit change in the level of women's political representation results in approximately a 1% increase in welfare state spending. Recent epidemiological research confirms the importance of government spending to population health (Beckfield & Bambra, 2016; Ng & Muntaner, 2015). When countries devote a more significant share of their economies to social welfare expenditures, population health and health inequalities tend to improve and narrow, respectively (Beckfield & Bambra, 2016; Dahl & van der Wel, 2013; Ng & Muntaner, 2015). Government spending shapes and influences population health through various public policies and programs that meet basic needs, manage common risks, and redistribute health-promoting resources. The theoretical and empirical connections between women in government, promotion of women's interests, and government spending have been established. The connection between women in government and population health remains in its infancy. Lastly, if women in government matters population health, the political sociology literature suggests that the partisan makeup of elected female representatives might matter as well. Partisan political theory contends that a primary determinant of variation in policy choices and policy outputs in constitutional democracies is the party ideology of government (Alesina, 1995; Castles, 1982; Garrett, 1998; Garrett & Lange, 1989; Hibbs, 1992; Huber & Stephens, 2001). The ideological stance of political parties ranges more or less along a left-right ideological scale (Castles & Mair, 1984; Cross, 2011). The political ideology of left-wing political parties is often associated with being social democratic, egalitarian, collectivist, and interventionist. Left-wing political parties tend to support a broad safety net of social welfare programs, including universal child care, education, and Medicare (Castles & Mair, 1984; Cross, 2011). In contrast, right-wing parties tend to favour private enterprise, big business, and free markets as well as competitiveness, restructuring, deficit reduction, and privatization. Right-wing parties are commonly associated with fiscal conservatism, which includes the explicit goal of reducing government spending. As for centre political parties, their ideological preferences reflect a moderate or centrist position that falls between the left and right of the political spectrum (Blais, 2005). Given these ideological differences, it remains unknown whether female politicians from left-wing, centre, and right-wing parties exert differential effects on population health.

1.2. Previous research

A small but growing body of research finds connections between women in government and population health. This work has taken place within three relevant contexts. First, among OECD countries, two critical studies were conducted by Lynch et al. (2001) and Muntaner et al. (2002). The former used the 1990–91 wave of the World Values Survey to investigate cross-sectional associations between the proportion of women elected to national government and life expectancy, mortality rates, and low birth weight among 16 wealthy countries. Correlation results indicate that having more females in government is associated with lower rates of female ($r = -0.63$) and male infant mortality ($r = -0.73$) (Lynch et al., 2001). Using the same data and methods, Muntaner et al. (2002) measured women in government, as the percentage of elected seats in national governments occupied by women, and find that rates of low birth weight and infant deaths from all causes were significantly lower in countries with more women in government. The second context of research has been conducted among low- and middle-income countries. Swiss, Fallon, and Burgos (2012) used pooled time-series analyses to examine the whether increases in women legislators are predictive of improvements in child health among 102 developing countries from 1980 to 2005. Compared to countries with no women in government, countries meeting a 20-percent threshold of women in government had higher rates of measles immunizations (10 percentage points), DPT immunizations (12 percentage points), infant survival (0.7 percentage points) and child survival (1 percentage point). More recently, Quamruzzaman and Lange (2016) conducted a multilevel analysis of the impact of female political representation in national parliaments on child health. Using cross-sectional data for 51 low- and middle-income countries and longitudinal data for 20 countries, they find that female representation is negatively related to infant mortality and positively related to measles vaccination status. Moreover, Quamruzzaman and Lange (2016) finds that state spending accounts for some of the mediation effects between female representation and child health.

