Stroke-Related Knowledge, Beliefs, and Behaviours of Chinese and European Canadians: Implications for Physical Therapists

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ABSTRACT

Purpose: To improve cross-cultural health education on risk-reducing behaviour change by examining the stroke-related knowledge, beliefs, and behaviours of Chinese Canadians (CCs). ***Methods:*** Participants (103 first-generation CCs and 101 European Canadians [ECs] representing the dominant cultural group in Canada) completed a cross-sectional questionnaire about knowledge, health behaviours, and beliefs related to stroke. ***Results:*** Compared with ECs, CCs were less aware of risk factors, warning signs, and appropriate responses to stroke in others. Information sources about stroke included mass media, family, and friends. CCs were less likely to smoke and drink alcohol but were also less likely to be physically active or to participate in structured exercise, less likely to have a healthy diet, and more likely to report stress. ***Conclusions:*** Theoretical dimensions of culture may explain variations in stroke-related knowledge, behaviours, and beliefs between CCs and ECs. Awareness of cultural differences can help physical therapists evaluate clients and appropriately tailor lifestyle-related health education.

Key Words: health promotion; public health practice; socioeconomic factors; attitude; stroke.

RÉSUMÉ

Objectif : Améliorer l'éducation en santé transculturelle portant sur le changement des comportements visant à réduire les risques en examinant les connaissances, les croyances ou les comportements des Sino-canadiens (SC) au sujet de l'accident vasculaire cérébral. ***Méthodes :*** Les participants (103 SC de première génération et 101 Euro-canadiens [EC] représentant le groupe culturel dominant au Canada) ont rempli un questionnaire transversal sur les connaissances, les comportements sanitaires et les croyances portant sur l'accident vasculaire cérébral. ***Résultats :*** Comparativement aux EC, les SC connaissaient moins les facteurs de risque, les signes avertisseurs et les façons appropriées de traiter les victimes d'un accident vasculaire cérébral. Les médias grand courant, les membres de la famille et les amis, notamment, constituaient les sources d'information. Les SC étaient moins susceptibles de fumer et de boire de l'alcool, mais aussi moins susceptibles de faire de l'activité physique ou de participer à des exercices structurés, moins susceptibles d'avoir une alimentation santé et plus susceptibles de signaler du stress. ***Conclusion :*** Des dimensions théoriques de la culture peuvent expliquer les variations, entre les SC et les EC, des connaissances, des comportements et des croyances portant sur l'accident vasculaire cérébral. La sensibilisation aux différences culturelles peut aider les physiothérapeutes à évaluer les clients et à personnaliser comme il se doit l'éducation en santé portant sur les habitudes de vie.

Canada is a cultural mosaic in which Chinese Canadians (CCs) are becoming increasingly dominant, especially on the west coast.[1] Because most Canadians are of European heritage, Western culture dominates;[2,3] since Western perceptions of health and wellness can differ from Eastern perceptions, cultural appropriateness and sensitivity of health care is a priority in multicultural Canada.[4] In 2002, the final report of the Romanow Commission on the Future of Health Care in Canada acknowledged that "health professionals should reflect the diversity of Canadian society and understand the ethnic and cultural backgrounds of the population they serve."[4(p.156)]

In Canada, stroke is a primary contributor to long-term disability and the third leading cause of premature death, costing $3.6 billion per year (direct and indirect costs).[5] In recent decades, stroke has also become a principal cause of death in China, with 1.3 million stroke deaths reported annually[6] Data on stroke prevalence and

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mortality among CC immigrants in Canada is limited, but the impact of stroke on both cultures is evident.

The Heart and Stroke Foundation of Canada reports that smoking, physical inactivity, high blood pressure, dyslipidemia, obesity, and diabetes are risk factors for stroke.[5] In Canada, poor diet, hypertension, and stress are leading risk factors;[7] among Chinese people living in China, hypertension has been reported to be the primary risk factor for stroke.[8]

Promoting healthy lifestyles and controlling hypertension reduce the incidence and severity of stroke and its impact on Canadian society.[9] The Canadian Hypertension Society has issued lifestyle guidelines to increase awareness of healthy choices and hypertension.[10] However, we need to better understand how health information can best be conveyed to CCs versus European Canadians (ECs).

