Ischaemic Heart Disease–Related Knowledge, Behaviours, and Beliefs of Indo-Canadians and Euro-Canadians: Implications for Physical Therapists

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ABSTRACT

Purpose: To examine knowledge, behaviours, and beliefs related to ischaemic heart disease (IHD) of Indo-Canadians (ICs), thereby helping target health education strategies. **Methods:** In a cross-sectional descriptive/comparative study, 102 Indian-born Indo-Canadians (ICs) and 102 Canadian-born Euro-Canadians (ECs) completed a standardized questionnaire on IHD knowledge and lifestyle-related behaviours and beliefs. **Results:** Compared with ECs, ICs were less aware of IHD-risk factors. ICs' lifestyle practices and beliefs were consistent with having less perceived control over health than ECs. ICs reported more stress from various sources and resorted less to exercise for stress relief and more to religious/spiritual activities. **Conclusions:** In accordance with health belief theory, approaches to educating immigrants from collectivistic cultures such as India to assume responsibility for their personal health may need to be different from those used with ECs, which stress self-management. Such programmes may need to emphasize lifestyle-related health knowledge and beliefs as bases for health behaviour change.

Key Words: health education; health promotion; socioeconomic factors; myocardial ischemia; attitude.

RÉSUMÉ

Objectif : Étudier les connaissances, les comportements et les croyances qui ont trait à la cardiopathie ischémique (CPI) chez les Indo-Canadiens (IC) pour aider ainsi à cibler des stratégies d'éducation en santé. **Méthodes :** Lors d'une étude descriptive/comparative transversale, 102 Indo-Canadiens (IC) d'origine indienne et 102 Euro-Canadiens (EC) d'origine canadienne ont rempli un questionnaire normalisé sur leurs connaissances relatives à la CPI et leurs comportements et croyances portant sur les habitudes de vie. **Résultats :** Comparativement aux EC, les IC connaissaient moins les facteurs de risque de CPI. Les pratiques et les croyances des IC au sujet des habitudes de vie correspondaient au fait qu'ils croyaient avoir moins de contrôle de leur santé que les EC. Ils ont signalé plus de stress provenant de diverses sources. Ils faisaient moins d'exercice pour soulager le stress et s'en remettaient davantage aux activités religieuses ou spirituelles. **Conclusions :** Conformément à la théorie des croyances en santé, il faudra peut-être aborder l'éducation des immigrants de cultures collectivistes comme l'Inde, qui vise à les amener à assumer la responsabilité de leur santé personnelle de façon distincte de celle des EC, qui met l'accent sur l'autoprise en charge. Ces programmes devront peut-être mettre l'accent sur les connaissances et les croyances relatives aux habitudes de vie dans le domaine de la santé comme base des changements de comportement en santé.

The Health Belief Model, a leading social cognition model of health services use, advocates that predicting a person's health-related behaviour should precede the goal of actually changing that behaviour.¹ Culture contributes significantly to people's lifestyle behaviours and health beliefs, particularly with respect to non-communicable conditions such as ischaemic heart disease (IHD) and the likelihood of making positive risk-reducing

choices.² Health behaviour change strategies that fail to consider factors such as social and cultural dimensions may be less effective.

Physical therapists are well positioned, as knowledge translators, to translate lifestyle-related health knowledge into action.³ To support inclusive health care in Canada,⁴ physical therapists need to devise effective health education and intervention strategies to address chronic

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lifestyle-related conditions across cultural groups. One leading dimension of culture is the individualism–collectivism continuum.⁵ Individualism, which characterizes Western cultures, is defined as a preference for a loose social framework in which people take care of themselves and their immediate families; health education typically reflects an individualistic perspective, as exemplified in such terms as *self-management* and *self-control*. Collectivism, which characterizes Eastern and Middle Eastern cultures, is defined as a preference for a tight social framework in which people expect relatives or family members to take care of them in exchange for familial loyalty. Whether people's self-image is defined in terms of "I" or "we" identifies their culture's position on this dimension.

Age-standardized mortality rates for IHD are higher among Indo-Canadians (ICs) than among Canadians of European heritage (ECs) and Chinese Canadians,⁶ a finding consistent with global reports of IHD prevalence.⁷ With more Indians in Canada and more older people in the population,⁸ the impact of IHD on mortality, quality of life, and health care costs is substantial. Increased rates of IHD among Indian immigrants are largely due to genetic susceptibility and metabolic predisposition; Indian immigrants to Western countries may also adopt lifestyle practices that may be injurious to their health.⁹ Further, age and sex variations in health beliefs and health-promoting practices have been well documented,¹⁰ and duration of residence in a host country is associated with changes in health behaviours.¹¹

Cost-effective strategies for reducing the burden of cardiovascular disease, the leading cause of premature death in Canada, include economic policies and educational programmes that support primary prevention through risk-factor control.¹² Quantitative studies of the relationships among IHD knowledge, lifestyle-related behaviours and beliefs, and elevated risk-factor profiles are lacking. Qualitative studies have shown that Indians' knowledge of IHD causation and risk-factor management is low compared with that of people in Western cultures;^{13,14} their levels of physical activity and exercise participation are also lower than those of other immigrant groups in these cultures.^{15–18} Indian diets are being investigated, given the suspicion that they have become high in carbohydrates and saturated fats and deficient in high-quality protein and antioxidants, thus contributing to the increased prevalence of lifestyle-related conditions.¹⁹ Inadequate knowledge of nutrition and high-fat cooking methods using butter, margarine, ghee (clarified butter), eggs and milk^{18,20,21} are health concerns for Indian immigrants.²² If such distinctions with respect to diet and exercise are supported in the IC community of the BC Lower Mainland, cultural theory may help to inform the tailoring of health education strategies related to healthy lifestyle choices to meet diverse cultural needs.

