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What Caused My Cancer? Cancer Patients' Perceptions on What May Have Contributed to the Development of Their Cancer: A Cross-Sectional, Cross-Country Comparison Study

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Abstract

Accurate public perceptions on the risk factors associated with cancer are important in promoting primary, secondary, and tertiary prevention. Limited studies have explored this topic among patients with cancer in non-western, low-to-middle-income countries. A cross-sectional survey to compare Australian and Vietnamese cancer patients' perceptions of what caused their cancer was undertaken. Adult, patients with cancer from both countries, receiving radiotherapy treatment completed a standardized survey, which included a 25-item module assessing their beliefs on the causes of their cancer. Items ranged from known evidence-based causes (eg, smoking, sun exposure) to non-evidence-based beliefs (eg, stress or anxiety, physical injury, or trauma). Country-specific logistic regression analyses were conducted to identify differences in the determinants of patients' top perceived causes. A total of 585 patient surveys were completed (75% response rate; 285 from Australia, and 300 from Vietnam). Most patients were male (58%) and aged 60 years and older (55%). The most frequently reported risk factor overall and for the Australian sample was "getting older" (overall = 42%, Australia = 49%, and Vietnam = 35%). While the most frequently reported risk factor for the Vietnamese sample was "poor diet" (overall = 39%, Australia = 11%, and Vietnam = 64%). There were differences in the characteristics associated with the top causes of cancer identified by Australian and Vietnamese patients. Patients' beliefs about what may have caused their cancer are complex and likely to be impacted by multiple factors, including the country from which they reside. Developing public awareness campaigns that are accurate and tailored to address the specific beliefs and possible misconceptions held by the target community are needed.

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Introduction

Cancer has traditionally been considered a disease affecting predominately higher income countries. However, incidence rates are rapidly increasing in non-Western countries, with almost 50% of all cancer cases in 2018 occurring in Asia.[1] The burden of cancer is also becoming disproportionally high in low-to-middle income countries, with more than two-thirds of cancer deaths occurring in these regions,[2] and a high proportion of the cancers from these regions diagnosed at an advanced stage.[3] Efforts are required to help reduce the burden of cancer, particularly in low-to-middle income countries.

A large proportion of cancers are preventable. It has been estimated that a third of all worldwide cancer deaths have been attributed to lifestyle risk factors, including excess weight, low vegetable and fruit consumption, lack of physical activity, tobacco, and alcohol use.[4] Early detection through routine screening and recognition of common cancer symptoms can help to reduce mortality and cancer-related burden.[3] However, reducing the burden of cancer through lifestyle changes, early detection, and treatment requires individuals to understand the risk factors associated with the development of cancer. Previous research has identified that intentions to participate in cancer screening and healthy lifestyle behaviors are related to a person's knowledge of cancer risk factors.[5-8] Unfortunately, previous survey studies have found that people's understanding of many cancer-related risk factors is modest to low.[6,9-18] Such studies have also found that awareness of cancer risk factors varied according to sociodemographic characteristics,[12,16-21] including country.[13,22,23] Improving understanding of the risk factors associated with cancer among both patients with cancer and the general public is important for both primary, secondary, and tertiary prevention.

The first step in improving people's understanding of cancer-related risk factors involves identifying the factors people believe causes their cancer; as well as any misconceptions that may exist in these perceptions. Such knowledge will allow for more targeted and tailored public health campaigns to be developed that specifically address people's misconceptions. It will also help to inform communication and information provision on cancer risk by health-care providers to their patients. Numerous studies have been conducted that explore public perceptions of risk factors associated with cancer.[6,9-17,19-23] While these studies identify some of the most common misconceptions related to cancer risk factors, most have been conducted in Western and/or high-income countries.[6-9,11-19,21-23] Given vast differences in cultural beliefs and cancer etiology that exist between non-Western and Western countries, and low-to-middle income and high-income countries, such information is unlikely to be relevant to these populations.