The effectiveness of health education depends on people's beliefs about the importance of new information and their confidence in their ability to change their own health behaviour (self-efficacy).[11] A distinction between Chinese and Western health belief systems[12,13] is the yin-yang theory of harmonious balance, which was first documented 2,500 years ago in *The Yellow Emperor's Classic of Medicine*.[14] This theory provides the basis for health beliefs and medicine in China today. Although little is known about the influence of this theory on how CCs conceptualize or understand stroke specifically, their stroke knowledge and beliefs tend to come from friends, relatives, and media rather than from formal health care sources.[15]

Studying cultural distinctions in health research has several challenges, including the fact that culture is dynamic.[16] When people immigrate, their cultural beliefs and behaviours are modified as they assimilate into a new culture. Although no health behaviour change strategy exists that applies to every member of a cultural group, increasing physical therapists' awareness of factors that can influence clients' health beliefs and self-efficacy about health behaviour change may help them tailor the health education they provide to make it more effective.[17]

The health belief model has been adapted to incorporate a broader range of predictive variables, including demographics, socio-psychological factors, health motivation, and perceived control.[18] Therefore, the purpose of this study was to examine CCs' knowledge of stroke, their lifestyle-related health behaviours and beliefs, and potential relationships among these factors. This research constitutes an important step toward preventing and managing stroke (and possibly other lifestyle-related conditions common in Western cultures) among Chinese immigrants to Canada.

We posed the following research questions:

(1) How does stroke knowledge compare between ECs and CCs?
(2) What are the interrelationships between stroke-related beliefs and behaviours?
(3) How might health programmes be constructed, targeted, and delivered to meet the needs of CCs?

METHODS

We conducted a cross-sectional survey with a convenience sample of community-dwelling CCs and ECs. Based on the 2001 population of 342,700 CCs,[1] the sample size of each group was estimated at 102 for a 95% CI with 9% confidence.[19]

The study received ethical approval from the University of British Columbia, and each participant provided informed consent.

We chose to compare ECs born in Canada with first-generation CCs (defined as those resident in but not born in Canada) because we believed this comparison would best reveal cultural variations between the two groups. Inclusion criteria for ECs were (1) born and residing in Canada, (2) European ancestry, (3) $\geq$40 years old (mid-life age is associated with greater risk for vascular disease),[20] and (4) able to read and write English. Inclusion criteria for CCs were (1) born in China (China, Taiwan, or Hong Kong) and immigrated to Canada as an adult, (2) $\geq$40 years old,[20] and (3) able to read and write Chinese.

Participants were recruited at community centres, libraries, places of worship, and other public spaces in Greater Vancouver (i.e., Vancouver, Burnaby, and Richmond). Recruitment notices were posted with eligibility criteria in English and in simplified and traditional Chinese. Participants were also recruited through word-of-mouth and referrals. One researcher (fluent in Chinese and English) contacted potential participants to review eligibility criteria and explain the study's purpose. Initial contact was made in English. Respondents could either complete the questionnaire on site or complete it at home and return it within 2 weeks. CCs chose their preferred language to complete the questionnaire.

The 30-minute questionnaire included closed- and open-ended questions assessing stroke knowledge, lifestyle-related health behaviours and beliefs, and demographics. *Stroke-related knowledge* included questions regarding common risk factors, warning signs, actions to take if someone is having a stroke, and locations in which information can be accessed. *Health behaviours* included questions about risk factors such as smoking history, dietary habits, physical activity habits, hours of sleep per night, and stress and stressors. We designed the questions with as few response options as possible to shorten completion time.

The English questionnaire was pilot-tested on four ECs. A back-translation method was used to translate the English questionnaire into simplified and traditional Chinese. Translations were checked by two people fluent

in both English and Chinese, then pilot-tested on four CCs. No additional revisions were required.

Statistical analysis

Our analysis was conducted in three parts using the Statistical Package for the Social Sciences, version 11 (SPSS Inc., Chicago, IL). We used descriptive analysis to examine differences within and between groups and descriptive statistics to summarize demographic information and questionnaire responses on stroke-related knowledge, behaviours, and beliefs. Chi-square analysis was used to compare differences between CCs and ECs for categorical variables and independent-samples *t*-tests to examine group differences for continuous variables. Between-group differences were analyzed based on ethnic group and within-group differences based on age. Demographic characteristics such as age, income, and education were also assessed and used as reference variables. Alpha was set at 0.05.