We therefore examined whether variations in IHD-related knowledge, behaviours, and beliefs exist between ICs and ECs and, and, if so, what implications these variations have for physical therapists with respect to differentially targeting strategies for health behaviour change.

METHODS

We conducted a cross-sectional questionnaire study of the IHD-knowledge, and lifestyle-related behaviours and beliefs of a convenience sample of ICs and ECs (a dominant cultural group in Canada).

To reduce the influence of culture, religion, language, and cardiovascular risk profile among South Asian groups reported in the literature,²² we focused on people who were born in India and immigrated to Canada as adults; this cohort makes up the majority of south Asians in Canada (62%).²³ Most European immigrants to Canada arrived before the 1960s;²⁴ therefore, we assumed that ECs who were born in Canada and eligible for inclusion into our study would be quite acculturated.

Based on the concentration of ICs living in Vancouver, Richmond, and Surrey, British Columbia,²⁴ we calculated a convenience sample of 102 for a power of 0.7, which was deemed adequate for this study.²⁵ ICs were eligible to participate if they were born in India, immigrated to Canada as adults (≥ 18 years of age), and were able to read and write either English or Punjabi; ECs were eligible if they were born in Canada, adults (≥ 18 years of age), and of European ancestry. We recruited from community and senior centres, libraries, places of worship, and business offices. Participants were pre-screened for inclusion and exclusion criteria; if these were met, they were given questionnaires to complete on site or return by mail.

The study received ethical approval from the University of British Columbia. Eligible participants were judged to have consented to participate in the study when they voluntarily completed and returned the survey.

We constructed a standardized questionnaire based on elements of established tools that reflect the key elements of the Health Belief Model, since this model encompasses dimensions related to cultural and ethnic variations (see Box 1). The questionnaire also included segments of questionnaires administered to other Asian groups if no Indian tool was available. The questionnaire's first four sections addressed knowledge of IHD and risk factors, IHD-related behaviours, health promotion barriers and facilitators, and health beliefs. (Box 1 shows the sources of the items in these four sections.) The fifth and final section requested participant demographics such as age, sex, and years of residence in Canada. Versions of this questionnaire have been used for other cultural groups.^{26,27}

The questionnaire was available in English and Punjabi, the most widely spoken language among ICs.²⁴

Box 1 Sources and Attributes of the Sections of the Questionnaire

Section	Source of Information	Attributes
Knowledge and risk factors of ischemic heart disease (IHD)	Streiner and Norman (2003) ²⁸	10 True/False questions (0 = lowest number [least knowledge]; 10 = highest number [greatest knowledge])
IHD-related behaviours	Haskell et al. (2007) ²⁹	To assess health-related improvements over past 12 mo, barriers, facilitators
From the Canadian Community Health Survey		
Physical activity	Multiple response options; self-rated parameters of regular exercise (type, intensity, duration, and frequency)	
Diet	17-item questionnaire; items related to food consumption (never, 1 × /wk, 2 × /wk, 3 × /wk, and ≥ 4 × /wk)	
Smoking	No/Yes; if so, how much how often	
Alcohol consumption	No/Yes; if so, how much how often	
Sleep	< 8h/night or ≥ 8h/night	
Stress	Self-rated (low, moderate, or high)	
Health promotion; barriers and facilitators to healthy lifestyle behaviours	Farooqi et al. (2000) ³⁰	Multiple-choice questions about health promotion, perceived barriers, and facilitating factors for risk-reducing behaviours were adapted from the Canadian Community Health Survey
Health beliefs (based on the Health Belief Model) ^{31–36} and on a validated assessment for osteoporosis-related beliefs and behaviours	Pardhan and Mahomed (2004) ³²	<ul style="list-style-type: none"> • Included <i>self-efficacy</i>, which measures confidence to perform specific tasks and overcome barriers • Nine subscales measured perceived susceptibility to and seriousness of IHD; dietary benefits and barriers; exercise benefits and barriers; health motivation; dietary and exercise self-efficacy • Most items used a 5-point response scale; exercise self-efficacy had a 3-point response scale, modified from original scales • General health beliefs were measured by how important respondents believed behaviours were to health
Demographic information		Sex, age, height, and weight; country of origin and length of residency in Canada (if immigrant); marital status, religious/spiritual affiliation, education, employment status

Seven people pre-tested the questionnaire, which we then modified to enhance clarity. Two people fluent in both English and Punjabi independently translated the questionnaire into Punjabi, and it was then back-translated and revised accordingly. Only minor revisions were needed.