Studies that aim to explore the perceptions of cancer causes among patients with cancer in non-Western and low-to-middle-income countries are needed. Furthermore, comparative studies that explore differences between Western and non-Western countries would be beneficial, as they would assist in identifying where such differences in perceptions lie and whether and how already available public health campaigns and information interventions used in other countries may be adapted and generalized across countries.

We sought to improve the knowledge base in this area by exploring (a) the most frequently perceived causes of cancer in a sample of patients with cancer from Australia and Vietnam; (b) whether the most frequently perceived causes differ between country; and (c) differences in the possible determinants of the most frequently perceived cause of cancer identified by Australian and Vietnamese patients with cancer. We chose to focus on Australia and Vietnam as these two countries represent two culturally and economically diverse countries. Australia is a high-income, Western country with an individualist culture. While Vietnam is a non-Western, lower middle-income nation, with a strong Eastern heritage underpinned by a predominantly collectivist culture. Furthermore, we chose to explore the perceptions of patients with cancer rather than the general population as those already diagnosed with cancer are likely to have been exposed to some form of information regarding possible risk factors related to their diagnosis, thus any misconceptions they hold are likely to be the most relevant to campaigns targeting primary, secondary, and tertiary preventions.

Aims

The overall objective of this study was to explore the differences between Australian and Vietnamese cancer patients' beliefs on what may have caused their cancer. Specifically, we sought to explore the following:

- The most frequently perceived causes of patients' cancer, overall and stratified by country;
- whether the most frequently perceived causes differ between country; and
- differences in the possible determinants of the most frequently perceived cause of cancer identified by Australian and Vietnamese patients with cancer.

Methods

Study Design

Descriptive cross-sectional survey of patients with cancer from radiation oncology clinics in Australia and Vietnam.

Sample

Patients were eligible to participate if they had a confirmed cancer diagnosis of any cancer type, were aged 18 years or older for Australia, or 21 years or over for Vietnam (due to variation between countries in what constitutes an adult), able to understand the main language spoken in each country, physically and mentally able to give informed consent and complete the survey, and presenting for at least their second appointment at the radiotherapy clinic to ensure they had received some care from the clinic to be able to answer survey questions relating to the quality of their cancer care.

Procedure

Participants were recruited from one regional radiotherapy clinic in Australia and one specialist cancer hospital in Vietnam. A research assistant was present in each of the clinics on selected days, where they recruited consecutive patients with cancer meeting the eligibility criteria. Eligible patients were approached by a research assistant or clinic staff member at the clinic while waiting for their appointment and provided with a study consent form and information sheet. Consenting patients were invited to complete a survey. All participants who took part in the study provided consent. The survey was completed by participants via pen-and-paper survey in Australia and via a face-to-face structured interview with a research assistant in Vietnam. These approaches of data collection were determined to be the most culturally appropriate modes of delivery for the two countries. Reimbursement of 100 000 Vietnamese Dong was provided to Vietnamese (approximately A$5) patients for their participation in the study. Patients were asked about various aspects of their cancer care and well-being, including their perceptions on what they believe contributed to the cause of their cancer. The study procedures and items assessing sociodemographic and clinical characteristics were pilot-tested and amended where appropriate in both Australia (n = 48) and Vietnam (n = 40) prior to conducting the study. Human research ethics approval was granted for the conduct of this study by the relevant organizations in Australia (University of Newcastle Human Research Ethics Committee approval number: H-2013-0016**)** and Vietnam (K Hospital Ethics Committee approval number: 17/QD-BVK).

Measures

Outcome measures

Views about the causes of cancer. Twenty-five items adapted from Willcox et al[24] explored patient beliefs about what may have caused their cancer (see Table 2 for a full list of items). The survey was developed based on evidence from the literature and piloted among experts in cancer control and behavioral science from Australia and Vietnam. Items ranged from known evidence-based causes (eg, smoking, sun exposure) to non-evidence-based beliefs (eg, stress or worry, injury, or physical trauma). Participants were asked to respond on a 5-point Likert scale, with response options (similar to that used in US-based studies of cancer causal attributions[25]) ranging from 1 = definitely did not contribute, 2 = small chance it contributed, 3 = reasonable chance it contributed, 4 = certain it contributed, and 5 = do not know. An open-ended response was also included, where patients could list any other perceived causes of their cancer that were not listed.