Third, existing studies also have tested the effects of women in government within the U.S. Kawachi, Kennedy, Gupta, and Prothrow-Stith (1999) used a cross-sectional ecological design to investigate the effect of women's representation in elected office, measured at the state-level as representatives, senators, and governors, on female and male mortality rates and mean days of activity limitations reported by women during the previous month. Correlation results indicate that higher political participation by women is associated with lower female mortality rates ($r = -0.51$), as well as lower activity limitations ($r = -0.47$). More recently, Homan (2017) used administrative data with fixed-effects and random-effects models to investigate the relationship between political gender inequality in state legislatures and state infant mortality rates in the United States from 1990 to 2012. Homan (2017) finds that higher percentages of women in state legislatures are associated with reduced infant mortality rates, both between states and within states over time. On one hand, these studies draw much needed attention to the beneficial effects of women's political representation on population health. On the other, this body of research is limited in several ways. First, existing studies suffer from the small "N-problem," which arises when the number of macro-level units of analysis is inherently limited (Lynch et al., 2001; Muntaner et al., 2002). Second, half of the reviewed studies above do not control for unobserved heterogeneity (i.e., omitted variable bias) due to their reliance on correlational methods (Lynch et al., 2001; Muntaner et al., 2002). Third, only one study to date has considered the potential mediating role of government spending (Quamruzzaman & Lange, 2016). It remains unknown whether government spending either accounts for all or some of the health effects of women in government on population health. Fourth, previous studies have not assessed the influence of partisan effects, or whether women in government from different political parties are predictive of varying levels of population health. Given that left-wing, centre, and right-wing political parties have divergent policy preferences (Schmidt, 1996, 2002), the effect of partisan politics and women in government warrants greater attention. Lastly, the links between women in government and population health have not been tested in Canada. Canada and its provinces offer a promising context to advance the women in government-population health hypothesis. Canadian provinces are sub-national jurisdictions with sufficient political autonomy to generate different social, economic, and health outcomes.

The number of women in government, government expenditures, and mortality rates all vary across provinces and over time (Dunn, 2016; Ng & Muntaner, 2015).

1.3. Research questions

In this time-series cross-sectional study, we contribute to the extant literature by specifically addressing the above limitations. Our research questions are three-fold. First, *does the cumulative strength of women in government influence the age-standardized all-cause mortality rates among Canadian provinces from 1976 to 2009?* Second, *does government spending mediate the effect of women in government on mortality rates?* Third, *do women in government from left-wing, centre, and right-wing political parties have differential effects on mortality rates?*

2. Methods

2.1. Design

This study pools time-series cross-sectional data of ten Canadian provinces from 1976 to 2009, including Newfoundland, Prince Edward Island, Nova Scotia, New Brunswick, Quebec, Ontario, Manitoba, Saskatchewan, Alberta, and British Columbia.

2.2. Data sources and variables

Data are retrieved from *Provincial Election Offices* and Statistics Canada's Canadian Socio-Economic Information Management System (CANSIM) II Tables. Our dependent variables are *total, male, and female age-standardized mortality rates per 1000 population* (all causes of death). These variables are age-standardized to the 1991 Canadian Census.

Cumulative women in government is measured as the cumulative seats held by female politicians as a percentage of provincial seats since 1960 (Huber, Ragin, Stephens, Brady, & Beckfield, 2004). This measure calculates women in government as a proportion of seats held by all government parties in each year and then sums these percentages since 1960. *Cumulative left women in government* is measured as the cumulative seats held by female politicians in left-wing political parties (e.g., Co-operative Commonwealth Federation, New Democratic, Parti Québécois) as a percentage of provincial seats held since 1960. The variables *cumulative centre women in government* and *cumulative right women in government* are measured the same as *cumulative left women in government*, but for centre (e.g., Liberal) and right-wing political parties (e.g., Action Démocratique du Québec, Progressive Conservative, Saskatchewan Party, Social Credit), respectively. Data on women in government includes a maximum of 340 province-years as cases. *Government spending* is measured as the average of standard scores (z-scores) of four provincial expenditures: medical care, preventive care, other social services, and post-secondary education (Statistics Canada, 2009). Recent work shows that these four expenditures are significant predictors of lower mortality rates among Canadian provinces between 1989 and 2009 (Ng & Muntaner, 2015) This variable is available for a total of 210 cases.