Our analysis included descriptive statistics to outline participant characteristics and IHD-related knowledge, behaviours, and beliefs; chi-square analysis to compare group differences for categorical variables; and independent-samples *t*-tests for continuous variables. To determine the influence of various variables on IHD-related health beliefs, we performed independent-samples *t*-tests

using IHD health belief scores as dependent variables. To examine relationships between IHD-related health beliefs and selected health behaviours, we used *t*-tests with behaviours as the independent variable. Alpha was set at 0.05. Detailed sub-analyses of the data with respect to age, sex, and length of residency in Canada were beyond the scope of this work. Data analysis was performed using SPSS version 11.0 (SPSS Inc., Chicago, IL).

RESULTS

Of 300 questionnaires distributed, 217 were returned; 13 were discarded because of incomplete data or because respondents did not meet eligibility criteria (i.e.,

Table 1 Demographic and Personal Characteristics of Indo-Canadians and Euro-Canadians

Characteristic	Indo-Canadians <i>n</i> = 102		Euro-Canadians <i>n</i> = 102		χ^2 *	<i>p</i> -value	Effect size
	No. (%)*	95%CI	No. (%)*	95%CI			
Mean (SD) age, y	44.98 (15.97)	41.87–48.09	51.27 (15.97)	48.16–54.38	<i>t</i> = −2.82	0.005†	0.39
Mean (SD) body mass index, kg/m ²	24.38 (6.74)	23.07–25.69	24.99 (4.36)	24.14–25.84	<i>t</i> = −0.75	0.46	0.11
Mean (SD) years in Canada	10.72 (10.32)	8.71–12.73	n/a				n/a
Mean (SD) no. of household members	3.96 (2.08)	3.55–4.37	2.41 (1.12)	2.19–2.63	<i>t</i> = 6.59	<0.001†	0.93
Sex							
Male	54 (52.9)	39.6–66.2	44 (43.1)	35.6–50.6	1.96	0.16	0.26
Female	48 (47.1)	33.0–61.2	58 (56.9)	50.4–63.4			
Marital status							
Single	13 (12.9)	−5.3 to 31.1	20 (19.6)	10.7–28.5	1.69	0.19	0.53
Married	76 (75.2)	65.5–84.9	61 (59.8)	53.5–66.1	5.52	0.019†	0.34
Divorced	5 (5.0)	−14.1 to 24.1	11 (10.8)	1.4–20.2	2.38	0.12	1.04
Widowed	7 (7.0)	−11.9 to 25.9	5 (4.9)	−4.8 to 14.6	0.40	0.53	0.37
Common-law	0 (0.0)	n/a	5 (4.9)	−4.8 to 14.6	5.08	0.024†	n/a
Religious affiliation							
Christianity	15 (14.7)	−3.2 to 32.6	58 (56.9)	50.4–63.4	39.44	<0.001†	2.83
Hinduism	24 (23.5)	6.5–40.5	0 (0.0)	n/a	27.2	<0.001†	1.47
Islam	10 (9.8)	−8.6 to 28.2	0 (0.0)	n/a	10.51	<0.001†	1.57
Sikhism	50 (49)	35.1–62.9	0 (0.0)	n/a	66.23	<0.001†	1.44
None/Other	3 (2.9)	−16.1 to 21.9	44 (43.1)	35.6–50.6	46.47	<0.001†	6.63
Education							
Grade school	4 (3.9)	−15.1 to 22.9	3 (3.0)	−6.8 to 12.8	0.14	0.71	0.29
High school	15 (14.7)	−3.2 to 32.6	16 (15.8)	6.7–24.9	0.05	0.82	0.08
Technical/trade school	8 (7.8)	−10.8 to 26.4	20 (19.8)	10.9–28.7	6.10	0.013†	1.34
College	3 (2.9)	−16.1 to 21.9	10 (9.9)	0.5–19.3	4.10	0.043†	1.86
University	72 (70.6)	60.1–81.1	52 (51.5)	44.6–58.4	7.79	<0.001†	0.42
Employment							
Employed full-time	36 (35.6)	20.0–51.2	32 (31.4)	23.2–39.6	0.42	0.52	0.15
part-time	9 (8.9)	−9.7 to 27.5	14 (13.7)	4.5–22.9	1.17	0.28	0.54
Homemaker	5 (5.0)	−14.1 to 24.1	7 (6.9)	−2.7 to 16.5	0.33	0.56	0.40
Unemployed	15 (14.9)	−3.1 to 32.9	2 (2.0)	−7.9 to 11.9	10.99	<0.001†	1.24
Retired	19 (18.8)	1.2–36.4	34 (33.3)	25.2–41.4	5.55	0.019	0.81
Self-employed	6 (5.9)	−13.0 to 24.8	12 (11.8)	2.5–21.1	2.13	0.144	0.92
Student	11 (10.9)	−7.5 to 29.3	1 (1.0)	−8.9 to 10.9	8.96	<0.001†	1.35
Household income							
<\$40,000	74 (76.3)	66.6–86.0	29 (31.5)	22.9–40.1	38.16	<0.001†	0.88
\$40,000–\$80,000	18 (18.6)	0.6–36.6	35 (38.0)	29.8–46.2	8.89	<0.001†	1.14
>\$80,000	5 (5.2)	−14.3 to 24.7	28 (30.4)	21.7–39.1	20.94	<0.001†	3.38
Occupation							
Not applicable	48 (49.0)	34.9–63.1	31 (36.5)	27.9–45.1	2.90	0.09	0.36
Business	7 (7.1)	−11.9 to 26.1	5 (5.9)	−4.6 to 16.4	0.12	0.73	0.21
Farming	2 (2.0)	−17.4 to 21.4	0 (0.0)	n/a	1.75	0.19	n/a
Management	3 (3.1)	−16.5 to 22.7	7 (8.2)	−2.2 to 18.6	2.36	0.13	1.52
Office worker	11 (11.2)	−7.4 to 29.8	15 (17.6)	7.8–27.4	1.54	0.22	0.61
Professional	19 (19.4)	1.6–37.2	21 (24.7)	15.3–34.1	0.75	0.39	0.32
Technical/trade	8 (8.2)	−10.8 to 27.2	6 (7.1)	−3.4 to 17.6	0.08	0.78	0.16