Independent measures

Demographic characteristics. Standard demographic items assessed age, gender, marital status, years of education, employment status, and health insurance for hospital care.

Cancer-related characteristics. Items assessed cancer type, time since diagnosis, radiotherapy treatment progress, treatments received, living away from home to receive treatment, number of appointments with the clinician, and reason for the visit to the clinic.

Survey translations. The survey was administered in English for Australian participants and in Vietnamese for participants recruited in Vietnam. The original survey was written in English. A forward and backward translation process was undertaken for the Vietnamese version. The backward translation was reviewed by study investigators native in the English language to ensure the content of the questions were correctly portrayed. Content that was believed to misrepresent the intended meaning of the question was retranslated and underwent subsequent rounds of backward–forward translation until the meaning was correct and consistent between the two study surveys.

Statistical Analyses

The Most Frequently Perceived Causes of Patients' Cancer

To identify which possible causes patients believed may have contributed to the development of their cancer and where differences in the identified risks differ between the two countries, each of the 25 items were dichotomized into "certain it contributed/reasonable chance it contributed" versus "small chance it contributed/definitely did not contribute/don't know." The percentage and frequency of each of the 25 items were calculated and ranked in descending order for patients overall, as well as by country.

Differences in the Determinants of the Top Perceived Cause of Cancer by Both Sample Groups

To identify potential sociodemographic and disease characteristics associated with the most frequently reported cause of cancer identified by Australian and Vietnamese patients and whether such determinants differed between the two samples, separate univariate logistic regression models were

conducted by the country, for the most frequently reported cause of cancer by Australian and Vietnamese patients. The main outcome was "certain it contributed/reasonable chance it contributed" versus "small chance it contributed/definitely did not contribute/don't know." The following sociodemographic and disease characteristics were explored as possible determinants as they were hypothesized as being related to patient perceptions in both countries: cancer type, time since diagnosis, employment status, years of education, age group and sex. As this was an exploratory analysis with the purpose of identifying possible determinants, and suitable confounders are not yet known given the lack of prior research in this area, only univariate regressions models were conducted to reduce misinterpretation of the estimates.

Results

A total of 512 eligible Australian patients were identified and approached about the study; of which 381 consented to take part (consent rate = 74%) and 285 returned a completed survey (response rate = 56%). From Vietnam, 319 eligible patients were identified and invited to take part in the study, of which 300 consented and completed a survey via interview (response and consent rate = 94%).

Participant Disease and Demographic Characteristics

Table 1 lists the demographic and disease characteristics of participants by country. The median age of all participants was 61 years (IQ1: 52, IQ3: 69). The majority of all participants were male (58%; n = 339), in a partnered relationship (82%; n = 477), diagnosed with head and neck cancer (32%; n = 183) at a median time of 4 months ago (IQ1: 2, IQ3: 8). As shown in Table 1, there were significant differences between Australian and Vietnamese participants for the following characteristics: age group at diagnosis, marital status, years of education, employment status, time since diagnosis, cancer type and insurance cover for hospital care.

Table 1. Participant Disease and Demographic Characteristics.

Characteristic	Australian sample, n (%) (n = 285)	Vietnamese sample, n (%) (n = 300)	χ^2 Results
Sex			3.30 (1), $P = .069$
Male	176 (62%)	163 (54%)	
Female	109 (38%)	137 (46%)	
Age group (years)			150.16 (2), $P < .001$[a]
Less than 50 years	15 (5.3%)	107 (36%)	
50-59 years	40 (14%)	99 (33%)	
60 years and over	227 (81%)	93 (31%)	
Marital status			44.54 (1), $P < .001$[a]
Partnered relationship	201 (71%)	276 (92%)	
Single	82 (29%)	23 (7.695)	
Education			21.52 (1), $P < .001$[a]
Less than 13 years	231 (87%)	210 (71%)	
13 years or more	35 (13%)	87 (29%)	
Employment status			128.47 (1), $P < .001$[a]
Currently working	42 (15%)	180 (61%)	
Not working	241 (85%)	117 (39%)	
Cancer type			88.63 (2), $P < .001$[a]
Breast	61 (22%)	38 (13%)	
Lung	14 (5.1%)	49 (16%)	
Head and neck	48 (18%)	135 (45%)	
Other	150 (55%)	77 (26%)	
Time since diagnosis			36.13 (2), $P < .001$[a]
0 to 6 months	156 (57%)	237 (80%)	
7 to 12 months	79 (29%)	47 (16%)	
More than 12 months	38 (14%)	13 (4.38%)	
Insurance cover for hospital care			86.92 (1), $P < .001$[a]
Yes	142 (50%)	257 (86%)	
No	140 (50%)	41 (14%)	