In all models, we control for several demographic, labour market, and economic variables. *Dependency ratio* is measured as the number of "dependents" for every 100 "workers": youth (ages 0–17) + seniors (age 65 or older) per 100 workers (aged 18–64). Controlling for this variable is important because a higher proportion of non-working dependents such as children and seniors may affect the demand for government spending in the form of welfare services and social transfers (Landon, McMillan, Muralidharan, & Parsons, 2006; Pampel & Williamson, 1988). *Immigrant population* is the percentage of immigrants. This variable controls for the 'healthy immigrant effect' and the uneven distribution of immigrants across provinces (Ng, Wilkins, Gendron, & Berthelot, 2005; Statistics Canada, 2006). *Women in labour force* refer to the percentage of women in the labour force for each province and is included as a control variable because of its potential role between government spending and population health (Raphael & Bryant, 2004). Welfare states with high levels of government spending tend to institute social service policies as a means of creating employment and facilitating the integration of women in the labour force. Such policies can have the effect of improving population health outcomes (Navarro & Shi, 2001; Navarro et al., 2006). *Unemployment rate* is the percentage of the total labour force unemployed for each province and is included as a measure of the current state of the economy. Among Canadian provinces, the association between unemployment and health has produced contradictory evidence, which may be due to modelling assumptions about age. Whereas Laporte and Ferguson (2003) find that higher unemployment rates are associated with higher age-standardized mortality rates, other research has demonstrated a strong procyclical pattern in the mortality rates of middle-aged Canadians (Ariizumi & Schirle, 2012). *Low income* refers to the percentage of all persons with low income after tax, set at 50% of adjusted median household income. Adjusting for low income is essential given its causal

Table 1
Means, total standard deviations, and within-group standard deviations, 1976–2009.[a]

		M	Total *SD*	Within-Province *SD*
Dependent outcomes				
	Total ASMR (per 1000 population)	7.04	0.98	0.91
	Male ASMR (per 1000 population)	9.08	1.41	1.32
	Female AMR (per 1000 population)	5.45	0.64	0.58
Independent variables				
	Cumulative women in government (%)	2.46	1.92	1.72
	Cumulative left women in government (%)	0.70	0.95	0.66
	Cumulative centre women in government (%)	0.68	0.72	0.61
	Cumulative right women in government (%)	0.79	0.72	0.58
	Government spending[b]	0.00	0.88	0.70
Control variables				
	Dependency ratio (%)	60.84	8.01	6.26
	Urban population (%)	65.73	14.24	2.14
	Immigrant population (%)	4.22	3.33	1.82
	Female labour force (%)	58.93	9.62	7.43
	Unemployment (%)	9.75	3.75	1.96
	Low income (%)	14.58	3.60	2.06
	Gross domestic product per capita ($)	32,905.37	8745.13	5218.98

Notes: *M* = mean; *SD* = standard deviation; ASMR = age-standardized mortality rates.
[a] *N* = 340 (10 provinces over 34 years).
[b] *N* = 210 (10 provinces over 21 years).

association with poor living conditions, food insecurity, inadequate housing, and other basic prerequisites of population health (Auger & Alix, 2009). *Real GDP per capita* is the gross domestic product in real per capita terms and deflated using the 2002 consumer price index. The market value of all goods and services produced in a given province is likely to be a principal determinant of government spending and population health (Elola, Daponte, & Navarro, 1995). This variable reflects the magnitude of a province's tax base and controls for the overall level of economic development of a province for a given year. Table 1 presents descriptive statistics for the variables used in this analysis. A full description of variable definitions and data sources is available in Table S1.

2.3. Data analysis

Our statistical methods are four-fold. First, we use scatterplots with fitted values to display bivariate correlations between women in government, government spending, and total mortality rates. Second, we model the effect of women in government and partisan women in government on total, male, and female mortality rates without controlling for government spending. Our regression models use Prais-Winsten estimates with panel-corrected standard errors (PW-PCSE), a first-order autocorrelation correction (AR1), and fixed-unit effects (Beck & Katz, 1995). PW-PCSE is well-suited to handle the 'temporal dominant' nature of the data set (i.e., 34 years > 10 years), and corrects for two potential violations: panel heteroscedasticity and contemporaneous correlation of errors (Reed & Ye, 2011). AR1 addresses the possibility of serial correlation of errors. Fixed-unit effects (dummies for $N - 1$ units) control for potential non-spherical errors in the cross-sectional dimension (i.e., unobserved heterogeneity or omitted variable bias). Fixed-time effects (dummies for $N - 1$ years) are excluded because they tend to aborob much of the trend in the dependent variable, leaving little to no variance for the explanatory variables (Plümper, Troeger, & Manow, 2005). Of note, our dependent variables are measured in levels and changes are determined by long-term changes in the independent variables (women in government). Measuring dependent variables in levels, opposed to short-term differences from year-to-year, is an appropriate approach to understanding the long-term effects of political variables (Huber & Stephens, 2001). All models control for dependency ratio, urban population, immigrant population, female labour force participation, unemployment, low income, and GDP per capita. Third, we conduct a mediation analysis by regressing total, male, and female mortality rates on government spending and women in government in the same model. Fourth, we repeat steps 2 and 3 with left, centre, and right women in government as independent variables.

