Public Health Nursing Vol. 22 No. 5, pp. 379–388
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Cardiovascular Health Promotion in Aging Women: Validating a Population Health Approach

Jo-Ann V. Sawatzky and Barbara J. Naimark

ABSTRACT ***Objective:*** Although cardiovascular disease is the leading cause of death in North American women, most cardiovascular research has focused on men. In addition, while there has been a recent trend toward population health promotion (PHP) and a consequent focus on the broad determinants of health, there is still a dearth of research evidence related to the promotion of cardiovascular health within this context. The purpose of this study was to explore and describe the interrelationships between the determinants of health and individual cardiovascular health/risk behaviors in healthy women, within the context of a framework for PHP. ***Design:*** A comprehensive inventory of factors affecting the cardiovascular health of women was operationalized in a survey questionnaire, the Cardiovascular Health Promotion Profile. Physical measures were also taken on each participant ($n = 206$). ***Results:*** The multivariate analyses support significant interrelationships between the population health determinants and multiple individual cardiovascular health/risk behaviors in this cohort ($p < 0.05$). ***Conclusions:*** The evidence from this study provides foundational validation for a population health approach and population-based strategies for cardiovascular health promotion in women. Further research, within the context of a PHP framework, is central to building on the body of knowledge in this area.

Key words: cardiovascular health, health promotion, women.

Cardiovascular disease (CVD) is a leading cause of death in North America. Each year, more men and women die of CVD compared with all cancers combined. While in men, the percentage of deaths due to CVD increases steadily after the age of 35, women are less vulnerable until the menopausal years. In both genders, however, cardiovascular mortality rates increase dramatically in the older age groups. Because the baby boomer generation is getting older and both men and women are living longer, the proportion of seniors in the population is expected to escalate over the next several decades. Consequently, it is anticipated that the magnitude of CVD will also increase in the years to come (Heart & Stroke Foundation of Canada, 2003).

Until recent years, most epidemiological research related to CVD focused on men. Either women were systematically excluded because of their low endpoint rates or there were simply not enough women in the studies to establish reliable results (Wenger, 1996). Although there has been a recent surge of research (and media) attention on CVD in women, most of these studies are still aimed at individual risk factors, such as obesity, smoking, or hormone replacement therapy (HRT).

Thus, there is a dearth of research evidence related to the promotion of women's cardiovascular health within the context of a broader population health perspective and the determinants of population health, including income and social status, social support networks, education, working conditions, physical environments, biology and genetics, personal

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health practices and coping skills, healthy child development, and health services (Bhatti, 1996; Federal, Provincial, & Territorial Advisory Committee on Population Health, 1994). The traditional determinants of men's health in general, and cardiovascular health in particular, tend to be generalized to women, and the unique aspects of a woman's cardiovascular health risks are often overlooked. For example, while there is mounting epidemiological evidence of an inverse relationship between socioeconomic status and CVD (Lynch, Kaplan, Cohen, Tuomilehto, & Salonen, 1996; Reeder, Liu, & Horlick, 1996), the profound implications for the aging female, in particular, who is often less educated, unemployed, and living below the poverty line, have not been addressed.

There is, however, also a growing recognition that relying exclusively on the prevention and treatment of chronic conditions at the individual level to improve a country's health will have little impact as an approach to improving the health status of the population (MacLean, 1996). The challenge therefore is to determine what enhances the overall cardiovascular health of women and then to develop broader, population-based strategies that will increase their chances of living long and healthy lives.

The Population Health Promotion (PHP) Model (Bhatti, 1996) is a three-dimensional illustration of how a population health approach can be implemented on the full range of health determinants, through action at various levels within society, by means of the comprehensive health promotion strategies described in the *Ottawa Charter for Health Promotion* (World Health Organization, 1986). This model also exemplifies the importance of evidence-based decision-making as a foundation for the development of health promotion activities (Bhatti, 1996). No previous studies have applied this type of framework to cardiovascular research. Accordingly, the purpose of this study was to explore and describe the interrelationships between the population-based determinants of health and specific individual risk factors of CVD in healthy women, thus establishing a broader context for cardiovascular health promotion strategies in this population.

Methods

A cross-sectional survey design was utilized to address the research hypothesis that there are significant interrelationships between the broad determinants of health and the cardiovascular health/risk profiles of women. This was part of a larger project in which the relationship between physical activity and the determinants of health was also explored in this population (Sawatzky & Naimark, 2002).