[a]Significant at $p < 0.05$.

Most Frequently Reported Causes of Cancer

Most participants (91.1%, n = 533) identified at least 1 of the listed causes as a possible cause of their cancer, with 79% (n = 464) selecting 2 or more of the causes listed. Table 2 illustrates the percentage and frequency of participants choosing each of the 25 items as a "reasonable/certain" cause of their cancer, across all participants and by country. Overall, the most frequently reported perceived causes of cancer was "getting older" (42%, n = 232), followed by "poor diet" (39%, n = 215), "air pollution" (38%, n = 210), "bad luck or fate" (37%, n = 205), "smoking" (30%, n = 165), and "pesticides" (30%, n = 163).

Only 3 "reasonable/certain" causes were endorsed by at least a quarter of the Australian respondents (also see Table 2), with "getting old" (49%, n = 130), "family history or genes" (33%, n = 89), and "bad luck or fate" (27%, n = 71) being the most frequently identified causes of cancer reported by the Australian sample. Fifteen "reasonable/certain" causes were endorsed by at least a quarter of the Vietnamese respondents, with "poor diet" (64%, n = 185), "air pollution" (61%, n = 178), and "pesticides" (49%, n = 136) being the 3 most frequently reported causes of cancer among these participants.

Characteristics Associated With the Top Identified Causes of Cancer by Australian and Vietnamese Patients

Getting older. Getting older was identified most frequently by Australian patients as a reasonable/certain cause of their cancer. As shown in Table 3, sex and age group were both significantly associated with "getting older" being identified as a

Table 2. Most Frequently Reported Causes of Cancer for all Patients and by Country in Ranked Order.

Overall rank	Rank Australia	Rank Vietnam	Reason	All respondent, % (n)	Australian Respondents, % (n)	Vietnamese Respondents, % (n)
1	1	10	Getting older	42 (232)	49 (130)	35 (102)
2	11	1	Poor diet	39 (215)	11 (30)	64 (185)
3	10	2	Air pollution	38 (210)	12 (32)	61 (178)
4	3	5	Bad luck or fate	37 (205)	27 (71)	47 (134)
5	7	6	Smoking	30 (165)	15 (39)	44 (126)
6	16	3	Pesticides	30 (163)	10 (27)	49 (136)
7	14	4	Food additives/preservatives	29 (160)	11 (28)	47 (132)
8	4	13	Sun exposure	27 (153)	24 (66)	30 (87)
9	12	7	Drinking too much alcohol	26 (142)	11 (29)	41 (113)
10	15	9	The will of God or the universe	25 (138)	11 (28)	38 (110)
11	6	11	Poor lifestyle choices caused by worry or stress (eg, smoking because if reduced my level of stress)	24 (128)	15 (38)	32 (90)
12	2	19	Family history or genes	23 (128)	33 (89)	14 (39)
13	5	15	Stress or worry (eg, about money or relationships)	22 (120)	17 (46)	25 (74)
14	22	8	Exposure to chemicals (in the home, environmental, or workplace)	22 (123)	3.70 (10)	39 (113)
15	17	12	Lack of exercise	21 (117)	9.26 (25)	32 (92)
16	9	14	Working hours (eg, long hours, irregular hours, or shift work)	20 (113)	14 (39)	26 (74)
17	13	16	Being overweight	14 (59)	11 (29)	17 (47)
18	23	17	Hormone medication (eg, hormone replacement therapy or "the pill")	11 (59)	3.36 (9)	17 (50)
19	25	18	Reproductive or hormonal history (eg, not having children, fertility treatments)	8.6 (48)	2.00 (5)	15 (43)
20	20	21	Mental illness (eg, anxiety, depression)	8.6 (48)	4.06 (11)	13 (37)
21	26	20	Over the counter medication	7.0 (39)	0.37 (1)	13 (38)
22	19	24	Use of electronic devices (eg, mobile phone, microwave oven)	6.7 (37)	5.56 (15)	7.7 (22)
23	21	22	Prescribed medication	6.4 (36)	4.03 (11)	8.7 (25)
24	18	25	Infections	6.2 (34)	5.77 (15)	6.6 (19)
25	24	23	Injury or physical trauma (eg, car accident, falling off a horse)	5.2 (29)	2.60 (7)	7.7 (22)