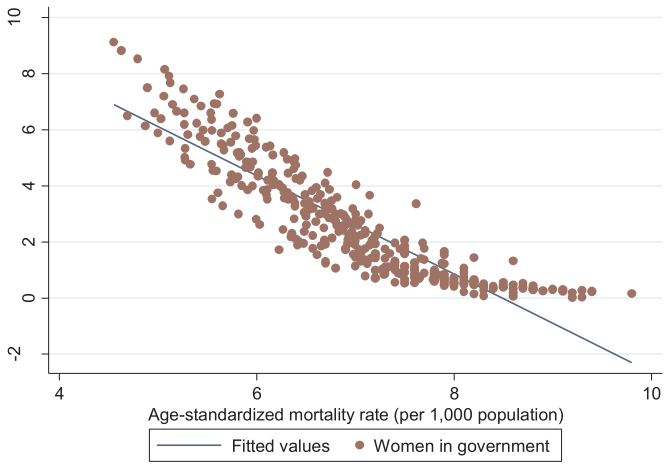

Fig. 1. Correlation between women in government and total mortality rates, 1976–2009 ($r = -0.90$).

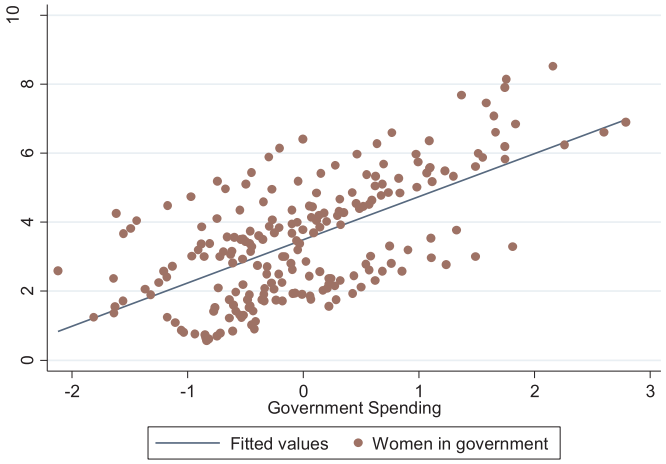

Fig. 2. Correlation between women in government and government spending, 1989–2009 ($r = 0.64$).

3. Results

3.1. Descriptive trends and bivariate associations

Trends in women in government and mortality rates represent significant changes among Canadian provinces. Between 1976 and 2009, the percentage of women in provincial government increased six-fold from 4.2% to 25.9% while age-standardized all-cause mortality rates declined by 37.5% (8.85 to 5.53 deaths per 1000 population) (Elections Canada, 2018; Statistics Canada, 2018a). Trends in government spending have witnessed changes as well - total provincial expenditures in real per capita terms increased from $5910 in 1989 to $8651 in 2009 (Statistics Canada, 2018b). Figs. 1 and 2 show strong negative and positive relationships between women in government and total mortality rates ($r = -0.90$) and women in government and government spending ($r = 0.64$). As the average percentage of women in government has historically risen, total mortality rates have declined, and government spending has increased.

3.2. Regression models

In Table 2, models 1–3 show that women in government have a significant negative effect on total, male, and female mortality rates, net of alternative factors. For a standard deviation increase in the cumulative average of women in government (1.92%), total, male, and female mortality rates are expected to decline by about 0.69–0.71 standard deviations. Interestingly, women in government have a more substantial negative effect on male mortality rates than female rates (1.00 vs 0.44 deaths per 1000 population). When government spending is added in models 4–6, the effect of women in government remains significant (standardized coefficients decrease from 0.76 to 0.54), and government spending has a significant negative effect. These results suggest that government spending partially mediates the inverse relationship between women in government and mortality rates. The standardized effects of left, centre, and right women in government on total, male, and female mortality rates are presented in Figs. 3–5. Each figure displays three sets of bars – one set for total, male, and female mortality outcomes. The first bar within each set displays the effect of left, centre, or right women in government (see bars shaded in black). The second and third bars in each set are the effects of left, centre, or right women in government and government spending in the same model (see bars shaded in gray). Two findings are worth noting. First,