Note: Numbers may not add to total due to non-responses or possibility of multiple responses.

* Unless otherwise indicated.

† Statistically significant values.

pre-screening data were not verified by questionnaire responses), for a total of 204 completed questionnaires (a 68% response rate). Table 1 summarizes respondents' demographic and personal characteristics; among our key findings were that the IC group was somewhat younger than the EC group (mean age 45 y vs. 52 y; $t = -2.82$, $p = 0.005$) and that more ICs than ECs were married

($\chi^2 = 5.52$, $p = 0.019$). Although more ICs reported having a university education ($\chi^2 = 7.79$, $p < 0.001$), they reported lower household income (more ICs reported <CAD\$40,000/y; $\chi^2 = 38.16$, $p < 0.001$).

ECs scored higher on the knowledge questionnaire (mean 9.1 [SD 1.3]) than ICs (8.6 [SD 1.4]; $t = -2.82$, $p = 0.005$; see notes on scoring in Box 1).

Table 2 General Health Behaviours of Indo-Canadians and Euro-Canadians

Characteristic	Indo-Canadians <i>n</i> = 102		Euro-Canadians <i>n</i> = 102		χ^2	<i>p</i> -value	Effect size
	No. (%)	95%CI	No. (%)	95%CI			
Sleep duration							
<8 h	66 (64.7)	53.2–76.2	64 (63.4)	57.4–69.4	0.04	0.84	0.03
≥8 h	36 (35.3)	19.7–50.9	37 (35.3)	27.4–43.2			
Tobacco smoking							
don't smoke	97 (96.0)	92.1–99.9	92 (93.9)	91.4–96.4	0.51	0.48	0.09
<1 pack/day	3 (3.0)	–16.3 to 22.3	3 (3.1)	–6.9 to 13.1	0.00	0.96	0.04
≥1 pack/day	1 (1.0)	–18.5 to 20.5	3 (3.1)	–6.9 to 13.1	1.11	0.29	2.14
Alcohol consumed							
Don't drink	74 (73.3)	63.2–83.4	25 (25.0)	16.3–33.7	46.84	<0.001*	0.94
1–5 drinks/wk	25 (24.8)	7.9–41.7	60 (60.0)	53.7–66.3	25.58	<0.001*	1.74
≥6 drinks/wk	2 (2.0)	–17.4 to 21.4	15 (15.0)	5.8–24.2	11	0.001*	3.66
Meals per day							
1–3	56 (54.9)	41.9–67.9	28 (27.5)	19.1–35.9	15.87	0.001*	0.68
≥4	46 (45.1)	30.7–59.5	74 (72.5)	67.3–77.7	23.61	0.001*	1.23
Stress level							
Low	32 (31.7)	15.6–47.8	33 (32.4)	24.3–40.5	0.01	0.92	0.03
Moderate	54 (53.5)	40.2–66.8	62 (60.8)	54.6–67	1.11	0.29	0.21
High	15 (14.9)	–3.1 to 32.9	7 (6.9)	–2.7 to 16.5	0.35	0.07	0.68
Stress relievers							
Walk/exercise	50 (49.0)	35.1–62.9	91 (89.2)	85.9–92.5	38.61	0.001*	2.11
Listen to music / watch TV	67 (65.7)	54.3–77.1	78 (76.5)	71.7–81.3	2.89	0.89	0.33
Religious/spiritual activities	42 (41.2)	26.3–56.1	17 (16.7)	7.7–25.7	14.90	0.001*	0.79
Meditate	18 (17.6)	0.0–35.2	14 (13.7)	4.5–22.9	0.59	0.44	0.26
Nothing	8 (7.8)	–10.8 to 26.4	0 (0.0)	n/a	8.33	0.004*	1.62
Other	18 (17.6)	0.0–35.2	42 (41.2)	33.6–48.8	14.97	0.001*	1.37
Health facilitators							
Increase physical activity	62 (61.4)	49.3–73.5	43 (42.2)	34.7–49.7	7.52	0.006*	0.45
Improve eating habits	49 (48.5)	34.5–62.5	46 (45.1)	37.8–52.4	0.24	0.63	0.1
Lose weight	30 (29.7)	13.3–46.1	39 (38.2)	30.4–46.0	1.65	0.20	0.34
Quit smoking	2 (2.0)	–17.4 to 21.4	6 (5.9)	–3.7 to 15.5	2.04	0.15	1.65
Reduce stress	38 (37.6)	22.2–53.0	28 (27.5)	19.1–35.9	2.39	0.12	0.34
Take vitamins	23 (22.8)	5.7–39.9	16 (15.7)	6.6–24.8	1.64	0.20	0.38
Barriers preventing you from making this improvement							
Lack of self-discipline	36 (35.6)	20.0–51.2	59 (58.4)	52.0–64.8	10.51	0.001*	0.87
Lack of time	37 (36.6)	21.1–52.1	28 (27.7)	19.2–36.2	1.84	0.18	0.31
Too tired / too stressed	26 (25.7)	8.9–42.5	14 (13.9)	4.7–23.1	4.49	0.034*	0.58
Too expensive	11 (10.9)	–7.5 to 29.3	5 (5.0)	–4.7 to 14.7	2.44	0.19	0.7
Disability / health problem	5 (5.0)	–14.1 to 24.1	7 (6.9)	–2.7 to 16.5	0.35	0.55	0.4
Language difficulties	4 (4.0)	–15.2 to 23.2	0 (0.0)	n/a	4.08	0.043*	2.01
Too late to change lifestyle	6 (5.9)	–13.0 to 24.8	4 (4.0)	–5.8 to 13.8	0.42	0.517	0.4
Weather conditions	21 (20.8)	3.4–38.2	8 (7.9)	–1.6 to 17.4	6.8	0.009*	0.81
Religious/cultural reasons	0 (0.0)	n/a	0 (0.0)	n/a	–	–	–
Factors that would encourage you to engage in healthy behaviours							
Same-sex fitness facilities	7 (6.9)	–11.9 to 25.7	6 (5.9)	–3.7 to 15.5	0.09	0.76	0.17
Specific advice	12 (11.9)	–6.4 to 30.2	18 (17.6)	8.6–26.6	1.34	0.25	0.49
Language-of-choice programmes	10 (9.9)	–8.6 to 28.4	0 (0.0)	n/a	7.88	0.005*	1.58
Health care practitioner's advice	24 (23.8)	6.8–40.8	25 (24.5)	15.9–33.1	0.02	0.90	0.03
Religious person advising you	6 (5.9)	–13.0 to 24.8	0 (0.0)	n/a	6.24	0.012*	1.73
Family support	39 (38.6)	23.3–53.9	23 (22.5)	13.8–31.2	6.17	0.013*	0.54
Friend accompanying you	33 (32.7)	16.7–48.7	34 (33.3)	25.2–41.4	0.01	0.92	0.02
Diagnosis with heart disease	4 (4.0)	–15.2 to 23.2	29 (28.4)	20.0–36.8	22.32	<0.001*	3.68
Fitness centre at work	24 (23.8)	6.8–40.8	14 (13.7)	4.5–22.9	3.36	0.07	0.53