Subjects

Women, who were between 35 and 74 years of age, were recruited from a local health and fitness facility. Participants were self-described as healthy, with no known medical history of a chronic health problem or disease, such as CVD, hypertension, diabetes, or cancer. To achieve the goal of heterogeneous patterns of physical activity, within a relatively equivalent socioeconomic cohort, we asked the prospective study participants to recruit a similar aged, nonmember friend to participate in the study. Two hundred and six women participated in this project.

Instruments

An exhaustive review of the research literature revealed that there were no published measures that encompassed the essential components of the determinants of cardiovascular health in women. Therefore, the Cardiovascular Health Promotion Profile (CVHPP) was developed during the preliminary stages of the project (Sawatzky, 1999). The CVHPP was based on a comprehensive inventory of factors that affect the cardiovascular health of women. These factors were categorized within the context of the population-based determinants of health, as outlined in the PHP Model (Table 1), and then operationalized in the survey questionnaire and a demographic form. To ensure face and content validity, the CVHPP questionnaire was reviewed by a panel of experts and pretested on a sample of 13 women.

Several established instruments were embodied within the CVHPP to operationalize specific variables. Paffenbarger's Physical Activity Questionnaire (PPAQ; Paffenbarger, Wing, & Hyde, 1978; Pereira et al., 1997) was included in the CVHPP to measure various aspects of physical activity in the study cohort. Reliability and validity of the PPAQ have been well established in a variety of cohorts, including women (Pereira et al., 1997). For example, Ainsworth, Leon, Richardson, Jacobs, and Paffenbarger (1993) reported high test–retest

TABLE 1. *Operationalizing the Determinants of Cardiovascular Health in Women*

Determinants	Variables
1. Income and social status	Annual household income (Table 2)
2. Social support networks	Social support (House et al., 1982) Marital status (Table 2)
3. Education	Level of education (Table 2)
4. Employment and working conditions	Employment status (employed versus not employed) Type of employment (Table 2)
5. Biology and genetic endowment	Family history of CVD Age Hyperlipidemia (self-report) Obesity (waist, BMI, and WHR measures) Menopausal status (pre, peri, or postmenopausal) Hormonal status (BCP, HRT, gravida/para)
6. Personal health practices and coping skills	Diet factor (five questions re actions and beliefs) Dietary fat/sodium intake (3-point Likert scale) Smoking history (current and past) Alcohol consumption (ETOH; beer, wine, spirits) Medications (Rx and non-Rx–listed) Physical activity (PPAQ) Fitness club member (yes/no) Perceived stress (PSS) Self-care (BSE, dental checkup, and blood tests) Perceived health status (4-point Likert scale)
7. Health services	Utilization patterns (i.e., MD/health professional visits, hospitalizations)

Note. BCP, birth control pill; BMI, body mass index; BSE, breast self-examination; CVD, cardiovascular disease; ETOH, alcohol intake; HRT, hormone replacement therapy; PPAQ, Paffenbarger's Physical Activity Questionnaire; PSS, Perceived Stress Scale; WHR, waist/hip ratio.

reliability at 1 month (0.72; $p < 0.05$) in a small sample, which included 38 women between the ages of 21 and 51 years. Specific to validity, several studies have reported a significant relationship ($p < 0.05$) between the PPAQ total index and the "gold standard" for physical fitness, Vo_2 max, with correlations ranging from 0.29 to 0.60 (Ainsworth et al., 1993; Jacobs, Ainsworth, Hartman, & Leon, 1993; Siconolfi, Lasater, Snow, & Carleton, 1985).

The Perceived Stress Scale (PSS; Cohen, Kamarck, & Mermelstein, 1983) was incorporated in the CVHPP as a broad indicator of the ability to cope with stressful situations. Reliability and validity of the PSS have also been established in previous research (Cohen et al, 1983; Gotlib, Whiffen, & Mount, 1991). Perceived social support was an aggregated score, based on the responses to five questions, measured on a 5-point Likert scale (never to very often), within the categories of intimate and social relationships, formal organizational involvement, and active/social and passive/solitary leisure activities (House, Robbins, & Metzner, 1982). Physical measures, including resting heart rate, blood pressure (BP), height, weight, and waist and hip circumferences, were taken on each of the participants.