Table 2
PW-PCSE models of women in government and government spending on total, male, and female age-standardized all-cause mortality rates in Canadian provinces, 1976–2009.[a]

	Model 1 Total		Model 2 Male		Model 3 Female		Model 4 Total + Gov't Sp.		Model 5 Male + Gov't Sp.		Model 6 Female + Gov't Sp.	
Covariate	*b*	β	*b*	β	*b*	β	*b*	β	*b*	β	*b*	β
Women in government	− 0.35‡ (− 10.83)	− 0.69	− 0.52‡ (− 12.65)	− 0.71	− 0.23‡ (− 8.37)	− 0.69	− 0.25‡ (− 8.02)	− 0.44	− 0.40‡ (− 8.96)	− 0.49	− 0.14‡ (− 5.29)	− 0.38
Government spending	–		–		–		− 0.13† (− 2.91)	− 0.19	− 0.15† (− 2.32)	− 0.09	− 0.14‡ (− 3.56)	− 0.19
No of province-years	340		340		340		210		210		210	
R^2	0.944		0.933		0.911		0.939		0.940		0.891	

Notes: PW-PCSE = Prais-Winsten regression with correlated panels corrected standard errors; Gov't Sp. = government spending; *b* = unstandardized coefficient; β = standardized coefficient; *z*-scores are in parentheses.
† $p < .01$.
‡ $p < .001$.
[a] Models include first-order serial autocorrelation correction and fixed unit effects and control variables (dependency ratio, urban population, immigrant population, female labour force participation, unemployment, low income, and GDP per capita).

women in government from all three political affiliations have a significant negative effect on total, male, and female mortality rates. For example, for a standard deviation increase in the cumulative average of left, centre, or right women in government, total mortality rates are expected to decline by 0.36, 0.40, and 0.21 standard deviations, respectively.

Second, after government spending is added to the models, the standardized effects of left, centre, and right women in government are reduced and remain significantly negative for seven of the nine mortality outcomes. The two exceptions include the effect of left and right women in government on female mortality rates, which are both entirely mediated through government spending (see Figs. 3 and 5). Full regression results are presented in Tables S2 (left women in government), S3 (centre women in government), and S4 (right women in government).

4. Discussion

This study contributes to the growing field of political epidemiology by investigating the links between women in government, government spending, political partisanship, and mortality rates among Canadian provinces (Kickbusch, 2015; Navarro et al., 2006). Theoretically, our approach demonstrates the value of applying insights from political sociology to population health. In doing so, we conceptualize women in government as leftist collective political actors and confirm their role a macrosocial determinant of population health. This is akin to moving backwards in the casual process and generating a fuller understanding of the effects of politics on health. Empirically, we find that women in government are predictive of mortality rates. As the cumulative average percentage of women in government has historically risen, total, male, and female mortality rates tend to be lower, net of alternative explanations. In concrete terms, a standard deviation increase in women in government would reduce total, male, and female mortality rates, respectively, by 0.68, 1.00, and 0.44 deaths per 1000 population. Besides finding that women in government matter, our results show that government spending partially mediates the effect of women in government on mortality rates. Because women in government and government spending are both significant predictors of mortality rates, this suggests at least two possible mechanisms. First, women in government reduce mortality rates by triggering specific types of government spending, including medical care, preventive care, post-secondary education, and social services. This mechanism reflects the politics of