"reasonable/certain" cause of both Australian and Vietnamese patients' cancer. For both samples, males reported statistically significantly higher odds of selecting perceiving getting older as a likely cause of their cancer compared to females. While those aged 60 years and older had statistically significantly higher odds of perceiving getting older as a cause of their cancer compared to those aged less than 60 years. Comparatively, cancer type was statistically significantly associated with Australian patients with cancer selecting getting older as a cause of their cancer, but not Vietnamese patients, with Australian patients diagnosed with other cancer type reporting statistically significantly higher odds than those diagnosed with breast cancer. While years of education was significantly associated with Vietnamese patients identifying getting older as a cause of their cancer but not Australian patients; with Vietnamese patients with 13 years or more of education reporting lower odds compared to those with less than 13 years of education.

Poor diet. Poor diet was identified most frequently by Vietnamese patients as a 'reasonable/certain cause' of their cancer. As shown in Table 3, none of the possible determinants identified were similar between the two samples. For the Australian sample time since diagnosis and age group were found to be statistically significantly associated with patients selecting poor diet as a cause of their cancer. Specifically, Australian patients diagnosed more than 12 months ago reported statistically higher odds of selecting poor diet compared to those diagnosed less than 6 months ago; while those 60 years and over reported statistically significantly lower odds of selecting poor diet as a cause of their cancer compared to those aged less than 60 years. Comparatively, for the Vietnamese sample, only sex was found to be statistically significantly associated with patients selecting poor diet as a cause of their cancer, with males reporting statistically significantly higher odds than female patients.

Discussion

This is one of the first studies to explore and compare the perceived causes of cancer of patients from Australia and Vietnam. This study provides important information that could be used to help improve public health initiatives aimed at

Table 3. Results From Univariate Logistic Regression models Identifying Characteristics Associated With the Top-Perceived Cause of Cancer of Australian and Vietnamese patients with Cancer.