RESULTS

Of 318 questionnaires distributed (154 English, 164 Chinese), 211 were returned and 7 were discarded (due to incomplete data) for a total of 101 ECs and 103 CCs. Table 1 shows descriptive and demographic data for participants. The two groups differed in three ways: the CC group had less education, included more homemakers, and had lower income ($p < 0.05$).

The majority of both groups (72.8% of CCs, 62.4% of ECs) reported healthy body weight (body mass index [BMI] 18.50–24.99 kg/m^2); 23.3% of CCs and 33.7% of ECs reported being overweight (BMI $\geq$ 25 kg/m^2), and 4.0% of ECs and 3.9% of CCs reported being underweight (BMI $<$ 18.5 kg/m^2). No sex differences were found in BMI. The majority of both CCs and ECs reported they had their blood pressure (76.0% and 71.3%) and blood cholesterol (53.4% and 58.4%) checked within the previous 6 months.

In total, 24.1% of CCs and 17.8% of ECs reported at least one of the following health problems: hypertension (CCs, 14.6%; ECs, 17.8%), diabetes (4.9%, 4.0%), heart disease (3.9%, 3.9%), stroke (1.9%, 0%), and high blood cholesterol (24.1%, 12.5%). Fewer CCs reported a family history of diabetes ($\chi^2 = 9.91$, $p = 0.002$) or heart diseases ($\chi^2 = 7.27$, $p = 0.007$). We found no differences between sexes for health problems or family history.

Fewer CCs than ECs could identify any risk factors for stroke and did not associate smoking, inactivity, or obesity with stroke ($p < 0.05$). More specifically, fewer CCs than ECs identified weakness, visual disturbance, or shortness of breath ($p < 0.05$) as warning signs of stroke, and fewer CCs said they would call 911 or visit an emergency department if someone showed signs of stroke ($p < 0.05$). CCs were more likely to answer "do not know how to respond" with respect to risk factors ($p < 0.05$).

CCs' primary sources of information on stroke and its risk factors were newspapers (39.6%), books (32.7%), and family and friends (18.8%), whereas ECs' primary sources were the internet (61.6%), doctors (42.4%), and medical facilities (36.4%).

Most respondents reported that they have "never smoked." Similarly low proportions of CCs and ECs reported that they "usually smoke," and more CCs reported that they "seldom smoke." Compared with ECs, CCs were likely to identify more as non-drinkers, and fewer CCs had 1–2 alcoholic drinks per day. More CCs reported never using alcohol or smoking to handle stress.

Table 2 shows activity levels based on the International Physical Activity Questionnaire short form;[21] overall, CCs reported being less strenuously active than ECs (approximately 54% vs. 91% engaged in medium-high physical activity regularly). Table 3 displays dietary habits of both groups and shows that CCs reported consuming fewer daily servings of fruit and vegetables (approximately 3 vs. 4 for ECs), meat (less than 2 vs. over 2 for ECs), dairy (just over 1 vs. over 2 for ECs), and added sugar (1.5 tsp. vs. 2 tsp. for ECs) but greater quantities of salt (almost 1.5 tsp. vs. less than 1 tsp. for ECs). Although CCs and ECs reported comparable stress levels, they reported different , stress-management strategies than ECs, including less physical activity (47% vs. 89%, $p < .001$) and less eating (5.1% vs. 30%, $p < .001$) (see Table 4). Finally, ECs reported beliefs more consistent with evidence-based healthy living, such as high importance of consuming low-fat foods (77% vs. 62% for CCs, $p < .019$) and grains (74% vs. 61% for CCs, $p < .046$), exercising (98% vs. 68%, $p < .001$), and maintaining a healthy weight (89% vs. 78%, $p < .048$) (see Table 5).

DISCUSSION

Stroke-related knowledge

Our study identified several gaps in CC participants' stroke knowledge. Compared to ECs, CCs were less aware of risk factors, major warning signs, and appropriate responses to signs of stroke. Hypertension was the stroke risk factor most often identified by CCs, reflecting the findings of studies conducted in South Korea[22] and Hong Kong;[15] smaller proportions of CCs identified heart disease, obesity, drinking alcohol, diabetes, and inactivity as stroke risk factors (4.0%–11.9%). However, comparable proportions of CCs and ECs reported hypertension as a risk factor for stroke (44% vs. 37%, respectively). Among CCs, 10.9% listed smoking as a risk factor, whereas 57.6% of ECs identified smoking as the most common stroke risk factor. This finding may reflect continued acceptance of smoking in Chinese society as well as less knowledge about its deleterious health effects.[23,24] Although ranking of risk factors in terms of importance may vary among ethnic groups, smoking is considered a leading modifiable risk factor.