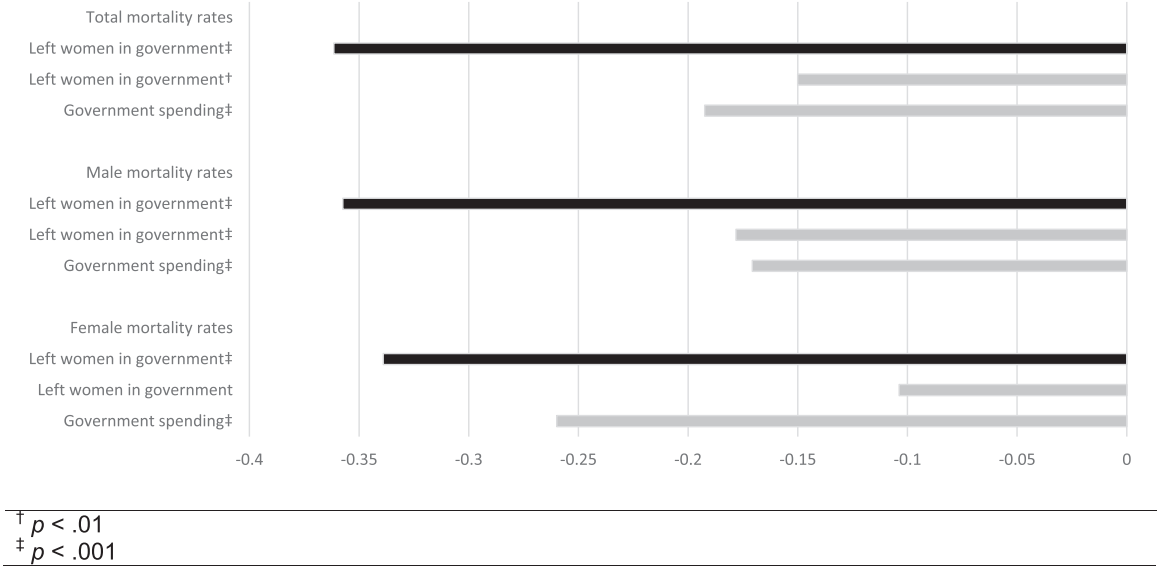

Fig. 3. Standardized effects of left women in government and government spending on total, male, and female age-standardized all-cause mortality rates in Canadian provinces, 1976–2009.

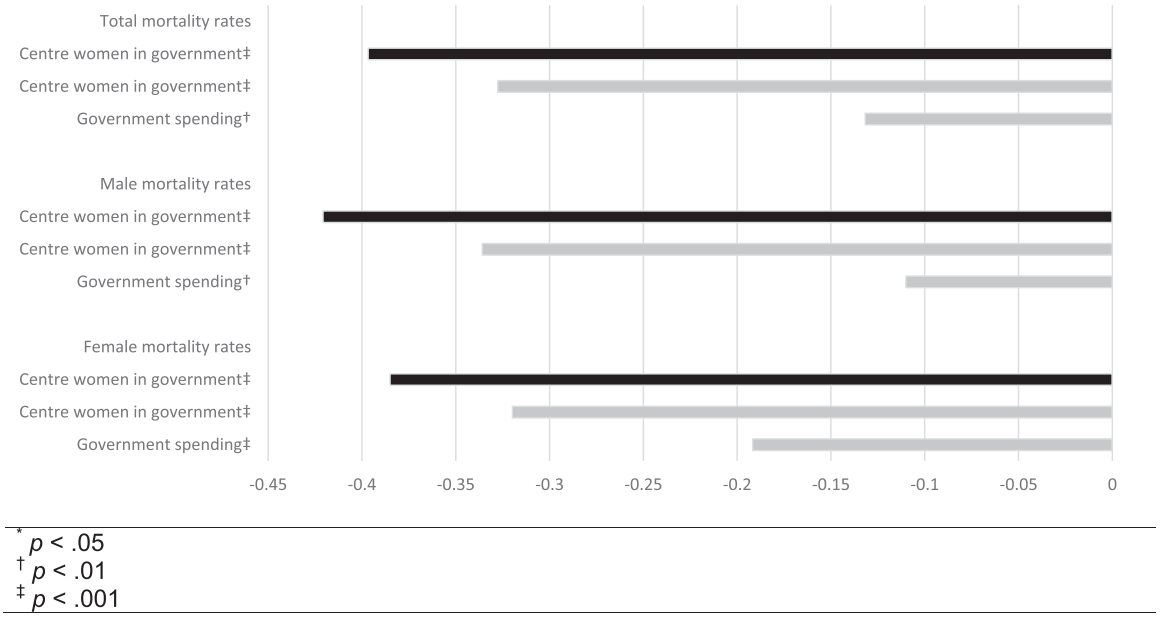

Fig. 4. Standardized effects of centre women in government and government spending on total, male, and female age-standardized all-cause mortality rates in Canadian provinces, 1976–2009.