	n (Total) n (% with Outcome)	Unadjusted Odds Ratio (OR)	95% Confidence Interval (CI)	Likelihood Ratio *P* Value
Getting older: Australian sample				
Time since diagnosis	253 (total)			.755
0 to 6 months	71 (49%)	Reference		
7 to 12 months	35 (49%)	1.03	0.58-1.81	
More than 12 months	20 (56%)	1.32	0.63-2.75	
Sex	265 (total)			<.001
Female	33 (32%)	Reference		
Male	97 (60%)	3.07	1.83-5.17	
Cancer type	254 (total)			.007
Breast	19 (32%)	Reference		
Lung	6 (43%)	1.62	0.49-5.32	
Head and neck	20 (48%)	1.96	0.87-4.43	
Other	81 (59%)	3.07	1.62-5.82	
Years of education	249 (total)			.715
Less than 13 years	110 (50%)	Reference		
13 years or more	14 (47%)	0.87	0.40-1.86	
Employment	264 (total)			.173
Currently working	16 (39%)	Reference		
Not working	113 (51%)	1.61	0.81-3.17	
Age group	262 (total)			<.001
Less than 60 years	14 (27%)	Reference		
60 years and over	114 (54%)	3.22	1.65-6.30	
Getting older: Vietnamese sample				
Time since diagnosis	288 (total)			.243
0 to 6 months	86 (37%)	Reference		
7 to 12 months	11 (24%)	0.54	0.26-1.12	
More than 12 months	4 (31%)	0.74	0.22-2.49	
Sex	289 (total)			.003
Female	34 (26%)	Reference		
Male	68 (43%)	2.16 (1.31-3.56)		
Cancer type	288 (total)			.067
Breast	6 (17%)	Reference		
Lung	21 (47%)	4.23	1.47-12.16	
Head and neck	48 (36%)	2.70	1.05-6.96	
Other	27 (36%)	2.78	1.02-7.54	
Years of education	287 (total)			.001
Less than 13 years	84 (41%)	Reference		
13 years or more	17 (20%)	0.36 (0.20-0.66)		
Employment	286 (total)			.301
Currently working	57 (33%)	Reference		
Not working	44 (39%)	1.30	0.79-2.13	
Age group	288 (total)			.001
Less than 60 years	58 (29%)	Reference		
60 years and over	44 (49%)	2.38	1.42-3.98	
Poor diet: Australian sample				
Time since diagnosis	256 (total)			.007
0 to 6 months	13 (8.8%)	Reference		
7 to 12 months	6 (8.2%)	0.92	0.34-2.54	
More than 12 months	10 (28%)	3.96	1.57-10.00	
Sex	268 (total)			.515
Female	20 (12%)	Reference		
Male	10 (9.6%)	1.31	0.59-2.91	
Cancer type	257 (total)			.635
Breast	4 (6.7%)	Reference		
Lung	2 (14%)	2.33	0.38-14.23	
Head and neck	6 (14%)	2.21	0.58-8.36	
Other	17 (12%)	1.95	0.63-6.06	

(continued)

Table 3. (continued)

	n (Total) n (% with Outcome)	Unadjusted Odds Ratio (OR)	95% Confidence Interval (CI)	Likelihood Ratio *P* Value
Years of education	253 (total)			.658
Less than 13 years	22 (10%)	Reference		
13 years or more	4 (13%)	1.29	0.41-4.03	
Employment	267 (total)			.789
Currently working	4 (10%)	Reference		
Not working	26 (11%)	1.16	0.38-3.54	
Age group	265 (total)			.049
Less than 60 years	10 (19%)	Reference		
60 years and over	20 (9.4%)	0.44	0.19-1.00	
Poor diet: Vietnamese sample				
Time since diagnosis	289 (total)			.378
0 to 6 months	145 (63%)	Reference		
7 to 12 months	29 (62%)	0.94	0.49-1.80	
More than 12 months	10 (83%)	2.93	0.63-13.69	
Sex	290 (total)			<.001
Female	67 (50%)	Reference		
Male	118 (75%)	2.98	1.81-4.90	
Cancer type	289 (total)			.078
Breast	22 (59%)	Reference		
Lung	31 (69%)	1.51		
Head and neck	93 (70%)	1.59		
Other	39 (53%)	0.76		
Years of education	288 (total)			.66
Less than 13 years	130 (64%)	Reference		
13 years or more	53 (62%)	0.89	0.53-1.50	
Employment	287 (total)			.669
Currently working	108 (62%)	Reference		
Not working	74 (65%)	1.11	0.68-1.82	
Age group	289 (total)			.601
Less than 60 years	130 (65%)	Reference		
60 years and over	55 (62%)	0.87	0.52-1.46	

increasing patients' cancer-related knowledge and potentially influencing their health behaviors.

Overall, getting older, poor diet, and air pollution were the 3 most frequently identified perceived causes of their cancer. Of these top concerns, two are environmental or biological (eg, age and pollution) rather than behavioral. Comparatively, other commonly recognized behavioral risk factors, such as smoking (ranked 5 overall, 7 by Australian sample, and 6 for Vietnamese sample) and alcohol consumption (ranked 9 overall, 12 by Australian sample, and 7 by Vietnamese sample), ranked lower, despite the empirical support for their association with the development of high incident cancers, such as lung cancer, in both countries.