Table 1 Socio-demographic Characteristics of Participants

	European Canadians $n = 101$		Chinese Canadians $n = 103$				
Characteristics	No. (%)*	95% CI	No. (%)*	95% CI	χ^2*	*p*-value	Effect size
Mean (SD) age, y	54.2 (11.84)	51.89–56.51	51.46 (9.54)	49.6–53.32	1.82	0.07	0.26
Mean (SD) years in Canada	N/A	N/A	12.66 (9.48)	10.81–14.51			
Sex							
Male	49 (48.50)	34.51–62.49	47 (45.63)	31.39–59.87	0.17	0.68	0.08
Female	52 (52.50)	38.93–66.07	56 (54.37)	41.32–67.42			
Education							
≤Elementary school	0 (0.00)	N/A	4 (3.88)	−15.05 to 22.81	4.00	0.045†	N/A
Technical/trade school	31 (30.69)	14.45–46.93	26 (25.24)	8.54–41.94	0.75	0.39	0.22
College university/post-graduate	70 (69.31)	58.51–80.11	73 (70.87)	60.45–81.29	0.06	0.81	0.04
Employment							
Employed	61 (60.40)	48.13–72.67	57 (55.43)	42.53–68.33	0.54	0.47	0.13
Home maker	4 (3.96)	−15.15 to 23.07	25 (24.27)	7.46–41.08	17.25	<0.001†	3.21
Unemployed	8 (7.92)	−10.79 to 26.63	3 (2.91)	−16.11 to 21.93	1.50	0.22	0.86
Retired	28 (27.72)	11.14–44.30	18 (17.58)	−0.01 to 35.17	3.70	0.08	0.45
Personal income							
<$19,999	18 (18.18)	0.36–36.00	36 (34.95)	19.37–50.53	7.43	0.007†	0.96
$20,000–$69,999	68 (68.69)	57.67–79.71	55 (53.40)	40.22–66.58	4.96	0.026†	0.35
≥$70,000	13 (13.13)	−5.23 to 31.49	12 (11.65)	−6.50 to 29.80	0.10	0.75	0.13
Birth place							
Mainland China	N/A	N/A	64 (64.14)	52.39–75.89			
Hong Kong	N/A	N/A	14 (13.99)	−4.18 to 32.16			
Taiwan	N/A	N/A	25 (24.27)	7.46–41.08			
First language							
Mandarin	N/A	N/A	81 (78.64)	69.71–87.57			
English	98 (97.03)	93.67–100.39	N/A	N/A			
Cantonese	N/A	N/A	22 (21.46)	4.30–38.62			
French	3 (2.97)	−16.24 to 22.18	N/A	N/A			
Language spoken at home							
Mandarin	N/A	N/A	71 (68.93)	58.17–79.69			
English	100 (99.00)	97.05–100.95	3 (2.91)	−16.11 to 21.93			
Cantonese	N/A	N/A	22 (21.36)	4.23–38.49			
Min Nan dialect	N/A	N/A	6 (5.83)	−12.92 to 24.58			
Other	1 (1.00)	−18.50 to 20.50	1 (0.97)	−18.24 to 20.18			

* Unless otherwise indicated.
† Statistically significant values.

Table 2 Physical Activity Levels Reported by Participants

	European Canadians $n = 101$		Chinese Canadians $n = 103$				
Physical activity level	No. (%)	95% CI	No. (%)	95% CI	χ^2	*p*-value	Effect size
Low	8 (9.52)	−10.82 to 29.86	45 (46.88)	32.30–61.46	30.85	<0.001*	3.31
Medium	56 (66.67)	54.32–79.02	38 (39.58)	24.03–55.13	13.17	<0.001*	0.63
High	20 (23.87)	5.19–42.55	13 (13.54)	−5.06 to 32.14	3.16	0.08	0.58

*Statistically significant values.