presence theory, or the idea that women in government are more inclined to legislate certain issues based on their experiences either as women in the labour force or as mothers (Phillips, 1995). Previous political sociology research shows that women in government are more likely to advance public policies meant to support government spending in general, and women, children, and social welfare in particular (Anzia & Berry, 2011; Bolzendahl & Brooks, 2007; Bratton & Ray, 2002; Volden, Wiseman, & Wittmer, 2016). Our study extends the implications of women in government to include improvements in population health (i.e., reductions in mortality rates). Future work could consider how women in government might improve population health by enacting public policies (e.g., offering universal, government-subsidized daycare) or improving the quality of existing programs (e.g., extending the number of weeks for parental leave) that are not captured by government spending data.

Second, women in government influence population health in non-government spending ways. After controlling for government spending, the effect of women of government remains significantly negative for total, male, and female mortality rates, and their standardized coefficients are reduced by 36%, 31%, and 45%, respectively. Since women in government appear to have an additional effect on mortality rates net of government spending, future work could assess whether these 'additional effects' also operate as relevant mechanisms. For example, research on gender politics finds that women in government govern differently than men. The former tends to interrupt less, pay closer attention to other people's nonverbal cues, and use a more democratic,

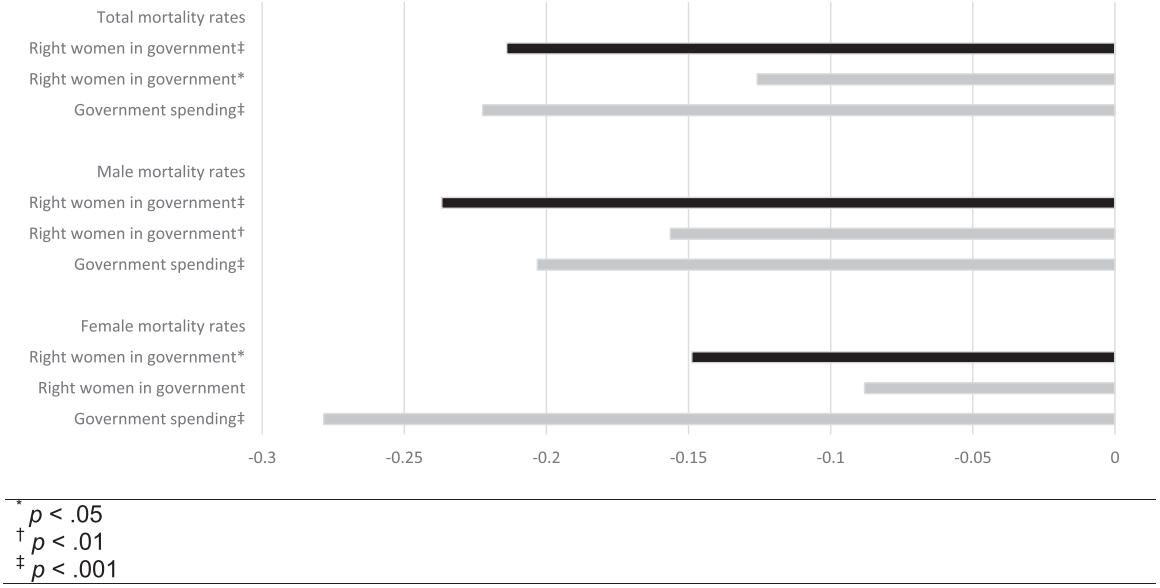

Fig. 5. Standardized effects of right women in government and government spending on total, male, and female age-standardized all-cause mortality rates in Canadian provinces, 1976–2009.

collaborative, and bipartisan governing style compared to male politicians (Eagly & Johnson, 1990; Kathlene, 1994). Other work suggests that women in government might also govern differently by attitudes, opinions, and behaviours; changing internal working procedures, or encouraging more trust in government (Wängnerud, 2009). If women in government are more likely to build coalitions, reach consensus more quickly, and adopt more accommodative strategies than men, it would be interesting to see if such governing and legislative differences have a differential effect on population health.