Note: Numbers may not add to total due to no response or possibility of multiple responses.

*Statistically significant values.

The general health behaviours of participants, and the barriers to and facilitators for engaging in healthy behaviours they reported, are presented in Table 2. Among our key findings was that ICs drink less alcohol than ECs (73.5% of ICs reported being non-drinkers vs. 25% of

ECs; $\chi^2 = 46.84$, $p < 0.001$). With respect to stress relievers, ICs reported opting to walk/exercise less than ECs ($\chi^2 = 38.61$, $p < 0.001$) and engage in religious and spiritual practices more ($\chi^2 = 14.90$; $p < 0.001$). Some 61% of ICs, versus 42% of ECs, reported that they engage

Table 3 Physical Activity and Exercise Practices of Indo-Canadians and Euro-Canadians

Questionnaire Item	Indo-Canadians <i>n</i> = 102		Euro-Canadians <i>n</i> = 102		χ^2	<i>p</i> -value	Effect size
	No. (%)	95%CI	No. (%)	95%CI			
Do you exercise?							
Yes	64 (66.7)	55.2–78.2	97 (96.0)	94.0–98.0	28.43	<0.001*	2.02
No	32 (33.3)	17.0–49.6	4 (4.0)	–5.8 to 13.8			
What type of activity do you do?							
Brisk walk	61 (69.3)	57.7–80.9	71 (73.2)	67.9–78.5	0.34	0.56	0.11
Swim	8 (9.1)	–10.8 to 29.0	6 (6.2)	–3.6 to 16.0	0.56	0.46	0.41
Jog/run	15 (17.0)	–2.0 to 36.0	24 (24.7)	15.9–33.5	1.64	0.20	0.5
Other	19 (21.6)	3.1–40.1	57 (58.8)	52.3–65.3	26.34	<0.001*	2.06
Place where you usually exercise							
Home	28 (33.3)	15.8–50.8	11 (11.0)	1.6–20.4	13.63	<0.001*	0.96
Outdoors	51 (60.7)	47.3–74.1	62 (62.0)	55.8–68.2	0.03	0.86	0.04
Gym	10 (11.9)	–8.2 to 32.0	31 (31.0)	22.7–39.3	9.61	0.002*	1.52
Recreation centre	9 (10.7)	–9.5 to 30.9	29 (29.0)	20.6–37.4	9.32	0.002*	1.57
Do you like to exercise?							
Yes	88 (92.6)	87.1–98.1	88 (88.0)	84.5–91.5	1.19	0.28	0.15
No	7 (7.4)	–12.0 to 26.8	12 (12.0)	2.6–21.4			
Sufficient levels of exercise ^{37,38}							
Yes	16 (15.7)	–2.1 to 33.5	45 (44.1)	36.7–51.5	25.42	<0.001*	1.77
No	69 (67.6)	56.6–78.6	54 (52.9)	46.1–59.7			

Note: Numbers may not add to total due to no response or possibility of multiple responses.