Table 3 Dietary Habits of Participants

	European Canadians $n = 101$		Chinese Canadians $n = 103$				
Servings/day	Mean (SD)	95% CI	Mean (SD)	95% CI	t	p-value	Effect size
Grains	2.97 (1.31)	2.71–3.23	3.25 (1.85)	2.89–3.61			
Vegetables/fruits	3.82 (1.74)	3.48–4.16	2.88 (1.67)	2.55–3.21	3.92	<0.001*	0.55
Meat and alternatives	2.27 (1.26)	2.02–2.52	1.94 (0.89)	1.77–2.11	2.13	0.03*	0.30
Milk/dairy	2.21 (1.04)	2.01–2.41	1.28 (1.11)	1.06–1.5	6.11	<0.001*	0.86
Sugar (tsp)	2.04 (2.10)	1.63–2.45	1.50 (1.24)	1.26–1.74	2.17	0.032*	0.31
Salt (tsp)	0.94 (0.73)	0.80–1.08	1.36 (0.79)	1.21–1.51	−3.86	<0.001*	0.55
Oil (tsp)	2.04 (1.50)	1.75–2.33	1.70 (1.19)	1.47–1.93	1.79	0.07	0.25

*Statistically significant values.

The most common warning signs for stroke reported by both CCs and ECs were dizziness and numbness, similar to the findings of a telephone interview survey by Pancioli and colleagues.[25] Most both CCs (79.2%) and ECs (72.7%) correctly identified at least one of five established warning signs.[26] While these proportions are higher than those reported in other population-based studies done in Ohio (57%)[25] and Australia (49.8%),[27] 15.8% of CCs could not identify what to do if someone shows signs of stroke, and only 7.9% correctly identified three or more warning signs.

Sources of stroke-related knowledge for CCs included mass media and personal acquaintances, consistent with findings among Hong Kong Chinese[15] and with Hofestede's cultural framework of individualism-collectivism.[28] People from collectivistic cultures such as China's turn to each other for support in serious matters such as health. A study in Quebec confirmed that CCs choose health professionals as sources of health information less often than Quebecois,[29] which may be a result of the language barriers experienced when using health services.[29–31]

Interrelationships between stroke-related beliefs and behaviours

The majority of ECs said they believe not smoking is very important to one's health, whereas CCs considered it less important. This finding matches participants' reported smoking behaviour: 71.8% of CCs said they never smoke (vs. 82.2% of ECs), approximating the rate for CCs in Quebec[32] and lower than the overall Canadian non-smoking rate,[33] although higher than the non-smoking rate in China.[34] Canadian immigration criteria that favour healthy people[35] who are less likely to smoke may explain differences from rates in China.

With respect to alcohol consumption, CCs were more likely to never drink alcohol and more likely to believe in the health benefits of alcohol abstinence. Although more CCs than ECs said that moderation is not important, 81.0% of CCs reported not drinking alcohol, and only 15% reported having 1–2 drinks per day. These findings are consistent with studies of alcohol consumption among Chinese people in North America.[32,36] Although disputes exist about the influence of cultural values on alcohol consumption in this population, the Confucian tradition—which promotes moderate or no drinking and discourages inebriation[37]—is a possible culturally-based explanation. Other cultural factors such as embarrassment about facial flushing after ingestion of alcohol, related to the concept of "saving face," may also contribute to low alcohol consumption.[38]

We observed differences in beliefs about the importance of physical activity to health: most ECs said they believe regular exercise is very important for health (none considered it not important), whereas CCs reported believing it to be somewhat to very important (and several considered it not important). These reported beliefs are consistent with participants' reported physical activity.

A cross-cultural study in China and the United States found higher proportions of both very active people and sedentary people in the United States than in China.[39] In our study, more CCs reported less strenuous physical activity than ECs; strenuous activity may be less valued in Chinese cultures because of traditional concerns about sweating.[14(p.88)] Fewer CCs said they believe "regular exercising" is "very important" to overall health, and more CCs recommended "light physical activity" to attain a long healthy life. This belief follows traditional beliefs about low-intensity physical activity and is consistent with self-reported physical activity levels. People in Asia may be more physically active on a daily basis because cars and labour-saving conveniences are less accessible; this low-intensity, high-volume daily physical activity may contribute to lower body weight, lower rates of obesity, and longer life expectancy in Asia. This health advantage in immigrants, however, is lost over time of residence in the West.[40]

Physical activity tends to be lower in high-income countries than in middle- and low-income countries,[39] a trend associated with sedentary occupations and screen-based recreational activities.[39] Time-related pressures in