Procedures

The study protocol was approved by the University of Manitoba, Faculty of Medicine, Ethical Review Committee prior to data collection. Trained research assistants recruited subjects by posting notices and approaching potential subjects at the fitness facility. Data collection sessions, including the completion of the questionnaires and physical measures, were held at the fitness facility. The physical measurements were taken by research assistants, who attended training sessions on an established protocol to ensure consistency in the data collection procedures. All subjects signed a statement of informed consent prior to participation.

Data analysis

Initially, descriptive statistics including frequencies, means, standard deviations, and ranges were used to describe the study variables. Variables with small cell sizes were excluded from subsequent analyses. Correlational analyses (Pearson's *r*, product moment, and Spearman's rank), analyses of variance (ANOVA and ANCOVA), simple regression, and chi-square (χ^2) tests were also utilized to identify possible relationships between the variables. However, because of the numerous questions and variables involved, multivariate methods were central to the data analyses. To this end, each of the broad determinants of health was treated as an outcome, or dependent variable, and analyzed with stepwise multiple regression, logistic regression, and/or discriminant function analyses (DFAs), with the key study variables entered into each of these analyses ($p < 0.05$). In an effort to explain as much of the variance as possible, each of the determinants was also included in the analyses of the other determinants, as an independent variable. Finally, while the relationships between all of the variables were explored in the preliminary analyses, only those variables that emerged as significant were included in the final models.

Results

A convenience sample of 206 women, who were between the ages of 35 and 74 years (mean age = 54 years), and self-described as healthy, participated in this study. Sixty-five percent of the women ($n = 135$) were members of the fitness facility. The demographic characteristics are summarized in Table 2. Almost 60% of the women were employed outside the home, and of those who were employed, most (80%) worked full time. A large proportion of the women were married, well educated, and employed (previously or currently) in professional/managerial positions. While there was considerable variation in the women's incomes, more than 50% reported combined family incomes between $25,000 and $64,000 and 30% were greater than $65,000 per annum.

The determinants of health and individual cardiovascular risk factors

The results are presented within the context of the overall study purpose to explore and describe the interrelationships between the broad determinants of health and individual cardiovascular health/risk behaviors in the study cohort.

TABLE 2. *Demographic Characteristics of the Cohort (n = 206)*[a]

Characteristic	Frequency	Percent
Employment status		
Employed	121	59
Not employed	85	41
Occupation		
Professional/executive	114	56
Managerial/business owner	23	11
Sales, clerical, secretarial	56	27
Other (laborer, service worker, homemaker)	13	6
Education		
High school graduate	45	22
Technical school/college or university certificate/degree	135	65
Master's/doctorate	26	13
Marital status		
Single (including widowed/separated/divorced)	59	29
Married/common law relationship	147	71
Family income		
<$44,000	56	28
$45,000–$64,000	55	27
$65,000–$84,000	31	15
$85,000–$104,000	25	12
>$104,000	33	16

[a]Data collapsed for summary purposes.

Income and social status. Not surprisingly, there was a positive relationship between income and marital status, employment status, and education. However, the stepwise regression analysis (Table 3) also isolated several significant factors, which may be predictive of differences in cardiovascular health promotion and disease prevention behaviors, based on a woman's income. There was a positive relationship between income and taking HRT, medication intake (i.e., primarily preventive medications, including vitamins, minerals, and herbs), and perceived health status and an inverse relationship with waist/hip ratio (WHR). It is important to note that while age, level of physical activity, and occupation were significant in the univariate analyses, these variables were explained by proxy in the final model.

Social support. The multivariate analyses provide evidence of an inverse relationship between social support and perceived stress, age, and alcohol intake in this cohort (Table 4). There was also a significant relationship between perceived social support and marital status. Also, women with more social support were more likely to do a monthly breast self-examination (BSE) and take aspirin (ASA) on a regular/daily basis.

Education. As one would expect, the DFA (high school graduate or less educated versus educated beyond the high school level) revealed a positive association between education and occupation in the study cohort ($p < 0.001$). Also, women who had completed high school or less education were older than the women with university/college degrees ($p = 0.04$). Although employment status and income did not emerge as significant in the multivariate analyses, there was evidence to suggest that these variables were explained by proxy. Specific to cardiovascular health/risk behaviors, the women with more education were less likely to be current smokers ($p = 0.02$) and had more positive perceptions of their health status ($p = 0.04$) compared with other women of their age. No other individual risk factors emerged as significant in the analyses of this health determinant.