When stratified by country, the top reported causes of cancer were different. For instance "getting old," "family history or genes," and "bad luck or fate" were the 3 most frequently selected causes of cancer by Australian patients but were ranked only 10th, 19th, and 5th (respectively) by Vietnamese patients. Both age and family history are evidence-based risk factors associated with many types of cancer[3] and thus may explain why Australian patients view these items as top causes of their cancer as such risk factors are heavily publicized in the Australian media. Comparatively, despite "bad luck or fate" being the third most frequently perceived cause of cancer by patients from Australia, it should be noted that a higher percentage of Vietnamese participants selected bad luck or fate (47%) as a possible cause of their cancer compared to Australian patients (27%). These data suggest that a substantial proportion of both Australian and Vietnamese patients hold fatalistic beliefs toward the development of their cancer. This is of concern as perceiving a lack of control over one's health may impact on a patients willingness to engage in essential health behaviors and influence their decisions relating to treatments and/or care.[26,27] It is thus important that public health campaigns are developed to help educate people globally, about the potential risk factors associated with developing cancer and highlight the importance that an individual's health behavior can play in the prevention, early diagnosis, and treatment of cancer. However, further research is needed to explore the role of these fatalistic beliefs among patients with cancer and whether this may help with adjusting to, coping with, and avoiding self-blame in relation to their diagnosis.[28-30]

For patients from Vietnam, "poor diet", "air pollution", and "pesticides" were identified as the most frequently perceived

causes of cancer, which were ranked 11th, 10th, and 16th in the Australian sample. Diet plays a central role in Vietnamese culture, with strong beliefs relating to the importance of diet and health. Maintaining a balance in yang through diet is seen as vital to maintaining good health and treating illness in traditional Vietnamese culture, while an imbalance in "hot" (yang) and "cold" (yin) foods can lead to illness and disease.[31] Given the cultural belief that diet is directly and strongly linked to health, it is not surprising that "poor diet" was viewed as a cause of cancer by most Vietnamese patients. Furthermore, "poor diet" may also have been interpreted as being related to poor food safety, which is a well-recognized and highly publicized issue in Vietnam.[32] Similarly, air pollution[33,34] pesticide use and chemical exposure[35,36] are all publicized and well-recognized public health issues in Vietnam. Comparatively, such issues are not experienced to the same level in Australia and thus not as great of a concern. The high publicity of such issues is likely to influence patients' perceptions of the impact such factors have had to their health and well-being, which may explain the differences in rankings of these risk factors between the two countries.

When exploring possible determinants of the top identified causes of cancer by Australian and Vietnamese patients with cancer, differences in the possible determinants were found between the two countries. The risk factor "getting older" was selected as the top perceived cause of cancer by Australian patients with cancer. Sex and age group were consistently identified in both the Australian and Vietnamese sample as significantly associated with patients with cancer selecting this possible cause. Comparatively, cancer type was identified as a possible determinant in the Australian sample only and years of education as a possible determinant in the Vietnamese sample only. Surprisingly, Vietnamese patients with a higher number of years of education reported lower odds of identifying older age as a possible cause of their cancer, despite this being a well-established, evidence-based risk factor for a wide variety of cancer types. This finding highlights the importance of educating all patients with cancer and the broader community on the risk factors related to cancer, despite their education level. "Poor diet" was selected as the top perceived cause of cancer by Vietnamese patients with cancer. There were no consistent determinants identified in the two samples. In the Australian sample, time since diagnosis and age group were identified as possible determinants. Sex was the only possible determinant identified in the Vietnamese sample. These findings highlight the difficulties of transferring established evidence-based public health campaigns used in Western countries and applying them directly to other, non-Western countries such as Vietnam, as tailoring to the priority groups that are often characteristic of such campaigns may not be as relevant in other countries.

Implications for Cancer Education

This study provides important information regarding what patients from Australia and Vietnam perceive contribute to the cause of their cancer, which can be used to inform future research, public health campaigns, and clinical practice. Firstly, public health campaigns that aim to empower patients and the general community on taking control of their health are suggested. Such campaigns could aim to address fatalistic views and emphasize the array of behaviors that people can engage in to help prevent, detect, and treat cancer.