Table 4 Stressors and Stress Reduction Beliefs of Participants

	European Canadians $n = 101$		Chinese Canadians $n = 103$				
Stress-related variable	No. (%)*	95% CI	No. (%)*	95% CI	χ^{2}*	*p*-value	Effect size
Stressor							
Family/marriage	36 (35.84)	23.91–27.77	37 (35.92)	20.46–51.38	10.69	0.001†	1.06
Away from home	2 (1.98)	−17.33 to 21.29	18 (17.48)	−0.07 to 35.03	13.85	<0.001†	4.06
Work	13 (12.87)	−5.33 to 31.07	26 (24.27)	7.79–40.75	4.37	0.037†	0.85
Lack of work	7 (6.93)	−11.88 to 25.74	28 (27.18)	10.70–43.66	14.72	<0.001†	2.23
Few friends	2 (1.98)	−17.33 to 21.29	12 (11.63)	−6.51 to 29.77	6.51	0.011†	2.99
Sickness	14 (13.86)	−4.24 to 31.96	4 (38.83)	23.73–53.93	16.34	<0.001†	1.69
Sickness in family	21 (20.79)	3.43–38.15	42 (40.78)	25.92 to 55.64	9.54	0.002†	1.04
Other	7 (6.93)	−11.88 to 25.74	9 (8.74)	−9.71 to 27.19	0.23	0.63	0.27
Stress level							
Low	41 (40.59)	25.56–55.62	48 (46.60)	32.49–60.71	0.75	0.39	0.20
Moderate	51 (50.50)	36.78–64.22	46 (44.66)	30.29–59.03	0.70	0.40	0.16
High	9 (8.91)	−9.70 to 27.52	9 (8.74)	−9.71 to 27.19	0.00	0.96	0.02
Effective stress relievers							
Physical activity/exercise	89 (88.12)	81.40–94.84	47 (47.47)	33.19–61.75	37.950	<0.001†	0.73
Work	21 (20.79)	3.43–38.15	22 (22.68)	5.18–40.18	0.104	0.75	0.10
Relaxation strategies	82 (81.19)	72.73–89.65	80 (79.21)	70.32–88.10	0.125	0.72	0.05
Sleep	90 (89.11)	82.67–95.55	75 (73.53)	63.55–83.51	8.096	0.004†	0.36
Hobbies	63 (62.38)	50.42–74.34	50 (51.02)	37.16–64.88	2.614	0.11	0.28
Time with friends	69 (68.32)	57.34–79.30	50 (50.00)	36.14–63.86	6.980	0.008†	0.41
Time with family	61 (60.40)	48.13–72.67	40 (40.40)	25.19–55.61	7.990	0.005†	0.48
Television	16 (15.84)	−2.05 to 33.73	20 (20.62)	2.89–38.35	0.759	0.38	0.33
Music	55 (54.46)	41.30–67.62	36 (36.73)	20.98–52.48	6.290	0.012†	0.46
Eating	30 (29.70)	13.35–46.05	5 (5.10)	−14.18 to 24.38	20.770	<0.001†	1.15
Smoking	9 (8.91)	−9.70 to 27.52	4 (4.08)	−15.31 to 23.47	1.900	0.17	0.71
Other	19 (18.81)	1.24–36.38	9 (9.18)	−9.68 to 28.04	3.810	0.05	0.65
Factors that would reduce stress							
Better relationships within family or at work	27 (26.73)	10.04–43.42	31 (30.39)	14.20–46.58	0.33	0.56	0.16
More self-discipline/control	36 (35.64)	19.99–51.29	25 (24.51)	7.65–41.37	2.99	0.08	0.40
Being in one's own country	4 (3.96)	−15.15 to 23.07	39 (38.24)	22.99–53.49	35.70	<0.001†	4.87
Better living conditions	11 (10.89)	−7.52 to 29.30	33 (32.35)	16.39–48.31	15.56	<0.001†	1.73
More money	19 (18.81)	1.24–36.38	33 (32.35)	16.39–48.31	4.48	0.002†	0.76
Others	22 (21.78)	4.53–39.03	20 (19.61)	2.21–37.01	0.15	0.70	0.12
Mean (SD) hours sleep/night	7.23 (1.02)	7.03–7.43	6.68 (1.15)	6.46–6.90	$t = 3.63$	<0.001†	0.51

* Unless otherwise indicated.
† Statistically significant values.

high-income countries such as Canada and the United States may prevent people from being as physically active as they would otherwise choose. Barriers between beliefs about physical activity and actual behaviours need to be explored and addressed.