*Statistically significant differences.

Table 4 Dietary Practices of Indo-Canadians and Euro-Canadians

Behaviour	Indo-Canadians <i>n</i> = 102		Euro-Canadians <i>n</i> = 102		χ^2	<i>p</i> -value	Effect size
	No. (%)	95%CI	No. (%)	95%CI			
Consume the following foods $\geq 3 \times$ /typical wk							
Red meat (beef/pork/lamb)	8 (8.4)	–10.8 to 27.6	36 (35.3)	27.3–43.3	20.48	<0.001*	2.53
Fish or other seafood	12 (12.2)	–6.3 to 30.7	14 (13.7)	4.5–22.9	0.10	0.76	0.13
Milk	65 (64.4)	52.8–76.0	59 (59.0)	52.6–65.4	0.61	0.44	0.14
Milk with reduced fat	32 (33.0)	16.7–49.3	52 (51.0)	44.1–57.9	6.60	0.010*	0.70
Cheese / dairy products	31 (31.0)	14.7–47.3	77 (75.5)	70.6–80.4	40.17	<0.001*	2.23
Low-fat cheese	14 (14.3)	–4.0 to 32.6	19 (19.6)	10.5–28.7	0.98	0.32	0.40
Desserts	32 (32.0)	15.8–48.2	52 (51.5)	44.6–58.4	7.84	0.005*	0.78
Low-fat desserts	10 (10.2)	–8.6 to 29.0	19 (19.2)	10.2–28.2	3.17	0.08	0.86
Fruit for dessert	62 (62.0)	49.9–74.1	60 (60.0)	53.7–66.3	0.08	0.77	0.05
Snacks between meals	46 (45.5)	31.1–59.9	68 (66.7)	61.0–72.4	9.20	0.002*	0.73
Vegetables/fruit as snack	41 (41.0)	25.9–56.1	59 (58.4)	52.0–64.8	6.10	0.014*	0.60
Eating out at fast-food restaurants	6 (6.0)	–13. to 25.0	1 (1.0)	–8.9 to 10.9	3.80	0.05	1.30
Food preparation method used $\geq 3 \times$ /typical wk							
Grilling	10 (10.4)	–8.5 to 29.3	22 (21.8)	13.0–30.6	4.67	0.031*	1.04
Boiling	34 (34.7)	18.7–50.7	29 (28.7)	20.3–37.1	0.82	0.36	0.22
Deep frying	20 (20.6)	2.9–38.3	0 (0.0)	n/a	22.95	<0.001*	1.52
Stir frying	27 (27.6)	10.7–44.5	19 (18.6)	9.7–27.5	2.25	0.13	0.41
Baking	29 (29.0)	12.5–45.5	32 (31.4)	23.2–39.6	0.14	0.71	0.10

Note: Numbers may not add to total due to no response or possibility of multiple responses.

*Statistically significant differences.

in physical activity to improve their health ($\chi^2 = 7.52$, $p < 0.006$).

Physical activity and exercise behaviours are summarized in Table 3. A key finding was that ICs reported engaging in less structured exercise than ECs, whose levels of structured exercise met recommended guidelines

($\chi^2 = 28.43$, $p < 0.001$). Responses to dietary questions are summarized in Table 4. Among our key findings were that ICs consumed less animal protein than ECs ($\chi^2 = 20.48$, $p < 0.001$), and snacked less ($\chi^2 = 9.20$, $p < 0.002$), but ICs deep-fried more than ECs ($\chi^2 = 22.95$, $p < 0.001$). General health belief scores and beliefs about

Table 5 General Health Belief Scores of Indo-Canadians and Euro-Canadians*

General Health Beliefs	Indo-Canadians <i>n</i> = 102		Euro-Canadians <i>n</i> = 102		<i>t</i>	<i>p</i> -value	Effect size
	Mean (SD)	95%CI	Mean (SD)	95%CI			
Perceived susceptibility	14.8 (4.9)	13.8–15.8	14.4 (4.6)	13.5–15.3	0.58	0.56	0.08
Perceived seriousness	22.6 (4.2)	21.8–23.4	22.4 (4.5)	21.5–23.3	0.18	0.86	0.05
Perceived dietary benefits	15.7 (2.3)	15.3–16.1	13.8 (2.4)	13.3–14.3	5.80	<0.001†	0.81
Perceived dietary barriers	11.9 (3.0)	11.3–12.5	11.4 (2.9)	10.8–12.0	1.24	0.22	0.17
Perceived exercise benefits	17.4 (2.0)	17.0–17.8	16.8 (2.1)	16.4–17.2	2.12	0.036†	0.30
Perceived exercise barriers	12.7 (3.5)	12.0–13.4	10.2 (2.7)	9.7–10.7	5.70	<0.001†	0.80
Health motivation	14.5 (2.5)	14.0–15.0	15.3 (2.6)	14.8–15.8	–2.40	0.017†	0.31
Dietary self-efficacy	19.8 (3.5)	19.1–20.5	19.0 (3.6)	18.3–19.7	1.56	0.12	0.23
Exercise self-efficacy	17.0 (4.0)	16.2–17.8	19.2 (4.1)	18.4–20.0	–3.75	<0.001†	0.55

* Numbers may not add to total due to no response or possibility of multiple responses.