Employment and working conditions. Four variables emerged as significant in the stepwise logistic regression model related to employment status (i.e., employed versus not employed), χ^2 (4, $n = 206$) = 142.63, $p < 0.001$. The women who were employed, either full or part time, were younger ($p < 0.001$) and reported higher family incomes ($p = 0.01$) compared with the non-employed cohort. Also, they had a history of fewer pregnancies ($p = 0.01$) and higher perceived stress scores ($p = 0.01$). Additional analysis (ANCOVA, controlling for age) revealed that those who worked part time reported significantly less perceived stress compared with their non-employed counterparts, $F(2, 197) = 3.94, p = 0.02$. Similarly, an analysis of the relationship between employment status and diastolic BP provided support for an apparent cardiovascular benefit of part-time employment, $F(2, 203) = 4.39$, $p = 0.01$.

The stepwise logistic regression model of women in higher (e.g., professionals, managers) versus lower (e.g., sales, clerical) level occupations, χ^2 (8, $n = 206$) = 97.25, $p < 0.001$), included the expected variables of income ($p = 0.01$), education ($p < 0.001$), and age ($p = 0.02$). Also, however, this model provided convincing evidence that the women in higher level occupations were more likely to do a BSE every month ($p < 0.001$) and perceived less stress in their lives ($p = 0.04$) compared with women in lower level occupations.

TABLE 3. *Stepwise Regression Analysis–Income*

Step	Variable added	R^2 increment	Final *t*-value	*p*-value
1	Marital status	0.233	8.11	<0.001
2	Employment status	0.09	4.31	<0.001
3	HRT	0.043	2.83	0.005
4	WHR (log)	0.027	−2.46	0.01
5	Education	0.019	2.13	0.03
6	Medications	0.015	2.2	0.03
7	Perceived health status	0.014	2.14	0.03

Note. Model $R^2 = 0.441$; HRT, hormone replacement therapy; WHR, waist/hip ratio.

TABLE 4. *Stepwise Regression Analysis–Social Support*

Step	Variable added	R^2 increment	Final *t*-value	*p*-value
1	Perceived stress	0.048	−3.13	0.002
2	Marital status	0.036	3.03	0.003
3	ETOH	0.031	−2.79	0.006
4	ASA intake	0.024	2.29	0.02
5	Age	0.019	−2.18	0.03
6	BSE monthly	0.018	1.99	0.047

Note. Model $R^2 = 0.175$; ASA, acetylsalicylic acid (asprin); BSE, breast self-examination; ETOH, alcohol intake.

Biology and genetics. Of the numerous variables included in the analyses related to this health determinant (Table 1), only family history of CVD, age, diastolic and systolic BP, and obesity emerged as significant in the various analyses. Sixty-five percent of the cohort ($n = 130$) reported a family history of cardiovascular-related health problems. Interestingly, the stepwise DFA model, $F(4, 206) = 6.46$, $p = 0.01$, revealed a significant inverse relationship between this variable and perceived health status ($p = 0.01$). Also, the women who reported a positive family history had higher systolic BPs compared with their counterparts with no family history of CVD ($p = 0.02$). Although there were no significant differences in their reported cardiovascular health behaviors, compared with the women without a positive family history, those with a positive family history of CVD were more knowledgeable about CVD ($p = 0.02$) and more likely to report the consumption of at least one alcoholic beverage per week ($p = 0.02$).

Despite a relatively homogeneous sample related to age, a stepwise regression analysis (Table 5) revealed that the older women in this study were less likely to be employed outside the home; they expended fewer kilocalories in physical activity per week, and their systolic BPs were higher. By contrast, they also perceived significantly less stress in their lives and their dietary actions and beliefs were better compared with their younger counterparts.

Although hypertension was an exclusion criterion for participation, there was still considerable variation in the BPs within the study cohort. Univariate analyses revealed an inverse relationship between diastolic BP and employment status and education. The stepwise regression model ($r^2 = 0.19$, $p < 0.05$) also suggested that the women with lower diastolic BPs were younger ($p < 0.01$), more physically active (i.e., exercised vigorously at least once per week; $p = 0.03$), and less likely to be taking medications ($p = 0.001$), and they had lower waist measurements ($p < 0.001$). Also, controlling for age in the ANCOVA analyses elicited a significant relationship between diastolic BP and waist measurement and body mass index (BMI) ($p < 0.01$).