The Chinese Food Guide Pagoda[41] and Canada's Food Guide[42] differ in food categorization and serving sizes; both, however, recommend consuming large amounts of grains, vegetables, and fruits and moderate to small amounts of meat, milk, and dairy products.[43] In our study, self-reported daily servings of fruit and vegetables, meat and alternatives, and dairy products were lower for CCs than for ECs. CCs reported servings of the four primary food groups were lower than recommended by Canada's Food Guide; both groups fell below the recommended five daily servings of grains and vegetables/

Table 5 General Health Beliefs Reported by Participants

Stress-related variable: Importance of health behaviours	European Canadians $n = 101$		Chinese Canadians $n = 103$				
	No. (%)	95% CI	No. (%)	95% CI	χ^2	*p*-value	Effect size
Low-fat diet							
Not important	1 (0.99)	−18.41 to 20.39	1 (0.97)	−18.24 to 20.18	0.00	1.00	
Somewhat important	22 (20.78)	3.83–37.73	38 (36.89)	21.55–52.23	5.60	0.008*	0.83
Very important	78 (77.23)	67.92–86.54	64 (62.14)	50.26–74.02	5.49	0.019*	0.34
Eating grains							
Not important	1 (0.99)	−18.41 to 20.39	4 (3.88)	−15.05 to 22.81	1.79	0.18	2.43
Somewhat important	25 (24.75)	7.83–41.67	36 (34.95)	19.37–50.53	2.53	0.11	0.47
Very important	75 (74.26)	64.37–84.15	63 (61.17)	49.14–73.20	3.99	0.046*	0.30
Eating fruit and vegetables							
Not important	0 (0.00)	N/A	0 (0.00)	N/A			
Somewhat important	4 (3.96)	−15.15 to 23.07	14 (13.59)	−4.36 to 31.54	—	—	
Very important	97 (96.04)	92.16–99.92	89 (86.41)	79.29–93.53	5.88	0.15	0.28
Exercising regularly							
Not important	0 (0.00)	N/A	7 (6.86)	−11.87 to 25.59	7.18	0.007*	n/a
Somewhat important	2 (1.98)	−17.33 to 21.29	26 (25.49)	8.74–42.24	23.88	<0.001*	5.40
Very important	99 (98.02)	95.28–100.76	69 (67.65)	56.61–78.69	32.88	<0.001*	0.59
Not smoking							
Not important	2 (1.98)	−17.33 to 21.29	12 (11.65)	−6.50 to 29.80	7.46	0.006*	3.00
Somewhat important	11 (10.89)	−7.52 to 29.30	7 (6.80)	−11.85 to 25.45	1.06	0.30	0.46
Very important	88 (87.13)	80.13–94.13	84 (81.55)	73.25–89.85	1.20	0.27	0.15
Not drinking alcohol/drinking in moderation							
Not important	4 (3.96)	−15.15 to 23.07	12 (11.65)	−6.50 to 29.80	4.17	0.041*	1.56
Somewhat important	16 (15.84)	−2.05 to 33.73	19 (18.45)	1.01–35.89	0.69	0.41	0.18
Very important	81 (80.20)	71.52–88.88	72 (69.90)	59.30–80.50	2.88	0.09	0.24
Maintaining healthy body weight							
Not important	0 (0.00)	N/A	5 (4.85)	−13.98 to 23.68	5.03	0.025*	n/a
Somewhat important	12 (11.88)	−6.43 to 30.19	18 (17.48)	−0.07 to 35.03	1.27	0.26	0.48
Very important	89 (89.12)	82.65–95.59	80 (77.67)	68.54–86.80	3.92	0.048*	0.28

N/A = not applicable.
*Statistically significant values.

fruits. These findings are consistent with those of the Canadian Community Health Survey.[44]

It is also possible that CCs inaccurately estimated servings, as Chinese diets traditionally include dishes that mix food groups.[13] Traditional Chinese beliefs have a significant impact on the diets of Chinese people living in North America and are strongly associated with healthy diets.[45] Lower daily consumption of dairy products and sugar and higher intake of salt also reflect a traditional Chinese dietary pattern.[41]