† Statistically significant difference.

Table 6 IHD-Related Beliefs of Indo-Canadians and Euro-Canadians*

Consider the following behaviours “very important” to keep healthy	Indo-Canadians <i>n</i> = 102		Euro-Canadians <i>n</i> = 102		χ^2	<i>p</i> -value	Effect size
	No. (%)	95% CI	No.	95% CI			
Eating proper kinds of food	80 (79.2)	70.3–88.1	81 (79.4)	74.9–83.9	0.00	0.97	0.01
Getting enough physical exercise	62 (63.3)	51.3–75.3	85 (83.3)	79.3–87.3	10.33	0.001†	0.73
Getting enough rest and sleep	70 (70.7)	60.0–81.4	81 (79.4)	74.9–83.9	2.04	0.15	0.27
Maintaining proper body weight	72 (72.0)	61.6–82.4	76 (74.5)	69.5–79.5	0.16	0.69	0.07
Having regular medical check-ups	53 (54.1)	40.7–67.5	48 (47.1)	39.9–54.3	0.99	0.32	0.19
Taking vitamins	32 (32.3)	16.1–48.5	32 (31.7)	23.5–39.9	0.01	0.92	0.02
Taking traditional herbal medicine	16 (16.3)	–1.8 to 34.4	9 (8.9)	–0.6 to 18.4	2.49	0.12	0.57
Having religious faith	50 (50.0)	36.1–63.9	21 (20.6)	11.8–29.4	19.16	<0.001†	0.80

* Numbers may not add to total due to no response or possibility of multiple responses.

† Statistically significant difference.

IHD = ischaemic heart disease.

lifestyle practices and health are summarized in Tables 5 and 6. Although the groups differed statistically on several general health belief scores, the absolute differences were small. With respect to beliefs about the importance to health of specific lifestyle behaviours/practices, ICs assigned more importance than ECs to religious faith ($\chi^2 = 19.16$, $p < 0.001$) and less importance to sufficient physical exercise ($\chi^2 = 19.16$, $p < 0.001$).

Both ICs and ECs who considered exercise “very important” to health overall were more likely to exercise at recommended levels than those who did not ($\chi^2 = 11.16$, $p = 0.001$, and $\chi^2 = 4.62$, $p = 0.032$, for ICs and ECs respectively). However, the proportion was lower among ICs (29% of the 63% who considered sufficient exercise very important) than among ECs (50% of 83%; $\chi^2 = 5.51$, $p = 0.019$). Paradoxically, ICs who believed that diet is very important for health were *not* less likely to deep-fry their food ($\chi^2 = 0.00$, $p = 0.96$). IC exercisers had higher scores for exercise benefits ($t = 2.52$, $p = 0.014$) and health motivation ($t = 2.88$, $p = 0.005$) than IC non-exercisers; EC exercisers had higher scores for health motivation ($t = 3.52$, $p = 0.001$) and exercise self-efficacy

($t = 3.59$, $p = 0.001$) than EC non-exercisers. Finally, ICs who deep-fried food regularly were more likely have high perceived ill health susceptibility scores ($t = -2.25$, $p = 0.027$).

DISCUSSION

The Health Belief Model is based on three principal premises:¹ A person will take a health-related action if he or she (1) believes that a health condition, such as IHD, can be avoided; (2) has a positive expectation that by taking some recommended action, he or she will avoid the given condition; and (3) feels confident to take the recommended action. Lifestyle health choices may reflect distinctions among cultural groups related to these premises. Therefore, we examined and compared the IHD-related knowledge, behaviours, and beliefs of ICs, specifically a sample of those born in India, and Canadian-born ECs (representing the dominant cultural group in Canada).

The health belief scores for ICs and ECs showed interesting trends. Although several comparisons showed statistically significant difference between ICs and ECs, the

absolute differences in scores were one or two points; the degree to which these findings represent meaningful distinctions is unclear, and thus warrants further study. However, we observed large absolute differences in scores for ICs' greater IHD-related health belief that religious faith is good for your health and for ECs' greater belief that exercise is important to health. ICs viewed factors such as language challenges, fatigue, and weather as impediments to exercise, whereas for ECs lack of self-discipline was the primary barrier—a view consistent with individualism.⁵ More ICs than ECs believed that family support and recommendations by a religious authority would encourage them to adopt healthier practices (consistent with collectivism),⁵ while more ECs than ICs believed that a diagnosis of heart disease would be a primary factor that would motivate them to take responsibility for their health (another individualistic attribute).