Stepwise regression analysis with each of the three most common measures of obesity (waist measurement, WHR, and BMI) as the outcome variables provided substantive support ($p < 0.05$) for a positive relationship between body size and systolic BP and resting heart rate, and inverse relationships with HRT, healthy dietary beliefs/actions, and perceived health status. Physical activity was consistently significant in the univariate but not the multivariate analyses, suggesting that this variable was explained by proxy, that is, explained within the

TABLE 5. *Stepwise Regression Analysis–Age*

Step	Variable	R^2 increment	Final *t*-value	*p*-value
1	Employment status	0.489	−12.85	<0.001
2	Systolic BP (log)	0.063	5.07	<0.001
3	Perceived stress	0.025	−3.39	<0.001
4	Dietary fat intake	0.02	−2.63	0.009
5	Total kilocalories of physical activity per week (log)	0.015	−3.01	0.003
6	Diet factor	0.009	2.1	0.04

Note. Model $R^2 = 0.622$; BP, blood pressure.

context of other variables included in the final models. Specific to the broader health determinants, only income emerged as significant, and only in the WHR, but not the BMI or waist measurement analyses, which also suggests a proxy influence.

Personal health practices and coping skills. This health determinant was operationalized with questions related to diet, medication intake, BSE, smoking status, alcohol consumption, physical activity, membership in a health and fitness facility, perceived stress, and perceived health status. While the cell sizes for many of these variables were too small to effect reliable results, the multivariate analyses with physical activity (i.e., total kilocalories of physical activity per week) as the outcome variable revealed that physically active women were younger, more likely to be members of the health and fitness facility, and reported a higher family income. Their actions and beliefs related to their diets were healthier and the perception of their health status (compared with other women of their age) was more positive. Resting heart rate, BMI, and waist measurement also decreased with increasing levels of physical activity ($p < 0.05$).

There was a significant inverse relationship between perceived stress and perceived health status, as well as social support in this cohort ($p = 0.01$). The women with higher perceived stress scores were younger ($p < 0.001$), employed ($p = 0.01$) and were also more likely to report that they had no time to prepare meals that are healthy ($p = 0.01$). Simple two-tailed t tests also revealed a significant, inverse relationship between perceived stress and vigorous exercise, $t(204) = 2.48$; $p = 0.01$, as well as regular exercise, $t(204) = 2.20$; $p = 0.03$.

Health services utilization. Ninety percent of the women in this study reported a regular checkup with their doctor, as well as their dentist, and 80% reported having their blood tested within the past year. Hence, comparisons between those who did and those who did not exhibit these health promotion behaviors were not feasible. Moreover, none of these variables emerged as significant in the univariate analyses.

Discussion

The evidence from this study lends support for the research hypothesis that there are significant interrelationships between the population-based determinants of health and the cardiovascular health/risk behaviors of healthy women. Although numerous researchers have studied isolated risk behaviors for CVD and concluded that factors such as socioeconomic status and social support have a significant influence on those behaviors, no one has explored multiple risk behaviors within the broader context of PHP. The complexity and overlapping nature of the relationships between the broad determinants and the individual cardiovascular risk behaviors revealed in this study reinforce the importance of addressing the determinants as a whole, rather than only within the context of the individual, and each risk factor in isolation.

The cross-sectional design of this study limits the conclusions that can be drawn from the data analyses. Also, sampling was done by a non-probability method. It is acknowledged that a convenience sample is less likely to be representative of the population than if a random sampling method is utilized. Although comparisons with the general population suggested that the sample was fairly representative and a relatively large sample size was obtained, it is important to acknowledge that the results should not be generalized beyond the population of healthy, middle-class women. By contrast, the results are particularly convincing because, despite this homogeneity, there were, in fact, notable differences within the cohort.

While the self-reporting strategy of data collection was advantageous in that it allowed for a direct means of gathering information from the cohort, this method is not without weaknesses. Validity and accuracy of reporting can be serious issues in self-reports (Streiner & Norman, 1996). For example, social desirability response sets were a threat to this study's validity because participants may have misrepresented their actual cardiovascular health behaviors with more positive ones. The assurance of anonymity and confidentiality reduced the risk of this type of response bias. Also, various strategies were used to enhance the accuracy of the responses. However, because some of the questions relied on memory, it is acknowledged that the responses may not have been entirely accurate.