Regarding political partisanship, this is the first study to find a robust negative relationship between left-wing, centre, and right-wing women in government and mortality rates. The ideological differences among social democratic, centrist, and fiscal conservative political parties appear less salient to mortality rates than increasing the actual number of women elected to government. While partisanship may matter to the ideological positions of political parties, we find no evidence that the partisan makeup of women in government has adverse effects on population health. With this said, we do find differences in the extent to which left, centre, and right women in government reduce mortality rates. Left and centre women in government have a larger effect on mortality rates than right women in government. For a standard deviation increase in the cumulative average of left and centre women in government, total mortality rates would decline by 0.35 and 0.39 deaths per 1,000, respectively. A similar increase in the cumulative average of right women in government would result in only 0.21 fewer deaths per 1000. After adding government spending to the partisan political models, we find broad evidence that left, centre, and right women in government combines with government spending to reduce mortality rates. We do find two exceptions; however, the effects of left and right women in government are fully mediated through government spending. These results lend support to the first mechanism identified above - left and right women in government matter to female mortality by triggering government spending. Further work is required to confirm or refute the nonpartisan and fully mediated effects presented here.

4.1. Limitations and strengths

Regarding limitations, our ecological study uses aggregate data to model cross-sectional associations between women in government, government spending, and population health. Given the exploratory nature of our findings, more work using different designs and methods, such as natural experiments, instrumental variables, and propensity score matching, are needed to increase the generalizability of our results (Sedgwick, 2014). Moreover, to bolster the search for causal explanations, we strongly encourage the use of qualitative methods to examine underlying mechanisms that might explain how, why, and under what circumstances women in government make substantive contributions to government spending and population health (Pawson, Greenhalgh, Harvey, & Walshe, 2005). Another drawback involves the implicit assumption of uniform lags concerning time-invariant variables. When estimating the effect of women in government on mortality rates, lags may seriously differ from unit (province) to unit (province) (Plümper et al., 2005). In our study, we opted not to lag our independent variables because the institutional settings and environments between provinces are more alike than different (Tsebelis, 2002). Lastly, the available time frame to test government spending as a mediator is shorter than desired. However, 1989 is the earliest year for which reliable data on provincial expenditures are available from Statistics Canada (2009). Despite the shorter than preferred time frame, the analyses still found significant government spending effects on mortality rates. Several study strengths are worth noting. First, our study overcomes the small “N-problem” by constructing a time-series cross-sectional dataset that pools cross-sectional units (ten Canadian provinces) with time series data (thirty-four years). Second, our estimation techniques control for and reduce unobserved heterogeneity and omitted variable bias through the use of fixed effects models (i.e., including dummies for N - 1 units). Third, as revealed through our mediation analyses, we find new evidence to support the idea that women in government combines with government spending to reduce mortality rates. Lastly, our study is the first to evaluate the links between political partisanship, women in government, government spending, and mortality rates within a Canadian context.

5. Conclusions

More women are becoming elected officials in political office; however, they remain underrepresented at all levels of government. The average number of seats held by women remains below 30% in national parliaments among OECD countries (Inter-Parliamentary Union, 2016). Healthy democracies are dependent on the active and equitable representation of women in government. Democracies fail to thrive and flourish if half of its population remains politically unheard, overlooked, and disempowered. We contend that electing more women in government not only promotes gender equality and strengthens democratic institutions but also makes real and substantive contributions to government spending and population health. A wide range of strategies have been proposed and implemented to help increase the number of women in government, including for example, funding public awareness campaigns that highlight the benefits of electing more females; developing mentoring programs that match established female politicians with aspiring female candidates; and supporting non-partisan women’s organizations and legislative caucuses that aim to help elect female candidates into office. Another strategy is the use of electoral gender quotas, which set numerical targets or specify the number or percentage of women to be included on candidate lists or allocated to seats in a legislature. To date, gender quotas have shown to be one of the most useful tools for ‘fast-tracking’ women into multiple levels of government (Dahlerup, Hilal, Kalandadze, & Kandawasvika-Nhundu, 2013). Given that women in government can bring about desirable changes in population health, we encourage more debate and research about quotas and other measures designed to level the political playing field for women.

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Conflict of interest and financial disclosure statement

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Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at doi:10.1016/j.ssmph.2018.08.003.

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