We observed less knowledge of IHD risk factors among ICs than among ECs, supporting the findings of several studies of health knowledge among Indian immigrants.^{5,17,39,40} Knowledge gaps, although important, do not completely explain lifestyle choices, which are also influenced by cultural dimensions including individualism/collectivism and uncertainty avoidance.⁵ As discussed above, Western cultures tend to be more individualistic and characterized by loose social frameworks, whereas Eastern and Middle Eastern cultures tend to be more collectivistic and characterized by tight social frameworks. The term *uncertainty avoidance* relates to the degree to which the members of a society feel uncomfortable with uncertainty and ambiguity; cultures that exhibit strong uncertainty avoidance, such as in those the East and Middle East, maintain rigid codes of belief and behaviours and are intolerant of unorthodox behaviour and ideas; whereas cultures that are weak on this dimension, such as Western countries, tend to maintain a more relaxed attitude in which practice counts more than principles.

ICs' collectivist orientation (e.g., reliance on social networks) was reflected in our findings, specifically in IC respondents' reliance on family support and religious faith.^{39,41} Less perceived control and reduced individual responsibility for health among Indians^{40–42} could explain the apparently lower health motivation and exercise self-efficacy observed in our IC cohort, while ECs' individualistic orientation may explain why our EC respondents associated self-efficacy with exercise performance and identified lack of self-discipline as a barrier to exercise.⁵

India ranks markedly higher than Canada on uncertainty avoidance.⁵ Based on this construct, ICs may be less inclined to modify their lifestyle in response to a diagnosis of heart disease. A belief that disease and death are pre-ordained and not controllable,^{14,39,41} and acceptance of disease diagnosis as inevitable,^{40,41,43} could explain this observation.

Our finding that ICs are less likely to engage in regular exercise is consistent with previous reports.⁴⁴ Although ICs are aware of the health benefits of physical activity, they may view physical activity as less important and its impact on health may be less well understood.

Overall, ICs were less likely than ECs to attend fitness classes or use fitness facilities. India is a *high-context* culture,⁴⁵ where individuals live within tight cultural networks with those sharing beliefs, limiting interactions with and influence from other cultural groups. This cultural dimension may have an impact on gym attendance,⁴⁶ as cultural expectations about modesty and sex segregation, the priority given to family obligations and work commitments over personal leisure time, language barriers, and climatic conditions may limit ICs' desire and ability to attend fitness facilities.^{40,41}

Our results support previous findings suggesting that ICs have higher fat intake,²⁰ which may be explained by poor nutritional knowledge^{14,47,48} or by a failure to integrate nutritional knowledge into practice. Although perceived susceptibility to IHD was comparable for ICs and ECs, 21% of ICs reported preparing deep-fried food more than twice a week, compared with none among ECs.

Variations in IHD-related knowledge and lifestyle-related behaviours and beliefs between ICs and ECs have implications for our efforts to target education about lifestyle-related health behaviour change to individual members of these populations. Although our research examined group trends, each person must be considered individually, and gross generalizations based on cultural background should be avoided. However, knowing a person's ethnicity and cultural heritage can provide physical therapists with valuable insight for targeted questions about IHD-related knowledge, behaviours, and beliefs, recognizing that marked variations can exist across cultures. With reference to the Health Belief Model, the "self" orientation of established health education programmes may not only be ineffective for people from cultures high in collectivism and uncertainty avoidance, but also be viewed negatively by a person from such a culture. Recognizing and respecting these variations (e.g., less orientation toward the self and more toward the health of the individual's family) may enhance programmes' impact on health behaviour change.

More ICs than ECs identified religious faith as having a positive impact on health. Capitalizing on religious faith and affiliations and involving religious leaders as facilitators for the purpose of promoting health initiatives could augment the benefit of community-based initiatives targeted to some cultural groups.⁴⁰

Our study has several limitations. First, questionnaire studies have limited validity because they are based on self-reported data; follow-up replication and extension studies are needed to establish the reproducibility of our findings. Second, years resident in Canada and acculturation factors, although beyond the scope of the data

reported, need to be studied in detail to examine how IHD knowledge, behaviours, and beliefs change over time and what variables affect such change. Finally, our findings can be generalized only to ICs born in India and to ECs born in Canada; nevertheless, however, they provide insight into how health education may benefit from being modified to the unique needs of someone from a non-European culture in which notions of the individual and uncertainty avoidance differ from the Eurocentric ideas to which Canadian health professionals may be more accustomed.

CONCLUSIONS

Our findings provide a much-needed baseline regarding IHD knowledge and related lifestyle behaviours and beliefs among ICs born in India. Results indicate that a focus on self-management that reflects individualism may not necessarily be the optimal health-promotion strategy for people from collectivist cultures such as India's. Further study is needed to confirm and extend our findings. Awareness of cultural variations may help physical therapists to empower individuals to make lifestyle modifications through means other than focusing primarily on Western constructs such as self-management—for example, attention to deficits in health knowledge/understanding, appreciation of alternative health beliefs, and motivational strategies linked to the health of the family and to religious affiliation.

KEY MESSAGES

What is already known on this topic

Increased rates of IHD in Indian immigrants to Western countries are due to genetic susceptibility, metabolic predisposition, and lifestyle changes adopted in Western environments. Indian immigrants' knowledge of IHD and risk-factor management is low.

What this study adds

Focusing on deficits in health knowledge/understanding and appreciation of alternative health beliefs, rather than focusing primarily on Western constructs such as self-management, may help physical therapists tailor lifestyle change strategies for patients from collectivist cultures such as India.

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