Second, the stark differences in the top-ranked causes of cancer by Vietnamese and Australian patients with cancer highlight that public health campaigns need to be tailored to address specific cultural beliefs of the community for which they are being delivered. It also emphasizes that campaigns found to be effective at addressing health misconceptions in Western cultures may not be easily transferred to different countries, as we cannot assume that they are relevant or appropriate to non-Western countries. Furthermore, the differences we found in the potential determinants of patients' beliefs emphasize that we cannot assume that such determinants are universal and generalizable across situations and countries. Given these data, it is suggested that all public health campaigns, particularly those addressing people's beliefs, should be designed to be specific to the population for which they are intended to be delivered. Future research that extends on these findings is needed in order to further unpack the complexities of patients' beliefs of the causes of their cancer and how they may be influenced by country. Furthermore, future research assessing the views of the general population is needed. Such research will help provide more specific directions on how to design future public health campaigns designed to address people's knowledge about cancer risk factors.

Strengths and Limitations

This is the only study we are aware of that explores and compares Vietnamese and Australian cancer patients' perceptions about the possible causes of their cancer. The high consent rates (>70%) and thorough backward–forward translation of study materials are strengths of this study. However, despite these strengths, there are several limitations that must be considered when interpreting the results of this study. Firstly, differences in several study design features (eg, survey administration methods, participation incentives, and eligibility criteria) may have affected the comparability of these two samples and potentially introduced bias in patient responses. Although biases may have been introduced as a result of using different methods such as mode of survey delivery,[37] utilizing the most culturally appropriate data collection methods was deemed most important than maintaining consistency between the two samples. A systematic review has found that the mode of survey delivery does not result in bias in patient-reported responses, although the setting may introduce some bias (ie, home vs clinic).[38] Furthermore, utilizing the same but culturally inappropriate modes of survey delivery may emphasize cultural differences and bias.[37] However, we did attempt to reduce such differences as much as possible by only employing

modifications to the study design that were necessary due to country-specific requirements and maintaining consistency wherever possible.

This study only presents quantitative data concerning cancer patients' perceptions regarding the possible causes of cancer. Consequently, we were unable to investigate in-depth patients' beliefs and the underlying concepts surrounding their beliefs that may assist in future education and cancer awareness initiatives. Thus, it is recommended that future studies use mixed methods to investigate cancer patients' perceptions surrounding the causes of their cancer. The focus of this research was on cancer patients' beliefs about the causes of their own cancer, rather than more population perceptions of causes of cancer. When making these causal attributions, patients with cancer may have been more likely than the general public to focus on non-modifiable or fatalistic causes as a strategy to reduce feelings of guilt and self-blame.[28-30]

In addition, the patient samples were recruited from only a selected number of treatment centers, which will limit the generalizability of the study results. While focusing on a sample of patients with cancer was thought to identify where the most common misconceptions of the causes of cancer may lie, as such a sample is assumed to have been exposed to an abundance of information concerning cancer, these data cannot be assumed to generalize to the broader noncancer population. Future research is needed to explore the Australian and Vietnamese community perceptions regarding the causes of cancer. Finally, this study was an exploratory study designed only to explore possible differences in patients' beliefs and determinants regarding their perceived causes of their cancer. Due to the exploratory nature, it was not possible to assess all possible differences in determinants across all patient's beliefs. Future study should use the information we have gained here and design larger studies that are powered and designed to investigate the causal factors of patient's beliefs.

Conclusions

Patient's beliefs about what may have caused their cancer are complex and likely to be impacted by multiple factors. However, patient's beliefs do seem to differ across countries. When educating people about the risk factors associated with cancer, it is important that such factors are considered and used to tailor such initiatives toward patient specific characteristics. Ensuring that patients hold accurate beliefs about cancer-related risk factors is essential. Being aware of the issues that are being highly publicized in the media may assist health-care providers in addressing any misconceptions that patients may hold.

Authors' Note

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Declaration of Conflicting Interests

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