The significant relationship between income and cardiovascular health behaviors coincides with the findings of others (Barrett-Connor, 1991; Luoto, Pekkanen, Uutela, & Tuomilehto, 1994; Moller,

Kristensen, & Hollnagel, 1996) and may suggest that women with higher levels of income are more knowledgeable about, and have better access to, health-related information. Higher income has also been associated with a greater sense of personal control and perceived self-efficacy which may, as a consequence, generate the impetus to take the necessary steps to accomplish an optimistic outcome.

It has long been speculated that social relationships and interactions have a positive impact on one's health and a protective effect against disease and even death. Interestingly, while married men are consistently found to be healthier than their non-married counterparts (Kaplan et al., 1988; Kawachi et al., 1996; Shumaker & Hill, 1991), the results are less convincing for women (Berkman & Syme, 1979; House et al., 1982; Kaplan et al., 1988; Schoenbach, Kaplan, Fredman, & Kleinbaum, 1986). The findings of this study, however, reinforce the important role of this determinant on women's health in general, and on their cardiovascular health, in particular. In addition to being a valuable resource for coping (Lazarus & Folkman, 1984), social relationships may provide the information, advice, and peer pressure that provoke the adoption of health-promoting behaviors (i.e., regular BSE). While this evidence, as well the findings related to employment, substantiates the support for workplace health promotion initiatives, it also implies that conveying the message to those with less or no social connections, such as the aging, non-employed woman, will be much more of a challenge.

It would appear that this study cohort had a substantial educational advantage over the average North American female. For example, while only 12% of the general population of females in Canada had a university degree in 1996 (Statistics Canada, 2000), 66% of the women in this study reportedly had a college certificate or university degree. This may explain the minimal evidence of a relationship between education and cardiovascular health behaviors. The results of a positive relationship between education and perceived health status, however, concur with Canada's Health Promotion Survey of 1990 (Health & Welfare Canada, 1990) and thus reinforce the significant impact of education on women's health.

The research literature is replete with evidence that biological and genetic make-up influences health status in general, and cardiovascular health, in particular. While the major documented risk factors of the development of CVD may have important genetic determinants (Friedlander, Kark, & Stein, 1985), the apparent clustering of major CVD risk factors such as obesity, hypertension, smoking, and sedentary living lead one to question, if not endorse, the significance of the environment. Although this study suggests a common link to the broader health determinants, further research is paramount to distinguishing between genetic predisposition, familial susceptibilities, and shared environmental influences for CVD risk in women (Murdaugh & O'Rourke, 1988).

Personal health practices and coping skills have been linked to a variety of health problems, including CVD. Hence, the modification of factors such as diet, smoking, alcohol intake, stress, and a regular regime of preventive medications and physical activity have become central to cardiovascular health promotion and disease prevention efforts in recent years. Although the cross-sectional nature of this study prohibits the inference of causality, clearly the physically active women exhibited healthier cardiovascular-related behaviors than their less active counterparts. It is important to note that even within a relatively homogeneous socioeconomic sample, the physically active women had a significantly higher socioeconomic status. A subsequent prospective follow-up of this cohort will provide further insight into the hypothesis that physical activity has a domino effect on the acquisition of other cardiovascular health-promoting behaviors.

In summary, the evidence from this study provides support for a broader approach to cardiovascular health promotion in women. The findings of significant interrelationships between the determinants of health and individual risk factors of CVD in women establish a foundation for PHP strategies within the various societal levels. For example, at the individual level, facilitating the development of personal skills vis-à-vis increasing knowledge and self-efficacy may enable women to have a greater sense of mastery and control over their own cardiovascular health. At the community level, research strategies should include changes in social networks, organizational norms, and perhaps even the physical environment. Appropriate research settings for the promotion of women's cardiovascular health within the community should include the workplace, with interventions that provide support for the part-time

employee. In the political arena, our findings suggest that an important strategy for promoting cardiovascular health in women is to advocate for healthy public policies, which address the broad determinants of health. Specific to health services, although the evidence from our study suggests that the cohort had adopted a philosophy of disease prevention/health promotion, it is important to acknowledge their socioeconomic advantage. It follows that subsequent research should encompass a more heterogeneous population.

Thus, this study provides foundational validation for a population approach to cardiovascular health promotion in women. The unique approach to organizing and building on existing knowledge related to cardiovascular health and disease, within the context of a PHP framework, establishes pivotal groundwork for evidence-based decision-making related to policy and program planning, as well as future research in this area.

Acknowledgments

This research was funded in part by The Manitoba Health Research Council and The Manitoba Nursing Research Institute.

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