We also observed differences between the two groups regarding stress, effective methods of stress reduction, and beliefs about stress reducers. CCs reported greater stress from a variety of factors; CC women reported that having few friends was particularly stressful. Among female participants, more CCs than ECs were homemakers, who may have fewer opportunities to socialize than women who work outside the home. These findings emphasize immigrants' increased risk of stress-related conditions due to emotional, social, cultural, educational, and economic adjustments. Potential stressors include a new language, limited education, difficulty in obtaining adequate or meaningful employment, low income, strained family life, and changes in socio-political and immigration status.[46]

Studies based on Hofstede's cultural theory have examined the experience of stress cross-culturally. Hofstede proposed that individuals from collectivistic cultures depend on interpersonal relationships and networks to reduce stress.[28] Our findings differ from this prediction,

however; fewer CCs than ECs considered time with or talking to friends and family to be effective in reducing stress. Instead, they believed that better living conditions, more money, and living in one's native country reduce stress. Thus, factors other than culture may explain our findings—for example, participants' specific demographics and immigration experiences.

Knowing how to identify and manage stress is important to offset its deleterious health effects. Based on our findings, CCs appeared to have fewer stress-management strategies than ECs. ECs consistently reported believing that stress can be reduced by physical activity, music, and hobbies; although CCs identified being away from family and friends as prime stressors, they were less inclined than ECs to report reduced stress from time spent with family and friends.

Implications for tailoring health programmes to CCs

Community-dwelling CCs are distinct from ECs with respect to stroke-related knowledge, behaviours, and beliefs; these differences have important implications for prevention strategies and delivery of health education. Since stroke is largely preventable, reaching Chinese immigrants with stroke-related information and maximizing their self-efficacy in regard to health behaviour change must be a priority. The knowledge gaps we identified in the CC community warrant not only the development of culturally sensitive stroke-related health education, including information about risk factors, warning signs, and emergency responses, but also administering this education in an appropriate and timely manner. Since people are generally interested in information that helps them resolve life challenges and problems,[47] materials should be presented in a relevant, understandable, and culturally sensitive manner. Written materials that focus on behaviours and provide how-to information are one way to accomplish this goal.[48]

Among participants in our study, CCs differed from ECs in being more likely to obtain stroke-related information from family and friends. Given the importance of family in Chinese culture, stroke-related health education may benefit from an intergenerational approach that targets key family members. This may cause a ripple effect by capitalizing on the influence of friends and family on those who are at risk.

Gyms and exercise classes may be culturally unfamiliar to CCs and may seem to focus undue attention on the individual; culturally sensitive recommendations for physical activities such as martial arts, tai chi, or traditional dance may be more appealing.

Our findings support the idea that stroke-related information and lifestyle-related health education can be tailored to CCs (at least first-generation CCs) in several ways. Patients' understanding of stroke and their lifestyle-related behaviours and beliefs cannot be assumed to be similar to that of ECs, nor can education necessarily be delivered in comparable ways. Assessing patients' knowledge and cultural beliefs about stroke and its risk factors and aligning their health behaviours with those that are culturally acceptable could augment the benefits of health behaviour change programmes.

Our study's primary limitation is related to the use of self-reported questionnaire response data that were not validated; to maximize the reliability of responses, however, we generated questions that were as unambiguous as possible and pilot-tested the questions to establish clarity and comprehensibility. Extension studies using qualitative methods will help to explore the cultural influences on our findings in depth.

CONCLUSIONS

Theoretical dimensions of culture may partly explain the differences we observed in stroke-related knowledge, behaviours, and beliefs between CCs and ECs. Greater awareness of cultural variations in health knowledge, beliefs, and behaviours can help physical therapists in assessing stroke risk in their Chinese patients and in tailoring lifestyle-related health education to this population.

KEY MESSAGES

What is already known on this topic

Chinese immigrants have become the largest immigrant group in Canada. Hypertension has been identified as the most important risk factor for stroke in Chinese people, and observational studies support modifying lifestyle-related risk factors for stroke prevention among Chinese immigrants in North America. While the promotion of healthy lifestyles and hypertension control reduces the incidence, severity, and impact of stroke on Canadian society, the impact of such educational initiatives across cultural groups is uncertain.

What this study adds

There are differences in stroke-related knowledge, behaviours, and beliefs between first-generation Chinese Canadians and Canadians of European descent, which are partly explained by culture. Knowledge gaps in the Chinese-Canadian community warrant the development of culturally sensitive health education on stroke risk factors, warning signs, and emergency responses. A greater awareness of cultural variations in lifestyle behaviours and beliefs will help physical therapists to assess stroke risk and tailor health education.

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